GLENCOE MATHEMATICS

California High School Exit Exam (CAHSEE)

Mathematics Standards Practice Workbook

Includes:

- California Content Standards Tested on the CAHSEE
- Student Recording Chart
- Diagnostic Test
- Numerous Practice Questions for Each Content Standard
- Full-Size Sample Test

Test-Taking Tips

- Go to bed early the night before the test. You will think more clearly after a good night's rest.
- Read each problem carefully and think about ways to solve the problem before you try to answer the question.
- Relax. Most people get nervous when taking a test. It's natural. Just do your best.
- Answer questions you are sure about first. If you do not know the answer to a question, skip it and go back to that question later.
- Think positively. Some problems may seem hard to you, but you may be able to figure out what to do if you read each question carefully.
- If no figure is provided, draw one. If one is furnished, mark it up to help you solve the problem.
- When you have finished each problem, reread it to make sure your answer is reasonable.
- Become familiar with a variety of formulas and when they should be used.
- Make sure that the number of the question on the answer sheet matches the number of the question on which you are working in your test booklet.

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Send all inquiries to:
Glencoe/McGraw-Hill
8787 Orion Place
Columbus, OH 43240-4027

ISBN: 0-07-867344-5 *CAHSEE Practice and Sample Test Workbook*

Printed in the United States of America.
1 2 3 4 5 6 7 8 9 10 079 13 12 11 10 09 08 07 06 05 04

Contents

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Overview

The material in this booklet is designed to help you prepare for the California High School Exit Exam (CAHSEE).

It contains:

- a Student Recording Chart,
- the content standards tested on the CAHSEE,
- a Diagnostic Test,
- practice for each content standard, and
- a Sample Test.

How to Use This Workbook

Diagnostic Test This test will help you identify any weaknesses you may have as you prepare to take the CAHSEE. Once you've taken the test and it's been graded, complete the Student Recording Chart that is found on page v. Mark an $\times$ in the square for each question that you answered *incorrectly.*

Practice If you missed one or two of the questions for a particular competency goal, you could probably use some extra practice with that goal. The Student Recording Chart lists practice pages for each competency goal. Complete the appropriate practice pages. If you are unsure about how to do some of the problems, you may want to refer to your mathematics book.

Sample Test After you have completed your practice worksheet(s), take the Sample Test on pages 129 to 146.

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Student Recording Chart

Directions Mark an × by each question from the Diagnostic Test that you answered *incorrectly.* If there are one or two ×s marked for a competency goal, write ***Yes*** in the ***Need Practice?*** box. Then complete the practice pages for that competency goal.

Strand	**Grade 6—Statistics, Data Analysis, and Probability**				
Goal	1.1	2.5	3.1	3.3	3.5
Test Questions	**7** ❑	**10** ❑	**14** ❑	**2** ❑ **27** ❑	**37** ❑
Need Practice?					
Practice Pages	19–20	21–22	23–24	25–26	27–28

Strand	**Grade 7—Number Sense**									
Goal	1.1	1.2	1.3	1.6	1.7	2.1	2.2	2.3	2.4	2.5
Test Questions	**11** ❑	**1** ❑ **18** ❑	**20** ❑ **61** ❑	**42** ❑	**24** ❑ **73** ❑	**49** ❑	**34** ❑	**53** ❑	**38** ❑	**21** ❑
Need Practice?										
Practice Pages	29–30	31–32	33–34	35–36	37–38	39–40	41–42	43–44	45–46	47–48

Strand	**Grade 7—Algebra and Functions**									
Goal	1.1	1.2	1.5	2.1	2.2	3.1	3.3	3.4	4.1	4.2
Test Questions	**4** ❑ **75** ❑	**54** ❑	**3** ❑ **17** ❑ **74** ❑	**43** ❑	**39** ❑	**26** ❑	**8** ❑ **44** ❑	**63** ❑	**6** ❑ **22** ❑ **76** ❑	**33** ❑ **79** ❑
Need Practice?										
Practice Pages	49–50	51–52	53–54	55–56	57–58	59–60	61–62	63–64	65–66	67–68

Strand	**Grade 7—Measurement and Geometry**									
Goal	1.1	1.2	1.3	2.1	2.2	2.3	2.4	3.2	3.3	3.4
Test Questions	**5** ❑ **40** ❑	**55** ❑	**12** ❑ **78** ❑	**15** ❑ **28** ❑	**9** ❑ **51** ❑	**56** ❑	**45** ❑	**23** ❑ **48** ❑	**35** ❑ **59** ❑	**29** ❑
Need Practice?										
Practice Pages	69–70	71–72	73–74	75–76	77–78	79–80	81–82	83–84	85–86	87–88

Strand	**Grade 7—Statistics, Data Analysis, and Probability**		
Goal	1.1	1.2	1.3
Test Questions	**13** ❑ **60** ❑	**36** ❑ **68** ❑	**30** ❑ **64** ❑
Need Practice?			
Practice Pages	89–90	91–92	93–94

Strand	**Grade 7—Mathematical Reasoning**						
Goal	1.1	1.2	2.1	2.3	2.4	3.1	3.3
Test Questions	**16** ❑ **80** ❑	**69** ❑	**41** ❑	**58** ❑	**66** ❑ **72** ❑	**70** ❑	**31** ❑
Need Practice?							
Practice Pages	95–96	97–98	99–100	101–102	103–104	105–106	107–108

Strand	**Algebra 1**									
Goal	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	15.0
Test Questions	**19** ❑	**46** ❑	**25** ❑ **47** ❑	**67** ❑	**32** ❑ **77** ❑	**71** ❑	**62** ❑	**57** ❑	**50** ❑	**65** ❑
Need Practice?										
Practice Pages	109–110	111–112	113–114	115–116	117–118	119–120	121–122	123–124	125–126	127–128

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California Content Standards Tested on the CAHSEE

Grade 6–Statistics, Data Analysis, and Probability	
1.1	Compute the mean, median, and mode of data sets.
2.5	Identify claims based on statistical data, and, in simple cases, evaluate the validity of the claims.
3.1	Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.
3.3	Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if P is the probability of an event, $1 - P$ is the probability of an event not occurring.
3.5	Understand the difference between independent and dependent events.
Grade 7–Number Sense	
1.1	Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation.
1.2	Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole-number powers.
1.3	Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.
1.6	Calculate the percentage of increases and decreases of a quantity.
1.7	Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest.
2.1	Understand negative whole-number exponents. Multiply and divide expressions involving exponents with a common base.
2.2	Add and subtract fractions by using factoring to find common denominators.
2.3	Multiply, divide, and simplify rational numbers by using exponent rules.
2.4	Use the inverse relationship between raising to a power and extracting the root of a perfect square integer; for an integer that is not square, determine without a calculator the two integers between which its square root lies and explain why.
2.5	Understand the meaning of the absolute value of a number; interpret the absolute value as the distance of the number from zero on a number line; and determine the absolute value of real numbers.
Grade 7–Algebra and Functions	
1.1	Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description (e.g., three less than a number, half as large as area A).
1.2	Use the correct order of operations to evaluate algebraic expressions such as $3(2x + 5)^2$.
1.5	Represent quantitative relationships graphically and interpret the meaning of a specific part of a graph in the situation represented by the graph.
2.1	Interpret positive whole-number powers as repeated multiplication and negative whole number powers as repeated division or multiplication by the multiplicative inverse. Simplify and evaluate expressions that include exponents.

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2.2	Multiply and divide monomials; extend the process of taking powers and extracting roots to monomials when the latter results in a monomial with an integer exponent.
3.1	Graph functions of the form $y = nx^2$ and $y = nx^3$ and use in solving problems.
3.3	Graph linear functions, noting that the vertical change (change in y-value) per unit of horizontal change (change in x-value) is always the same and know that the ratio ("rise over run") is called the slope of a graph.
3.4	Plot the values of quantities whose ratios are always the same (e.g., cost to the number of an item, feet to inches, circumference to diameter of a circle). Fit a line to the plot and understand that the slope of a line equals the quantities.
4.1	Solve two-step linear equations and inequalities in one variable over the rational numbers, interpret the solution or solutions in the context from which they arose, and verify the reasonableness of the results.
4.2	Solve multistep problems involving rate, average speed, distance, and time or a direct variation.

Grade 7–Measurement and Geometry

1.1	Compare weights, capacities, geometric measures, times, and temperatures within and between measurement systems (e.g., miles per hour and feet per second, cubic inches to cubic centimeters).
1.2	Construct and read drawings and models made to scale.
1.3	Use measures expressed as rates (e.g., speed, density) and measures expressed as products (e.g., person-days) to solve problems; check the units of the solutions; and use dimensional analysis to check the reasonableness of the answer.
2.1	Use formulas routinely for finding the perimeter and area of basic two-dimensional figures and the surface area and volume of basic three-dimensional figures, including rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms and cylinders.
2.2	Estimate and compute the area of more complex or irregular two- and three-dimensional figures by breaking the figures down into more basic geometric objects.
2.3	Compute the length of the perimeter, the surface area of the faces, and the volume of a three-dimensional object built from rectangular solids. Understand that when the lengths of all dimensions are multiplied by a scale factor, the surface area is multiplied by the square of the scale factor and volume is multiplied by the cube of the scale factor.
2.4	Relate the changes in measurement with a change of scale to the units used (e.g., square inches, cubic feet) and to conversions between units (1 square foot = 144 square inches or [1 ft^2] = [144 in^2], 1 cubic inch is approximately 16.38 cubic centimeters or [1 in^3] = [16.38 cm^3].)
3.2	Understand and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine their image under translations and reflections.
3.3	Know and understand the Pythagorean theorem and its converse and use it to find the length of the missing side of a right triangle and the lengths of other line segments and, in some situations, empirically verify the Pythagorean theorem by direct measurement.
3.4	Demonstrate an understanding of conditions that indicate two geometrical figures are congruent and what congruence means about the relationships between the sides and angles of the two figures.

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Grade 7–Statistics, Data Analysis, and Probability	
1.1	Know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data.
1.2	Represent two numerical variables on a scatterplot and informally describe how the data points are distributed and any apparent relationship that exists between the two variables (e.g., between time spent on homework and grade level).
1.3	Understand the meaning of, and be able to compute the minimum, the lower quartile, the median, the upper quartile, and the maximum of a data set.
Grade 7–Mathematical Reasoning	
1.1	Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.
1.2	Formulate and justify mathematical conjectures based on a general description of the mathematical question or problem posed.
2.1	Use estimation to verify the reasonableness of calculated results.
2.3	Estimate unknown quantities graphically and solve for them by using logical reasoning and arithmetic and algebraic techniques.
2.4	Make and test conjectures by using both inductive and deductive reasoning.
3.1	Evaluate the reasonableness of the solution in the context of the original solution.
3.3	Develop generalizations of the results obtained and the strategies used and apply them to new problem situations.
Algebra 1	
2.0	Students understand and use such operations as taking the opposite, finding the reciprocal, and taking a root. They understand and use the rules of exponents.
3.0	Students solve equations and inequalities involving absolute values.
4.0	Students simplify expressions before solving linear equations and inequalities in one variable, such as $3(2x - 5) + 4(x - 2) = 12$.
5.0	Students solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.
6.0	Students graph a linear equation and compute the x-and y-intercepts (e.g., graph $2x + 6y = 4$).
7.0	Students verify that a point lies on a line, given an equation of the line. Students are able to derive linear equations.
8.0	Students understand the concept of parallel lines and how their slopes are related.
9.0	Students solve a system of two linear equations in two variables algebraically and are able to interpret the answer graphically. Students are able to solve a system of two linear inequalities in two variables and to sketch the solution sets.
10.0	Students add, subtract, multiply, and divide monomials and polynomials. Students solve multistep problems, including word problems, by using these techniques.
15.0	Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.

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Name: Date:

Diagnostic Test

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

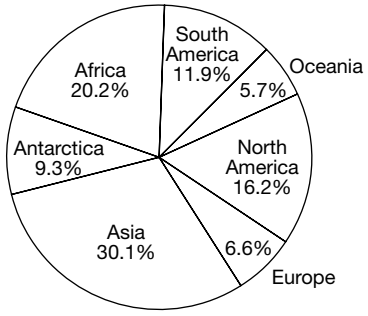
1 What is the product $28.5 \cdot 0.03$? 1 _____

A 0.085
B 0.855
C 0.95
D 9.5

2 A quarterback at UCLA has completed 10 out of 16 passes so far this season. What is the probability that he will complete his next pass? 2 _____

F 0.16
G 0.375
H 0.625
J 1.6

3 The graph shows the areas of the continents of the world as percents. Which statement about the graph is *not* true? 3 _____



A The area of Asia is twice as great as the area of North America.
B Asia has the greatest area.
C North and South America combined have a greater area than Africa.
D The part that represents Asia is greater than a quarter of a circle.

4 Claudio drove at 60 kilometers per hour for x hours and 70 kilometers per hour for y hours. Which expression represents the distance he drove in $x + y$ hours? 4 _____

F $65(x + y)$
G $60x + 70y$
H $70x + 60y$
J $130(x + y)$

5 How many seconds are there in one day? 5 _____

A 1,400
B 3,600
C 86,400
D 216,000

Go on

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Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

6 To get an A in algebra, Blake needs an average score of 92 or higher. His scores on the first three tests are 93, 90, and 90. There is one more test to take. What is the lowest score Blake can make on the fourth test and still get an A? **6** _____

F 95
G 94
H 93
J 92

7 What is the mean of these scanner prices? **7** _____

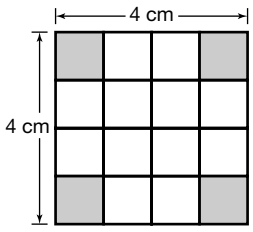
$65, $150, $100, $100, $100, $70, $100, $100, $120, $110, $100

A $92.27
B $100
C $101.36
D $150

8 What is the slope of the line containing $(-4, 2)$ and $(0, -10)$? **8** _____

F -10
G -3
H $\frac{1}{3}$
J 3

9 A large square is divided into same-size smaller squares as shown. What is the area of the shaded region? **9** _____



A 1 cm^2
B 4 cm^2
C 12 cm^2
D 16 cm^2

Go on

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Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

10 In a survey of 100 people who lived in an apartment complex, 25 owned cats, 12 owned fish, 5 owned birds, and the rest had no pets. What does the survey tell you about the popularity of dogs as pets? **10** _____

F Dogs are less popular than cats.
G Dogs are less popular than fish.
H Dogs are less popular than birds.
J Nothing; possibly the landlord does not allow dogs.

11 The length of a microchip is about 3×10^{-7} mm. What is this length in standard notation? **11** _____

A 30,000,000 mm
B 0.000003 mm
C 0.0000003 mm
D 0.00000003 mm

12 Gold is measured and priced in troy ounces. One troy ounce is equivalent to 1.097 regular ounces. If gold is currently priced at $350 per troy ounce, about how much is 10 lb of gold worth? **12** _____

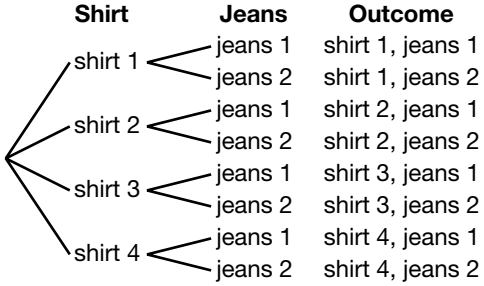
F $61,432
G $56,000
H $51,048
J $5,600

13 The hours worked in one week by the employees at a fast-food restaurant are listed. In a stem-and-leaf plot of these data, what are the stems? **13** _____

31 40 28 17 9 13 18 22 33 27 18 10 8 25

A 1, 2, 3, 4
B 1, 2, 3
C 0, 1, 2, 3, 4
D 0, 1, 2, 4

14 The tree diagram shows the shirt-jeans combinations possible with 4 different shirts and 2 different pairs of jeans. What is the probability that a combination chosen at random will include shirt 2? **14** _____



F $\frac{1}{2}$
G $\frac{1}{3}$
H $\frac{1}{4}$
J $\frac{1}{8}$

Go on

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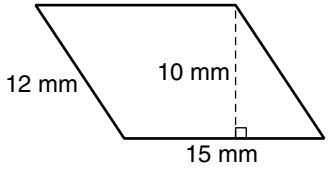
Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

15 What is the perimeter of the parallelogram shown?



A 180 mm
B 54 mm
C 37 mm
D 27 mm

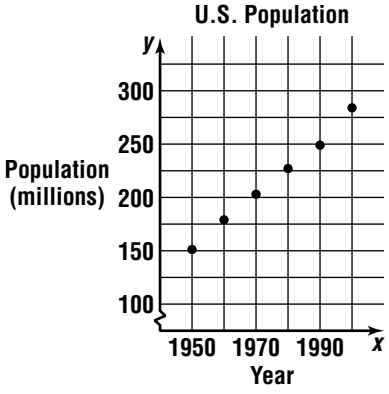
15 _____

16 Mrs. Andrews bought tickets for a play for the family. She bought 2 adult tickets, 3 children's tickets at $1.50 each, and 1 senior ticket for $2.00. What do you need to know to find out how much Mrs. Andrews paid for all the tickets?

F what the upper age limit is to qualify for children's tickets
G what the lower age limit is to qualify for senior tickets
H the price of each adult ticket
J whether Mrs. Andrews paid cash or used a credit card

16 _____

17 The graph shows the United States population (in millions) for each decade from 1950 to 2000. Which decade shows the greatest numerical increase in population?



A 1950–1960
B 1970–1980
C 1980–1990
D 1990–2000

17 _____

18 What is $5\frac{1}{2} \div 2\frac{1}{4}$?

F $12\frac{3}{8}$
G $4\frac{1}{2}$
H $3\frac{1}{4}$
J $2\frac{4}{9}$

18 _____

19 What is the simplified form of $(3x^3)^2(2x^5)$?

A $18x^{11}$
B $6x^{10}$
C $3x^{11}$
D $18x^{30}$

19 _____

Go on

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Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

20 Which is the best estimate of 67% of 12,000? **20** _____

F 9,000
G 8,000
H 6,000
J 4,000

21 What is the value of $-|-3 - 12|$? **21** _____

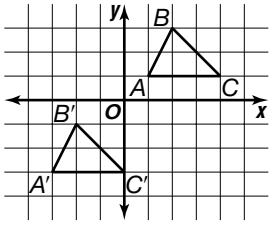
A -15
B -9
C 9
D 15

22 What is the solution of $\frac{n}{-3} + 5 = 8$? **22** _____

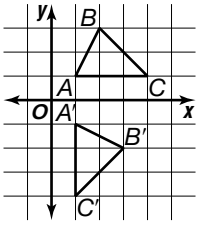
F -39
G -9
H 9
J 39

23 Which graph shows a translation of $\triangle ABC$? **23** _____

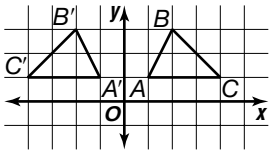
A



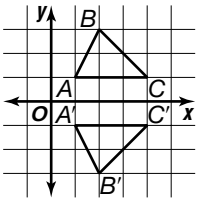
B



C



D



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Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

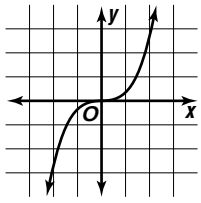
24 Pak invests $5,000 at 5.2% compounded annually. If he leaves the money in the account without making any withdrawals, how much will he have at the end of 2 years? **24** _____

F $260
G $273.52
H $5,520
J $5,533.52

25 Simplify the expression $5(3a - 2) - (2a + 4)$. **25** _____

A $17a + 14$
B $13a - 14$
C $a - 6$
D $13a + 14$

26 Which is the equation of the graph shown? **26** _____



F $y = \frac{1}{3}x^3$
G $y = x^3$
H $y = \frac{1}{3}x^2$
J $y = -\frac{1}{3}x^3$

27 A ski resort at Lake Tahoe is completely full 5 out of 7 nights a week during ski season. What is the probability that a skier will get a room during ski season if she shows up without a reservation? **27** _____

A 71.4%
B 57.1%
C 28.6%
D 32.8%

Go on

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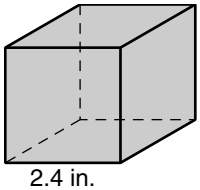
Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

28 What is the surface area of the cube shown? **28** _____



F 5.76 in^2
G 13.824 in^2
H 17.28 in^2
J 34.56 in^2

29 If $\triangle ABC \cong \triangle XYZ$, which of the following must be true? **29** _____

A $\angle ACB \cong \angle XYZ$
B $\overline{BC} \cong \overline{XY}$
C $\overline{AB} \cong \overline{XY}$
D $\angle ACB \cong \angle ZXY$

30 The hourly wages of 5 employees in an office are listed. What is the mean hourly wage? **30** _____

$6.02, $7.46, $6.77, $12.70, $7.25

F $12.70
G $8.04
H $7.25
J $6.02

31 There are 15 people at a block club meeting. How many different committees of 2 people can be formed? **31** _____

A 15 committees
B 30 committees
C 105 committees
D 210 committees

32 What are the x- and y-intercepts of the graph of $7x + 10y = 45.5$? **32** _____

F x-intercept: 0.65; y-intercept: 4.55
G x-intercept: 4.55; y-intercept: 6.5
H x-intercept: 6.5; y-intercept: 4.55
J x-intercept: 65; y-intercept: 455

Go on

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Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

33 A length of 1 inch is equivalent to 2.54 centimeters. How many centimeters are equivalent to 50 feet? **33** _____

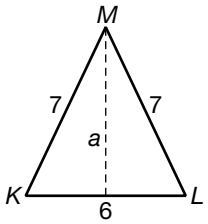
A 15,240 cm
B 1,524 cm
C 127 cm
D 15.25 cm

34 What is the value of $\frac{1}{4} + \frac{9}{10} - \frac{1}{2}$? **34** _____

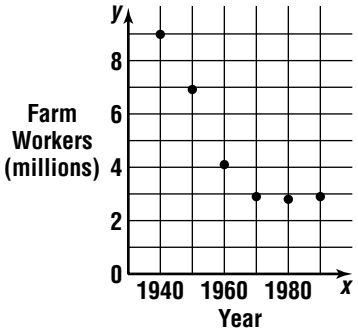
F $\frac{9}{80}$ **G** $\frac{13}{20}$
H $\frac{9}{10}$ **J** $1\frac{13}{20}$

35 What is the approximate altitude a of $\triangle KLM$? **35** _____

A 3.6
B 4.2
C 6.3
D 7.6



36 The scatterplot shows the number of farm workers in millions in the United States at the beginning of each decade from 1940 to 1990. Which statement about the scatterplot is true? **36** _____



F The number of farm workers remained constant over the time period.
G The number of farm workers increased steadily between 1940 and 1990.
H By 2020, there will be fewer than 1 million farm workers.
J The number of farm workers decreased steadily between 1940 and 1970.

37 A student guessed the answers to five true-false questions on a quiz. What is the probability that the student guessed correctly on all five questions? **37** _____

A $\frac{1}{32}$ **B** $\frac{1}{16}$
C $\frac{1}{4}$ **D** $\frac{1}{2}$

Go on

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Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

38 What is the largest perfect square that is less than 1,000? **38** _____

F 961
G 900
H 31
J 30

39 Which expression is equivalent to $\sqrt{64x^{16}y^{36}}$? **39** _____

A $32x^8y^{18}$
B $8x^4y^6$
C $32x^{-4}y^6$
D $8x^8y^{18}$

40 How many milliliters are there in a 2-liter container of orange juice? **40** _____

F 20,000 mL
G 2,000 mL
H 200 mL
J 0.002 mL

41 In a climb for charity, Ellen climbed 58 flights of stairs in a high-rise building. Each flight of stairs has 22 steps. Which is a reasonable estimate of the number of steps Ellen climbed? **41** _____

A 12,000 steps
B 1,200 steps
C 120 steps
D 80 steps

42 On April 1 of 2000, a technology stock was priced at \$60 per share. By April, 2001, the stock had fallen to \$12 per share. What was the percent of decrease in the price of the stock? **42** _____

F 20%
G 25%
H 50%
J 80%

Go on

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Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

43 What is the value of $2^3 \cdot 3^{-2} \cdot (-1)^5$? **43** _____

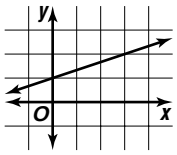
A $-\frac{8}{9}$

B $-\frac{2}{3}$

C $\frac{2}{3}$

D $\frac{8}{9}$

44 What is the slope of the line shown? **44** _____



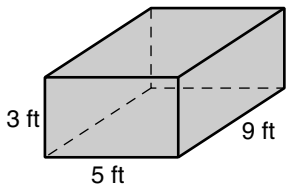
F 3

G 2

H $\frac{1}{3}$

J $-\frac{1}{3}$

45 What is the volume in cubic yards of the rectangular prism shown? **45** _____



A 135 yd^3

B 15 yd^3

C 5 yd^3

D 3 yd^3

46 Find all values of x that make the inequality $|x + 5| > 4$ true. **46** _____

F $x < -9$ or $x > -1$

G $x < -4$ or $x > 4$

H all real numbers

J no real numbers

Go on

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Name: Date:

Diagnostic Test (continued)

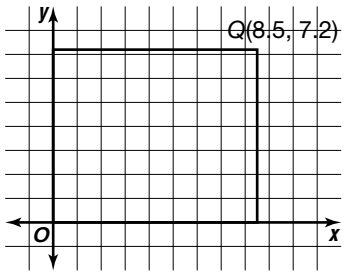
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

47 Which inequality is equivalent to $6x - 4(2 + x) < 5x - 12$? **47** _____

A $7x > -20$
B $3x > 4$
C $7x < 4$
D $3x < 4$

48 What is the area of the rectangle shown? **48** _____

F 15.7 units^2
G 51.84 units^2
H 61.2 units^2
J 72.5 units^2



49 Which number is equivalent to $7^3 \div 7^{-3}$? **49** _____

A 7^{-9}
B 0
C 1
D 7^6

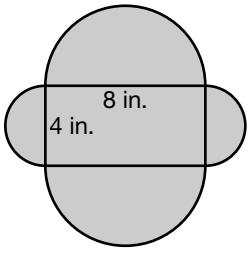
50 Which expression is equivalent to the one shown? **50** _____

$$3a^2 + b^2 - 2c^2 + a^2 - 2b^2 + 3c^2$$

F $4a^2 + 3b^2 + 3c^2$
G $4a^2 - b^2 + c^2$
H $3a^2 - 3b^2 + 3c^2$
J $a^2 + b^2 + c^2$

51 What is the area of the figure shown? **51** _____

A $(32 + 12\pi)$ in^2
B 52π in^2
C $(32 + 20\pi)$ in^2
D 80π in^2



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Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

52 What must be true if 13 people are selected at random from an algebra class? **52** _____

F At least two of them were born in the same month of the year.
G Three of them were born in the same month of the year.
H Three of them were born on the same day of the week.
J Four of them were born on the same day of the week.

53 What is the value of $(3.6)^{-2} \cdot (3.6)^4$? **53** _____

A $\frac{1}{3.6^8}$
B 3.6
C 12.96
D 2,176.782336

54 What is the value of $\frac{n^2 + 4n}{(n + 4)^2}$ if $n = -2$? **54** _____

F 3
G 1
H $\frac{1}{3}$
J -1

55 The drawing of a shark in a dictionary is $1\frac{1}{2}$ inches long. The actual shark measured 9 feet long. What scale is used? **55** _____

A 1 in.: 9 ft
B 1 ft : 6 ft
C 1 ft : 9 in.
D 1 in.: 6 ft

56 If the length of the side of a cube is halved, what happens to the volume of the cube? **56** _____

F The volume is divided by 2.
G The volume is divided by 4.
H The volume is divided by 8.
J The volume is not changed.

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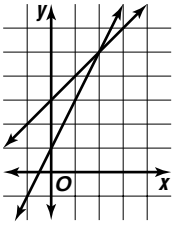
Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

57 The graph of the system of equations $y = 2x + 1$ and $y = x + 3$ is shown. What is the solution of the system of equations?



A (0, 3)
B (1, 0)
C (2, 5)
D (5, 2)

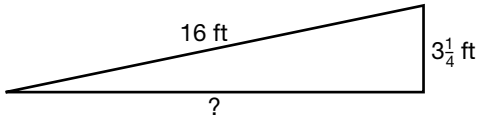
57 _____

58 Which has the greater area, a square with sides of 5 centimeters or a circle with diameter 5 centimeters?

F the circle
G The areas are equal.
H not enough information to decide
J the square

58 _____

59 A ramp is 16 feet long. At its top, it is $3\frac{1}{4}$ feet above the ground. What is the approximate horizontal distance covered by the ramp?



A 12.8 ft
B 15.7 ft
C 16.3 ft
D 19.3 ft

59 _____

60 The percentages of cruises to various destinations for a San Francisco cruise line are shown. In a circle graph of the data, how large is the angle for the section for Melbourne, Australia?

Destination	Percentage of Cruises
Acapulco, Mexico	29%
Anchorage, Alaska	18%
Honolulu, Hawaii	33%
Vancouver, B. C.	9%
Melbourne, Australia	11%

F 3.96°
G 33°
H 39.6°
J 396°

60 _____

Go on

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Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

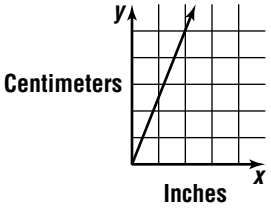
61 Which is equivalent to $1\frac{2}{5}$? **61** _____

A 140%
B 120%
C 40%
D 1.2%

62 Which is an equation of a line that is *not* parallel to $x - 2y = 7$? **62** _____

F $2x - 4y = 7$
G $y = \frac{1}{2}x$
H $3x = 6y + 4$
J $y + \frac{1}{2}x = 3$

63 The graph can be used to convert x inches to centimeters. What equation could describe this graph? **63** _____



A $y = 2x$
B $y = 2.54x$
C $2y = x$
D $2.54y = x$

64 The approximate gasoline mileages are listed for 14 sport-utility vehicles. What is the median of the data? **64** _____

15, 15, 13, 21, 10, 13, 22, 18, 18, 15, 19, 13, 17, 20

F 13 and 15
G 16
H 16.4
J 5

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Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

65 A red fox can run 5 miles per hour faster than a wolf. The fox covers 60 miles in the time it takes the wolf to cover 50 miles. What is the wolf's speed? **65** _____

A 25 mi/h
B 30 mi/h
C 50 mi/h
D 60 mi/h

66 What is the tenth number in the pattern below? **66** _____

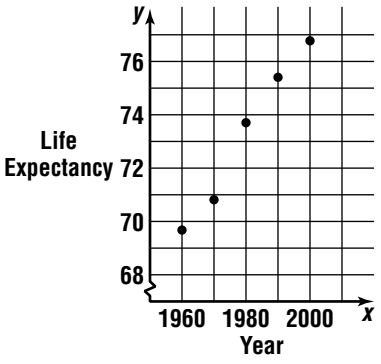
$-5, -2, 1, 4 \ldots$

F 7
G 13
H 16
J 22

67 Solve $5(x + 4) \leq 2(x - 4) + 1$. **67** _____

A $x \leq -8$
B $x > 8$
C $x < -7$
D $x \leq -9$

68 The scatterplot shows the life expectancy of people in the United States at the beginning of each decade from 1960 to 2000. Which statement is true about the scatterplot? **68** _____



F Life expectancy increases from decade to decade.
G Life expectancy has remained constant over the decades.
H Life expectancy has decreased from decade to decade.
J Women have a greater life expectancy than men do.

Go on

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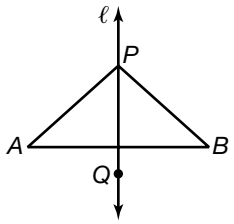
Name: Date:

Diagnostic Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

69 In the figure, line ℓ is the perpendicular bisector of $\overline{AB}$, and $\overline{AP} \cong \overline{BP}$. Suppose Q is another point on ℓ. Which is a reasonable conjecture about this situation?



A $\overline{AQ} \cong \overline{AP}$
B $\overline{BQ} \cong \overline{BP}$
C $\overline{AQ} \cong \overline{BQ}$
D $\angle APB \cong \angle AQB$

69 _____

70 Juanda has tossed a coin 3 times and the outcomes have been 3 heads. What is a reasonable conjecture about the outcome on the fourth toss?

F The fourth outcome will be tails.
G The probability that the fourth outcome will be tails is $\frac{3}{4}$.
H The probability that the fourth outcome will be tails is $\frac{1}{2}$.
J The probability that the fourth outcome will be tails is $\frac{1}{4}$.

70 _____

71 Which is an equation of the line passing through the points $(3, -4)$?

A -27
B -9
C 9
D 27

71 _____

72 Darnell says that all quadrilaterals have four right angles. Which shape provides a counterexample?

F rectangle
G square
H trapezoid
J triangle

72 _____

Go on

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Name: Date:

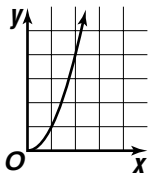
Diagnostic Test (continued)

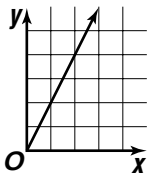
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

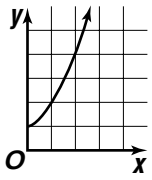
73 A bookstore had a sale during which all books were reduced by 20%. After the sale, the prices were marked up 20% over the sale price. How do the prices before and after the sale compare? **73** _____

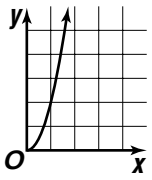
A The prices were the same before and after the sale.
B The prices after the sale were less than the prices before the sale.
C The prices after the sale were greater than the prices before the sale.
D There is not enough information to make the comparison.

74 Which graph shows that for each 1-unit increase in the value of x, the value of y is doubled? **74** _____

F


G


H


J


75 Which inequality represents *twice the sum of a number and 5 is at most the sum of the number and 5*? **75** _____

A $2x + 5 \leq x + 5$
B $2(x + 5) < x + 5$
C $2(x + 5) \leq x + 5$
D $2x + 5 \geq x + 5$

76 Which number is *not* a solution of $5 \leq \frac{x + 2}{-3}$? **76** _____

F -16
G -17
H -18
J -19

Go on

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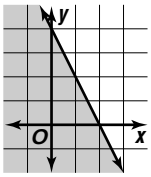
Name: Date:

Diagnostic Test (continued)

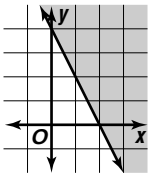
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

77 Which is the graph of $2x + y \leq 4$? **77** _____

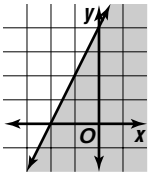
A



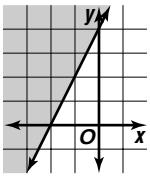
B



C



D



78 When cooked, a 50-pound bag of rice yields 590 four-ounce servings. How many ounces of cooked rice would a 10-pound bag of rice yield? **78** _____

F 59 oz
G 118 oz
H 160 oz
J 472 oz

79 One British Thermal Unit is the amount of energy required to raise the temperature of 1 pound of water 1°F. How many BTUs will you need to increase the temperature of 10 pounds of water from 50°F to 68°F? **79** _____

A 10 BTU
B 18 BTU
C 28 BTU
D 180 BTU

80 The average of 6 numbers is 65.4. Two of the numbers are identical. What other information would allow you to find what the identical numbers are? **80** _____

F what the total of the six numbers is
G what the four other numbers are
H whether the identical numbers are greater than 65.4
J whether the identical numbers are less than 65.4

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Standards Practice

Statistics, Data Analysis, and Probability 1.1 (Grade 6)

SDAP 1.1 **Compute the mean, median, and mode of data sets.**

Examples

1 Find the mean of the following set of data.

4.2 m, 6.3 m, 7.3 m, 4.2 m, 5.4 m, 5.0 m

A 5.2 m
B 5.4 m
C 6.3 m
D 6.7 m

To find the mean, first add the data items.

$4.2 + 6.3 + 7.3 + 4.2 + 5.4 + 5.0 = 32.4$

Now divide this sum by the number of items. There are 6 items.

$32.4 \div 6 = 5.4$ **B**

2 What is the median of these data?

$2,100; $2,500; $1,890; $1,800; $2,350; $2,080

F $1,040
G $2,080
H $2,090
J $2,120

The median is the middle number when the data are arranged in order. First, arrange the data in order from least to greatest.

$1,800; $1,890; $2,080; $2,100; $2,350; $2,500

There are two middle numbers, $2,080 and $2,100.
Add these numbers and divide by 2.

$2,080 + $2,100 = $4,180

$4,180 ÷ 2 = $2,090 **H**

3 Find the mode of the following data.

51 min, 49 min, 53 min, 43 min, 49 min, 50 min, 51 min

A 49 min
B 50 min
C 51 min
D 49 min and 51 min

The mode is the number or numbers that appears most often in the data set. In this case, both 49 min and 51 min appear twice, so they are the two modes. **D**

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Standards Practice

Statistics, Data Analysis, and Probability 1.1 (Grade 6)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

Listed below are the low temperatures (°F) for the first 14 days of February in Eureka, CA.

46°, 42°, 44°, 46°, 51°, 52°, 52°, 54°, 54°, 49°, 52°, 53°, 52°, 53°

1 What is the mean temperature for the 14 days? **1** _____

A 50°
B 51°
C 52°
D 54°

2 What is the median temperature for the 14 days? **2** _____

F 51°
G 51.5°
H 52°
J 53°

3 What is the mode of the temperatures? **3** _____

A 51°
B 52°
C 53°
D 54°

4 Which is the mean temperature for the five coldest days? **4** _____

F 42°
G 43°
H 45.4°
J 47.5°

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Standards Practice

Statistics, Data Analysis, and Probability 2.5 (Grade 6)

SDAP 2.5

Identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.

Examples

1 There are 400 students at Marita's school. In a random sample of 150 students, Marita found that 80 students ride bikes to school, 40 walk to school, and 30 are driven to school. Which conclusion is most reasonable based on Marita's survey?

A Only 80 students in Marita's school have bikes.

B About $\frac{1}{5}$ of the students in the school live too far from school to walk.

C About half of the students in the school ride bikes to school.

D A greater fraction of the students walk than Marita's survey showed.

There is no way to know from the survey the exact number of students who have bikes. Knowing that a student is driven to school does not tell you how far the student lives from school. Since Marita used a large random sample, the fractions of students who ride bikes and who walk are probably about the same for the whole school as for the sample. Her results indicate that about 53%, or about $\frac{1}{2}$, of the students ride bikes. **C**

2 Yorktown has more than 130,000 registered voters. In a survey, 7 of 10 voters in the Crestwood community of Yorktown said they planned to vote for candidate A for mayor, 1 planned to vote for candidate B, and 2 were undecided. Is it valid to predict that candidate A will win the election?

F Yes, because 70% is a majority of the voters.

G No, because the results may not be typical of results throughout the city.

H Yes, because even if the undecided voters vote for candidate B, candidate A will still win.

J Yes, because Crestwood voters are well informed.

The survey was too small. It should have included voters from all communities of the city. The sample is a convenience sample, not a random sample. **G**

3 A maker of over-the-counter medications claims that 90% of doctors surveyed recommend antacid X. Which information about the survey would suggest that the maker's claim is misleading?

A The survey included only doctors who were supplied with samples of antacid X to be given to patients.

B The survey included both male and female doctors.

C The survey was conducted over a one-month period.

D The survey asked doctors to choose from among 6 different antacids.

The information that the doctors were given samples of antacid X to give to their patients might bias the doctors in favor of that particular antacid. **A**

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Standards Practice

Statistics, Data Analysis, and Probability 2.5 (Grade 6)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 A radio station wants to find out what kind of music its listeners prefer. Which would be the best way to select a sample for this survey? **1** _____

A Survey 1,000 teen-agers.
B Survey 100 persons at an opera performance.
C Survey 1,000 people at random in their broadcast area.
D Survey 1,000 senior citizens.

2 Anita wanted to know the favorite subject of sixth graders. She asked 100 sixth graders whether English or mathematics is their favorite subject. Why is her survey biased? **2** _____

F She should have asked students to name their favorite subject.
G Anita should have included teachers in her survey.
H Anita's sample is too small.
J Anita should also have asked about physical education.

3 A survey of 200 sixth graders in Sacramento, CA, showed that 75% of the students were born in California. Why is it not valid to conclude that 75% of Sacramento's residents were born in California? **3** _____

A The sample is too small.
B The sample is not a random sample of all Sacramento residents.
C The survey was probably conducted at only one or two schools.
D The survey should have included high school students.

4 A researcher believes that higher speed limits on California highways cause more accidents. Which of the following factors should she *not* consider when she gathers data? **4** _____

F accidents on highways where the speed limit has been increased
G accidents on highways where the speed limit has not changed
H the number of cars traveling on highways with and without increased speed limits
J whether accidents happen during the day or night

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Standards Practice

Statistics, Data Analysis, and Probability 3.1 (Grade 6)

SDAP 3.1

Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.

Examples

1 A penny, a nickel, and a dime are tossed all at once. Which is a listing of all possible outcomes?

A HHT, HTH, HTT, THH, THT, TTH
B HHH, HHT, HTH, HTT, THH, THT, TTH, TTT
C HHH, TTT
D HHH, HHT, HTT, TTT

Each coin will show heads (H) or tails (T) when tossed. Because there are 3 coins, there are $2 \times 2 \times 2 = 8$ possible outcomes. **B**

2 Alan has 5 different headbands and 7 different T-shirts. He picks one headband and one T-shirt without looking. How many combinations of headbands and T-shirts are possible?

F 12 combinations
G 24 combinations
H 30 combinations
J 35 combinations

There are 5 ways to choose a headband and 7 ways to choose a T-shirt. There are $7 \times 5 = 35$ possible combinations. **J**

3 A bag contains 4 white marbles, 3 red marbles, and 4 blue marbles. If you pick one marble without looking, what is the probability of choosing a blue marble?

A $\frac{1}{12}$
B $\frac{4}{11}$
C $\frac{4}{7}$
D $\frac{4}{4}$

The probability is the ratio of favorable outcomes to the total number of possible outcomes. There are 4 favorable outcomes and $4 + 4 + 3 = 11$ possible outcomes. The theoretical probability of picking a blue marble is $\frac{4}{11}$. **B**

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Standards Practice

Statistics, Data Analysis, and Probability 3.1 (Grade 6)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

This chart shows the possible outcomes for rolling two numbered cubes. Use the chart as needed for Questions 1–3.

1,1	1,2	1,3	1,4	1,5	1,6
2,1	2,2	2,3	2,4	2,5	2,6
3,1	3,2	3,3	3,4	3,5	3,6
4,1	4,2	4,3	4,4	4,5	4,6
5,1	5,2	5,3	5,4	5,5	5,6
6,1	6,2	6,3	6,4	6,5	6,6

1 How many ways are there to roll a sum of 7 on the two cubes? **1** _____

A 6 ways
B 7 ways
C 8 ways
D 9 ways

2 What is the probability of rolling the same number on both cubes? **2** _____

F $\frac{1}{12}$
G $\frac{1}{6}$
H $\frac{1}{5}$
J $\frac{1}{2}$

3 What is the probability of rolling a sum greater than 9 on the two cubes? **3** _____

A $\frac{1}{12}$
B $\frac{5}{36}$
C $\frac{1}{6}$
D $\frac{5}{18}$

4 You flip 4 coins all at once. What is the probability that you will get tails on all 4 coins? **4** _____

F $\frac{1}{16}$
G $\frac{1}{8}$
H $\frac{1}{4}$
J $\frac{1}{2}$

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Standards Practice

Statistics, Data Analysis, and Probability 3.3 (Grade 6)

SDAP 3.3

Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if *P* is the probability of an event, $1 - P$ is the probability of an event not occurring.

Examples

1 A spinner is divided into several sections. Each section is red, yellow, or blue. Which list could show the probability that you will spin a particular color?

A $P(\text{red}) = 30\%$, $P(\text{yellow}) = 30\%$, $P(\text{blue}) = 30\%$
B $P(\text{red}) = 15\%$, $P(\text{yellow}) = 50\%$, $P(\text{blue}) = 35\%$
C $P(\text{red}) = 60\%$, $P(\text{yellow}) = 25\%$, $P(\text{blue}) = 25\%$
D $P(\text{red}) = 40\%$, $P(\text{yellow}) = 20\%$, $P(\text{blue}) = 10\%$

The probabilities must have a sum of 1 or 100%. **B**

2 Suppose you roll 5 numbered cubes. Which event has a probability of 1?

F rolling a sum less than 20
G rolling a sum equal to 20
H rolling a sum greater than 4
J rolling a sum equal to 4

An event has a probability of 1 if it is certain to occur. Sums greater than or equal to 20 are possible but not certain. A sum less than 5 is impossible. Every possible sum is 5 or more and therefore greater than 4. **H**

3 Julio has red and blue socks in a drawer. He reaches in without looking and takes out two socks. The probability that he gets two socks of the same color is $\frac{4}{9}$. What is the probability that one sock is red and the other blue?

A $\frac{8}{9}$
B $\frac{7}{9}$
C $\frac{6}{9}$
D $\frac{5}{9}$

Getting one red and one blue sock simply means not getting socks of the same color. For any event E, $P(\text{not } E) = 1 - P(E)$.
So $P(\text{red sock and blue sock}) = 1 - P(\text{both same color}) = 1 - \frac{4}{9}$ or $\frac{5}{9}$. **D**

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Standards Practice

Statistics, Data Analysis, and Probability 3.3 (Grade 6)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Suppose the probability of rain on Thursday is 80%. What is the probability of no rain on Thursday? **1** _____

A 20%
B 40%
C 50%
D 60%

2 Which event has a probability of zero? **2** _____

F An earthquake will occur somewhere in California in 2020.
G Water will freeze at 20°C.
H The sun will shine in Los Angeles tomorrow.
J Water will boil at 100°C.

3 A spinner has sections colored green, black, and orange. The probability of the spinner stopping on a green section is $\frac{2}{13}$, and the probability of its stopping on a black section is $\frac{4}{13}$. What is the probability of the spinner stopping on an orange section? **3** _____

A $\frac{8}{13}$
B $\frac{7}{13}$
C $\frac{6}{13}$
D $\frac{5}{13}$

4 One player for the L.A. Lakers has a 0.48 field goal average. What is the probability that he will *not* make a basket on his next attempt? **4** _____

F 1
G 0.5
H 0.48
J 0.52

5 What is the probability of an event that can never occur? **5** _____

A 1
B 0.5
C 0.001
D 0

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Standards Practice

Statistics, Data Analysis, and Probability 3.5 (Grade 6)

SDAP 3.5 **Understand the difference between independent and dependent events.**

Examples

1 Suppose you flip a coin three times and get heads, then tails, and then tails again. If you flip the coin one more time, what is the probability of getting heads?

A 1

B $\frac{3}{4}$

C $\frac{1}{2}$

D $\frac{1}{8}$

When you flip a coin, each flip is independent of the other flips. Each time, you have an equal chance of getting heads or tails. The probability of heads on the fourth flip is $\frac{1}{2}$. **C**

2 A bag contains 10 yellow and 5 green marbles. Without looking, you take out marbles one at a time and do not put them back in the bag. The first two marbles you take out are yellow. What is the probability that the third marble will be yellow?

F $\frac{9}{15}$

G $\frac{8}{13}$

H $\frac{9}{14}$

J $\frac{10}{15}$

The first two draws change the number of yellow marbles in the bag. After the second draw, there are 8 yellow marbles and 5 green marbles in the bag, for a total of 13 marbles. The probability of yellow on the third draw is $\frac{8}{13}$. **G**

3 A bag contains 3 red cubes and 4 yellow cubes. Suppose you take a cube from the bag without looking, record the color, then put the cube back into the bag. You do this several times. For the first three trials, the cubes are yellow, red, and yellow. What is the probability that the fourth cube will be yellow?

A $\frac{4}{7}$

B $\frac{1}{2}$

C $\frac{3}{7}$

D $\frac{2}{7}$

Since you put the cube you draw back into the bag each time, the cube you draw each time is independent of any that you drew before. The probability of a yellow cube is $\frac{4}{7}$ for each draw. **A**

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Standards Practice

Statistics, Data Analysis, and Probability 3.5 (Grade 6)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Suppose you roll a numbered cube four times and get the number 5 each time. What is the probability of getting 5 on the next roll? **1** _____

A $\left(\frac{1}{6}\right)^5$

B $\frac{1}{6}$

C $\frac{4}{6}$

D $\frac{5}{6}$

2 Two numbered cubes have faces numbered 1 to 6. One cube is red, and the other cube is yellow. If you roll the red cube and get the number 2, what is the probability of getting 2 if you next roll the yellow cube? **2** _____

F $\frac{1}{36}$

G $\frac{1}{30}$

H $\frac{1}{6}$

J $\frac{5}{6}$

3 A standard deck of cards has 26 red cards and 26 black cards. You draw cards one at a time and do not put them back into the deck. If you draw 2 black cards and a red card on the first three draws, what is the probability of a red card on the fourth draw? **3** _____

A $\frac{24}{50}$

B $\frac{24}{49}$

C $\frac{25}{50}$

D $\frac{25}{49}$

4 A spinner has five equal-size sections numbered 1 through 5. What is the probability of spinning the number 4 and then the number 3? **4** _____

F $\frac{1}{25}$

G $\frac{1}{5}$

H $\frac{1}{4}$

J $\frac{1}{3}$

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Standards Practice

Number Sense 1.1 (Grade 7)

NS 1.1

Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation.

Examples

1 Express 7.4×10^{-4} in standard notation.

A 7.4000
B 0.0074
C 0.00074
D 0.000074

To write 7.4×10^{-4} in standard notation, notice that the exponent for 10 is negative 4. Move the decimal point 4 places *to the left.* In standard notation, 7.4×10^{-4} is 0.00074. **C**

2 In 1997, the United States Government collected about $1,600,000,000,000 in revenue. Express this number in scientific notation.

F 1.6×10^{9}
G 1.6×10^{10}
H 1.6×10^{11}
J 1.6×10^{12}

You must write the number as a product. The first factor must be greater than or equal to 1 and less than 10. The second factor must be a power of 10. Assume that the decimal point is at the end of the number. Move the decimal point 12 places to the left to get the first factor. Use 10^{12} as the power of 10. **J**

3 Which number is greatest?

A 6.4×10^{-2}
B 6.4×10^{-1}
C 6.4×10^{1}
D 6.4×10^{2}

Since the decimal factors are all 6.4, compare the exponents. Because 2 is the greatest exponent, 6.4×10^{2} is the greatest number. **D**

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Standards Practice

Number Sense 1.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 The diameter of the Sun is about 1,390,000 kilometers. What is this distance in scientific notation? **1** _____

A 139×10^4 km
B 13.9×10^5 km
C 1.39×10^7 km
D 1.39×10^6 km

2 The length of the light waves that produce the color red is about 7×10^{-7} meters. What is the length in standard notation? **2** _____

F 0.00000007 m
G 0.0000007 m
H 7,000,000 m
J 70,000,000 m

3 Which is the least number? **3** _____

A 7.4×10^{-2}
B 7.4×10^{-1}
C 7.4×10^0
D 7.4×10^1

4 Two million gallons of ice cream are produced in the United States each day. Express the number of gallons of ice cream produced in one week in scientific notation. **4** _____

F 2×10^6 gal
G 14×10^6 gal
H 1.4×10^7 gal
J 2×10^7 gal

5 A light-year is about 9.45×10^{12} kilometers. One star near Earth is about 4.3 light-years away. About how many kilometers is this? **5** _____

A 40.635×10^{14} km
B 4.0635×10^{14} km
C 4.0635×10^{13} km
D 0.40635×10^{15} km

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Standards Practice

Number Sense 1.2 (Grade 7)

NS 1.2

Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole number powers.

Examples

1 What is $-8.03 + 4.10$?

A 12.13
B 3.393
C -3.93
D -12.13

To add two numbers with different signs, first find their absolute values.
$|-8.03| = 8.03$ and $|4.10| = 4.10$.
Subtract the lesser absolute value from the greater absolute value, and give the result the sign of the number with the greater absolute value.
$-8.03 + 4.10 = -(8.03 - 4.10) = -3.93$ **C**

2 What is the value of $\left(2\frac{1}{2}\right)^2$?

F $4\frac{1}{4}$
G 5
H $6\frac{1}{4}$
J $12\frac{1}{2}$

$\left(2\frac{1}{2}\right)^2$ means $\left(2\frac{1}{2}\right)\left(2\frac{1}{2}\right)$ or $\frac{5}{2} \cdot \frac{5}{2}$. Multiply numerators and denominators:
$\frac{5}{2} \cdot \frac{5}{2} = \frac{25}{4}$ or $6\frac{1}{4}$. **H**

3 What is $36 \div \frac{2}{3}$?

A 72
B 54
C 24
D 12

To divide 36 by $\frac{2}{3}$, multiply 36 by the multiplicative inverse of $\frac{2}{3}$, which is $\frac{3}{2}$.
So $36 \div \frac{2}{3} = \frac{36}{1} \cdot \frac{3}{2} = \frac{108}{2}$ or 54. **B**

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Standards Practice

Number Sense 1.2 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 $-2\frac{4}{5} + \frac{1}{10} =$ **1** _____

A $-2\frac{9}{10}$

B $-2\frac{7}{10}$

C $2\frac{7}{10}$

D $2\frac{9}{10}$

2 Simplify $(0.02)^4$. **2** _____

F 0.00000002

G 0.00000016

H 0.16

J 16

3 What is 8.7×10^2? **3** _____

A 8.700

B 87

C 870

D 8,700

4 What is the value of $1\frac{2}{3} - \left(-6\frac{1}{2}\right)$? **4** _____

F $-8\frac{1}{6}$

G $-4\frac{5}{6}$

H $8\frac{1}{6}$

J $4\frac{5}{6}$

5 $\frac{2}{3} \cdot \left(-\frac{6}{5}\right) \cdot \left(-\frac{1}{3}\right) =$ **5** _____

A $\frac{4}{15}$

B $\frac{4}{45}$

C $-\frac{4}{45}$

D $-\frac{4}{15}$

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Standards Practice

Number Sense 1.3 (Grade 7)

NS 1.3

Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.

Examples

1 What percent is equivalent to $\frac{7}{8}$?

A 0.875%
B 8.75%
C 87.5%
D 875%

First divide 7 by 8 to express $\frac{7}{8}$ as a decimal: $7 \div 8 = 0.875$.

Then write 0.875 as a percent: $0.875 = 87.5\%$. **C**

2 Express $2\frac{7}{12}$ feet as a decimal rounded to the nearest hundredth.

F 0.58 ft
G 2.3 ft
H 2.58 ft
J 25.3 ft

First write $2\frac{7}{12}$ as an improper fraction: $2\frac{7}{12} = \frac{31}{12}$. To write $\frac{31}{12}$ as a decimal, divide 31 by 12. To the nearest hundredth, $31 \div 12 = 2.58$. **H**

3 On any given day, 65% of the customers at a San Francisco restaurant are tourists. Of 200 restaurant customers, how many would you expect to be tourists?

A 13 customers
B 65 customers
C 120 customers
D 130 customers

Change 65% to the decimal 0.65. Then multiply 200 by 0.65. Since $200 \times 0.65 = 130$, you would expect 130 of the 200 customers to be tourists. **D**

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Standards Practice

Number Sense 1.3 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Between 10% and 11% of California's population is 65 years old or older. California's population is about 33,000,000. Which of the following best describes how many Californians are 65 or older? **1** _____

A between 300,000 and 330,000 people
B between 3,630,000 and 30,000,000 people
C between 3,300,000 and 3,630,000 people
D more than 3,630,000 people

2 What is the value of $\frac{2}{3}$ expressed as a percent to the nearest tenth of a percent? **2** _____

F 66.7%
G 66.6%
H 6.7%
J 0.6%

3 Which is the best estimate of 45% of 45,000? **3** _____

A 2,000
B 16,000
C 20,000
D 22,000

4 Which list is in order from least to greatest? **4** _____

F 0.6, 0.5, 0.401, $\frac{2}{5}$
G 0.401, 0.5, $\frac{2}{5}$, 0.6
H $\frac{2}{5}$, 0.401, 0.5, 0.6
J $\frac{2}{5}$, 0.5, 0.401, 0.6

5 In a survey of 150 households, 70% separate their garbage for recycling. How many of the 150 households do *not* separate their garbage? **5** _____

A 35 households
B 45 households
C 70 households
D 105 households

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Standards Practice

Number Sense 1.6 (Grade 7)

NS 1.6 **Calculate the percentage of increases and decreases of a quantity.**

Examples ***1*** The price of a soft drink sold in a vending machine increased from \$1.00 to \$1.20. What was the percent of increase?

A 12%
B 16.7%
C 20%
D 50%

The percent of increase is the ratio of the amount of increase to the original amount. The amount of increase was $1.20 - 1.00$ or 0.20.

$$\text{percent of increase} = \frac{0.20}{1.00}$$
$$= 20\% \ \textbf{C}$$

2 Aletha lost 10 pounds during the summer. Her weight at the end of the summer was 112 pounds. What was her percent of decrease?

F 10%
G 9%
H 8%
J 6%

The percent of decrease is the ratio of the amount of decrease to the original amount. Aletha's original weight was $112 + 10$ or 122 pounds.

$$\text{percent of decrease} = \frac{10}{122}$$
$$\approx 0.082$$
$$\approx 8\% \ \textbf{H}$$

3 California's population in 1990 was about 30,000,000. Its population in 2000 was about 33,000,000. What was the percent of increase?

A 3%
B 9%
C 10%
D 30%

The amount of increase was $33{,}000{,}000 - 30{,}000{,}000$ or 3,000,000.

$$\text{percent of increase} = \frac{3{,}000{,}000}{30{,}000{,}000}$$
$$= 10\% \ \textbf{C}$$

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Standards Practice

Number Sense 1.6 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 In 1992, the number of African rhinos alive in the wild was estimated at 8,300. By 1999 the number had increased to about 13,000. What was the percent of increase? **1** _____

A about 36%
B about 57%
C about 64%
D about 157%

2 During the year 2000, the price of a certain stock decreased from $45 per share to $18 per share. What was the percent of decrease in the price? **2** _____

F 40%
G 60%
H 150%
J 250%

3 In January of 2000, a certain brand of computer cost $1200. In June, the price was $1050. What was the percent of increase or decrease in the price? **3** _____

A 14% increase
B 12.5% increase
C 12.5% decrease
D 87.5% decrease

4 If the value of a house triples in ten years, what is the percent of increase in the value of the house? **4** _____

F 300%
G 200%
H 100%
J $33\frac{1}{3}\%$

5 A calf weighed 40 pounds at birth. The calf is now a cow that weighs 400 pounds. By what percent has its weight increased? **5** _____

A 900%
B 90%
C 11%
D 10%

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Standards Practice

Number Sense 1.7 (Grade 7)

NS 1.7

Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest.

Examples

1 A sweater originally priced at $35 is on sale for 10% off the original price. What does Mei Ling pay for the sweater on sale if she must also pay a 4% sales tax?

A $32.90
B $32.76
C $31.50
D $30.10

To find the sale price, subtract 10% of $35 from $35:
$\$35.00 - \$3.50 = \$31.50$.

To find the sales tax, find 4% of the sale price: $\$31.50 \times 0.04 = \$1.26$.

Final price: sale price + tax = $\$31.50 + \$1.26$ or $32.76 **B**

2 What is the simple interest for 1 year on a $5,000 loan if the annual interest rate is 12%?

F $6,000
G $5,600
H $600
J $60

Use the formula for simple interest, $I = prt$. The principal is $5,000, the rate is 0.12, and the time is 1 year.

$I = \$5{,}000 \times 0.12 \times 1$ or $600 **H**

3 Tony deposits $1,000 into an account that pays 3% interest compounded once each year. How much will Tony have after 5 years?

A $1,030.00
B $1,150.00
C $1,159.27
D $5,150.00

To find the balance after one year, multiply $1,000 by 1.03. Each succeeding year, the new balance is multiplied by 1.03. This can be represented by $\$1{,}000(1.03)^n$, where n represents the number of years. For 5 years, the balance is $\$1{,}000(1.03)^5$. Rounded to the nearest cent, this is equal to $1,159.27. **C**

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Standards Practice

Number Sense 1.7 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 A ring at Jared's Jewelry is priced at $270. The price represents a markup of 125% of the price Jared paid. What did Jared pay for the ring? **1** _____

A $337.50
B $216.00
C $150.00
D $120.00

2 Andy earns a commission of 4.5% for each house he sells. One month he sold a $120,000 house and a $110,000 house. How much commission did he earn on these two houses? **2** _____

F $10,350
G $9,900
H $5,400
J $4,950

3 Jamal put $1,500 in a savings account that pays 6% compound interest annually. How much will he have in the account after 4 years? **3** _____

A $360.00
B $393.72
C $1,860.00
D $1,893.72

4 How much interest would you pay on $2,000 borrowed for 2 years at a simple interest rate of 9.5%? **4** _____

F $95
G $380
H $2,095
J $2,380

5 How much profit does Brittany make on a pair of earrings if she buys the earrings for $15 and marks them up to 150% of what she paid? **5** _____

A $22.50
B $17.50
C $15.00
D $7.50

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Standards Practice

Number Sense 2.1 (Grade 7)

NS 2.1

Understand negative-whole number exponents. Multiply and divide expressions involving exponents with a common base.

Examples

1 What is the value of 5^{-4}?

A -20

B $\frac{1}{625}$

C $\frac{1}{125}$

D $\frac{1}{20}$

Use the definition of a negative exponent.

$$5^{-4} = \frac{1}{5^4}$$
$$= \frac{1}{5 \cdot 5 \cdot 5 \cdot 5}$$
$$= \frac{1}{625}$$ **B**

2 Which expression is equivalent to $(2^3)(2^{-2})(2^{-1})$?

F 2^6

G 2^0

H $\frac{1}{2}$

J $\frac{1}{2^6}$

The common base is 2. To multiply expressions with a common base, add the exponents.

$$(2^3)(2^{-2})(2^{-1}) = 2^{3+(-2)+(-1)}$$
$$= 2^0$$ **G**

3 What is the value of $\frac{3^2}{3^{-1}}$?

A 27

B 9

C 3

D $\frac{1}{3}$

Divide expressions with a common base by subtracting the exponents.

$$\frac{3^2}{3^{-1}} = 3^{2-(-1)}$$
$$= 3^3$$
$$= 27$$ **A**

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Standards Practice

Number Sense 2.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 What is the value of 2^{-5}? **1** _____

A $-\frac{1}{10}$

B $-\frac{1}{32}$

C $\frac{1}{32}$

D $\frac{1}{10}$

2 What is $5^4 \cdot 5^3$? **2** _____

F 25^{12}

G 25^7

H 5^{12}

J 5^7

3 Which of the following is equivalent to $6^{-3} \div 6^5$? **3** _____

A 6^{-15}

B 6^{-8}

C 6^2

D 6^8

4 What is the value of $3^{-2} \cdot 3^{-1}$? **4** _____

F 9

G $\frac{1}{3}$

H $\frac{1}{9}$

J $\frac{1}{27}$

5 What is the value of $\frac{5^{-2}}{5^{-1}}$? **5** _____

A 25

B 5

C $\frac{1}{5}$

D $\frac{1}{125}$

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Standards Practice

Number Sense 2.2 (Grade 7)

NS 2.2

Add and subtract fractions by using factoring to find common denominators.

Examples

1 What is $\frac{3}{4} + \frac{2}{3}$?

A $-\frac{5}{7}$

B $\frac{5}{12}$

C $\frac{1}{2}$

D $1\frac{5}{12}$

The least common denominator of the fractions if 12.

$$\frac{3}{4} + \frac{2}{3} = \frac{9}{12} + \frac{8}{12}$$
$$= \frac{17}{12}$$
$$= 1\frac{5}{12}$$ **D**

2 What is $\frac{7}{10} - \frac{1}{5}$?

F $\frac{1}{2}$ **G** $\frac{3}{5}$

H $\frac{9}{10}$ **J** $\frac{6}{5}$

The least common denominator of the fractions is 10.

$$\frac{7}{10} - \frac{1}{5} = \frac{7}{10} - \frac{2}{10}$$
$$= \frac{5}{10}$$
$$= \frac{1}{2}$$ **F**

3 What is the value of $\frac{1}{2} - \frac{1}{3} + \frac{1}{5}$?

A $\frac{1}{30}$ **B** $\frac{1}{10}$

C $\frac{11}{30}$ **D** $\frac{13}{15}$

The least common denominator of the three fractions is 30.

$$\frac{1}{2} - \frac{1}{3} + \frac{1}{5} = \frac{15}{30} - \frac{10}{30} + \frac{6}{30}$$
$$= \frac{11}{30}$$ **C**

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Standards Practice

Number Sense 2.2 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 What is $2\frac{1}{2} - 1\frac{2}{3}$? **1** _____

A $1\frac{5}{6}$

B $1\frac{1}{3}$

C $\frac{5}{6}$

D $\frac{2}{3}$

2 What is $\frac{3}{5} + \frac{3}{10} + \frac{3}{4}$? **2** _____

F $\frac{9}{20}$

G $\frac{9}{19}$

H $1\frac{1}{5}$

J $1\frac{13}{20}$

3 What is the value of $3\frac{1}{2} + \frac{1}{3} - \frac{5}{12}$? **3** _____

A $\frac{5}{12}$

B $2\frac{59}{60}$

C $3\frac{5}{12}$

D $3\frac{5}{6}$

4 What is the value of $\frac{7}{54} - \frac{1}{36}$? **4** _____

F $\frac{11}{108}$

G $\frac{1}{9}$

H $\frac{17}{108}$

J $\frac{1}{3}$

5 What is the value of $\frac{7}{8} + \frac{1}{3}$? **5** _____

A $\frac{1}{4}$

B $\frac{1}{3}$

C $\frac{11}{12}$

D $1\frac{5}{24}$

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Standards Practice

Number Sense 2.3 (Grade 7)

NS 2.3 **Multiply, divide, and simplify rational numbers by using exponent rules.**

Examples

1 What is the value of $2.5^3 \cdot 2.5^{-1}$?

A 6.25
B 2.5
C 0.4
D 0.16

The base of each power is 2.5. To multiply the powers, add the exponents.

$$\begin{aligned} 2.5^3 \cdot 2.5^{-1} &= 2.5^{3+(-1)} \\ &= 2.5^2 \\ &= 6.25 \end{aligned}$$ **A**

2 What is the value of $\frac{(-4)^2}{(-4)^3}$?

F -4
G -0.25
H 0.25
J 4

The base of each power is -4. To divide, subtract the exponent of the divisor from the exponent of the dividend.

$$\begin{aligned} \frac{(-4)^2}{(-4)^3} &= (-4)^{2-3} \\ &= (-4)^{-1} \\ &= \frac{1}{-4} \\ &= -0.25 \end{aligned}$$ **G**

3 Simplify $(3^2)^{-2}$.

A $-\frac{1}{81}$
B $\frac{1}{81}$
C 1
D 81

To raise a power to a power, multiply the exponents.

$$\begin{aligned} (3^2)^{-2} &= 3^{-4} \\ &= \frac{1}{3^4} \\ &= \frac{1}{81} \end{aligned}$$ **B**

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Standards Practice

Number Sense 2.3 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Simplify $\frac{(-8)^{-2}}{(-8)^0}$. **1** _____

A -64

B $\frac{1}{64}$

C 1

D 64

2 What is the value of $2^4 \cdot 2^3$? **2** _____

F 2

G 48

H 128

J 4,096

3 Which of the following is equivalent to $\frac{6.5^4}{6.5^2} \cdot 6.5^{-2}$? **3** _____

A 6.5^{-10}

B 6.5^{-4}

C 1

D 6.5

4 What is the value of $\frac{5^{-2}}{5^{-1}}$? **4** _____

F 25

G 5

H $\frac{1}{5}$

J $\frac{1}{25}$

5 Which of the following is equivalent to $(3.5^2)^{-1} \cdot 3.5^4$? **5** _____

A 3.5^2

B 3.5^{-2}

C 3.5^{-5}

D 3.5^{-8}

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Standards Practice

Number Sense 2.4 (Grade 7)

NS 2.4

Use the inverse relationship between raising to a power and extracting the root of a perfect square integer; for an integer that is not square, determine without a calculator the two integers between which its square root lies and explain why.

Examples

1 What is the value of $\sqrt{225}$?

A 2.5
B 5
C 15
D 25

$\sqrt{225}$ means the positive number whose square is 225. Because $15^2 = 225$, 15 is the positive square root of 225. **C**

2 What is the value of $\sqrt{841}$?

F 19
G 23
H 27
J 29

Since $29^2 = 841$, $\sqrt{841} = 29$. **J**

3 Between which two integers does $\sqrt{75}$ lie?

A 8 and 9
B 7 and 8
C 6 and 7
D 5 and 6

If an integer is not a perfect square, its square root lies between the squares of two consecutive integers. Since $8^2 = 64$, $9^2 = 81$, and 75 is between 64 and 81, the square root of 75 lies between 8 and 9. **A**

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Standards Practice

Number Sense 4.4 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 What is the value of $\sqrt{121}$? **1** _____

A 9
B 11
C 19
D 21

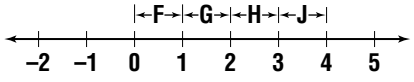
2 Between which two integers does $\sqrt{35}$ lie? **2** _____

F 4 and 5
G 6 and 7
H 5 and 6
J 3 and 4

3 What is the largest perfect square less than 100? **3** _____

A 9
B 64
C 81
D 99

4 On which part of the number line does $\sqrt{3}$ lie? **4** _____



F F
G G
H H
J J

5 How many whole numbers have square roots greater than 5 but less than 6? **5** _____

A 10 whole numbers
B 9 whole numbers
C 8 whole numbers
D 1 whole number

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Standards Practice

Number Sense 2.5 (Grade 7)

NS 2.5

Understand the meaning of the absolute value of a number; interpret the absolute value as the distance of the number from zero on a number line; and determine the absolute value of real numbers.

Examples

1 What is true about the absolute value of any real number?

A It is positive or 0.
B It is greater than 0.
C It is equal to its opposite.
D It is less than 0.

By definition, the absolute value of a real number a is a if $a > 0$, is 0 if $a = 0$, or is $-a$ if $a < 0$. Since a is positive if $a > 0$, a is 0 if $a = 0$, and $-a$ is positive if $a < 0$, the absolute value of a is positive or 0. **A**

2 What is the value of $|-2.5|$?

F -3
G -2.5
H 0
J 2.5

The absolute value symbol, $||$, indicates the distance of a number from 0 on the real number line. Since the distance between two points is not negative, the absolute value of a number cannot be negative. On the real number line, the point labeled -2.5 is 2.5 units from 0. **J**

3 What is the value of $-|3 - 6|$?

A 9
B 3
C -3
D -9

Since $|3 - 6| = |-3|$, evaluate $-|-3|$. Since $|-3| = 3$, $-|-3| = -3$. **C**

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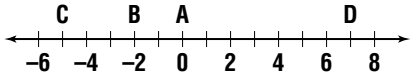
Standards Practice

Number Sense 2.5 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 The coordinate of which point has absolute value 5? **1** _____



A A
B B
C C
D D

2 What is the value of $|-3 - 5|$? **2** _____

F 8
G 2
H -2
J -8

3 What is the value of $-|1.4 + 1.6| + 3$? **3** _____

A 6
B 3
C 0
D -6

4 What is the value of $|-2 - (-7)|$? **4** _____

F -9
G -5
H 5
J 9

5 Lena chose a number, found its absolute value and added the absolute value to the original number. If she did all the work correctly, which number can you be sure she did *not* get for the sum? **5** _____

A -2
B 0
C 2
D 3

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Standards Practice

Algebra and Functions 1.1 (Grade 7)

AF 1.1

Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description (e.g., three less than a number, half as large as area A).

Examples

1 Which expression represents *8 less than 3 times a number*?

A $3x < 8$
B $3x - 8$
C $8 - 3x$
D $8 < 3x$

The phrase *3 times a number* means 3 times the number x, or $3x$. The phrase *8 less than* means to subtract 8 from the quantity $3x$. Thus, the expression is $3x - 8$. **B**

2 75 is more than 8 times the quotient of a number and 3. Which inequality represents this description?

F $8\left(\frac{n}{3}\right) > 75$
G $75 \geq 8\left(\frac{n}{3}\right)$
H $75 > 8\left(\frac{n}{3}\right)$
J $8\left(\frac{n}{3}\right) \geq 75$

The phrase *8 times the quotient of a number and 3* can be represented by the expression $8\left(\frac{n}{3}\right)$. Because 75 is greater than this quantity, the inequality is $75 > 8\left(\frac{n}{3}\right)$. **H**

3 A number n is less than 3 but greater than -5. Which of the following represents this description?

A $n < 3$ and $-5 < n$
B $n > 3$ and $-5 < n$
C $n < 3$ and $-5 > n$
D $n > 3$ and $-5 > n$

Since n is less than 3, you can write $n < 3$. Since n is greater than -5, you know that $n > -5$, or in other words, that $-5 < n$. So, $n < 3$ and $-5 < n$. **A**

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Standards Practice

Algebra and Functions 1.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Which expression represents *the product of a number and 6 subtracted from 50*? **1** _____

A $6x - 50$
B $6(x - 50)$
C $50 - 6x$
D $6(50 - x)$

2 If you divide 4 more than twice a number by 0.1, the result is 3.4. Which equation represents this information? **2** _____

F $2n + \frac{4}{0.1} = 3.4$
G $\frac{2n + 4}{0.1} = 3.4$
H $\frac{2n}{0.1} + 4 = 3.4$
J $\frac{2n}{0.1} = 3.4$

3 Which inequality represents *twice a number is at most 35*? **3** _____

A $2x > 35$
B $2x < 35$
C $2x \geq 35$
D $2x \leq 35$

4 The original price of a pair of pants was p dollars. The pants are on sale for \$5 off the original price. Which of the following represents what you would pay if you buy two pairs of pants at the sale price? **4** _____

F $(p - 5) + (p - 5)$
G $p - 2 \cdot 5$
H $2 \cdot p - 5$
J $(p - 5) + (5 - p)$

5 A number n is at least 6 but no more than 10. Which of the following describes this situation? **5** _____

A $6 < n$ and $n < 10$
B $6 \leq n$ and $n \leq 10$
C $6 \leq n$ and $n > 10$
D $6 \leq n$ and $n \geq 10$

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Standards Practice

Algebra and Functions 1.2 (Grade 7)

AF 1.2

Use the correct order of operations to evaluate algebraic expressions such as $3(2x + 5)^2$.

Examples

1 What is the value of $3(x + 2) - 2x$ if $x = -4$?

A -14
B 2
C 10
D 26

First replace x by -4 each time it occurs.

$$3(x + 2) - 2x = 3(-4 + 2) - 2(-4)$$

Next, add inside the parentheses.

$$3(-4 + 2) - 2(-4) = 3(-2) - 2(-4)$$

Now multiply.

$$3(-2) - 2(-4) = -6 - (-8)$$

Finally, subtract.

$$-6 - (-8) = 2$$ **B**

2 What is the value of $\frac{x^2 - (-2)}{x + 4}$ when $x = 5$?

F $2\frac{5}{9}$
G 3
H $4\frac{5}{9}$
J $5\frac{4}{9}$

First evaluate the numerator and denominator of the fraction after replacing x by 5: $x^2 - (-2) = 5^2 - (-2) = 25 + 2 = 27$ and $x + 4 = 5 + 4 = 9$.

Thus, $\frac{x^2 - (-2)}{x + 4} = \frac{27}{9}$ or 3. **G**

3 What is the value of $0.5(2x^2 + 3)^2$ if $x = 2$?

A 8.5
B 11
C 30.25
D 60.5

$0.5(2x^2 + 3) = 0.5(2 \cdot 2^2 + 3)^2$ *Replace x by 2.*

$= 0.5(11)^2$ *Simplify inside the parentheses.*

$= 0.5(121)$ *Square the number 11.*

$= 60.5$ **D**

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Standards Practice

Algebra and Functions 1.2 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Evaluate $45 - 3x$ if $x = 9$. **1** _____

A 18
B 28
C 368
D 378

2 What is the value of $6x + 3 - 4x \div 2$ if $x = 5$? **2** _____

F $6\frac{1}{2}$
G 7
H 23
J 31

3 What is the value of $c^2 + 7c - 2$ if $c = 3$? **3** _____

A 25
B 28
C 46
D 48

4 What is the value of $\frac{x^2 - 5x}{x^2 - 3x}$ if $x = 4$? **4** _____

F -4
G -1
H 1
J 4

5 Evaluate $a + b^2$ if $a = 5$ and $b = 7$. **5** _____

A 19
B 24
C 54
D 144

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Standards Practice

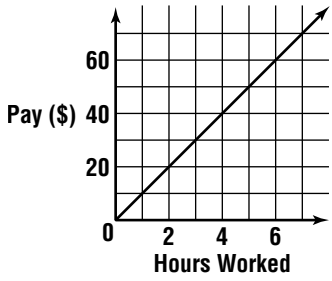
Algebra and Functions 1.5 (Grade 7)

AF 1.5

Represent quantitative relationships graphically and interpret the meaning of a specific part of a graph in the situation represented by the graph.

Examples

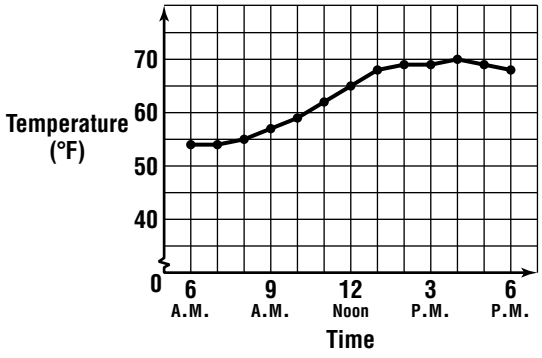
1 In the graph shown, x-values represent hours worked and y-values represent dollars earned. Which statement is supported by the information given in the graph?



A The salary is $15 per hour.
B The more hours you work, the less you earn.
C There is no extra pay for overtime.
D The more hours you work, the more you earn.

On the graph, the y-values increase as the x-values increase. Therefore, the amount earned increases as the hours worked increase. **D**

The graph shows the temperatures at one recording station in San Diego one day in April, between 6 A.M. and 6 P.M. Use the graph for Examples 2 and 3.



2 At what time during these 12 hours was the highest temperature recorded?

F at 6 A.M.
G at 4 P.M.
H at 3 P.M.
J at 5 P.M.

On the graph, the highest point is at (4, 70), so the highest temperature was recorded at 4 P.M. **G**

3 For what time interval was the recorded temperature 65° or less?

A from 1 P.M. through 6 P.M.
B from 6 A.M. through 12 noon
C from 6 A.M. through 11 A.M.
D from 6 A.M. through 10 A.M.

Notice that the horizontal grid line at the 65° level has a dot on it at the time corresponding to 12 noon. The dots to the left of 12 noon are below the 65° level. The dots to the right of 12 noon are above the 65° level. So, the interval for which the temperature was 65°F or less is from 6 A.M. to 12 noon. **B**

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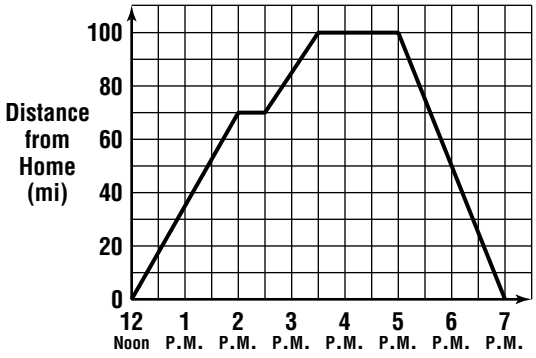
Standards Practice

Algebra and Functions 1.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

The graph shows information about a trip that Mr. Chavez made to buy a new computer. Use the graph to answer the questions.



1 On the way to the town where the computer store was, Mr. Chavez had a flat tire and had to stop to change the tire. How long did it take him to change the tire? **1** _____

A $\frac{1}{4}$ hour

B $\frac{1}{2}$ hour

C $\frac{3}{4}$ hour

D 1 hour

2 At what time did he stop to change the tire? **2** _____

F 1:30 P.M.

G 1:45 P.M.

H 2:00 P.M.

J 2:15 P.M.

3 How much time did he spend in the town where he bought his new computer? **3** _____

A $\frac{1}{2}$ hour

B 1 hour

C $1\frac{1}{4}$ hours

D $1\frac{1}{2}$ hours

4 What was his total driving time? **4** _____

F 7 hours

G 5 hours

H 4 hours

J 3 hours

5 During which time period was Mr. Chavez driving the fastest? **5** _____

A 12 noon to 1 P.M.

B 1 P.M. to 2 P.M.

C 2:30 P.M. to 3:30 P.M.

D 5 P.M. to 7 P.M.

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Standards Practice

Algebra and Functions 2.1 (Grade 7)

AF 2.1

Interpret positive whole-number powers as repeated multiplication and negative whole-number powers as repeated division or multiplication by the multiplicative inverse. Simplify and evaluate expressions that include exponents.

Examples

1 Which expression is equivalent to $\frac{1}{2}x^2y^{-4}$?

A $\frac{x^2}{y^4}$

B $\frac{x^2}{4y^4}$

C $\frac{x^2}{2y^4}$

D $\frac{2}{x^2y^4}$

y^{-4} means $\frac{1}{y^4}$, so the expression is the product of $\frac{1}{2}$, x^2, and $\frac{1}{y^4}$, or $\frac{x^2}{2y^4}$. **C**

2 What is the value of $(2^3)(3^2)(2^{-2})$?

F 9

G 18

H 96

J 288

The expression can be written as $\frac{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3}{2 \cdot 2}$, which simplifies to $2 \cdot 3 \cdot 3$ or 18. **G**

3 What is the value of $x^5 + x^3$ if $x = -2$?

A -40

B -16

C 40

D 256

Replace x by -2 to get $(-2)^5 + (-2)^3 =$
$(-2)(-2)(-2)(-2)(-2) + (-2)(-2)(-2) = -32 + (-8)$ or -40. **A**

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Standards Practice

Algebra and Functions 2.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Which expression is equivalent to $(a^3)^{-4}$? **1** _____

A a^{-1}

B $\frac{1}{a^3 \cdot a^3 \cdot a^3 \cdot a^3}$

C $\frac{1}{a^4}$

D $\frac{1}{a^3}$

2 What is the simplified form of $(3x^4y^3)^3$? **2** _____

F $3x^7y^6$

G $3x^{12}y^9$

H $27x^7y^6$

J $27x^{12}y^9$

3 Evaluate $\frac{x^{-5}}{x^2}$ when $x = 1$. **3** _____

A $\frac{1}{7}$

B $\frac{1}{5}$

C $\frac{1}{3}$

D 1

4 Which expression is equivalent to $(a^{-4}b^2c^{-1})^{-3}$? **4** _____

F $a^{-7}b^{-1}c^{-4}$

G $\frac{a^{12}c^3}{b^6}$

H $a^{12}b^6c^3$

J $\frac{a^{12}c^3}{b^{-6}}$

5 What is the value of $\frac{4^{-3}}{4^{-5}}$? **5** _____

A 16

B 4

C $\frac{1}{16}$

D $\frac{1}{65{,}536}$

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Standards Practice

Algebra and Functions 2.2 (Grade 7)

AF 2.2

Multiply and divide monomials; extend the process of taking powers and extracting roots to monomials when the latter results in a monomial with an integer exponent.

Examples

1 Which expression is equivalent to $6x^2y(3x)$?

A $6x^3y$
B $18x^2y$
C $6x^3$
D $18x^3y$

To multiply monomials, first multiply the numerical coefficients. Then multiply variables that have the same base by adding the exponents. Note that x^2 and x have the same base.

$$\begin{aligned} 6x^2y(3x) &= (6 \cdot 3)(x^2 \cdot x^1)(y) \\ &= 18x^3y \end{aligned}$$ **D**

2 Simplify $\frac{8a^2b^4c}{48a^5b^6c}$.

F $\frac{a^3b^2}{6}$
G $\frac{1}{6a^3b^2}$
H $\frac{1}{6a^3b^2c}$
J $6a^7b^{10}c^2$

To divide monomials, first divide the numerical coefficients. Then divide variables that have the same base by subtracting the exponents.

$$\begin{aligned} \frac{8a^2b^4c}{48a^5b^6c} &= \frac{8}{48}(a^{2-5})(b^{4-6})(c^{1-1}) \\ &= \frac{1}{6}a^{-3}b^{-2}c^0 \\ &= \frac{1}{6a^3b^2} \end{aligned}$$ **G**

3 Which expression is equivalent to $\sqrt{144x^8}$?

A $12x^2$
B $12x^3$
C $12x^4$
D $14x^6$

The square root of a product is equal to the product of the square roots.

$$\begin{aligned} \sqrt{144x^8} &= \sqrt{144} \cdot \sqrt{x^8} \\ &= \sqrt{12 \cdot 12} \cdot \sqrt{x^4 \cdot x^4} \\ &= 12x^4 \end{aligned}$$ **C**

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Standards Practice

Algebra and Functions 2.2 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Which expression is equivalent to $(4x^6y^8)(-3xy^5)$? **1** _____

A $-12x^6y^{40}$
B $12x^7y^{13}$
C $-12x^7y^{13}$
D $-12x^5y^3$

2 Which expression is equivalent to $\frac{12a^2b^3c^4}{27ab^5c^3}$? **2** _____

F $\frac{3}{7}abc$
G $\frac{4}{9}a^3b^8c^7$
H $\frac{4}{9}a^2b^{15}c^{12}$
J $\frac{4ac}{9b^2}$

3 Which expression is equivalent to $(-5x^4y^3)^3$? **3** _____

A $-125x^{12}y^9$
B $-5x^{12}y^3$
C $-125x^7y^6$
D $125x^{12}y^3$

4 If a and b are positive, which expression is equivalent to $\sqrt{100a^3b^2}$? **4** _____

F $10ab$
G $10ab\sqrt{a}$
H $10a^2b$
J $10ab\sqrt{ab}$

5 Which expression is equivalent to $(2m^2n^3)(4mn)^2$? **5** _____

A $16m^2n^2$
B $16m^4n^6$
C $32m^4n^5$
D $32m^4n^6$

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Standards Practice

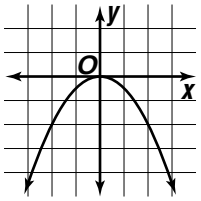
Algebra and Functions 3.1 (Grade 7)

AF 3.1

Graph functions of the form $y = nx^2$ and $y = nx^3$ and use in solving problems.

Examples

1 Which equation represents the function whose graph is shown?



A $y = x^2$

B $y = -x^2$

C $y = -\frac{1}{2}x^2$

D $y = \frac{1}{2}x^2$

The parabola opens downward, so the coefficient of x^2 must be negative. The point $(2, -2)$ is on the graph. The x- and y-coordinates make $y = -\frac{1}{2}x^2$ true but do not make $y = -x^2$ true. The correct equation is $y = -\frac{1}{2}x^2$. **C**

2 Which quadrants contain the graph of $y = x^3$?

F first and second quadrants

G first and third quadrants

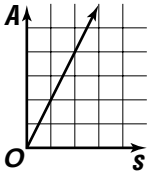
H first and fourth quadrants

J second and third quadrants

Check values of x: for positive values of x, x^3 is positive; for negative values of x, x^3 is negative. Therefore, the graph of $y = x^3$ is in the first and third quadrants. **G**

3 The formula for the area of a square is $A = s^2$. Which is the graph of this equation?

A



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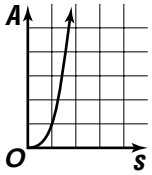
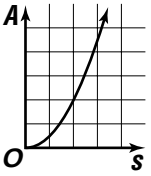
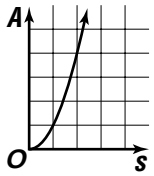


C



D



Check values of s and A. The graph should show a value of 0 for A when $s = 0$, a value of 1 for A when $s = 1$, and a value of 4 for A when $s = 2$. **D**

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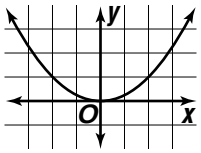
Standards Practice

Algebra and Functions 3.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Which equation represents the function graphed?



A $y = \frac{1}{4}x^2$

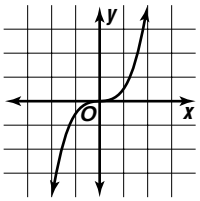
B $y = x^2$

C $y = \frac{1}{2}x^2$

D $y = 2x^2$

1 _____

2 Which equation represents the function graphed?



F $y = x^3$

G $y = \frac{1}{2}x^3$

H $y = -\frac{1}{2}x^3$

J $y = -x^3$

2 _____

3 At which points do the graphs of $y = x^2$ and $y = x^3$ intersect?

A (0, 0) and (−1, −1)

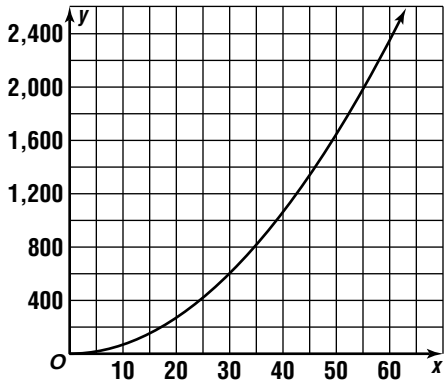
B (0, 0) and (−1, 1)

C (0, 0) and (1, −1)

D (0, 0) and (1, 1)

3 _____

4 The formula $y = 0.66x^2$ represents the number of miles x that can be seen when flying at a height of y feet. Use the graph to determine the approximate number of miles that can be seen at a height of 2,000 feet.



F about 60 miles

G about 55 miles

H about 50 miles

J about 45 miles

4 _____

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Standards Practice

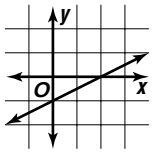
Algebra and Functions 3.3 (Grade 7)

AF 3.3

Graph linear functions, noting that the vertical change (change in *y*-value) per unit of horizontal change (change in *x*-value) is always the same and know that the ratio ("rise over run") is called the slope of a graph.

Examples

1 Which equation describes the graph shown?



A $y = x + 1$

B $y = \frac{1}{2}x - 1$

C $y = -\frac{1}{2}x + 1$

D $y = 2x - 1$

Notice that the line rises as x-values increase, so the slope is positive. Check points on the graph: when $x = 0$, $y = -1$; when $x = 2$, $y = 0$. The points $(0, -1)$ and $(2, 0)$ are on the line $y = \frac{1}{2}x - 1$. **B**

2 What is the slope of the line that contains the points (3, 1) and (5, 5)?

F -2

G $-\frac{1}{2}$

H $\frac{1}{2}$

J 2

The slope of the line is "rise over run ." For the given points, this ratio is $\frac{5-1}{5-3} = \frac{4}{2}$ or 2. **J**

3 A line contains the points $(0, -3)$, (1, 2), and $(2, y)$. What is the value of y?

A -3

B 1

C 3

D 7

The slope of a line is the same no matter which pair of points on the line you use to calculate "rise over run." Find the slope between the points $(0, -3)$ and (1, 2).

$$m = \frac{-3-2}{0-1} = \frac{-5}{-1} \text{ or } 5$$

The slope between (1, 2) and $(2, y)$ is also 5.

$$5 = \frac{2-y}{1-2}$$

$$-5 = 2 - y$$

$$y = 7$$ **D**

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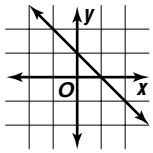
Standards Practice

Algebra and Functions 1.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 What is the slope of the line in the graph?



A -1
B 0
C 1
D 2

1 _____

2 A line with slope 5 contains the points (0, 3) and $(-2, y)$. What is the value of y?

F -13
G -7
H 7
J 13

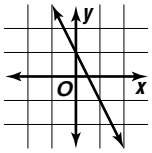
2 _____

3 Which equation does *not* have a straight line as its graph?

A $y = 0.5x + 5$
B $y = -8x$
C $y = |x|$
D $y = 2$

3 _____

4 Which equation describes the graph shown?



F $y = -2x$
G $y = -2x + 1$
H $y = -\frac{1}{2}x + 1$
J $y = 2x - 1$

4 _____

5 If a line has undefined slope, what is true of the line?

A The line is horizontal.
B The line has no y-intercept.
C The line is vertical.
D The line passes through the origin.

5 _____

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Standards Practice

Algebra and Functions 3.4 (Grade 7)

AF 3.4

Plot values of quantities whose ratios are always the same (e.g., cost to the number of an item, feet to inches, circumference to diameter of a circle). Fit a line to the plot and understand that the slope of a line equals the quantities.

Examples

1 The formula $C = pn$ can be used to determine the cost C of n items with a fixed price p. Suppose $p = \$6$. Which expression represents the value of C on the graph of $C = pn$?

A $6 + n$

B $6n$

C $\frac{n}{6}$

D $6 - n$

Substitute 6 for p in $C = pn$ to get $C = 6n$. **B**

2 The formula for the circumference of a circle is $C = \pi d$, where d is the diameter of the circle and $\pi \approx 3.14$. What is the slope of the line that represents the graph of $C = \pi d$?

F about 3.14

G about $3.14 - d$

H about $3.14 + d$

J about $\frac{3.14}{d}$

Since $C = \pi d$, the graph contains the points $(d, \pi d)$. If $d = 1$ and $d = 2$, the graph contains $(1, \pi)$ and $(2, 2\pi)$. The slope of the line containing these points is $\frac{2\pi - \pi}{2 - 1}$. Since $\pi \approx 3.14$, the slope is about 3.14. **F**

3 The equation $f = \frac{1}{12}i$ can be used to convert inches to feet. If the point $(i, 6)$ is on the graph of this equation, what is the value of i?

A 2

B 0.5

C 72

D 60

Replace f in the equation by 6 and solve for i.

$$6 = \frac{1}{12}i$$

$$12(6) = 12 \cdot \frac{1}{12}i$$

$$72 = i$$ **C**

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Standards Practice

Algebra and Functions 3.4 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 A flight from Chicago to Los Angeles maintains an average speed of 345 mi/h. If t represents the number of hours in flight and d represents distance traveled, which two points (t, d) could you use to graph $d = rt$? **1** _____

A (345, 1) and (0, 0)
B (1, 345) and (2, 690)
C (345, 1) and (690, 2)
D (1, 345) and (2, 345)

2 Which equation can be used to convert miles to feet? **2** _____

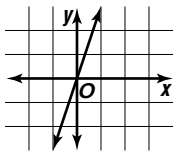
F $f = 5{,}280 + m$
G $f = \frac{m}{5{,}280}$
H $f = 5{,}280m$
J $f = 5{,}280 - m$

3 What point must be on the graph of $y = kx$? **3** _____

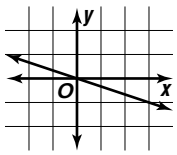
A (1, 1)
B (0, 1)
C (0, 0)
D (1, 0)

4 You can use the equation $y = \frac{1}{3}x$ to find the number of yards in x feet. **4** _____
Which of the following is the graph of this equation?

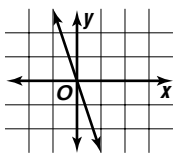
F



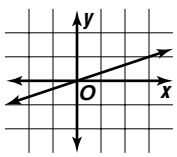
G



H



J



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Standards Practice

Algebra and Functions 4.1 (Grade 7)

AF 4.1

Solve two-step linear equations and inequalities in one variable over the rational numbers, interpret the solution or solutions from the context from which they arose, and verify the reasonableness of the results.

Examples

1 What is the solution of $1.5x - 5 = 4$?

A 13.5

B 6

C $\frac{2}{3}$

D -6

You need to get x by itself on one side of the equation. Add 5 to each side of $1.5x - 5 = 4$ to get $1.5x - 5 + 5 = 4 + 5$. Simplify: $1.5x = 9$. Now divide each side by 1.5 to obtain $\frac{1.5x}{1.5} = \frac{9}{1.5}$. Simplifying gives $x = 6$. If you replace x with 6 in the original equation, you get a true statement. **B**

2 Solve $\frac{a}{-5} \geq -8$.

F $a \geq 40$

G $a \leq -40$

H $a \geq -40$

J $a \leq 40$

Solve for a. First multiply each side by -5 and reverse the order of the inequality.

$$-5\left(\frac{a}{-5}\right) \leq -8(-5)$$

Then simplify.

$$a \leq 40$$

If you replace a in the original inequality by 40 or any number less than 40, you will get a true statement. **J**

3 Juanita challenged her classmates with this number puzzle. If you multiply a number by 3 and add 14, you get negative 10. What is the number?

A -8

B $-\frac{4}{3}$

C $\frac{4}{3}$

D 8

An equation for the puzzle is $3n + 14 = -10$. Solving for n gives the following.

$$\begin{aligned} 3n + 14 - 14 &= -10 - 14 \\ 3n &= -24 \\ \frac{3n}{3} &= \frac{-24}{3} \\ n &= -8 \end{aligned}$$

If you check -8 in Juanita's puzzle, you find that it works. **A**

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Standards Practice

Algebra and Functions 4.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 What is the solution of $4x + 7 = 43$? **1** _____

A 8
B 9
C 12.5
D 36

2 Solve $\frac{3a}{6} \leq -10$. **2** _____

F $a \leq -20$
G $a \geq 20$
H $a \leq 20$
J $a \geq -20$

3 Three charities will get equal shares of the profits from a school carnival. The profit from admission tickets is \$400, from refreshments, \$700, and \$850 from game tickets. How much will each charity get? **3** _____

A \$1,950
B \$650
C \$516.67
D \$366.67

4 Suppose you want to add 18 to a number to get a sum that is greater than or equal to 8. What is the smallest number you can use? **4** _____

F -18
G -10
H -8
J 8

5 What inequality describes the solutions of $-15 < n + 15$? **5** _____

A $n > 0$
B $n < -30$
C $n > 30$
D $n > -30$

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Standards Practice

Algebra and Functions 4.2 (Grade 7)

AF 4.2

Solve multistep problems involving rate, average speed, distance, and time or a direct variation.

Examples

1 In California's population, 26 people out of 100 are under 18 years of age. In a random group of 200 people, how many people would you expect to be under 18?

A 52 people
B 44 people
C 36 people
D 13 people

Write a proportion and solve by using cross products.

$$\frac{26}{100} = \frac{x}{200}$$
$$26 \cdot 200 = 100 \cdot x$$
$$5{,}200 = 100x$$
$$52 = x$$ **A**

2 Suppose y varies directly as x and $y = 16$ when $x = 10$. What is the value of x when $y = 40$?

F 4
G 25
H 64
J 160

A direct-variation equation has the form $y = kx$, where k is constant. Use the known values for x and y to find k.

$$16 = k \cdot 10$$
$$1.6 = k$$

Now use the equation $y = 1.6x$ to find x when $y = 40$.

$$40 = 1.6x$$
$$\frac{40}{1.6} = \frac{1.6x}{1.6}$$
$$25 = x$$ **G**

3 Bart drove 240 miles in 6 hours on Monday. If he drives at about the same speed on Tuesday, what is a reasonable distance he might drive in 5 hours on Tuesday?

A 300 mi
B 288 mi
C 200 mi
D 40 mi

Write a proportion and use cross products.

$$\frac{6}{240} = \frac{5}{d}$$
$$6d = 1{,}200$$
$$d = 200$$ **C**

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Algebra and Functions 4.2 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 If y varies directly as x and $y = 98$ when $x = 14$, what is y when $x = 11$? **1** _____

A 1,078
B 154
C 84
D 77

2 On the model of an airplane, 4 feet corresponds to 80 feet on the actual plane. What is the wingspan on the model if the plane's wingspan is 45 feet? **2** _____

F 1.8 ft
G 2.25 ft
H 20 ft
J 35 ft

3 Karen jogs at a rate of 4.5 miles per hour. How far does she jog in 12 minutes? **3** _____

A 0.9 mi
B 1 mi
C 1.125 mi
D 9 mi

4 The ratio of students to teachers is 18 to 1 at The Pulaski School. There are 792 students at the school. How many teachers are there? **4** _____

F 54 teachers
G 44 teachers
H 34 teachers
J 18 teachers

5 Blake is a geologist studying coastal rivers in southern California. She found that silt was deposited in a riverbed at the rate of 4 inches every 500 years. How many years would it take to deposit 5 inches of silt? **5** _____

A 400 years
B 550 years
C 625 years
D 800 years

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Standards Practice

Measurement and Geometry 1.1 (Grade 7)

MG 1.1

Compare weights, capacities, geometric measures, times, and temperatures within and between measurement systems (e.g., miles per hour and feet per second, cubic inches to cubic centimeters).

Examples

1 A speed limit of 65 milers per hour in Sacramento, CA, is about the same as what speed limit in kilometers per hour in Vancouver, BC? (1 mi ≈ 1.6 km)

A about 41 km/h
B about 66.6 km/h
C about 104 km/h
D about 400 km/h

Set up a proportion, and solve by using cross products. Each ratio compares kilometers to miles.

$$\frac{1.6}{1} = \frac{x}{65}$$

$$x = 104$$

65 mi/h is about 104 km/h. **C**

2 How many liters are equivalent to 2,500 milliliters?

F 0.25 L
G 2.5 L
H 25 L
J 250 L

Use the fact that 1,000 mL = 1 L to write a proportion.

$$\frac{1{,}000}{1} = \frac{2{,}500}{x}$$

$$x = 2.5$$

2,500 mL is equivalent to 2.5 L. **G**

3 How many square feet are there in a flower bed that measures 1.5 yards by 20 yards?

A 30 ft^2
B 90 ft^2
C 150 ft^2
D 270 ft^2

Convert 1.5 yd and 20 yd to feet and use the formula $A = \ell w$.
Since 1 yd = 3 ft, you know that 1.5 yd = 4.5 ft and 20 yd = 60 ft.
Use $\ell = 4.5$ and $w = 60$ in the formula.

$$A = 4.5 \cdot 60$$

$$= 270$$

The flower bed has an area of 270 ft^2. **D**

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Standards Practice

Measurement and Geometry 1.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Which speed in feet per second is equivalent to 60 miles per hour? **1** _____

A 5,280 ft/s
B 3,600 ft/s
C 880 ft/s
D 88 ft/s

2 What Fahrenheit temperature is equivalent to 30°C? Use the formula $F = 1.8C + 32$. **2** _____

F 86°F
G 62°F
H 54°F
J 38°F

3 California is the second largest rice-producing state in the United States, after Arkansas. California's average rice yield is 8,500 pounds per acre. How many tons is this? **3** _____

A 85 tons
B 8.5 tons
C 4.25 tons
D 3.25 tons

4 How many hours are there in a 365-day year? **4** _____

F 7,300 h
G 8,760 h
H 10,950 h
J 21,900 h

5 Which is a reasonable estimate for the mass of a bunch of bananas? **5** _____

A 1 oz
B 1 kg
C 1 T
D 1 g

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Standards Practice

Measurement and Geometry 1.2 (Grade 7)

MG 1.2 **Construct and read drawings and models made to scale.**

Examples ***1*** Oscar is making a scale model of a truck. On his model, 2 inches represents 6 feet on the actual truck. If the actual truck is 16 feet long, how long is Oscar's model?

A 8 in.

B $5\frac{1}{3}$ in.

C 3 in.

D $2\frac{2}{3}$ in.

Set up a proportion and solve it by using cross products. Let m be the length of the model. Each ratio compares model measures to actual measures.

$$\frac{2}{6} = \frac{m}{16}$$
$$6m = 32$$
$$m = 5\frac{1}{3}$$

Oscar's model is $5\frac{1}{3}$ in. long. **B**

2 In an atlas, a map of Ethiopia has a scale of 1 inch to 200 miles. At its widest point from west to east, the map is about 5 inches wide. About how wide is Ethiopia?

F 40 mi

G 400 mi

H 1,000 mi

J 10,000 mi

Since 1 in. on the map represents 200 actual miles, 5 in. on the map represents 200×5, or 1,000 mi. **H**

3 Sometimes, scale drawings are enlargements of actual objects. For a drawing of machine parts, 2 centimeters represents 3 millimeters on the actual part. How long is a screw that is 5 centimeters long on the drawing?

A 5 mm **B** 7.5 mm

C 9 mm **D** 10 mm

Use a proportion. Let ℓ be the length of the screw. Each ratio compares scale-drawing length in centimeters to actual length in millimeters.

$$\frac{2}{3} = \frac{5}{\ell}$$
$$2\ell = 15$$
$$\ell = 7.5$$

The screw is 7.5 mm long. **B**

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Standards Practice

Measurement and Geometry 1.2 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 On a model airplane, 2 feet corresponds to 40 feet on the actual plane. What is the wingspan on the model if the wingspan on the plane is 45 feet? **1** _____

A 20 ft
B 7.11 ft
C 2.25 ft
D 1.8 ft

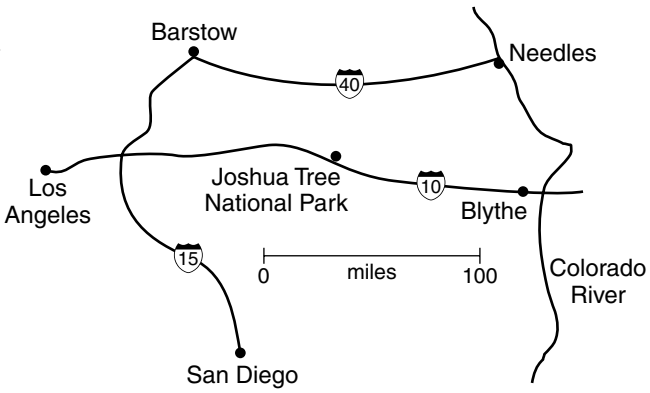
2 The distance from San Francisco to Sacramento is $3\frac{1}{16}$ inches on a map of the state. If the map scale is $1\frac{1}{16}$ inches to 20 miles, what is the actual distance from San Francisco to Sacramento? **2** _____

F about 60 mi
G about 75 mi
H about 85 mi
J about 150 mi

3 On a blueprint, 2 inches represents 10 feet. What ratio shows how inches on the blueprint are related to inches in the house? **3** _____

A 1:120
B 1:60
C 12:60
D 60:1

4 Joshua Tree National Park lies approximately halfway between Los Angeles and Blythe, along Route 10. What is the approximate distance from Los Angeles to the park? **4** _____



F 200 mi
G 150 mi
H 100 mi
J 50 mi

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Standards Practice

Measurement and Geometry 1.3 (Grade 7)

MG 1.3

Use measures expressed as rates (e.g., speed, density) and measures expressed as products (e.g., person-days) to solve problems; check the units of the solutions; and use dimensional analysis to check the reasonableness of the answer.

Examples

1 For short distances, a cheetah can run at a speed of about 80 miles per hour. At this speed, about how many feet would a cheetah run in 1 second?

A 1.3 ft/s
B 45 ft/s
C 117.3 ft/s
D 7,040 ft/s

To change mi/h to ft/s, use dimensional analysis. Start with the ratio $\frac{80 \text{ miles}}{1 \text{ hour}}$.

Then multiply by ratios equal to 1 in order to arrive at a ratio of feet to 1 second.

$$\frac{80 \cancel{\text{ miles}}}{1 \cancel{\text{ hour}}} \cdot \frac{1 \cancel{\text{ hour}}}{60 \cancel{\text{ minutes}}} \cdot \frac{1 \cancel{\text{ minute}}}{60 \text{ seconds}} \cdot \frac{5{,}280 \text{ feet}}{1 \cancel{\text{ mile}}} = \frac{80 \cdot 5{,}280 \text{ feet}}{60 \cdot 60 \text{ seconds}} \approx \frac{117.3 \text{ feet}}{1 \text{ second}}$$

The cheetah would run about 117.3 ft/s. **C**

2 Silver has a density of 10.5 g/cm^3. This means that the mass of 1 cubic centimeter of silver is 10.5 grams. What is the approximate mass of a cube of silver that measures 2.54 centimeters on each edge?

F 26.7 g
G 67.7 g
H 164 g
J 172.2 g

Find the volume of the cube in cubic centimeters.

$2.54^3 \approx 16.4 \text{ cm}^3$

Then multiply by the density.

$16.4 \text{ cm}^3 \cdot 10.5 \text{ g}/1 \text{ cm}^3 = 172.2 \text{ g}$

The cube of silver has a mass of about 172.2 g. **J**

3 Over the 20-year period from 1977 to 1997, the hourly minimum wage increased from \$2.30 to \$5.15. How much more did a worker earning the minimum wage earn for a 40-hour week in 1997 than in 1977?

A \$57
B \$92
C \$114
D \$206

The increase in the rate of pay was \$5.15 − \$2.30 or \$2.85 per hour. To find the increase in the amount of pay, multiply by 40 hours.

$\$2.85 \times 40 = \$114$ **C**

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Standards Practice

Measurement and Geometry 1.3 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Luz burned 275 calories in 25 minutes of jogging. At this rate, how many calories did she burn in 15 minutes of jogging? **1** _____

A 11 calories
B 150 calories
C 165 calories
D 225 calories

2 Jim's father earns $22.50 per hour as a bus driver. How much does he earn in a 7-hour day? **2** _____

F $3.21
G $157.50
H $1,575.00
J $15,750.00

3 Roger rides his bike at an average rate of 12 miles per hour. At this rate, how long does it take him to ride the 10 miles from his house to the nature center? **3** _____

A 120 min
B 90 min
C 50 min
D 40 min

4 A parachutist's speed close to the ground is about 20 feet per second. What is this speed in miles per hour? **4** _____

F about 19.9 mi/h
G about 13.6 mi/h
H about 1.36 mi/h
J about 1.0 mi/h

5 If 3 people working together can paint the exterior of a house in 4 days, how long would it take 2 people to do the same job? **5** _____

A 12 days
B 6 days
C $2\frac{2}{3}$ days
D $1\frac{1}{3}$ days

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Standards Practice

Measurement and Geometry 2.1 (Grade 7)

MG 2.1

Use formulas routinely for finding the perimeter and area of basic two-dimensional figures and the surface area and volume of basic three-dimensional figures, including rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, and cylinders.

Examples

1 What is the area of a right triangle with legs of 6 centimeters and 8 centimeters?

A 64 cm^2 **B** 48 cm^2
C 36 cm^2 **D** 24 cm^2

The area of a triangle is equal to $\frac{1}{2}$ the product of its base and its height. In a right triangle, either leg can be the base and either leg can be the height. Let the base be 6 cm and the height be 8 cm. Then

$$A = \frac{1}{2} \cdot 8 \cdot 6$$
$$= 24$$

The area of the triangle is 24 cm^2. **D**

2 What is the volume of a rectangular prism with length 2 feet, width 1.5 feet, and height 5 feet?

F 15 ft^3 **G** 10 ft^3
H 7.5 ft^3 **J** 3 ft^3

The volume of a rectangular prism is the product of its three dimensions.

$$V = \ell wh$$
$$= 2 \cdot 1.5 \cdot 5$$
$$= 15$$

The volume of the prism is 15 ft^3. **F**

3 A cylinder has a height of 10 inches and a radius of 4 inches. What is its approximate surface area? Use $\pi \approx 3.14$.

A 351.68 in^2 **B** 130.24 in^2
C 125.6 in^2 **D** 40 in^2

First find the lateral area of the cylinder. The lateral area is equal to the area of a rectangle with a base equal to the circumference of the cylinder and a height equal to the height of the cylinder. Then add the area of the two circular bases.

$$\text{surface area} = \text{lateral area} + \text{area of bases}$$
$$= 2\pi r \cdot h + 2(\pi r)$$
$$= 2\pi(4)(10) + 2\pi(4)^2$$
$$= 112\pi$$
$$\approx 351.68$$

The area is about 351.68 in^2. **A**

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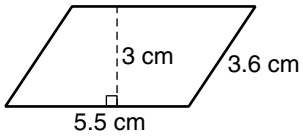
Standards Practice

Measurement and Geometry 2.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

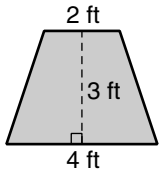
1 What is the perimeter of the parallelogram shown?



A 18.2 cm
B 16.5 cm
C 12.1 cm
D 9.1 cm

1 _____

2 What is the area of the trapezoid shown?



F 18 ft^2
G 12 ft^2
H 9 ft^2
J 6 ft^2

2 _____

3 What is the surface area of a cube with edges 2 feet long?

A 8 ft^2
B 12 ft^2
C 16 ft^2
D 24 ft^2

3 _____

4 To the nearest cubic inch, what is the volume of a cylinder with diameter 5 inches and height 12 inches? Use $\pi \approx 3.14$.

F 942 in^3
G 288 in^3
H 236 in^3
J 187 in^3

4 _____

5 An economy-size cereal box measures 12 inches by 8 inches by 3 inches. What is the volume of the cereal box?

A 312 in^3
B 288 in^3
C 156 in^3
D 96 in^3

5 _____

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Standards Practice

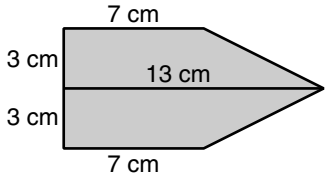
Measurement and Geometry 2.2 (Grade 7)

MG 2.2

Estimate and compute the area of more complex or irregular two- and three-dimensional figures by breaking the figures down into more basic geometric objects.

Examples

1 What is the area of the figure shown?



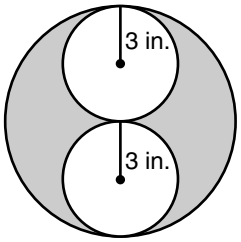
A 30 cm^2
B 33 cm^2
C 60 cm^2
D 120 cm^2

The figure is made up of two congruent trapezoids. Its area is the sum of the two areas. Use $A = \frac{1}{2}(b_1 + b_2)h$ to find the area of one trapezoid.

$A = \frac{1}{2}(7 + 13)3$ or 30

Since each trapezoid has an area of 30 cm^2, the figure has a total area of 30 cm^2 + 30 cm^2 or 60 cm^2. **C**

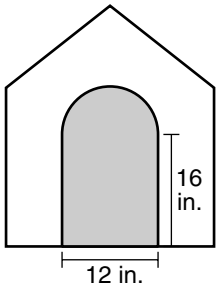
2 In the figure, the radius of each interior circle is 3 inches. What is the approximate area of the shaded region? Use $\pi \approx 3.14$.



F about 169.6 in^2
G about 113.1 in^2
H about 56.5 in^2
J about 28.3 in^2

The area of each small circle is πr^2 or 9π. So the two small circles have a total area of 18π. The large circle has a radius of 6 in. and an area of 36π. Subtract the combined area of the two small circles from the area of the large circle to find the area of the shaded region: $36\pi - 18\pi$ or 18π. Since $18\pi \approx 56.52$, the area of the shaded region is about 56.5 in^2. **H**

3 The opening of a doghouse has the shape shown. What is the area of the opening? Use $\pi \approx 3.14$.



A about 305 in^2
B about 249 in^2
C about 211 in^2
D about 192 in^2

The opening is a semicircle on top of a rectangle. The rectangle has an area of $16 \cdot 12$ or 192 in^2. The semicircle has an area of $0.5\pi(6^2)$ or about 57 in^2.

Add the two areas: 192 in^2 + 57 in^2 = 249 in^2. **B**

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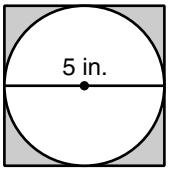
Standards Practice

Measurement and Geometry 2.2 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

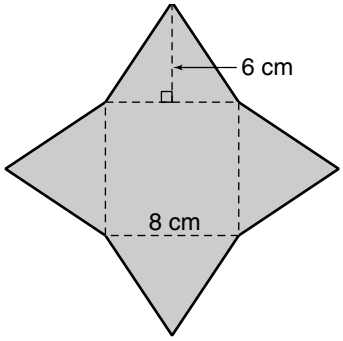
1 In the figure, the diameter of the circle is 5 inches. To the nearest square inch, what is the area of the shaded region? Use $\pi \approx 3.14$.



A about 54 in^2
B about 25 in^2
C about 20 in^2
D about 5 in^2

1 _____

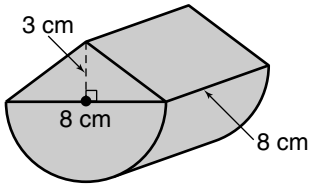
2 What is the area of the figure shown?



F 48 cm^2
G 64 cm^2
H 96 cm^2
J 160 cm^2

2 _____

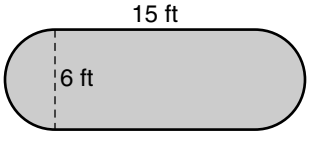
3 What is the best estimate of the surface area of the figure shown? Use $\pi \approx 3.14$.



A 250 cm^2
B 300 cm^2
C 350 cm^2
D 400 cm^2

3 _____

4 A table in a conference room has the dimensions shown in the diagram. What is the approximate area of the table top? Use $\pi \approx 3.14$.



F 28 ft^2
G 90 ft^2
H 104 ft^2
J 118 ft^2

4 _____

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Measurement and Geometry 2.3 (Grade 7)

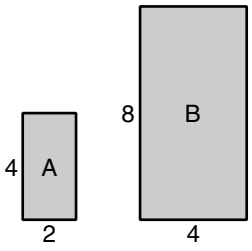
MG 2.3

Compute the length of the perimeter, the surface area of the faces, and the volume of a three-dimensional object built from rectangular solids. Understand that when the lengths of all dimensions are multiplied by a scale factor, the surface area is multiplied by the square of the scale factor and the volume is multiplied by the cube of the scale factor.

Examples

1 How do the dimensions and area of rectangle B compare to the dimensions and area of rectangle A?

A The dimensions and area are both multiplied by 2.
B The dimensions are multiplied by 2 and the area is multiplied by 4.
C The dimensions and area are both multiplied by 4.
D The dimensions are multiplied by 2 and the area stays the same.



The area of rectangle A is $2 \times 4 = 8$; the area of rectangle B is $4 \times 8 = 32$. Notice that the dimensions of rectangle B are 2 times those of rectangle A and the area of rectangle B is 4 times that of rectangle A. **B**

2 If you divide the length of the edge of a cube by 3, what happens to the surface area?

F It is divided by 3.
G It is increased by 3.
H It is divided by 9.
J It is decreased by 9.

The surface area of a cube is equal to $6e^2$, where e is the length of the edge. The length of the edge of the smaller cube is $\frac{e}{3}$, so its surface area is $6\left(\frac{e}{3}\right)^2 = \frac{6e^2}{9}$. Thus the surface area of a cube is divided by 9 when its edge length is divided by 3. **H**

3 If you double the dimensions of a rectangular prism, what happens to its volume?

A It is multiplied by 2.
B It is multiplied by 4.
C It is multiplied by 6.
D It is multiplied by 8.

If the dimensions of the original prism are ℓ, w, and h, then the dimensions of the new prism are 2ℓ, $2w$, and $2h$. The volume of the original prism is ℓwh and the volume of the new prism is $(2\ell)(2w)(2h)$ or $8\ell wh$. Therefore, the volume is multiplied by 8. **D**

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Measurement and Geometry 2.3 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 If the surface area of a rectangular prism is 52 cm^2, what is the surface area of the prism whose dimensions are double those of the original prism? **1** _____

A 416 cm^2
B 312 cm^2
C 208 cm^2
D 104 cm^2

2 The dimensions of rectangular prism B are $\frac{1}{3}$ as long as the dimensions of rectangular prism A. Which ratio is equivalent to $\frac{\text{volume of prism B}}{\text{volume of prism A}}$? **2** _____

F $\frac{1}{27}$
G $\frac{1}{9}$
H $\frac{1}{3}$
J $\frac{3}{1}$

3 A rectangular gift box has a surface area of 90 in^2. What is the surface area of a rectangular box whose dimensions are $\frac{2}{3}$ those of the gift box? **3** _____

A 40 in^2
B 50 in^2
C 60 in^2
D 75 in^2

4 Andrea drew a triangle on a sheet of paper. She used a copier to enlarge the triangle so that its dimensions were double the original dimensions. Then she made a copy that had dimensions $\frac{4}{5}$ those of the original triangle. What is the ratio of the area of the enlarged copy to the area of the reduced copy? **4** _____

F 25:4
G 5:2
H 2:5
J 4:25

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Standards Practice

Measurement and Geometry 2.4 (Grade 7)

MG 2.4

Relate the changes in measurement with a change of scale to the units used (e.g., square inches, cubic feet) and to conversions between units (1 square foot = 144 square inches or [1 ft^2] = [144 in^2], 1 cubic inch is approximately 16.38 cubic centimeters or [1 in^3] = [16.38 cm^3]).

Examples

1 If the area of a triangle is 2.5 square feet, what is the area of the triangle in square inches?

A 25 in^2
B 30 in^2
C 144 in^2
D 360 in^2

Because 1 ft = 12 in., 1 ft^2 = (12 · 12) in^2, or 144 in^2. Therefore, 2.5 ft^2 = 2.5 · 144 in^2 or 360 in^2. **D**

2 What is the volume in cubic meters of a rectangular prism that measures 50 centimeters by 60 centimeters by 150 centimeters?

F 0.45 m^3
G 4.5 m^3
H 45 m^3
J 450 m^3

The volume of the prism is 50 × 60 × 150 or 450,000 cm^3. Since 100 cm = 1 m, 1 m^3 = (100 × 100 × 100) cm^3 or 1,000,000 cm^3. Divide the volume in cubic centimeters by 1,000,000 to find the number of cubic meters: 450,000 ÷ 1,000,000 = 0.45. Therefore, the volume of the prism is 0.45 m^3. **F**

3 The area of a parallelogram is 18 square inches. What is the area of the parallelogram to the nearest square centimeter?

A 46 cm^2
B 92 cm^2
C 116 cm^2
D 117 cm^2

Because 1 in. = 2.54 cm, 1 in^2 is equivalent to $(2.54)^2$ cm^2 or about 6.45 cm^2. Therefore, 18 in^2 = (18 · 6.45) cm^2 or about 116 cm^2. **C**

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Standards Practice

Measurement and Geometry 2.4 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

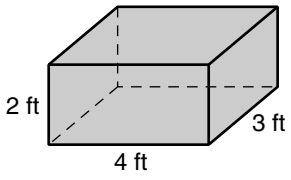
1 A football field is 100 yards long by 160 feet wide. What is the area of the football field in square feet? **1** _____

A 16,000 ft^2
B 44,000 ft^2
C 48,000 ft^2
D 55,000 ft^2

2 How many square centimeters are there in 1 square kilometer? **2** _____

F 10,000,000,000 cm^2
G 10,000,000 cm^2
H 100,000 cm^2
J 10,000 cm^2

3 What is the volume in cubic inches of the rectangular prism shown? **3** _____



A 41,472 in^3
B 1,728 in^3
C 288 in^3
D 24 in^3

4 A square mile of area is equivalent to about how many square kilometers? **4** _____

F 0.4 km^2
G 0.6 km^2
H 1.6 km^2
J 2.6 km^2

5 Which equality is true? **5** _____

A $1\ m^2 = 1{,}000\ km^2$
B $1\ km^2 = 1{,}000\ m^2$
C $1\ m^2 = \frac{1}{100}\ km^2$
D $1\ km^2 = 1{,}000{,}000\ m^2$

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Standards Practice

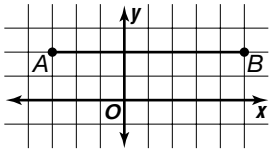
Measurement and Geometry 3.2 (Grade 7)

MG 3.2

Understand and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine their images under translations and reflections.

Examples

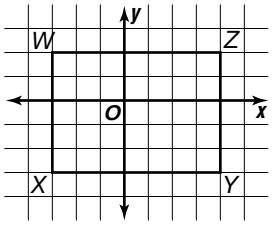
1 What is the length of $\overline{AB}$?



A 9 units
B 8 units
C -8 units
D -9 units

$\overline{AB}$ is a horizontal segment, since the points have the same y-coordinate. Find the absolute value of the difference of the x-coordinates: $|5 - (-3)| = 8$. $\overline{AB}$ is 8 units long. **B**

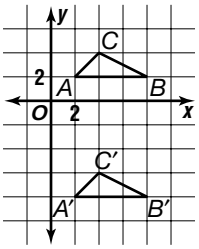
2 What is the area of rectangle $WXYZ$?



F 8 units^2
G 16 units^2
H 25 units^2
J 35 units^2

Find the length WX and width XY of the rectangle: $WX = |2 - (-3)| = 5$ and $XY = |4 - (-3)| = 7$. Therefore the area of $WXYZ$ is $7 \cdot 5$ or 35 units^2. **J**

3 How is $\triangle A'B'C'$ obtained from $\triangle ABC$?



A $\triangle ABC$ is translated 10 units down.
B $\triangle ABC$ is translated 8 units down.
C $\triangle ABC$ is reflected over the x-axis.
D $\triangle ABC$ is translated 10 units up.

Notice that the y-coordinates of points A', B', and C' are 10 less than the y-coordinates of A, B, and C, while the x-coordinates are the same. $\triangle A'B'C'$ is obtained by translating $\triangle ABC$ 10 units down. **A**

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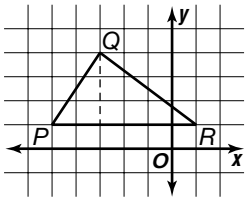
Standards Practice

Measurement and Geometry 3.2 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

Use the triangle shown for Questions 1–3.



1 What is the area of $\triangle PQR$? 1 _____

A 18 units^2
B 12 units^2
C 9 units^2
D 6 units^2

2 If $\triangle PQR$ is translated to the right 4 units, what are the coordinates of the image points, P', Q', and R'? 2 _____

F $P'(-1, 1)$, $Q'(0, 4)$, $R'(5, 5)$
G $P'(-1, 5)$, $Q'(1, 8)$, $R'(5, 5)$
H $P'(-5, 5)$, $Q'(2, 4)$, $R'(1, 6)$
J $P'(-1, 1)$, $Q'(1, 4)$, $R'(5, 1)$

3 If $\triangle PQR$ is reflected across the y-axis, what are the coordinates of R', the image of R? 3 _____

A $(1, -1)$
B $(-1, 1)$
C $(0, 1)$
D $(1, 0)$

4 The endpoints of a radius of a circle have coordinates $(-4, 4)$ and $(-7, 4)$. What is the circumference of the circle to the nearest tenth? Use $\pi \approx 3.14$. 4 _____

F 18.8 units
G 28.3 units
H 34.6 units
J 69.1 units

5 The y-coordinates of A and B are equal to 0. If rectangle $ABCD$ is reflected across the x-axis, which points are the same? 5 _____

A A and A', C and C'
B A and A', D and D'
C A and A', B and B'
D B and B', C and C'

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Standards Practice

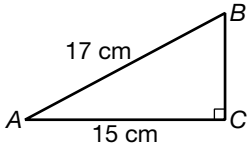
Measurement and Geometry 3.3 (Grade 7)

MG 3.3

Know and understand the Pythagorean theorem and its converse and use it to find the length of the missing side of a right triangle and the lengths of other line segments and, in some situations, empirically verify the Pythagorean theorem by direct measurement.

Examples

1 What is the length of $\overline{BC}$ in the triangle shown?



A 4 cm
B 8 cm
C 22.7 cm
D 64 cm

Notice that $\triangle ABC$ is a right triangle and that $\overline{AB}$ is its hypotenuse. Use the Pythagorean theorem. $AC^2 + BC^2 = AB^2$, or $BC^2 = AB^2 - AC^2$. Substitute the values the diagram gives for AB and AC.

$$\begin{aligned} BC^2 &= 17^2 - 15^2 \\ &= 289 - 225 \\ &= 64 \end{aligned}$$

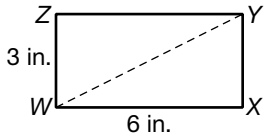
Since $8^2 = 64$, $BC = 8$ cm. **B**

2 If the sum of the squares of the lengths of two sides of a triangle is equal to the square of the length of the third side, what is true of the triangle?

F It is an obtuse triangle.
G It is a right triangle.
H It is an acute triangle.
J It is an equilateral triangle.

The question gives a statement of the hypothesis of the converse of the Pythagorean theorem. Therefore, the conclusion is that the triangle is a right triangle. **G**

3 What is the length of diagonal $\overline{WY}$ of rectangle $WXYZ$?



A about 3 in.
B about 5.2 in.
C about 6.7 in.
D about 9 in.

First notice that because opposite sides of a rectangle have the same length, $XY = 3$ in. Now use the Pythagorean theorem.

$$\begin{aligned} 6^2 + 3^2 &= WY^2 \\ 45 &= WY^2 \\ \sqrt{45} &= WY \\ 6.7 &\approx WY \end{aligned}$$

The diagonal is about 6.7 in long. **C**

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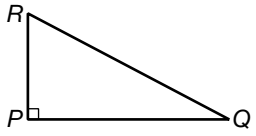
Standards Practice

Measurement and Geometry 3.3 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

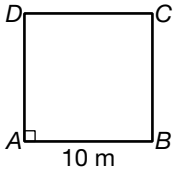
1 Which equation is true for right triangle PQR?



A $PR^2 - PQ^2 = RQ^2$
B $RQ^2 + PR^2 = PQ^2$
C $PQ^2 + PR^2 = RQ^2$
D $PQ^2 + RQ^2 = PR^2$

1 _____

2 What is the length of a diagonal of square $ABCD$?



F about 14 m
G 20 m
H about 40 m
J about 200 m

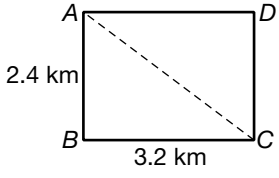
2 _____

3 Which triple of numbers could represent the lengths of the sides of a right triangle?

A 6, 8, 10
B 3, 3, 6
C 1, 2, 3
D 4, 9, 16

3 _____

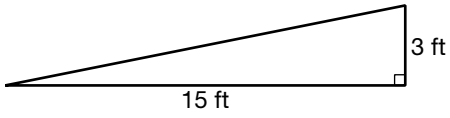
4 How much shorter is the direct path from A to C than the path that goes from A to B to C?



F 0.8 km
G 1.6 km
H 4 km
J 5.6 km

4 _____

5 A ramp rises 3 feet over a span of 15 feet. What is the length of the ramp to the nearest tenth of a foot?



A 16.2 ft
B 15.3 ft
C 14.7 ft
D 13.5 ft

5 _____

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Standards Practice

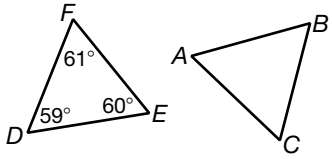
Measurement and Geometry 3.4 (Grade 7)

MG 3.4

Demonstrate an understanding of conditions that indicate two geometrical figures are congruent and what congruence means about the relationship between the sides and angles of the two figures.

Examples

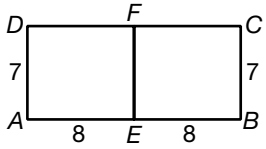
1 If $\triangle ABC \cong \triangle DEF$, what is the measure of $\angle B$?



A 58°
B 59°
C 60°
D 61°

The order of vertices in the congruence statement tells you that $\angle A$ corresponds to $\angle D$, $\angle B$ corresponds to $\angle E$, and $\angle C$ corresponds to $\angle F$. Since the measure of $\angle E$ is 60°, the measure of $\angle B$ is also 60°. **C**

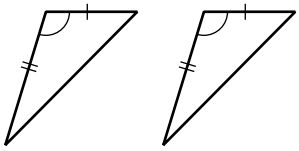
2 Which congruence statement is true about the rectangles shown?



F $AEFD \cong EFCB$
G $AEFD \cong BCFE$
H $AEFD \cong BEFC$
J $ADFE \cong CFEB$

To find a correct correspondence of vertices, use congruent sides. $\overline{AE}$ and $\overline{BE}$ both measure 8 units, so they are corresponding sides. $\overline{EF}$ is common to both figures; and $\overline{AD}$ and $\overline{BC}$ both measure 7 units, so they are corresponding sides. One correspondence that works is $A \leftrightarrow B$, $E \leftrightarrow E$, $F \leftrightarrow F$, and $D \leftrightarrow C$. Therefore, $AEFD \cong BEFC$. **H**

3 The triangles shown have congruent sides and angles as marked in the diagram. What can you conclude about the triangles?



A The two triangles are isosceles.
B The two triangles are not congruent.
C The two triangles are right triangles.
D The two triangles are congruent.

One set of conditions that permits you to conclude that two triangles are congruent is that two sides and the included angle of one triangle are congruent to two sides and the included angle of the other triangle. The markings in the diagram show that the two triangles are congruent. **D**

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Standards Practice

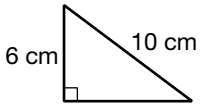
Measurement and Geometry 3.4 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

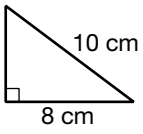
1 Which statement is always true about congruent triangles? **1** _____

A The triangles are right triangles.
B The triangles are obtuse triangles.
C The triangles are acute triangles.
D Corresponding sides are congruent.

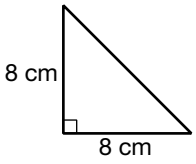
2 Which triangle is congruent to the triangle shown at the right? **2** _____



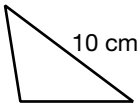
F



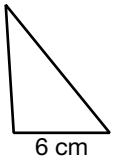
G



H



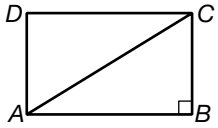
J



3 Pentagon $ABCDE \cong$ pentagon $MNOPQ$. Which of the following must be true? **3** _____

A $\angle A \cong \angle O$
B $AE = MQ$
C $\angle D \cong \angle M$
D $BC = PQ$

4 In the diagram, $ABCD$ is a rectangle. Which is a true statement about the two triangles in the diagram? **4** _____



F $\triangle ABC \cong \triangle ACD$
G $\triangle ADC \cong \triangle ACB$
H $\triangle ABC \cong \triangle CDA$
J $\triangle BCA \cong \triangle DCA$

5 Which statement is true? **5** _____

A Two equilateral triangles must be congruent.
B Two squares are always congruent.
C Two right triangles cannot be congruent.
D Some equilateral triangles are congruent.

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Name: Date:

Standards Practice

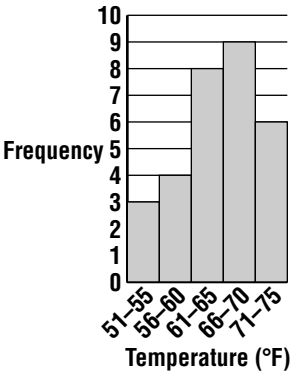
Statistics, Data Analysis, and Probability 1.1 (Grade 7)

SDAP 1.1

Know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data.

Examples

1 The histogram shows the daily high temperatures in Fahrenheit degrees in San Francisco during September. For how many days were the temperatures in the 66°–70° range?



A 9 days
B 8 days
C 6 days
D 4 days

Find the interval 66°–70° along the horizontal axis. Then locate the frequency along the vertical scale that aligns with the top of the bar for this interval. The temperatures were in the 66°–70° range for 9 days. **A**

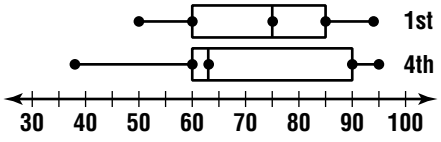
2 The list shows the number of books checked out daily over a 2-hour period at a branch library in Los Angeles. In a stem-and-leaf plot of the data, what are the leaves that correspond to the stem 2?

15 18 21 32 25 33 18 29 30 19 18 30 26 31

F 5, 5, 9
G 1, 5, 6, 9
H 2, 2, 5, 8
J 1, 3, 5

Any numbers from 20 to 29 have 2 as their stem. Checking the list shows that 21, 25, 26, and 29 are in this interval. The leaves for the stem 2 are 1, 5, 6, and 9. **G**

3 This box-and-whisker plot compares test scores for two algebra classes. Which statement about the information provided by the graph is *not* true?



A The fourth-period class had both the lowest scores and the highest score.
B The first quartile is the same for both classes.
C The highest scores are grouped more closely for the first-period class.
D The range of the middle 50% of the scores is greater for the first-period class.

Examining the graph confirms that statements A, B, and C are true. Since the box for the fourth-period class is longer, statement D is not true. **D**

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Standards Practice

Statistics, Data Analysis, and Probability 1.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

Use these data for Questions 1–3.

18, 40, 19, 38, 23, 35, 41, 20, 12, 82, 23, 15, 39, 32, 22, 38

1 In a histogram of the data, which interval or intervals correspond to a frequency of 0? **1** _____

A 0–19 **B** 20–39
C 40–59 **D** 60–79

2 What leaves correspond to the stem 4 in a stem-and-leaf plot of the data? **2** _____

F 0, 1 **G** 1
H 0 **J** 0, 1, 8

3 What is the range of the data? **3** _____

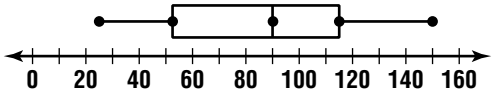
A 12 **B** 32
C 70 **D** 72

The prices for 13 nonstick frypans are listed. Use the data for Questions 4 and 5.

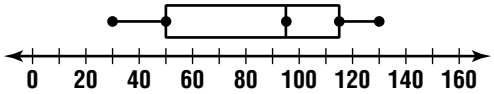
$115 $115 $70 $90 $130 $150 $50 $115 $30 $50 $25 $65 $95

4 Which is a box-and-whisker plot of the data? **4** _____

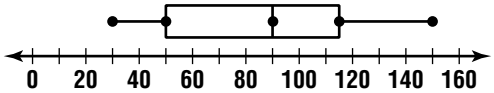
F



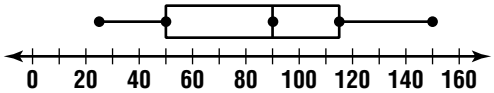
G



H



J



5 50% of the prices fall in what interval? **5** _____

A $50–$150 **B** $90–$115
C $50–$115 **D** $50–$90

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Standards Practice

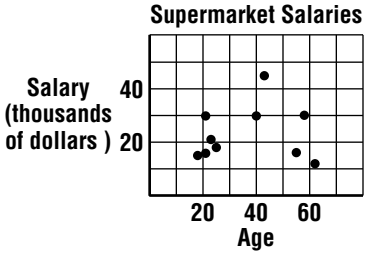
Statistics, Data Analysis, and Probability 1.2 (Grade 7)

SDAP 1.2

Represent two numerical variables on a scatterplot and informally describe how the data points are distributed and any apparent relationship that exists between the two variables (e. g., between time spent on homework and grade level).

Examples

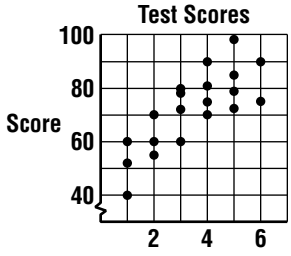
1 The ages and salaries of 10 employees at the James Supermarket are shown in the scatterplot. Which statement about the scatterplot is true?



A As age increases, salary increases.
B As age increases, salary decreases.
C As age increases, salary remains the same.
D Age and salary are not related.

The points in the scatterplot do not show any linear relation; they do not cluster close to a line with positive slope, a line with negative slope, nor a horizontal line. Therefore, age and salary are not related. **D**

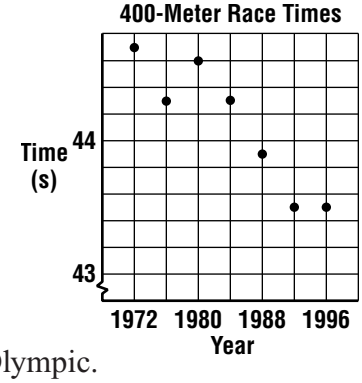
2 Test scores and time spent studying for a test are shown for 20 algebra students. What can you conclude about the relationship between hours of study and test scores?



F The amount of time spent studying did not improve test scores.
G The more time spent studying, the higher the test score.
H The more time spent studying, the lower the test score.
J Test scores are not related to time spent studying.

Because the points on the scatterplot lie close to a line with positive slope, test scores have a positive correlation with hours of study. This means that as the number of hours of study increased, test scores increased. **G**

3 The scatterplot shows the times to the nearest tenth of a second for the men's 400-meter run in the Olympic games from 1972 to 1996. What seems to be true about the scatterplot?



A The times generally decrease from Olympic to Olympic
B The times generally increase from Olympic to Olympic.
C The times and the years are unrelated.
D The times remain constant from Olympic to Olympic.

If a line is fitted to the points on the scatterplot, the line has a negative slope, so the correlation between times and years is negative. This means that as the years increase, the times for the run decrease. **A**

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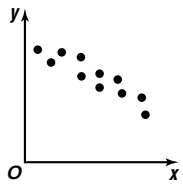
Standards Practice

Statistics, Data Analysis, and Probability 1.2 (Grade 7)

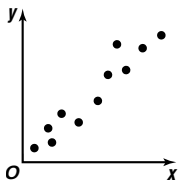
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Which scatterplot shows no correlation between the variables? **1** _____

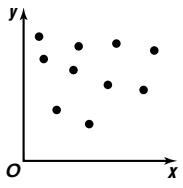
A



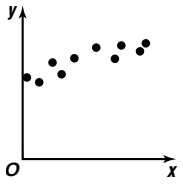
B



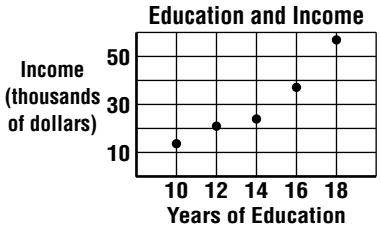
C



D

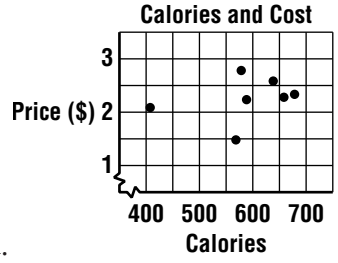


2 The scatterplot shows level of education as compared to income in thousands of dollars. What kind of correlation is shown? **2** _____



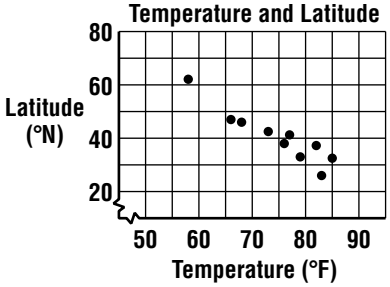
- **F** negative correlation
- **G** 0 correlation
- **H** a correlation of 1
- **J** positive correlation

3 The scatterplot shows the price of large hamburgers as compared to the calories the hamburgers contain at seven fast-food restaurants. What can conclude about a correlation between calories and price? **3** _____



- **A** The more calories, the higher the price.
- **B** Number of calories and price are not related.
- **C** The highest priced hamburger has the fewest calories.
- **D** The more calories, the lower the price.

4 The scatterplot shows the normal July temperatures and the latitudes north of the Equator for 10 locations in the United States. Which statement seems to be true? **4** _____



- **F** As temperature increases, latitude increases.
- **G** Temperature and latitude are not related.
- **H** As temperature increases, latitude decreases.
- **J** As latitude changes, temperature remains constant.

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Standards Practice

Statistics, Data Analysis, and Probability 1.3 (Grade 7)

SDAP 1.3

Understand the meaning of, and be able to compute, the minimum, the lower quartile, the median, the upper quartile, and the maximum of a data set.

Examples

The scores of 25 students on an algebra test are listed. Use the data for Examples 1–3.

63 72 66 78 82 75 94 77 69 74 68 60 96
78 89 61 75 95 60 79 83 71 79 62 67

1 What is the median score?

A 89
B 78
C 76
D 75

The median is the middle score when the scores are arranged in order from least to greatest. Because there are 25 scores, the middle score is the 13th one in the ordered arrangement. The middle, or median, score is 75. **D**

2 What is the range of the scores?

F 25
G 36
H 60
J 96

The range of the data is the difference between the maximum value and the minimum value. Therefore, the range is 96 − 60 or 36. **G**

3 The middle 50% of the scores are between which two numbers?

A 66.5 and 75
B 75 and 95
C 60 and 75
D 66.5 and 80.5

The middle 50% of the scores are between the lower and upper quartiles. The lower quartile is the average of the sixth and seventh numbers in the ordered set of scores: $(66 + 67) \div 2 = 66.5$. The upper quartile is the average of the nineteenth and twentieth numbers in the ordered set of scores: $(79 + 82) \div 2 = 80.5$. The middle 50% of the scores are between 66.5 and 80.5. **D**

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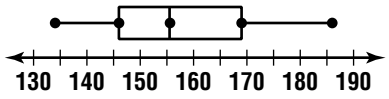
Standards Practice

Statistics, Data Analysis, and Probability 1.3 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

The box-and-whisker plot summarizes the average winning speeds in the Indianapolis 500 auto race for the years 1988–1997. Use the plot for Questions 1–3.



1 What is the range of the data? **1** _____

A 52
B 40
C 34
D 22

2 What is the median of the data? **2** _____

F 146
G 155.5
H 168
J 186

3 Between which two values will you find the top 50% of the data? **3** _____

A 134 and 155.5
B 168 and 186
C 155.5 and 168
D 155.5 and 186

4 What is the median of the top 50% of the data called? **4** _____

F the median
G the lower quartile
H the upper quartile
J the maximum value

5 Which number must be an element of the data set? **5** _____

A the median
B the lower quartile
C the maximum value
D the range

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Standards Practice

Mathematical Reasoning 1.1 (Grade 7)

MR 1.1

Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.

Examples

1 In exercise class, the instructor has participants spend x minutes on the treadmill, twice as long on the exercise bike, and 3 times as long in the swimming pool. Which expression represents the amount of time spent in the pool?

A $\frac{1}{3}x$

B $x + 3$

C $3x$

D $3 - x$

Because x represents the amount of time on the treadmill and the amount of time spent swimming is 3 times as great, $3x$ represents the amount of time spent in the pool. **C**

2 What should you do first to find the average of this set of numbers?

94, 118, 121, 94, 121, 140, 106

F Put the numbers in order from least to greatest.

G Add the numbers.

H Find the middle number.

J Divide each number in half.

The average of the numbers is equal to the sum of the numbers divided by the number of numbers. Therefore, the first step is to find the sum. **G**

3 Andrea bought 6 oranges for $1.80 and 5 bananas. What do you need to know to find out how much she paid in all for the oranges and bananas?

A the price per pound for oranges

B the price per pound for bananas

C how much she paid for each orange

D how much she paid for the 5 bananas

To find the total amount she paid for oranges and bananas, you need to add the amount she paid for the 5 bananas to $1.80. Since this information is not given, it is what you need to know. **D**

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Standards Practice

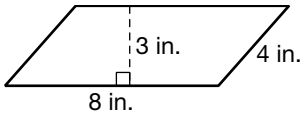
Mathematical Reasoning 1.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Which pattern can you use to tell if a number is divisible by 3? **1** _____

A The last digit is 3.
B The number is odd.
C The sum its digits is divisible by 3.
D The number is even.

2 Which information in the diagram do you need to find the area of the parallelogram? **2** _____



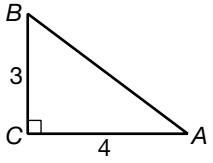
F the side lengths 8 in. and 4 in.
G the base 8 in. and the altitude 3 in.
H the altitude 3 in. and the side length 4 in.
J All the information is needed.

3 The price of a movie at the Rialto is given for 5 recent years. What can you observe from the table to predict the price of a movie in 2003? **3** _____

Year	1997	1998	1999	2000	2001
Movie Price ($)	7.75	8.00	8.25	8.50	8.75

A The price increases 25¢ each year.
B The price has increased by $1.
C The price will double in 2 years.
D The price will be less than $4 in 2 years.

4 If you use the formula $c^2 = a^2 + b^2$ to find the length of the hypotenuse of $\triangle ABC$, what should you do first? **4** _____



F Add 3 and 4.
G Take the square root of 3 and 4.
H Find the product of 2, 3, and 4.
J Square 3 and 4.

5 The lengths of the sides of a triangle are consecutive even integers. The perimeter of the triangle is 48 inches. Which expressions can you use to represent the lengths of the three sides? **5** _____

A $n + 1, n + 2, n + 3$
B $n, 2n, 48 - 2n$
C $n, n + 2, n + 4$
D $n, n + 1, n + 2$

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Standards Practice

Mathematical Reasoning 1.2 (Grade 7)

MR 1.2

Formulate and justify mathematical conjectures based on a general description of the mathematical question or problem posed.

Examples

1 A first triangle is congruent to a second triangle and the second triangle is congruent to a third triangle. What is a reasonable conjecture?

A The third triangle is twice the size of the first triangle.
B The first triangle is congruent to the third triangle.
C The first triangle is not congruent to the third triangle.
D The first and third triangles are the same triangle.

The property of congruence is transitive. Thus, $\triangle ABC \cong \triangle DEF$ and $\triangle DEF \cong \triangle GHI$ implies that $\triangle ABC \cong \triangle GHI$. **B**

2 The table shows the maximum number of intersections possible with 2, 3, 4, 5, and 6 segments. How many intersections do you think would be possible with 8 segments?

Number of segments	2	3	4	5	6
Number of intersections	1	3	6	10	15

F 21 intersections
G 28 intersections
H 30 intersections
J 32 intersections

As the number of segments increases, the number of intersections increases. The number of intersections increases in the pattern $+2$, $+3$, $+4$, $+5$. Since there are 15 intersections possible with 6 segments, there would be $15 + 6$ or 21 intersections possible with 7 segments, and $21 + 7$ or 28 possible with 8 segments. **G**

3 Study the pattern in the fractions shown. What is a reasonable conjecture about the decimal for $\frac{9}{11}$?

$$\frac{1}{11} = 0.0909\ldots \qquad \frac{2}{11} = 0.1818\ldots \qquad \frac{4}{11} = 0.3636\ldots$$

A 0.9999…
B 0.8181…
C 0.7272…
D 0.4545…

From the examples given, a reasonable conjecture is that the repeating digits are the product of 9 and the numerator of the fraction. Thus, it is reasonable to guess that $\frac{9}{11} = 0.8181\ldots$. **B**

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Standards Practice

Mathematical Reasoning 1.2 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

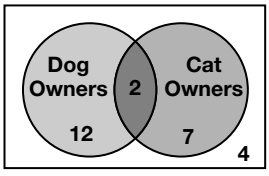
1 The radius of a circle is an integer. Which is a reasonable conjecture about the area of the circle? **1** _____

A It is a rational number.
B It is an integer.
C It is an irrational number.
D It is less than 3.

2 Lines a, b, and c are in the same plane. Line a is perpendicular to line b and line b is perpendicular to line c. Which is a reasonable conjecture about the relationship between lines a and c? **2** _____

F Line a is parallel to line c.
G Line a is perpendicular to line c.
H Lines a and b are the same line.
J Lines a and c intersect.

3 The Venn diagram shows the results of Martha's poll of pet owners. Which statement is *not* justified by the diagram? **3** _____



A 25 people were surveyed.
B 14 people have only dogs.
C 4 people have no cats or dogs.
D 2 people have both cats and dogs.

4 One famous conjecture in mathematics is that every even number from 6 on can be written as the sum of two odd prime numbers. Which way of writing 100 does *not* illustrate the conjecture? **4** _____

F $3 + 97 = 100$
G $41 + 59 = 100$
H $53 + 47 = 100$
J $31 + 69 = 100$

5 The sum of the measures of the angles of a triangle is 180°; the sum of the measures of the angles of a quadrilateral is 360°; the sum of the measures of the angles of a pentagon is 540°. Which is a reasonable conjecture about the sum of the angle measures in a polygon with n sides? **5** _____

A $S = n \cdot 60°$
B $S = (n - 2) \cdot 180°$
C $S = n \cdot 90°$
D $S = n \cdot 180°$

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Standards Practice

Mathematical Reasoning 2.1 (Grade 7)

MR 2.1 **Use estimation to verify the reasonableness of calculated results.**

Examples

1 Carlos used a calculator to multiply 75.3 by 62. Which of the following might he use to check the calculator results?

A 800×60
B 70×60
C 80×6
D 80×60

To estimate the product, round 75.3 to 80 and 62 to 60. The product 80×60 will give a good estimate. **D**

2 The Bilt-Rite Company has projected a 17% increase in sales for the coming year. Its sales this year were $8,213,000. What is a reasonable estimate for sales in the coming year?

F $9,600,000
G $1,600,000
H $960,000
J $160,000

With the projected increase, next year's sales will be 117% of this year's. Round 117% to 120% and round $8,213,000 to $8,000,000: $8{,}000{,}000 \times 1.2 = 9{,}600{,}000$. **F**

3 Admission tickets to an amusement park cost $26.95. You want to be sure you have enough money for 16 tickets. Which is the best estimate to use for the cost of 16 tickets?

A $\$26 \times 20$
B $\$27 \times 20$
C $\$27 \times 10$
D $\$26 \times 10$

In this case, the estimate should be high to make sure that you have enough money. Rounding both numbers up will give the best estimate. Round $26.95 to $27 and round 16 to 20. **B**

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Mathematical Reasoning 2.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Sharon is planning a trip to a state park that is 100 miles away. Her car gets about 24 miles per gallon, and her tank is almost empty. If gas costs $1.89 per gallon, how much should she plan to spend on gas for the round trip? **1** _____

A about $10
B about $16
C about $20
D about $9.50

2 Raul was astonished that the few groceries he bought cost $29.88. The cash register receipt showed these amounts: **2** _____

2.98, 1.17, 8.04, 3.79, 4.22, 6.58, 3.10.

Which of the following will give the best estimate of the cost of the groceries?

F $2 + 1 + 8 + 3 + 4 + 6 + 3$
G $3 + 1 + 8 + 4 + 4 + 7 + 3$
H 3×7
J 8×7

3 Which gives the best estimate of $7{,}894 \div 17$? **3** _____

A $7{,}000 \div 20$
B $8{,}000 \div 10$
C $8{,}000 \div 20$
D $7{,}000 \div 10$

4 Jennifer's quiz scores in math for the first 5 weeks were 70, 80, 85, 95, and 100. She calculated her average to be 86. Which of the following is the best estimate to use for checking her calculation? **4** _____

F $(70 + 80 + 80 + 80 + 100) \div 5$
G $(70 + 80 + 80 + 90 + 100) \div 5$
H $(70 + 80 + 90 + 90 + 100) \div 5$
J $(70 + 80 + 90 + 100 + 100) \div 5$

5 If 32% of a number is 14, what is a quick way to estimate the number? **5** _____

A Multiply 14 by 0.3.
B Multiply 14 by $\frac{1}{3}$.
C Divide 14 by 3.
D Multiply 14 by 3.

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Standards Practice

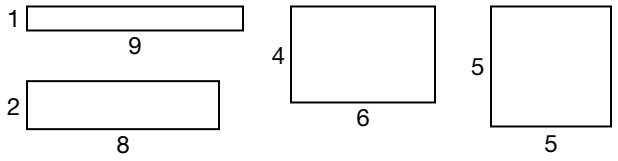
Mathematical Reasoning 2.3 (Grade 7)

MR 1.1

Estimate unknown quantities graphically and solve for them by using logical reasoning and arithmetic and algebraic techniques.

Examples

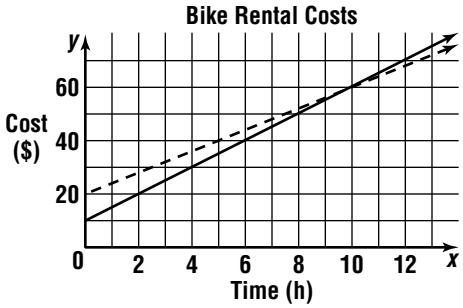
1 The perimeter of each rectangle shown is 20 units. Which are the dimensions of the rectangle with the greatest area?



A 5×5
B 1×9
C 4×6
D 2×8

Compute areas: $5 \times 5 = 25$ units^2; $1 \times 9 = 9$ units^2; $4 \times 6 = 24$ units^2; $2 \times 8 = 16$ units^2. The 5×5 rectangle, or square, has the greatest area. **A**

2 The solid line shows the cost of renting a bike at \$5 per hour with a deposit of \$10. The dashed line shows the cost of renting a bike at \$4 per hour with a deposit of \$20. For how many hours would you need to rent a bike to make it cheaper to use the second plan?



F more than 4 hours
G more than 5 hours
H more than 10 hours
J more than 20 hours

The equation for the solid line is $y = 5x + 10$ and the equation for the dashed line is $y = 4x + 20$. The lines intersect at (10, 60). From that point on, the dashed line is below the solid line. Thus the second plan is cheaper after 10 hours. **H**

3 In a basketball tournament, each of 8 teams must play each of the other teams once. How many games will be played?

A 16 games
B 21 games
C 28 games
D 64 games

Use diagrams and logic to determine the number of games. Label the teams A through H. Team A's pairings:

A—B A—C A—D A—E A—F A—G A—H 7 games

Team B's additional pairings:

B—C B—D B—E B—F B—G B—H 6 games

By similar reasoning, Team C will be paired with five additional teams D through H, and so on. Thus, there will be $7 + 6 + 5 + 4 + 3 + 2 + 1$ or 28 games. **C**

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Standards Practice

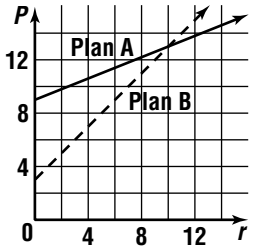
Mathematical Reasoning 2.3 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

Two pricing plans for an amusement park are listed.

Plan A: \$9 plus 40¢ per ride
Plan B: \$3 plus \$1 per ride

The graph shows the two plans. Use the information for Questions 1–4.



1 Which equation represents the price for Plan A? **1** _____

A $P = 4r + 900$
B $P = 0.4r + 9$
C $P = 9 - 0.4r$
D $P = 0.4r(9)$

2 Which equation represents the price for Plan B ? **2** _____

F $P = 100r + 3$
G $P = 3r - 1$
H $P = 3r$
J $P = r + 3$

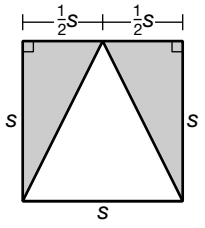
3 When are the prices the same? **3** _____

A for 13 rides
B for 11 rides
C for 10 rides
D for 9 rides

4 When is it cheaper to use Plan A? **4** _____

F for more than 10 rides
G for fewer than 10 rides
H for 10 or more rides
J for exactly 10 rides

5 What is the area of each shaded triangle in the figure? **5** _____



A $\frac{1}{2}s^2$
B $\frac{1}{3}s^2$
C $\frac{1}{4}s^2$
D $\frac{1}{4}s$

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Standards Practice
Mathematical Reasoning 2.4 (Grade 7)

MR 2.4 **Make and test conjectures by using both inductive and deductive reasoning.**

Examples ***1*** Marie tested the sums of several pairs of odd numbers and decided that the sum of any two odd numbers is even. Which algebraic equation best supports this conjecture?

A $(2n + 1) + (2k + 1) = 2(n + k) + 2$
B $(2n + 1) + (2n + 1) = 4n + 2$
C $(2n + 2) + (2k + 2) = 2(n + k) + 4$
D $2n + (2n + 1) = 4n + 1$

All of the equations are true, but only the first one shows that the sum of any two odd numbers is even. If n and k are whole numbers, then $2n + 1$ and $2k + 1$ represent any two odd integers. The sum, $2(n + k) + 2$ must be even because $2(n + k)$ is even and adding 2 to an even number results in an even number. **A**

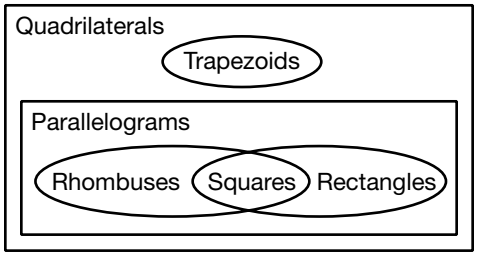
2 The pattern shows the sum of the first n odd numbers for $n = 2$, 3, 4, and 5. What conjecture is reasonable for the sum of the first 100 odd numbers?

$1 + 3 = 4 = 2^2$ $\qquad$ $1 + 3 + 5 = 9 = 3^2$
$1 + 3 + 5 + 7 = 16 = 4^2$ $\qquad$ $1 + 3 + 5 + 7 + 9 = 25 = 5^2$

F 100
G 1,000
H 10,000
J 100,000

From the pattern, a reasonable conjecture is that the sum of the first n odd numbers is equal to n^2. Therefore, it seems reasonable that the sum of the first 100 odd numbers is equal to 100^2, or 10,000. **H**

3 The Venn diagram shows how quadrilaterals are related. Which statement *cannot* be deduced from the diagram?



A Every square is a rectangle.
B No trapezoid is a parallelogram.
C Every rhombus is a square.
D Every rectangle is a parallelogram.

Notice that the diagram shows that every square is a rhombus because the region representing squares is totally contained within the region representing rhombuses. But it shows that not every rhombus is a square because parts of the region representing rhombuses is outside the region representing squares. Therefore, you cannot conclude that every rhombus is a square. **C**

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Mathematical Reasoning 2.4 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 A famous and useful sequence in mathematics is the pattern of numbers shown. What is the tenth number in the pattern? **1** _____

1, 1, 2, 3, 5, 8, 13, …

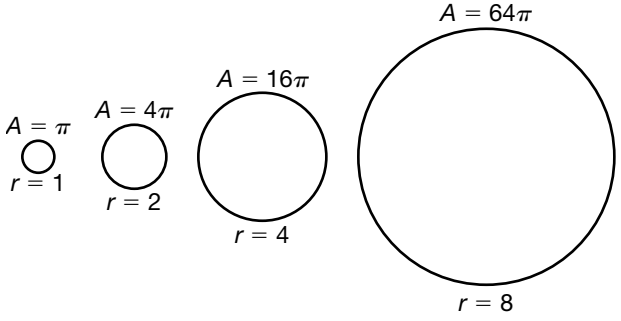
A 21 **B** 34
C 55 **D** 89

2 Which statement justifies this statement? **2** _____

Except for 2, every prime number must be odd.

F Odd numbers have just 2 divisors.
G Every even number greater than 2 has at least 3 divisors.
H An odd number is not divisible by 2.
J The number 2 is prime.

3 The diagrams show what happens to the area of a circle when the radius is doubled. Which statement is true about the effect of doubling the radius? **3** _____



A The area is multiplied by 2. **B** The area is multiplied by π.
C The area is multiplied by 16. **D** The area is multiplied by 4.

4 Dwayne tried several numbers in the expression $(2n)^2 + 1$ and decided that a prime number results when n is replaced by a whole number. For which replacement does the expression *not* produce a prime number? **4** _____

F 1 **G** 2
H 3 **J** 4

5 Gwen says that every number that ends with the digit 4 is divisible by 4. Which number provides a counterexample? **5** _____

A 14 **B** 24
C 44 **D** 64

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Standards Practice

Mathematical Reasoning 3.1 (Grade 7)

MR 3.1

Evaluate the reasonableness of the solution in the context of the original situation.

Examples

1 There are seven starting salary categories for various jobs at a firm that employs 145 people. The starting salaries are: \$150,000, \$80,000, \$50,000, \$40,000, \$30,000, \$30,000, \$18,000. What measure of central tendency would you use to represent the "typical" starting salary?

A median
B mean
C mode
D none of these

Because you do not know how many employees are in each category, none of the given measures of central tendency represents the typical salary. Without more information, you cannot decide what the typical salary might be. **D**

2 How many minibuses that hold 16 passengers are needed to take 70 students on a field trip?

F 4 minibuses
G 4.4 minibuses
H 5 minibuses
J 6 minibuses

The quotient of 70 and 16 is 4.375. From the context of the problem, you need a whole-number solution. Since 4 buses are not enough, 5 buses are needed. **H**

3 Jane has a piece of fabric $1\frac{1}{2}$ yards long and 8 inches wide. She wants to make placemats that are 12 inches long. How many placemats can she make?

A 4 placemats
B $4\frac{1}{2}$ placemats
C 5 placemats
D 8 placemats

Each placemat is 1 ft long; the $1\frac{1}{2}$ yard of fabric is equivalent to $4\frac{1}{2}$ feet.

Jane has enough fabric for 4 placemats, with $\frac{1}{2}$ feet of fabric left over. **A**

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Mathematical Reasoning 3.1 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Two sides of a triangle measure 6 centimeters and 10 centimeters. Which *cannot* be the measure of the third side? **1** _____

A 5 cm
B 8 cm
C 15 cm
D 20 cm

2 The measures in degrees of the angles of a quadrilateral are x, $2x$, $3x$, and $4x$. How many of the angles measure more than 90°? **2** _____

F four angles
G three angles
H two angles
J one angle

3 A number between 1 and 10 is multiplied by a fraction between 0 and 1. The product is *always* between what two numbers? **3** _____

A 0 and 10
B 0 and 1
C 1 and 10
D 0.1 and 10

4 Each angle of an equilateral triangle measures 60°; each angle of a square measures 90°; each angle of a regular pentagon measures 108°. What is a reasonable estimate of the measure of each angle of a regular hexagon? **4** _____

F 180°
G 135°
H 120°
J 100°

5 A number greater than 0 is divided by a number between 0 and 1. What is *always* true of the quotient? **5** _____

A It is less than the dividend.
B It is less than the divisor.
C It is greater than either the dividend or the divisor.
D It is equal to the dividend.

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Standards Practice

Mathematical Reasoning 3.3 (Grade 7)

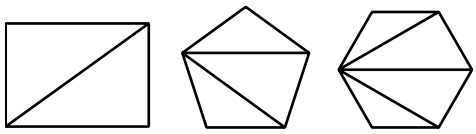
MR 3.3

Develop generalizations of the results obtained and the strategies used and apply them to new problem situations.

Examples

1 How many triangles are formed when you draw all the diagonals from one vertex of a polygon with 12 sides?

A 12 triangles
B 10 triangles
C 9 triangles
D 4 triangles



First solve the problem for polygons with fewer sides to see if there is a pattern. Notice that there are 2 triangles for a 4-sided polygon, 3 triangles for a 5-sided polygon, and 4 triangles for a 6-sided polygon. Thus, the number of triangles formed for an n-sided polygon is $n - 2$. This means that for a 12-sided polygon, there are 10 triangles formed. **B**

2 What is the sum of the first 10 even numbers?

F 40 **G** 50
H 110 **J** 200

Write the first ten even numbers as a sum.

$$2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20$$

$$22$$

For the first 10 even numbers, there would be 5 sums of 22; therefore, the sum of the first 10 even numbers is $5 \times 22 = 110$. **H**

3 To raise funds for a new classroom computer, students in an algebra class agreed to begin with a donation of 1¢ and to increase the amount donated by 1¢ per day for a total of 30 days. How much would each student donate in 30 days?

A \$.31 **B** \$4.65
C \$9.00 **D** \$9.30

First, solve some simpler problems. In four days, each student would donate $1 + 2 + 3 + 4 = 10¢$. If you pair the first and last addends and the middle addends, the amount can be thought of as $2 \times 5 = 10¢$. In four days, each student would donate $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 = 36¢$. Again pair addends to rewrite the sum as $4 \times 9 = 36¢$. Thus, the sum for 30 addends can be found by noticing that there would be 15 addends of 31. So the total donated by each student in 30 days would be $15 \times 31 = 465¢$, or \$4.65. **B**

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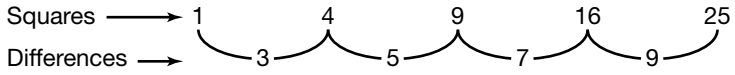
Mathematical Reasoning 3.3 (Grade 7)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 In a supermarket display, cereal boxes are stacked with 15 boxes on the bottom row, 13 boxes on the next row, 11 boxes on the third row, and so on. The top row has one box. How many boxes are there in the stack? **1** _____

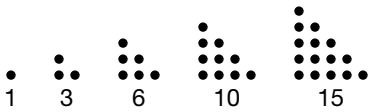
A 48 boxes
B 50 boxes
C 56 boxes
D 64 boxes

2 How much greater is the 25th square number than the 24th square number? Use this pattern to help you. **2** _____



F 47
G 49
H 50
J 51

3 The first five triangular numbers are shown. How many dots form the 12th triangular number? **3** _____



A 66 dots
B 78 dots
C 80 dots
D 91 dots

4 Twelve outfits consisting of a jacket, a shirt, and a pair of slacks can be formed from 2 jackets, 3 shirts, and 2 pairs of slacks. How many outfits can be formed from 4 jackets, 6 shirts, and 4 pairs of slacks? **4** _____

F 24 outfits
G 48 outfits
H 64 outfits
J 96 outfits

5 A 3-4-5 triangle is a right triangle with side lengths 3, 4, and 5. One way to form a triangle that is similar to the 3-4-5 triangle is to multiply the length of each side by 2 to get a 6-8-10 triangle. Which of the following triangles is similar to these two triangles? **5** _____

A 5-12-13 triangle
B 10-24-26 triangle
C 9-12-15 triangle
D 12-16-32 triangle

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Standards Practice

Algebra 2.0 (Algebra 1)

ALG 2.0

Students understand and use such operations as taking the opposite, finding the reciprocal, and taking a root. They understand and use the rules of exponents.

Examples

1 What is the value of $-\left(-\frac{1}{2} - \frac{2}{3}\right) \div \frac{5}{6}$?

A $-\frac{7}{5}$ **B** $-\frac{5}{36}$

C $\frac{1}{5}$ **D** $\frac{7}{5}$

First write the fractions inside the parentheses with a common denominator:

$$-\left(-\frac{1}{2} - \frac{2}{3}\right) \div \frac{5}{6} = -\left(-\frac{3}{6} - \frac{4}{6}\right) \div \frac{5}{6}$$

$$= -\left(-\frac{7}{6}\right) \div \frac{5}{6} \quad \textit{Simplify the dividend.}$$

$$= \frac{7}{6} \div \frac{5}{6}$$

$$= \frac{7}{6} \times \frac{6}{5} \quad \textit{Multiply by the reciprocal of the divisor.}$$

$$= \frac{7}{5}$$ **D**

2 Simplify $8x(2x^3)^2$.

F $16x^6$ **G** $32x^6$

H $32x^7$ **J** $16x^7$

First use the rules of exponents to simplify $(2x^3)^2$.

$$8x(2x^3)^2 = 8x(2^2)(x^3)^2$$

$$= 8x(4)(x^6)$$

$$= (8)(4)(x)(x^6) \quad \textit{Commutative and Associative Properties}$$

$$= 32x^7$$ **H**

3 What numbers satisfy $2x^2 = 288$?

A 12 and -12 **B** $\frac{\sqrt{288}}{2}$ and $-\frac{\sqrt{288}}{2}$

C 24 and -24 **D** 0 and 12

First multiply each side of the equation by $\frac{1}{2}$.

$$\frac{1}{2}(2x^2) = \frac{1}{2}(288)$$

$$x^2 = 144$$

Take the square root of each side of the equation.

$$x = \pm 12$$ **A**

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Standards Practice

Algebra 2.0 (Algebra 1)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 What is the value of $-\sqrt{64}$? **1** _____

A -16
B -8
C 4
D 8

2 What is the solution of $\frac{7}{8}x - 5 = 9$? **2** _____

F 16
G $\frac{49}{4}$
H $\frac{7}{2}$
J -16

3 Simplify $5(3x^4)^3$. **3** _____

A $27x^7$
B $135x^7$
C $15x^{12}$
D $135x^{12}$

4 What is the value of $\sqrt{8\sqrt[3]{8}}$? **4** _____

F 8
G 6
H 4
J 2

5 What is the value of $-\frac{9}{10} - \left(\frac{-3}{5}\right)$? **5** _____

A $-\frac{6}{10}$
B $-\frac{3}{10}$
C $\frac{3}{10}$
D $\frac{6}{10}$

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Standards Practice

Algebra 3.0 (Algebra 1)

ALG 3.0 **Students solve equations and inequalities involving absolute values.**

Examples

1 Find all values of x that satisfy the equation $|2x - 4| = 8$.

A 2 and -2
B -6 and -2
C 6 and -2
D -6 and 2

By the definition of absolute value, $|2x - 4| = 8$ means that $2x - 4 = 8$ or $2x - 4 = -8$. Solve both equations.

$2x - 4 = 8$ or $2x - 4 = -8$
$2x = 12$ $2x = -4$
$x = 6$ $x = -2$

Check both solutions. Both $|2 \cdot 6 - 4| = 8$ and $|2 \cdot (-2) - 4| = 8$ are true. **C**

2 Find all values of x that make the inequality $|2x - 1| < 4$ true.

F $\frac{3}{2} < x < \frac{5}{2}$ **G** $-\frac{3}{2} < x < \frac{5}{2}$
H $-\frac{5}{2} < x < \frac{3}{2}$ **J** $-\frac{5}{2} < x < -\frac{3}{2}$

By the definition of absolute value, $|2x - 1| < 4$ means $2x - 1 > -4$ and $2x - 1 < 4$. Solve both inequalities.

$2x - 1 > -4$ and $2x - 1 < 4$
$2x > -3$ $2x < 5$
$x > -\frac{3}{2}$ $x < \frac{5}{2}$

The solutions are all values of x that satisfy *both* inequalities. The solutions can be described by $-\frac{3}{2} < x < \frac{5}{2}$. **G**

3 Find all values of x that make the inequality $|4 - x| \geq 5$ true.

A $x \leq -9$ or $x \geq 1$
B $x \leq 1$ or $x \geq -9$
C $x \leq 9$ or $x \geq -1$
D $x \leq -1$ or $x \geq 9$

By the definition for absolute value, $|4 - x| \geq 5$ means $4 - x \leq -5$ or $4 - x \geq 5$.

Solve both inequalities.

$4 - x \leq -5$ or $4 - x \geq 5$
$-x \leq -9$ $-x \geq 1$
$x \geq 9$ $x \leq -1$ **D**

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Standards Practice

Algebra 3.0 (Algebra 1)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 What are the solutions of $4|2x - 5| = 12$? **1** _____

A -4 and 4
B 1 and 4
C -1 and 4
D -4 and -1

2 Find all values of x that make the inequality $|x + 1| \leq 5$ true. **2** _____

F $-4 \leq x \leq 6$
G $4 \leq x \leq 6$
H $-6 \leq x \leq -4$
J $-6 \leq x \leq 4$

3 Solve $|8x - 4| \geq 12$. **3** _____

A $x \leq -1$ or $x \geq 2$
B $x \geq 2$
C $x \leq -1$ or $x \geq 1$
D $x \leq 2$ or $x \geq -2$

4 Solve $|2x - 1| + 3 < 4$. **4** _____

F $-3 < x < 3$
G $x > 0$
H $0 < x < 1$
J $x < 1$

5 Which inequality is represented by the graph? **5** _____

A $|x| \geq 1$
B $|x| \leq 1$
C $|x| < 1$
D $|x| > 1$

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Standards Practice

Algebra 4.0 (Algebra 1)

ALG 4.0

Students simplify expressions before solving linear equations and inequalities in one variable, such as $3(2x - 5) + 4(x - 2) = 12$.

Examples

1 Simplify $3x + 2(5 - x) + \frac{1}{4}(8x + 12)$.

A $4x + 22$
B $3x + 2$
C $7x + 13$
D $3x + 13$

First use the Distributive Property.

$$3x + 2(5 - x) + \frac{1}{4}(8x + 12) = 3x + 10 - 2x + 2x + 3$$

Finally, combine like terms.

$$\begin{aligned} 3x + 10 - 2x + 2x + 3 &= (3x - 2x + 2x) + (10 + 3) \\ &= 3x + 13 \end{aligned}$$

D

2 Which equation is equivalent to $2\left(\frac{1}{2}x + 4\right) - \frac{1}{3}(6x - 3) = 12$?

F $1 - x = 12$
G $9 - x = 12$
H $7 - x = 12$
J $3x + 5 = 12$

Use the Distributive Property to simplify the left side of the equation.

$$2\left(\frac{1}{2}x + 4\right) - \frac{1}{3}(6x - 3) = x + 8 - 2x + 1$$

Now combine like terms.

$$x + 8 - 2x + 1 = 9 - x$$

Thus, the equivalent equation is $9 - x = 12$. **G**

3 Which inequality is equivalent to $2x - 3 < 7x + 2(5 - 2x)$?

A $2x - 3 < 5x + 10$
B $2x - 3 < 7x + 10$
C $2x - 3 < 3x + 10$
D $2x < 7x + 10$

Simplify the expression on the right side of the inequality.

$$\begin{aligned} 7x + 2(5 - 2x) &= 7x + 10 - 4x \\ &= 3x + 10 \end{aligned}$$

Thus, $2x - 3 < 3x + 10$ is equivalent to the original inequality. **C**

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Standards Practice

Algebra 4.0 (Algebra 1)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Which property do you use to rewrite $3x + 5x + 2x - x$ as $(3 + 5 + 2 - 1)x$? **1** _____

A Commutative Property of Addition
B Associative Property of Addition
C Distributive Property of Multiplication over Addition
D Associative Property of Multiplication

2 Which expression is equivalent to $4(2x + 3) - 3(5 - x)$? **2** _____

F $7x - 12$
G $11x - 3$
H $5x - 3$
J $5x - 12$

3 Which equation is equivalent to $\frac{3}{5}(5x - 10) + \frac{1}{5}(10x - 15) = 0$? **3** _____

A $5x - 33 = 0$
B $5x - 25 = 0$
C $5x - 6 = 0$
D $5x - 9 = 0$

4 Which inequality is equivalent to $-3(x + 2) + 6(5 - 2x) \leq 0$? **4** _____

F $-15x + 24 \leq 0$
G $-5x + 36 \leq 0$
H $-5x + 24 \leq 0$
J $-15x + 36 \leq 0$

5 Which inequality is equivalent to $8 - 2x > 4 - 3(3 - x)$? **5** _____

A $13 > 3x$
B $3 > 3x$
C $13 > 5x$
D $13 > -x$

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Standards Practice

Algebra 5.0 (Algebra 1)

ALG 5.0

Students solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.

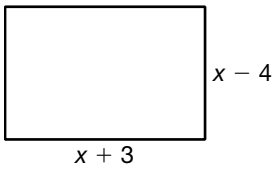
Examples

1 Solve $8 - 4x \leq 32$.

A $x \leq -6$
B $x \geq 10$
C $x \leq -10$
D $x \geq -6$

$8 - 4x \leq 32$
$-4x \leq 24$ *Subtract 8 from each side.*
$x \geq -6$ *Divide each side by −4 and reverse the inequality sign.* **D**

2 The perimeter of the rectangle shown is 74. What is the value of x?



F 16
G 18
H 19
J 20

The perimeter of a rectangle of length ℓ and width w is $2\ell + 2w$. Let $\ell = x + 3$ and $w = x - 4$. The perimeter is 74, so an equation is $2(x + 3) + 2(x - 4) = 74$. Solve the equation for x.

$2x + 6 + 2x - 8 = 74$ *Use the Distributive Property.*
$4x - 2 = 74$ *Combine like terms.*
$4x = 76$ *Add 2 to both sides.*
$x = 19$ *Divide both sides by 4.*

Check: $2(19 + 3) + 2(19 - 4) = 74$. **H**

3 The value of 10 quarters, d dimes, and 4 nickels is more than \$3.00. How many dimes are there?

A more than 3 dimes
B 3 dimes
C fewer than 3 dimes
D more than 30 dimes

Write and solve an inequality.

$0.25(10) + 0.1d + 0.05(4) > 3.00$
$2.5 + 0.1d + 0.2 > 3.00$
$0.1d + 2.7 > 3.00$
$0.1d > 0.3$
$d > 3$ **A**

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Standards Practice

Algebra 5.0 (Algebra 1)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

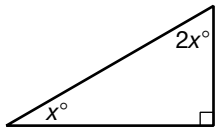
1 Which property lets you add -5 to each side of $2x + 5 = 17$? **1** _____

A Associative Property of Addition
B Addition Property of Equality
C Commutative Property of Addition
D Symmetric Property of Equality

2 Solve $4(x - 3) \geq 2(9 - x)$. **2** _____

F $x \geq 3\frac{1}{2}$
G $x \geq 6$
H $x \leq 5$
J $x \geq 5$

3 What is the measure of the larger acute angle in the right triangle shown? **3** _____



A 30°
B 45°
C 60°
D 75°

4 Ariana bought 3 compact discs at the music store. She gave the clerk $30 and received $2.23 in change. If the discs were all the same price and the tax on her purchase was $1.07, how much did each disc cost? **4** _____

F $9.10
G $9.00
H $8.90
J $8.40

5 The oldest child in the Sanchez family is 3 times as old as the youngest child, and the middle child is 4 years older than the youngest child. The total of the ages of the 3 children is 29. What is the age of the middle child? **5** _____

A 5
B 9
C 10
D 15

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Standards Practice
Algebra 6.0 (Algebra 1)

ALG 6.0

Students graph a linear equation and compute the *x*- and *y*-intercepts (e.g., graph $2x + 6y = 4$).

Examples

1 What is the *y*-intercept of the graph of $5x + 2y = 10$?

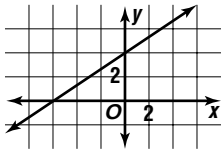
A -5
B 2
C 5
D 10

The *y*-intercept is the *y*-coordinate of the point where the graph crosses the *y*-axis. The *x*-coordinate of this point is 0. So solve $5(0) + 2y = 10$.

$5(0) + 2y = 10$
$2y = 10$
$y = 5$

The *y*-intercept is 5. **C**

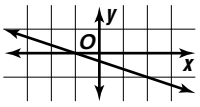
2 What is the equation of the line shown in the graph?

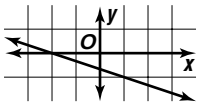


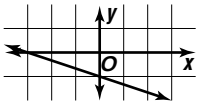
F $2x + 3y = 12$
G $-2x + 3y = 12$
H $3x - 2y = 12$
J $3x + 2y = 12$

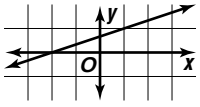
Notice that the *x*-intercept is -6 and the *y*-intercept is 4. Substitute these *x*- and *y*-values in the equations. Equation F: $2 \cdot 0 + 3 \cdot 4 = 12$, but $2 \cdot (-6) + 3 \cdot 0 \neq 12$. Equation G: $-2 \cdot 0 + 3 \cdot 4 = 12$ and $-2 \cdot (-6) + 3 \cdot 0 = 12$. A check of Equations H and J shows that the intercepts do not satisfy these equations. Therefore, Equation G is correct. **G**

3 Which is the graph of $x + 3y = -2$?

A


B


C


D


Find the *x*- and *y*-intercepts of the graph of $x + 3y = -2$.

x-intercept: $x + 0 = -2$, $x = -2$

y-intercept: $0 + 3y = -2$, $y = -\frac{2}{3}$

The graph of $x + 3y = -2$ contains $(-2, 0)$ and $\left(0, -\frac{2}{3}\right)$. **B**

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Standards Practice

Algebra 6.0 (Algebra 1)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 What are the x- and y-intercepts of the graph of $5x - 4y = 10$? **1** _____

A x-intercept: 2; y-intercept: $2\frac{1}{2}$

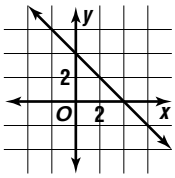
B x-intercept: $-2\frac{1}{2}$; y-intercept: -2

C x-intercept: 2; y-intercept: $-2\frac{1}{2}$

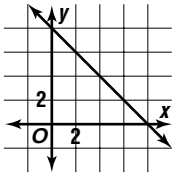
D x-intercept: $-2\frac{1}{2}$; y-intercept: 2

2 Which is the graph of $x + \frac{1}{2}y = 4$? **2** _____

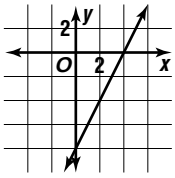
F



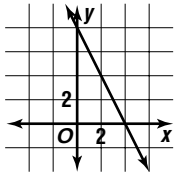
G



H



J



3 Which is an equation of a line whose intercepts are both negative? **3** _____

A $x - y = 3$

B $-x + y = -3$

C $x + y = -3$

D $x + y = 3$

4 What is true of a line that has no x-intercept? **4** _____

F The line is parallel to the x-axis.

G The line is vertical.

H The line has positive slope.

J The line has undefined slope.

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Standards Practice
Algebra 7.0 (Algebra 1)

ALG 7.0

Students verify that a point lies on a line, given an equation of the line. Students are able to derive linear equations.

Examples

1 Which point lies on the line $3x + y = 12$?

A (0, 4)
B (3, 3)
C (−3, 3)
D (3, −3)

Substitute the given coordinates into the equation:

A: $3 \cdot 0 + 4 \neq 12$
B: $3 \cdot 3 + 3 = 12$✓
C: $3 \cdot (-3) + 3 \neq 12$
D: $3 \cdot 3 + (-3) \neq 12$

Therefore, (3, 3) lies on the line $3x + y = 12$. **B**

2 What is an equation of the line with slope −2 that contains the point (4, −1)?

F $2x - y = 7$
G $y = -2x - 9$
H $y = -2x - 7$
J $y = -2x + 7$

Use the slope-intercept form of the linear equation, $y = mx + b$. Since $m = -2$, the equation has the form $y = -2x + b$. Substitute the coordinates of (4, −1) in this equation to determine b.

$-1 = -2 \cdot 4 + b$
$7 = b$

An equation is $y = -2x + 7$. **J**

3 What is an equation of the line that contains (4, 6) and (5, 8)?

A $y = -2x + 2$
B $y = 2x + 2$
C $y = 2x - 2$
D $y = 2x - 8$

Use the given points to find the slope: $\frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 6}{5 - 1}$. Substitute the slope 2 in $y = mx + b$ to get $y = 2x + b$. Use the coordinates of one of the points to determine b. Use the coordinates of (4, 6).

$6 = 2 \cdot 4 + b$
$-2 = b$

Thus, an equation of the line is $y = 2x - 2$. **C**

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Standards Practice

Algebra 7.0 (Algebra 1)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Which point lies on the line $-2x - 3y = 7$? **1** _____

A $(-1, -3)$
B $(1, 3)$
C $(1, -3)$
D $(-1, 3)$

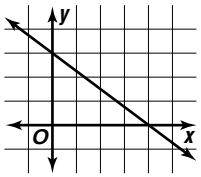
2 What is an equation of the line with slope 1 that contains $(0, -4)$? **2** _____

F $y = x - 4$
G $y = -4x$
H $x + y = 4$
J $y = -\frac{1}{4}x$

3 What is an equation of the line that contains (2, 5) and (4, 13)? **3** _____

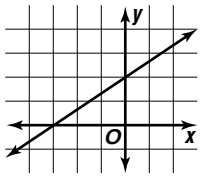
A $y = 4x + 3$
B $y = 4x - 3$
C $y = \frac{1}{4}x + 12$
D $y = \frac{1}{4}x + 4$

4 What is an equation of the line shown? **4** _____



F $y = \frac{3}{4}x + 3$
G $y = -\frac{4}{3}x + 4$
H $y = -\frac{3}{4}x + 3$
J $y = \frac{4}{3}x - 4$

5 Which point does *not* lie on the line shown? **5** _____



A $(-6, -2)$
B (9, 8)
C (6, 6)
D $(-9, 9)$

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Standards Practice

Algebra 8.0 (Algebra 1)

ALG 8.0

Students understand the concept of parallel lines and how their slopes are related.

Examples

1 Which equation is *not* the equation of a line parallel to $y = \frac{1}{2}x + 10$?

A $y = \frac{1}{2}x$

B $y = -\frac{1}{2}x - 10$

C $y = \frac{1}{2}x - 10$

D $y = \frac{1}{2}x + 100$

Parallel lines have the same slope. The only line that does not have slope $\frac{1}{2}$ is $y = -\frac{1}{2}x - 10$. **B**

2 Which is an equation of a line parallel to $3x - 2y = 17$?

F $y = \frac{3}{2}x$

G $y = -\frac{3}{2}x + 4$

H $y = -\frac{2}{3}x + 1$

J $y = \frac{2}{3}x - 17$

Find the slope of $3x - 2y = 17$ by writing the equation in the form $y = mx + b$.

$3x - 2y = 17$

$-2y = -3x + 17$ *Subtract 3x from both sides.*

$y = \frac{3}{2}x - \frac{17}{2}$ *Divide both sides by −2.*

Thus, the slope of $3x - 2y = 17$ is $\frac{3}{2}$, and the line $y = \frac{3}{2}x$ is parallel to it. **F**

3 What is an equation of the line that contains (0, 4) and is parallel to the line $y = -x - 4$?

A $y = -4x$

B $y = -\frac{1}{4}x + 4$

C $y = -x + 4$

D $y = x + 4$

The slope of the parallel line is -1, and its y-intercept is 4. Therefore, its equation is $y = -x + 4$. **C**

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Standards Practice

Algebra 8.0 (Algebra 1)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Which is an equation of a line parallel to $y = 1.4x + 7.5$? **1** _____

A $y = -1.4x + 7.5$
B $y = x + 7.5$
C $y = 6$
D $y = 1.4x - 2$

2 Which is an equation of a line parallel to $2x + 2y = 11$? **2** _____

F $y = -2x + 11$
G $y = x - 11$
H $y = -x + 4$
J $y = x + \frac{11}{2}$

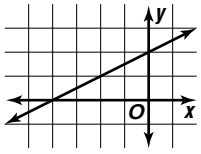
3 What is an equation of the line parallel to $y = 5x + 1$ that contains (3, 9)? **3** _____

A $y = 5x + 24$
B $y = 5x - 6$
C $y = 5x + 6$
D $y = -5x - 6$

4 Which is the equation of a line parallel to the y-axis? **4** _____

F $x = -5$
G $y = 0$
H $y = -x$
J $2x + 2y = 2$

5 What is an equation of the line that passes through (8, 3) and is parallel to the line shown? **5** _____



A $y = \frac{1}{2}x - 4$
B $y = \frac{1}{2}x - 5$
C $y = \frac{1}{2}x - 1$
D $y = 2x - 8$

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Standards Practice

Algebra 9.0 (Algebra 1)

ALG 9.0

Students solve a system of two linear equations in two variables algebraically and are able to interpret the answer graphically. Students are able to solve a system of two linear inequalities in two variables and to sketch the solution sets.

Examples

1 Which is the solution of this system of equations?

$$2x + y = 1 \text{ and } x + 2y = 5$$

A $(1, -3)$ **B** $(1, 3)$
C $(-1, -3)$ **D** $(-1, 3)$

Solve the first equation for y to get $y = 1 - 2x$. Replace y in the second equation by $1 - 2x$.

$x + 2(1 - 2x) = 5$
$x + 2 - 4x = 5$ *Distributive Property*
$-3x + 2 = 5$ *Combine like terms.*
$-3x = 3$ *Subtract 2 from each side.*
$x = -1$ *Divide each side by −3.*

Substitute -1 for x in one of the original equations to find that $y = 3$. The solution is $(-1, 3)$. **D**

2 Which point is *not* in the solution set of this system of inequalities?

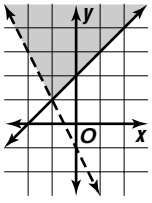
$$y \leq 3x - 1 \text{ and } y > -x + 2$$

F $(3, 2)$ **G** $(4, -1)$
H $(2, 5)$ **J** $(2, 0)$

A point is not a solution of the system if its coordinates result in a false statement when substituted in one or both of the inequalities. Test each ordered pair.

F: $2 \leq 9 - 1$, true; $2 > -3 + 2$, true
G: $-1 \leq 12 - 1$, true; $-1 > -4 + 2$, true
H: $5 \leq 6 - 1$, true; $5 > -2 + 2$, true
J: $0 \leq 6 - 1$, true; $0 > -2 + 2$, false **J**

3 Which system describes the graph shown?



A $y \geq x + 2$ and $y < -2x + 1$
B $y \geq x + 2$ and $y > -2x - 1$
C $y > x + 2$ and $y \geq -2x - 1$
D $y \leq x + 2$ and $y < -2x + 1$

The shaded region is the portion of the graph that is above both lines, so choices A and D cannot be correct. Notice that the solid line has equation $y = x + 2$ and the dotted line has equation $y = -2x - 1$. Thus, the system is $y \geq x + 2$ and $y > -2x - 1$. **B**

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Standards Practice
Algebra 9.0 (Algebra 1)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 If a system of linear equations has exactly one solution, what do you know about the lines in the graph of the system? **1** _____

A The lines are parallel.
B The lines are identical.
C The lines intersect in a point.
D One line is horizontal and the other is vertical.

2 Which is the solution of the system $3y - 2x = 9$ and $x + y = 8$? **2** _____

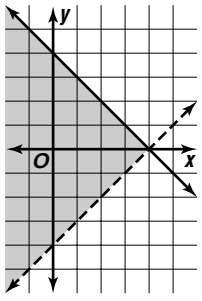
F (5, 3)
G (3, 5)
H (−17, 25)
J (−3, −5)

3 Which point is in the solution set of this system? **3** _____

$$6x - 2y \leq 12 \text{ and } x + y \geq 0$$

A (3, 0)
B (−4, −2)
C (2, −3)
D (0, 0)

4 Which system is shown in the graph? **4** _____



F $x + y \geq 4$ and $x - y > 4$
G $x + y \leq 4$ and $x - y > 4$
H $x + y \leq 4$ and $x - y < 4$
J $x + y < 4$ and $x - y \leq 4$

5 Aretha has \$125 in savings and plans to save \$60 each month. Miguel has \$50 in savings and plans to save \$75 each month. After how many months will their savings be equal? **5** _____

A 5 months
B 6 months
C 10 months
D 15 months

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Standards Practice

Algebra 10.0 (Algebra 1)

ALG 10.0

Students add, subtract, multiply, and divide monomials and polynomials. Students solve multistep problems, including word problems, by using these techniques.

Examples

1 Which is the product $(x + 3)(x^2 + 2x + 2)$?

A $x^3 + 2x^2 + 2x$
B $x^2 + 3x + 5$
C $x^3 + 5x^2 + 8x$
D $x^3 + 5x^2 + 8x + 6$

Use the Distributive Property to multiply. Then combine like terms:

$$\begin{array}{r} x^2 + 2x + 2 \\ \times \quad x + 3 \\ \hline 3x^2 + 6x + 6 \\ x^3 + 2x^2 + 2x \\ \hline x^3 + 5x^2 + 8x + 6 \end{array}$$

D

2 What is the quotient $\frac{5y^3}{20y}$?

F $\frac{1}{4}y^4$
G $\frac{1}{4}y^2$
H $4y^2$
J $\frac{1}{4}y$

Find the quotient of the coefficients and use the quotient property of powers.

$$\frac{5y^3}{20y} = \frac{1}{4}y^{3-1}$$
$$= \frac{1}{4}y^2$$ **G**

3 One side of a square is increased by 5 inches and the other side is decreased by 4 inches to form a nonsquare rectangle. The area of the rectangle is the same as the area of the original square. What is the length of a side of the square?

A 8 in.
B 10 in.
C 20 in.
D 25 in.

Let s be the length of a side of the square. Then the dimensions of the rectangle are $s + 5$ and $s - 4$. The area of the square is s^2 and the area of the rectangle is $(s + 5)(s - 4)$. The two areas are equal.

$s^2 = (s + 5)(s - 4)$
$s^2 = s^2 + 5s - 4s - 20$ *Use the Distributive Property.*
$s^2 = s^2 + s - 20$ *Combine like terms.*
$0 = s - 20$ *Subtract s^2 from each side.*
$20 = s$ *Add 20 to each side.*

The length of a side of the square is 20 in. **C**

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Standards Practice

Algebra 10.0 (Algebra 1)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Find the sum. **1** _____

$(6x^3 + 7x - 2) + (5x^2 + 7) + (4x^3 + 8x^2 - 11x + 8)$

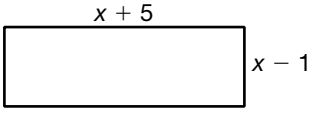
A $10x^3 + 5x^2 + 7x + 5$
B $10x^3 + 13x^2 - 4x + 13$
C $10x^3 + 8x^2 - 4x + 15$
D $6x^3 + 12x^2 + 5$

2 Find the difference. **2** _____

$(a^3 + 3a^2 - 2a + 5) - (5a^3 + 2a - 4)$

F $-4a^3 + 3a^2 + 1$
G $6a^3 + 3a^2 + 9$
H $-4a^3 + 3a^2 - 4a + 9$
J $a^3 + 5a^2 + 1$

3 What is a polynomial expression for the area of the rectangle? **3** _____



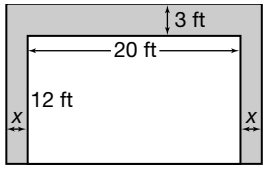
A $x^2 + 4x - 5$
B $2x + 4$
C $x^2 + 6x + 5$
D $x^2 + 4x + 5$

4 Find the quotient. **4** _____

$(2x^3y + 6x^2y^2 + 8xy^3) \div 2xy$

F $x^2y + 3xy + 4xy^4$
G $4x^4y^2 + 12x^3y^3 + 16x^2y^4$
H $2x^2y + 3xy + 4xy^2$
J $x^2 + 3xy + 4y^2$

5 Mr. Abato is planning to construct a concrete walkway on three sides of his garden, as shown. The width of the garden is 12 feet and the length is 20 feet. The width of the longer portion of the walkway will be 3 feet. If the total area of the walkway is to be one-half the area of the garden, how wide should the remaining two sides of the walkway be? **5** _____



A $1\frac{3}{4}$ ft
B 2 ft
C $1\frac{1}{4}$ ft
D $2\frac{1}{2}$ ft

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Standards Practice

Algebra 15.0 (Algebra 1)

ALG 15.0

Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.

Examples

1 Kurt, who is riding a racing bike, is going 10 miles per hour faster than Sherry on a mountain bike. Kurt covers 50 miles in the time that it takes Sherry to cover 30 miles. What is Kurt's speed?

A 10 mi/h **B** 15 mi/h
C 20 mi/h **D** 25 mi/h

Let r represent Sherry's rate of speed on the touring bike. Express each time as a ratio of distance to rate. For Sherry, the ratio is $\frac{30}{r}$. For Kurt on the racing bike, the ratio is $\frac{50}{r + 10}$. The ratios are equal: $\frac{30}{r} = \frac{50}{r + 10}$. Cross-multiplying gives $30r + 300 = 50r$. Solving for r gives $r = 15$. So Kurt's speed is $r + 10$ or 25 mi/h. **D**

2 Mr. Bagnato can carpet a room in 3 hours. His apprentice can carpet the same room in 5 hours. How long would it take them working together?

F $1\frac{7}{8}$ hours **G** 2 hours
H 4 hours **J** 8 hours

Let h be the number of hours for them to carpet the room. Mr. Bagnato does $\frac{1}{3}$ of the job per hour, and his apprentice does $\frac{1}{5}$ of the job per hour. Think of the completed job as 1. Then $h\left(\frac{1}{3}\right)$ represents the part Mr. Bagnato does, and $h\left(\frac{1}{5}\right)$ represents the part his apprentice does. An equation is $\frac{h}{3} + \frac{h}{5} = 1$. Use 15 as the common denominator and solve for h.

$5h + 3h = 15$
$8h = 15$
$h = 1\frac{7}{8}$ **F**

3 A particular solder is 40% lead and 60% tin. How much lead must be added to 200 pounds of this solder to make one that is 50% lead?

A 10 lb **B** 20 lb
C 40 lb **D** 50 lb

The original solder has $0.4(200) = 80$ lb of lead. Let x be the amount of lead to be added to get a solder that is 50% lead. An equation is $80 + x = 0.5(200 + x)$. Solve this equation for x.

$80 + x = 0.5(200 + x)$
$80 + x = 100 + 0.5x$
$0.5x = 20$
$x = 40$ **C**

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Standards Practice

Algebra 15.0 (Algebra 1)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 Alfie drove 85 miles on the expressway in 2 hours. The rest of his trip, 15 miles in the Los Angeles metropolitan area, took an additional 30 minutes. What was his average rate of speed for the entire trip? **1** _____

A 50 mi/h
B 42.5 mi/h
C 40 mi/h
D 35 mi/h

2 A freight train leaves Sterling traveling east at 40 miles per hour. Two hours later, a passenger train, also headed east, leaves Sterling on a parallel track at 60 miles per hour. How far are the trains from Sterling when the passenger train catches up to the freight train? **2** _____

F 200 mi
G 240 mi
H 260 mi
J 300 mi

3 Two investments are made that total $5,000. Part of the money is invested at 4% and the rest at 5%. In the first year, the total amount paid in simple interest is $230. How much is invested at the 5% rate? **3** _____

A $1,000
B $2,000
C $2,500
D $3,000

4 Jan can mow a neighbor's lawn in 3 hours. Marco can mow the same lawn in 2 hours. To the nearest minute, how long will it take if they mow together? **4** _____

F 45 min
G 1 h
H 1 h 12 min
J 1 h 15 min

5 Juanita has 2 different solutions containing weed killer and water. The weaker solution is 5% weed killer and the strong solution is 15% weed killer. Juanita wants to combine the solutions to make 10 liters of a solution that is 12% weed killer. How many liters of the stronger solution should she use? **5** _____

A 8 L
B 7 L
C 5 L
D 3 L

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Sample Test

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

1 What is the value of $\frac{3}{5} \cdot \frac{3}{4} \cdot \frac{2}{3}$? **1** _____

A $\frac{3}{20}$

B $\frac{11}{60}$

C $\frac{3}{10}$

D $\frac{11}{12}$

2 A Stanford University basketball player has a free-throw percentage of 82%. At this rate, how many free throws can he expect to make in his next 50 trips to the free-throw line? **2** _____

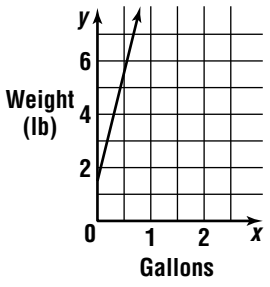
F 21 free throws

G 25 free throws

H 41 free throws

J 45 free throws

3 The graph shows the weight of a 5-gallon tub as it is filled with water. How much does the empty tub weigh? **3** _____



A 0 lb

B 1.5 lb

C 5.5 lb

D 10 lb

4 A number increased by 3.4 is at most 128.6. Which inequality represents this situation? **4** _____

F $n + 3.4 \leq 128.6$

G $n - 3.4 > 128.6$

H $n + 3.4 < 128.6$

J $n - 128.6 \geq 3.4$

5 The speed limit in school zones in California is 15–20 miles per hour. How many feet per second is 20 mi/h? **5** _____

A 1,760 ft/s

B $293\frac{1}{3}$ ft/s

C $29\frac{1}{3}$ ft/s

D 22 ft/s

Go on

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Name: Date:

Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

6 The four waitresses at the Golden Cafe combine their tips and share them equally at the end of each 6-day week. One week's tips were \$345, \$362, \$354, \$249, \$370, \$474. How much does each waitress get? **6** _____

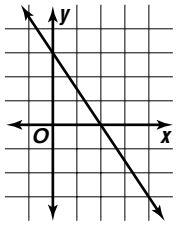
F \$463.50
G \$488.50
H \$513.50
J \$538.50

7 Which statement is true about the mean and median of these data? **7** _____

64 in. 61 in. 66 in. 64 in. 60 in. 65 in. 69 in. 63 in.

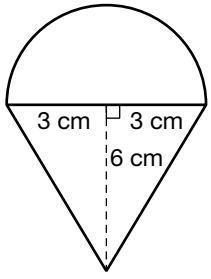
A The mean is greater than the median.
B The mean and median are equal.
C The median is greater than the mean.
D The data have no mode.

8 What is the slope of the line shown? **8** _____



F $-\frac{3}{2}$
G $-\frac{2}{3}$
H $\frac{2}{3}$
J $\frac{3}{2}$

9 What is the area of the figure shown? **9** _____



A about 32.13 cm^2
B about 37.27 cm^2
C about 42.08 cm^2
D about 46.26 cm^2

Go on

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Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

10 In a survey of a random sample of math students taking algebra, 75% of the students said they preferred algebra to geometry. Why is it *not* valid to conclude that most math students prefer algebra to geometry? **10** _____

F 75% is not large enough a percentage to say that most math students prefer algebra.
G The number of students in the sample is not known.
H Surveying only algebra students out of all math students is likely to bias the results.
J Teachers should have been included in the survey.

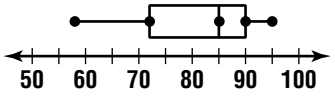
11 An estimate of the world's population in 2050 is 10 billion people. Express this number in scientific notation. **11** _____

A 1.0×10^6
B 10×10^9
C 1.0×10^{10}
D 1.0×10^9

12 The maximum eruption rate of the volcano Mount St. Helens during the last century was 2.0×10^4 cubic meters per second. At this rate, how many cubic meters of volcanic lava and ash would be emitted in a 5-second span? **12** _____

F 100,000 m^3
G 400,000 m^3
H 1,000,000 m^3
J 400,000,000 m^3

13 The box-and-whisker plot shows information about scores on a science test. Which of the following must be true? **13** _____



A Someone received a score of 95.
B Someone received a score of 90.
C Someone received a score of 85.
D Someone received a score of 72.

14 If you flip 4 coins, what is the probability that you will get tails on all 4 coins? **14** _____

F $\frac{1}{2}$
G $\frac{1}{4}$
H $\frac{1}{10}$
J $\frac{1}{16}$

Go on

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Name: Date:

Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

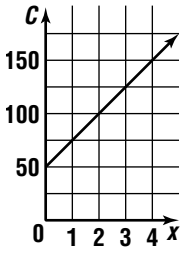
15 What is the circumference of a tire that has a radius of 10 inches? **15** _____

A about 31.4 in.
B about 62.8 in.
C about 78.5 in.
D about 314 in.

16 Maria bought 3 CDs that were all the same price and 2 tapes that each cost $6.95. What other information will help you find the cost of each CD? **16** _____

F whether the CDs were on sale
G the amount Maria paid for all 5 items
H who the recording artists were
J the amount of tax Maria had to pay

17 The graph shows the cost C of hiring a plumber for x hours. What does the point (2, 100) on the graph indicate? **17** _____



A The plumber costs $50 per hour.
B The service charge for the plumber is $100.
C The cost of hiring the plumber for 2 hours is $100.
D The plumber costs twice as much for 2 hours as for 1 hour.

18 What is the value of $58.5 \div 18$? **18** _____

F 325
G 32.5
H 3.25
J 0.325

19 What number satisfies the equation $-\frac{3}{5}x - 4 = 8$? **19** _____

A -20
B $-7\frac{1}{5}$
C $-6\frac{2}{3}$
D 20

Go on

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Name: Date:

Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

20 The town of Lakeside has 56,000 households. Forty percent of those households have at least one personal computer. How many of Lakeside's households do *not* have personal computers? **20** _____

F 33,600 households
G 22,400 households
H 5,600 households
J 3,360 households

21 Which point would be farther from 0 on a number line? **21** _____

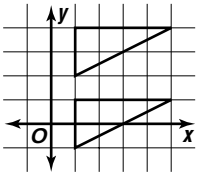
A point A with coordinate 6
B point B with coordinate -15
C point C with coordinate -6
D point D with coordinate 12

22 What is the solution of $\frac{2 - 3a}{4} \leq 8$? **22** _____

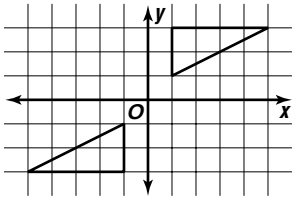
F $a \geq 10$
G $a \geq -10$
H $a \leq -10$
J $a \leq 10$

23 Which shows the reflection of a triangle across the y-axis? **23** _____

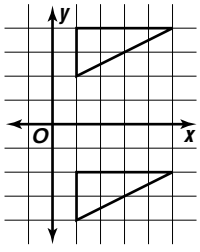
A



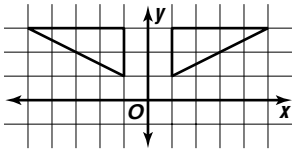
B



C



D



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Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

24 Julio buys a backpack on sale. The sale price is 30% off the original price of $30. How much does Julio pay for the backpack if he must pay a sales tax of 8.5% on his purchase? **24** _____

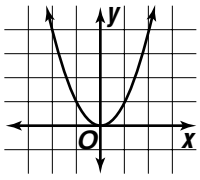
F $11.55
G $18.45
H $22.79
J $23.55

25 Simplify the expression $2.4x - 3(0.2x + 8) + 20$. **25** _____

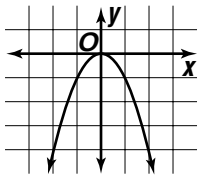
A $1.8x - 4$
B $3x + 44$
C $1.8x + 28$
D $3x + 28$

26 Which of the following is the graph of $y = -0.5x^2$? **26** _____

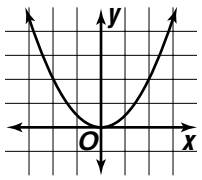
F



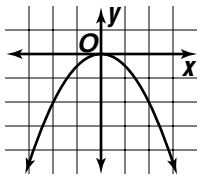
G



H



J



27 Speedy Airlines claims that 7 out of 8 of its flights leaving from LAX are on time. What is the probability that the next Speedy Airlines flight from LAX will leave on time? **27** _____

A 90%
B 87.5%
C 80%
D 70%

Go on

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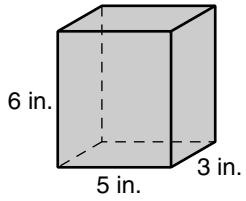
Name: Date:

Sample Test (continued)

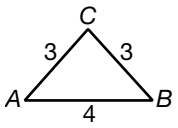
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

28 What is the surface area of the rectangular prism shown? **28** _____

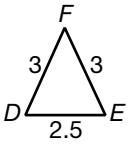


F 196 in^2
G 126 in^2
H 96 in^2
J 90 in^2

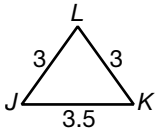
29 Which triangle is congruent to $\triangle ABC$ at the right? **29** _____



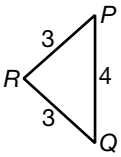
A



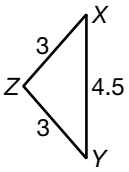
B



C



D



30 The prices for 17 cameras are listed. What is the median price for these cameras? **30** _____

$110, $230, $200, $250, $140, $120, $200, $150, $150, $175, $185, $160, $90, $230, $160, $200, $180

F $150
G $160
H $170
J $175

31 What is the sum of the first 25 odd numbers? **31** _____

A 825
B 625
C 325
D 225

32 What are the x- and y-intercepts of the graph of $2x + 3y = 12$? **32** _____

F x-intercept: 6; y-intercept: 3
G x-intercept: 6; y-intercept: 4
H x-intercept: 4; y-intercept: 6
J x-intercept: 4; y-intercept: 4

Go on

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Name: Date:

Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

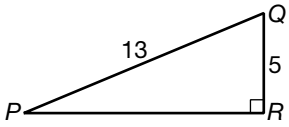
33 Mr. Cardenas drove 360 kilometers in 4.5 hours. What was his average speed? **33** _____

A 8 km/h
B 9 km/h
C 80 km/h
D 90 km/h

34 What is the sum of $\frac{2}{5}$, $\frac{5}{6}$, and $\frac{3}{4}$? **34** _____

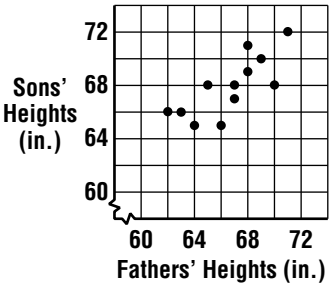
F $1\frac{59}{60}$ **G** $1\frac{7}{10}$
H $\frac{2}{3}$ **J** $\frac{1}{4}$

35 For right triangle PQR, what is the length of $\overline{PR}$? **35** _____



A 8
B 12
C $\sqrt{194}$
D 18

36 The heights in inches of 12 fathers and their sons are shown in the scatterplot. Which statement about the scatterplot is true? **36** _____



F There is no relationship between fathers' and sons' heights.
G In every case, the son's height exceeds the father's height.
H There is a positive relationship between fathers' and sons' heights.
J There is a negative relationship between fathers' and sons' heights.

37 There are 14 girls and 13 boys in Amelia's math class. The teacher is randomly choosing two girls and two boys to help reorganize the bulletin board. If the teacher has already chosen one girl, what is the probability that Amelia will be chosen? **37** _____

A $\frac{1}{27}$ **B** $\frac{1}{26}$
C $\frac{2}{27}$ **D** $\frac{1}{13}$

Go on

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Name: Date:

Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

38 The value of $\sqrt{x}$ is between 10 and 11. What might the value of x be? **38** _____

F 10.5
G 90
H 115
J 125

39 Which expression is equivalent to $(a^{-4}b^2c)^{-5}$? **39** _____

A $\frac{1}{a^9b^3c^6}$

B $\frac{1}{a^{20}b^{10}c^5}$

C $\frac{a^{20}}{b^{10}c^5}$

D $\frac{a^{20}}{b^{-10}c^{-5}}$

40 On a hot day, the temperature reached 35°C in San Diego. What is the equivalent temperature in °F? (Use the formula $F = 1.8C + 32$.) **40** _____

F 120.6°F
G 95°F
H 67°F
J 51.4°F

41 What is the best estimate of the volume of a container that measures 7 inches wide, 19 inches long, and 12 inches high? **41** _____

A 1,000 in^3
B 1,400 in^3
C 2,000 in^3
D 3,000 in^3

42 In Chicago, one home heating bill for January, 2001, was \$670. The heating bill for January, 2000, was \$420. What was the approximate percent of increase in the bill from one year to the next? **42** _____

F 37%
G 60%
H 163%
J 260%

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Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

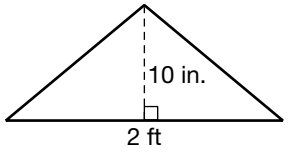
43 What is the value of $\frac{3^3 \cdot 2^4}{4^2}$? **43** _____

A 9
B 15
C 22
D 27

44 What is the slope of the line that contains the points (7, 8) and (15, 30)? **44** _____

F $2\frac{3}{4}$
G $1\frac{8}{11}$
H $\frac{11}{19}$
J $\frac{4}{11}$

45 What is the area in square feet of the triangle shown? **45** _____



A $\frac{5}{6}$ ft^2
B $1\frac{2}{3}$ ft^2
C 120 ft^2
D 240 ft^2

46 Find all values of x that make the inequality $4|5 - x| + 3 < 11$ true. **46** _____

F $-7 < x < 3$
G $-3 < x < 3$
H $-7 < x < -3$
J $3 < x < 7$

Go on

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Name: Date:

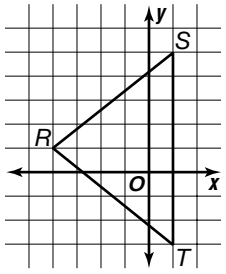
Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

47 Which inequality is equivalent to $8(x - 1) - 4(2 - x) < -10$? **47** _____

A $12x < 6$
B $7x < -10$
C $12x < -26$
D $4x < -1$

48 What is the area of the triangle shown? **48** _____



F 13 units^2
G 16 units^2
H 20 units^2
J 40 units^2

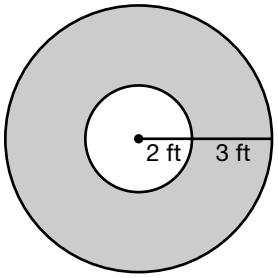
49 What is the value of $(2^3)(2^{-2})(2^4)$? **49** _____

A 1,024
B 512
C 32
D $\frac{1}{32}$

50 What is the product of $(x - 5)$ and $(x^2 + 10)$? **50** _____

F $x^3 - 5x^2 + 10x - 50$
G $x^3 - 5x^2 + 10x + 50$
H $x^3 + 10x^2 - 5x - 50$
J $x^3 - 10x^2 + 5x + 50$

51 What is the area of the shaded region? **51** _____



A about 79 ft^2
B about 66 ft^2
C about 28ft^2
D about 19 ft^2

Go on

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Name: Date:

Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

52 Kevin measured angles A and B of $\triangle ABC$. Then he determined the measure of angle C without measuring. What property of triangles did he use? **52** _____

F The sum of the lengths of any two sides of a triangle is greater than the length of the third side.
G A right triangle has two acute angles.
H The base angles of an isosceles triangle have the same measure.
J The sum of the measures of the angles of a triangle is 180°.

53 What is the value of $\frac{1.1^4}{1.1^2}$? **53** _____

A 1.21
B 1.771561
C 12.1
D 121

54 What is the value of $\frac{2x^2 - 2x + 10}{x - 3}$ if $x = 5$? **54** _____

F 5
G 10
H 25
J 35

55 The coast redwood is one of the tallest trees in the world. One coast redwood growing in the Humbolt Redwoods is about 360 feet tall. If a scale of 1 inch = 50 feet is used for a scale drawing of this tree, how tall will the tree be in the drawing? **55** _____

A $\frac{1}{10}$ ft
B $\frac{1}{2}$ ft
C $7\frac{1}{5}$ in.
D $13\frac{4}{5}$ in.

56 If you double the length of each side of a cube, what happens to its surface area? **56** _____

F The surface area is doubled.
G The surface area is multiplied by 4.
H The surface area is multiplied by 8.
J The surface area is not changed.

Go on

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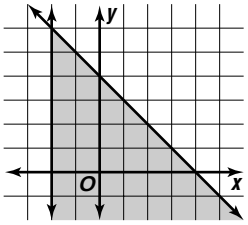
Name: Date:

Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

57 Which system of inequalities is shown in the graph?



A $x \geq -2$ and $y \geq -x + 4$
B $x \geq -2$ and $y \leq -x + 4$
C $x \leq -2$ and $y \leq -x + 4$
D $x \leq -2$ and $y \geq -x + 4$

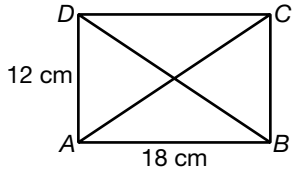
57 _____

58 A holding pen for sheep measures 32 feet by 12 feet. It has a fence post every 4 feet around the perimeter. How many fence posts are there?

F 32 fence posts
G 28 fence posts
H 24 fence posts
J 22 fence posts

58 _____

59 To the nearest millimeter, what is the length of each diagonal of rectangle *ABCD*?



A 134 mm
B 147 mm
C 216 mm
D 468 mm

59 _____

60 The back-to-back stem-and-leaf plot shows scores from the last algebra test for Mr. Garcia's and Ms. Fox's classes. Which of the following pieces of information can be obtained from the plot?

Mr. Garcia		Ms. Fox
0	10	0 0
9 7 7 3	9	5 7
9 9 9 5 3	8	0 3 6 7
0	7	2 2 3 6 9
6 5	6	4 9
0|7 = 70		*7|9 = 79*

F Ms. Fox has fewer students than Mr. Garcia.
G Mr Garcia's class has a higher median score than Ms. Fox's.
H Ms. Fox's class has a higher median score than Mr. Garcia's.
J Mr. Garcia's class has fewer girls than Ms. Fox's.

60 _____

Go on

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Name: Date:

Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

61 Which list is in order from least to greatest? **61** _____

A $\frac{9}{25}, \frac{2}{5}, 0.3, 41\%$

B $41\%, \frac{2}{5}, \frac{9}{25}, 0.3$

C $\frac{2}{5}, 41\%, 0.3, \frac{9}{25}$

D $0.3, \frac{9}{25}, \frac{2}{5}, 41\%$

62 Which is an equation of the line that contains (2, 1) and is parallel to $2x - 3y = 8$? **62** _____

F $2x + y = 1$

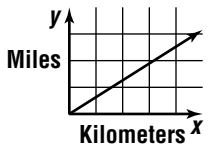
G $2x - 3y = 5$

H $2x - 3y = 1$

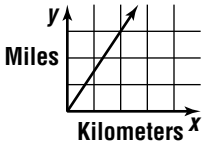
J $3x + 2y = 7$

63 Which graph shows that there is about 0.62 mile to a kilometer? **63** _____

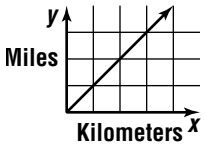
A



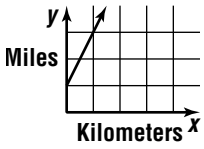
B



C



D



64 The prices for 7 pocket PCs are listed. What is the range of the prices? **64** _____

$480, $525, $500, $500, $500, $400, $400

F $125

G $472

H $480

J $500

Go on

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Name: Date:

Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

65 Elena plans to mix a 10% solution of blue dye with a 15% solution of blue dye to make 16 ounces of a solution that is 12% blue dye. How many ounces of 10% solution will she need to use? **65** _____

A 6.4 oz
B 7.36 oz
C 8.64 oz
D 9.6 oz

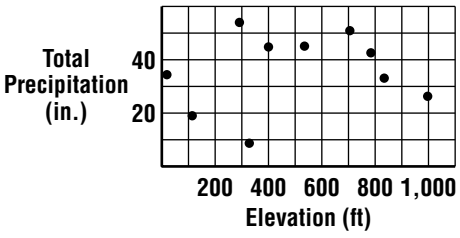
66 What is the approximate volume of a water tank in the shape of a cylinder that has a radius of 4 meters and a height of 6 meters? (Use 3.14 for π.) **66** _____

F about 1,800 m^3
G about 452 m^3
H about 300 m^3
J about 75 m^3

67 Mandy bought a softball glove on sale for \$5 more than one-third of its original price. If she paid \$20 for the glove, what was the original price? **67** _____

A \$75
B \$57
C \$45
D \$30

68 The scatterplot shows the elevation x in feet for 10 locations in the United States in relation to the total precipitation y in inches for one year. What does the scatterplot show about a correlation between elevation and precipitation? **68** _____



F There is a negative correlation.
G For elevations above 500 ft, the precipitation is below 40 in.
H There is a positive correlation.
J There is no correlation.

Go on

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Name: Date:

Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

69 What is a reasonable conjecture about the product of two or more nonzero integers if an even number of the factors are negative? **69** _____

A The product is even.
B The product is positive.
C The product is odd.
D The product is negative.

70 Ruiz measures the acute angles of right triangle ABC as 52° and 47°. How do you know that Ruiz made a mistake in measuring the angles? **70** _____

F Each acute angle must measure less than 45°.
G The acute angles of a right triangle have the same measure.
H The sum of the measures of the acute angles must be 90°.
J The sum of the measures of the acute angles must be less than 90°.

71 Which point lies on the line $5x - 6y = 11$? **71** _____

A (1, 1)
B (−1, 1)
C (−1, −1)
D (1, −1)

72 What is the value of $-7.5 - (-1.2) + (-1.8) - 6.7$? **72** _____

F −17.2
G −14.8
H 11.2
J 14.8

Go on

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Name: Date:

Sample Test (continued)

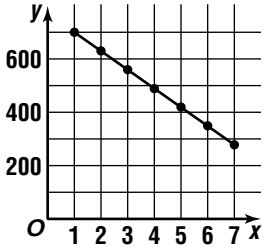
Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

73 Sherry sells real estate. She receives a 4.5% commission for selling a $165,000 house. How much does she make from the sale? **73** _____

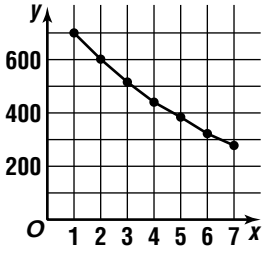
A $74,250
B $7,425
C $742.50
D $74.25

74 During a 7-day sale, each day the price of an item is reduced by $\frac{1}{7}$ from the previous day's price. Suppose an item was priced at $700 on day 1 of the sale. Which graph shows the prices of the item over the 7-day period? **74** _____

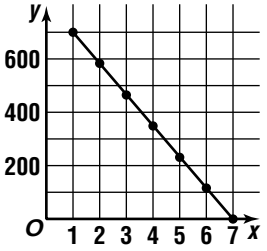
F



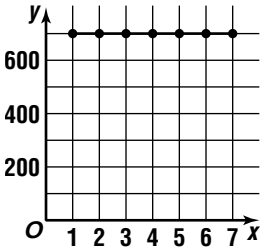
G



H



J



75 Beatriz has 20 coins in quarters and nickels. The coins are worth $2.20. Which system of equations can you use to find the number of quarters q and nickels n she has? **75** _____

A $q + n = 20$ and $0.30qn = 2.20$
B $q + n = 20$ and $0.25q + 0.05n = 2.20$
C $q + n = 2.20$ and $0.25q + 0.05n = 20$
D $q + n = 20$ and $0.30q = n + 2.20$

76 Randy's lunch cost $4.80. This amount included the price of the lunch plus 5% sales tax and a 15% tip. What was the price of Randy's lunch? **76** _____

F $4.60
G $4.20
H $4.00
J $3.64

Go on

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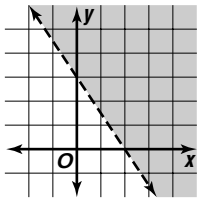
Name: Date:

Sample Test (continued)

Read each question and choose the best answer. Then write the letter for the answer you have chosen in the blank at the right of each question.

77 Which inequality is shown in the graph?



A $2x + 3y < 6$
B $2x + 3y > 6$
C $3x + 2y < 6$
D $3x + 2y > 6$

77 _____

78 A quart is about 0.95 liter. Which expression can you use to convert liters per second to gallons per minute?

F $\frac{1 \text{ qt}}{0.95 \text{ L}} \times \frac{1 \text{ gal}}{4 \text{ qt}}$
G $\frac{60 \text{ s}}{1 \text{ min}} \times \frac{1 \text{ qt}}{0.95 \text{ L}} \times \frac{4 \text{ qt}}{1 \text{ gal}}$
H $\frac{60 \text{ s}}{1 \text{ min}} \times \frac{1 \text{ qt}}{0.95 \text{ L}} \times \frac{1 \text{ gal}}{4 \text{ qt}}$
J $\frac{60 \text{ s}}{1 \text{ min}} \times \frac{0.95 \text{ L}}{1 \text{ qt}} \times \frac{1 \text{ gal}}{4 \text{ qt}}$

78 _____

79 One pint of fertilizer is recommended per 4 square feet of garden. How many pints of fertilizer should be used for a 16 feet by 20 feet garden?

A 20 pt
B 60 pt
C 80 pt
D 90 pt

79 _____

80 In a survey of 48 students, 12 students said they like only broccoli, 3 said they like both broccoli and green beans, and 5 said they like neither broccoli nor green beans. How many students like only green beans?

F 40 students
G 28 students
H 25 students
J 20 students

80 _____

STOP

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