

Introduction - Grade 6 Mathematics

The following released test questions are taken from the Grade 6 Mathematics Standards Test. This test is one of the California Standards Tests administered as part of the Standardized Testing and Reporting (STAR) Program under policies set by the State Board of Education.

All questions on the California Standards Tests are evaluated by committees of content experts, including teachers and administrators, to ensure their appropriateness for measuring the California academic content standards in Grade 6 Mathematics. In addition to content, all items are reviewed and approved to ensure their adherence to the principles of fairness and to ensure no bias exists with respect to characteristics such as gender, ethnicity, and language.

This document contains released test questions from the California Standards Test forms in 2003, 2004, and 2005. First on the pages that follow are lists of the standards assessed on the Grade 6 Mathematics Test. Next are released test questions. Following the questions is a table that gives the correct answer for each question, the content standard that each question is measuring, and the year each question last appeared on the test.

The following table lists each strand/reporting cluster, the number of items that appear on the exam, and the number of released test questions that appear in this document.

STRAND/REPORTING CLUSTER	NUMBER OF QUESTIONS ON EXAM	NUMBER OF RELEASED TEST QUESTIONS
Number Sense – Ratios, Proportions, Percentages, and Negative Fractions	15	10
Number Sense – Operations and Problem Solving with Fractions	10	8
Algebra and Functions	19	15
Measurement and Geometry	10	8
Statistics, Data Analysis, and Probability	11	7
TOTAL	65	48

In selecting test questions for release, three criteria are used: (1) the questions adequately cover a selection of the academic content standards assessed on the Grade 6 Mathematics Test; (2) the questions demonstrate a range of difficulty; and (3) the questions present a variety of ways standards can be assessed. These released test questions do not reflect all of the ways the standards may be assessed. Released test questions will not appear on future tests.

For more information about the California Standards Tests, visit the California Department of Education's Web site at <http://www.cde.ca.gov/ta/tg/sr/resources.asp>.

THE NUMBER SENSE STRAND

In Grade 6, there are two reporting clusters within the Number Sense strand: 1) Ratios, Proportions, Percentages, and Negative Fractions and 2) Operations and Problem Solving with Fractions. This booklet contains released test questions for each of these clusters.

The following four California content standards are included in the Ratios, Proportions, Percentages, and Negative Fractions reporting cluster of the Number Sense strand and are represented in this booklet by 10 test questions. These questions represent only some ways in which these standards may be assessed on the Grade 6 California Mathematics Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Number Sense

Standard Set 1.0* **Students compare and order positive and negative fractions, decimals, and mixed numbers. Students solve problems involving fractions, ratios, proportions, and percentages:**

6NS1.1* Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line.

6NS1.2* Interpret and use ratios in different contexts (e.g., batting averages, miles per hour) to show the relative sizes of two quantities, using appropriate notations (a/b , a to b , $a:b$).

6NS1.3* Use proportions to solve problems (e.g., determine the value of N if $4/7 = N/21$, find the length of a side of a polygon similar to a known polygon). Use cross-multiplication as a method for solving such problems, understanding it as the multiplication of both sides of an equation by a multiplicative inverse.

6NS1.4* Calculate given percentages of quantities and solve problems involving discounts at sales, interest earned, and tips.

* Denotes key standards (*Mathematics Framework for California Public Schools*)

The following four California content standards are included in the Operations and Problem Solving with Fractions reporting cluster of the Number Sense strand and are represented in this booklet by eight test questions. These questions represent only some ways in which these standards may be assessed on the Grade 6 California Mathematics Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS REPORTING CLUSTER

Number Sense

Standard Set 2.0* **Students calculate and solve problems involving addition, subtraction, multiplication, and division:**

6NS2.1	Solve problems involving addition, subtraction, multiplication, and division of positive fractions and explain why a particular operation was used for a given situation.
6NS2.2	Explain the meaning of multiplication and division of positive fractions and perform the calculations (e.g., $5/8$ divided by $15/16 = 5/8 \times 16/15 = 2/3$).
6NS2.3*	Solve addition, subtraction, multiplication, and division problems, including those arising in concrete situations, that use positive and negative integers and combinations of these operations.
6NS2.4*	Determine the least common multiple and the greatest common divisor of whole numbers; use them to solve problems with fractions (e.g., to find a common denominator to add two fractions or to find the reduced form for a fraction).

* Denotes key standards (*Mathematics Framework for California Public Schools*)

THE ALGEBRA AND FUNCTIONS STRAND/REPORTING CLUSTER

The following nine California content standards are included in the Algebra and Functions strand/reporting cluster and are represented in this booklet by 15 test questions. These questions represent only some ways in which these standards may be assessed on the Grade 6 California Mathematics Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS STRAND/CLUSTER

Algebra and Functions

Standard Set 1.0 Students write verbal expressions and sentences as algebraic expressions and equations; they evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results:

6AF1.1* Write and solve one-step linear equations in one variable.

6AF1.2 Write and evaluate an algebraic expression for a given situation, using up to three variables.

6AF1.3 Apply algebraic order of operations and the commutative, associative, and distributive properties to evaluate expressions; and justify each step in the process.

6AF1.4 Solve problems manually by using the correct order of operations or by using a scientific calculator.

Standard Set 2.0 Students analyze and use tables, graphs, and rules to solve problems involving rates and proportions:

6AF2.1 Convert one unit of measurement to another (e.g., from feet to miles, from centimeters to inches).

6AF2.2* Demonstrate an understanding that *rate* is a measure of one quantity per unit value of another quantity.

6AF2.3 Solve problems involving rates, average speed, distance, and time.

Standard Set 3.0 Students investigate geometric patterns and describe them algebraically:

6AF3.1 Use variables in expressions describing geometric quantities (e.g., $P = 2w + 2l$, $A = \frac{1}{2}bh$, $C = \pi d$ – the formulas for the perimeter of a rectangle, the area of a triangle, and the circumference of a circle, respectively).

6AF3.2 Express in symbolic form simple relationships arising from geometry.

* Denotes key standards (*Mathematics Framework for California Public Schools*)

THE MEASUREMENT AND GEOMETRY STRAND/REPORTING CLUSTER

The following six California content standards are included in the Measurement and Geometry strand/reporting cluster and are represented in this booklet by eight test questions. These questions represent only some ways in which these standards may be assessed on the Grade 6 California Mathematics Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS STRAND/CLUSTER

Measurement and Geometry

Standard Set 1.0 Students deepen their understanding of the measurement of plane and solid shapes and use this understanding to solve problems:

6MG1.1*	Understand the concept of a constant such as π ; know the formulas for the circumference and area of a circle.
6MG1.2	Know common estimates of π (3.14; 22/7) and use these values to estimate and calculate the circumference and the area of circles; compare with actual measurements.
6MG1.3	Know and use the formulas for the volume of triangular prisms and cylinders (area of base \times height); compare these formulas and explain the similarity between them and the formula for the volume of a rectangular solid.

Standard Set 2.0 Students identify and describe the properties of two-dimensional figures:

6MG2.1	Identify angles as vertical, adjacent, complementary, or supplementary and provide descriptions of these terms.
6MG2.2*	Use the properties of complementary and supplementary angles and the sum of the angles of a triangle to solve problems involving an unknown angle.
6MG2.3	Draw quadrilaterals and triangles from given information about them (e.g., a quadrilateral having equal sides but no right angles, a right isosceles triangle).

* Denotes key standards (*Mathematics Framework for California Public Schools*)

THE STATISTICS, DATA ANALYSIS, AND PROBABILITY STRAND/REPORTING CLUSTER

The following nine California content standards are included in the Statistics, Data Analysis, and Probability strand/reporting cluster and are represented in this booklet by seven test questions. These questions represent only some ways in which these standards may be assessed on the Grade 6 California Mathematics Standards Test.

CALIFORNIA CONTENT STANDARDS IN THIS STRAND/CLUSTER

Statistics, Data Analysis, and Probability

Standard Set 1.0 Students compute and analyze statistical measurements for data sets:

6PS1.1	Compute the range, mean, median, and mode of data sets.
6PS1.2	Understand how additional data added to data sets may affect these computations of measures of central tendency.
6PS1.3	Understand how the inclusion or exclusion of outliers affects measures of central tendency.

Standard Set 2.0 Students use data samples of a population and describe the characteristics and limitations of the samples:

6PS2.2*	Identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling) and which method makes a sample more representative for a population.
6PS2.5*	Identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.

Standard Set 3.0 Students determine theoretical and experimental probabilities and use these to make predictions about events:

6PS3.1*	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.
6PS3.3*	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.
6PS3.4	Understand that the probability of either of two disjoint events occurring is the sum of the two individual probabilities and that the probability of one event following another, in independent trials, is the product of the two probabilities.
6PS3.5*	Understand the difference between independent and dependent events.

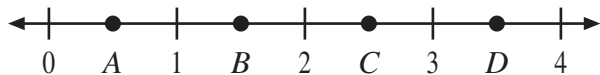
* Denotes key standards (*Mathematics Framework for California Public Schools*)

Released Test Questions

Math

6

- 1 Which point shows the location of $\frac{3}{2}$ on the number line?



- A point A
B point B
C point C
D point D

- 2 Which list of numbers is ordered from least to greatest?

- A $\frac{1}{2}$, $2\frac{1}{2}$, 0.2, 0.02
B 0.02, 0.2, $2\frac{1}{2}$, $\frac{1}{2}$
C 0.02, 0.2, $\frac{1}{2}$, $2\frac{1}{2}$
D 0.2, $\frac{1}{2}$, 0.02, $2\frac{1}{2}$

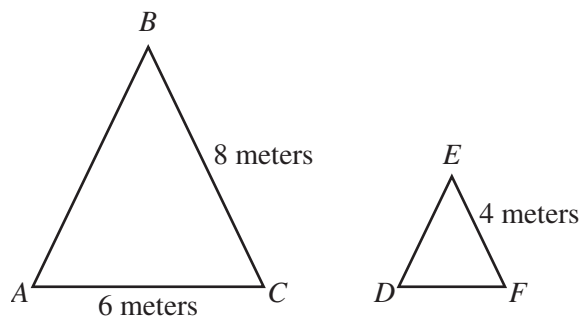
- 3 Which of the following fractions is closest to 0?

- A $-\frac{5}{12}$
B $-\frac{2}{3}$
C $\frac{5}{6}$
D $\frac{3}{4}$

- 4 The weekly milk order for the Tranquility Inn includes 40 gallons of low-fat milk and 15 gallons of chocolate milk. What is the ratio of the number of low-fat gallons to chocolate gallons in the Tranquility Inn's weekly milk order?

- A 3:1
B 5:1
C 5:3
D 8:3

- 5 $\triangle ABC$ is similar to $\triangle DEF$. What is the length of \overline{DF} ?



- A 2 meters
B 3 meters
C 5 meters
D 10 meters

- 6** A farmer harvested 14,000 pounds of almonds from an 8-acre orchard. Which proportion could be solved to find x , the expected harvest from a 30-acre orchard?

A $\frac{8}{14,000} = \frac{x}{30}$

B $\frac{8}{14,000} = \frac{30}{x}$

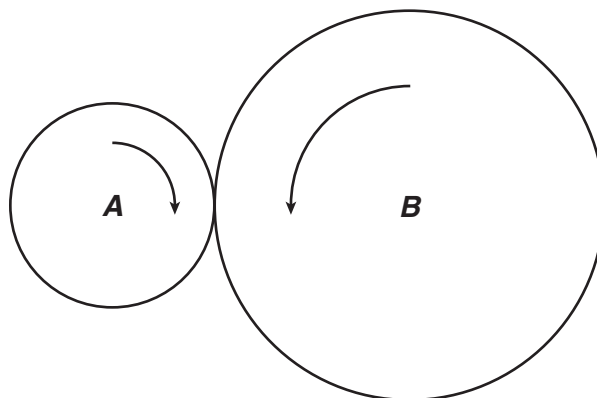
C $\frac{30}{14,000} = \frac{x}{8}$

D $\frac{30}{14,000} = \frac{8}{x}$

- 7** A certain map uses a scale of 1 inch equals 25 miles. How many miles are represented by 5 inches on this map?

- A 5
B 25
C 50
D 125

- 8** When wheel B turns 2 revolutions, wheel A turns 5 revolutions. When wheel A turns 40 revolutions, how many revolutions does wheel B turn?



- A 4
B 16
C 80
D 100

- 9** The vice president of sales took a client out to lunch. If the lunch was \$44 and she gave a 20% tip, how much money did she spend on lunch?

- A \$8.80
B \$35.20
C \$52.80
D \$53.80

- 10** If 50% of a number is 20, what is 75% of the number?

- A 8
B 15
C 30
D 45

Released Test Questions

Math

6

11 What is $\frac{10}{11} \times \frac{11}{12}$?

A $\frac{5}{6}$

B $\frac{21}{23}$

C $1\frac{1}{120}$

D 2

12 What is the product of $\frac{2}{5}$ and $\frac{4}{5}$?

A $\frac{1}{5}$

B $\frac{8}{25}$

C $\frac{1}{2}$

D $\frac{6}{5}$

13 A group of hikers climbed from Salt Flats (elevation -55 feet) to Talon Bluff (elevation 620 feet). What is the difference in elevation between Talon Bluff and Salt Flats?

A 565 feet

B 575 feet

C 665 feet

D 675 feet

14 $12 \div -3 =$

A 9

B 4

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

D -4

15 One morning, the temperature was 5° below zero. By noon, the temperature rose 20° Fahrenheit (F) and then dropped 8° F by evening. What was the evening temperature?

A 17° below zero

B 15° below zero

C 12° above zero

D 7° above zero

16 $-4 + (-3) =$

A -7

B -1

C 1

D 7

17 $\frac{3}{8} + \frac{1}{12} =$

A $\frac{1}{5}$

B $\frac{1}{6}$

C $\frac{11}{24}$

D $\frac{11}{48}$

18 What is the greatest common divisor of 54, 36, and 24?

A 2

B 3

C 6

D 9

19 What value of k makes the following equation true?

$$k \div 3 = 36$$

A 108

B 98

C 39

D 12

20 The Sojourn family went on a vacation. They started with \$2000. If they spent \$150 each day, which expression represents how much money they had after x days?

A $1850x$

B $2000 - 150x$

C $150x$

D $2000 + 150x$

21 Ellen had some change in her pocket. After her friend gave her \$0.45, Ellen had \$1.35 altogether. Which equation can she use to find the original amount of money, m , she had in her pocket?

A $m + 0.45 = 1.35$

B $1.35 = m - 0.45$

C $m = 1.35 \times 0.45$

D $m + 1.35 = 0.45$

22 Which algebraic equation best describes the total growth (T) in height of pine trees over a 3-year period, if g equals the rate of growth in centimeters per year?

A $T = 3g$

B $T = 3 + g$

C $T = \frac{g}{3}$

D $T = \frac{3}{g}$

Released Test Questions

Math

6

- 23** A telephone company charges \$0.05 per minute for local calls and \$0.12 per minute for long-distance calls. Which expression gives the total cost in dollars for x minutes of local calls and y minutes of long-distance calls?

A $0.05x + 0.12y$
 B $0.05x - 0.12y$
 C $0.17(x + y)$
 D $0.17xy$

- 24** The steps Quentin took to evaluate the expression $3m - 3 \div 3$ when $m = 8$ are shown below.

$3m - 3 \div 3$ when $m = 8$ $3 \times 8 = 24$ $24 - 3 = 21$ $21 \div 3 = 7$

What should Quentin have done differently in order to evaluate the expression?

A divided $(24 - 3)$ by (24×3)
 B divided $(24 - 3)$ by $(24 - 3)$
 C subtracted $(3 \div 3)$ from 24
 D subtracted 3 from $(24 \div 3)$

- 25** $8 + 8 \div 2 + 2 =$

A 4
 B 8
 C 10
 D 14

- 26** How many inches are in $2\frac{1}{2}$ feet?

A 24 inches
 B 25 inches
 C 29 inches
 D 30 inches

- 27** It takes a machine 12 minutes to fill 200 bottles of soda. At this rate, how many minutes will it take the machine to fill 500 bottles of soda?

A 25 minutes
 B 28 minutes
 C 30 minutes
 D 40 minutes

- 28** Trish's resting heart rate is 50 beats per minute. For every minute she exercises, her heart rate increases 5 beats per minute. How long will it take her to reach a heart rate of 120 beats per minute?

A 5 minutes
 B 14 minutes
 C 34 minutes
 D 70 minutes

- 29** Marcus spent \$3.25 to wash his car. If one quarter operates the car wash for 60 seconds, how long did it take him to wash his car?

A 10 minutes
B 13 minutes
C 16 minutes
D 32.5 minutes

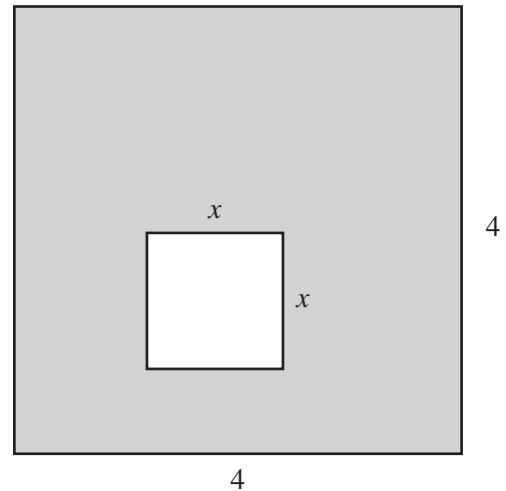
- 30** A car gets 24 miles per gallon of gasoline (mi/gal). How many gallons of gasoline would the car need to travel 144 miles?

A 6.5 gallons
B 6 gallons
C 5.5 gallons
D 5 gallons

- 31** Jerry read a 200-page book in 10 hours. At that rate, how long will it take him to read a 320-page book?

A 16 hours
B 18 hours
C 24 hours
D 32 hours

- 32** A square with a side of x is inside a square with a side of 4, as pictured below. Which expression represents the area of the shaded region in terms of x ?



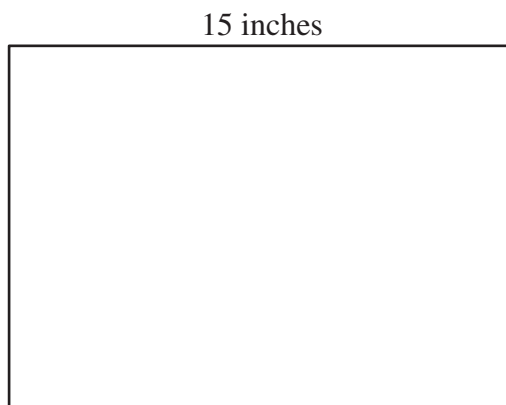
- A $16 + x^2$
B $16 - x^2$
C $16 - 2x$
D $16 - 4x$

Released Test Questions

Math

6

- 33** The rectangle shown below has length 15 inches and perimeter P inches.

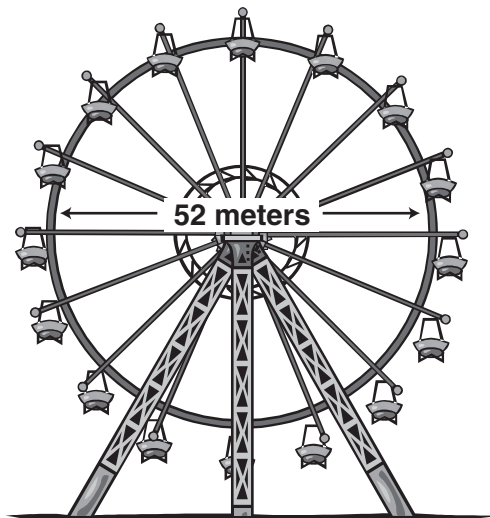


Which equation could be used to find the width of the rectangle?

- A $P = 15 + \frac{w}{2}$
- B $P = 15 - w$
- C $P = 30 + 2w$
- D $P = 30 - 2w$
-
- 34** Which equation could be used to find the area in square inches of a circle with a radius of 8 inches?

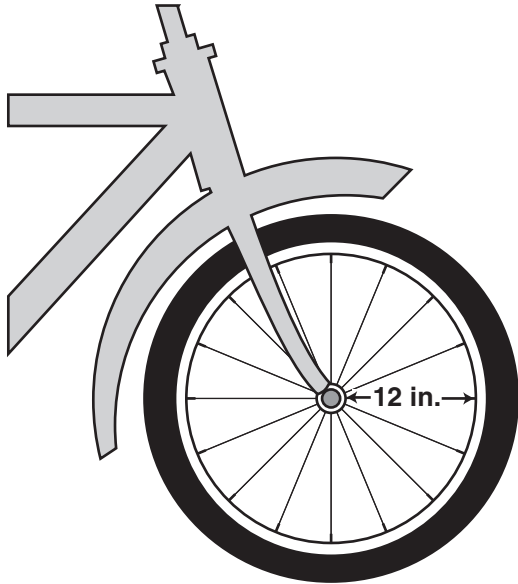
- A $A = 4 \times \pi$
- B $A = \pi \times 4^2$
- C $A = 8 \times \pi$
- D $A = \pi \times 8^2$

- 35** A Ferris wheel at the local fair has a diameter of 52 meters. Which expression can be used to find its circumference, C , in meters?



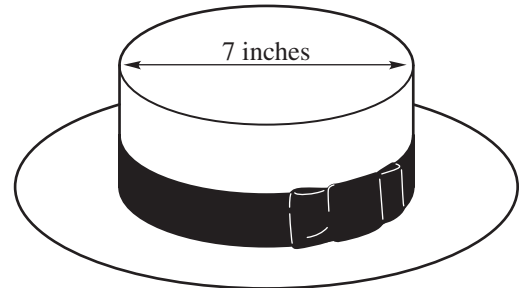
- A $C = 26 \times \pi$
- B $C = 52 \times \pi$
- C $C = 2 \times 52 \times \pi$
- D $C = 26^2 \pi$

- 36** A bicycle wheel has an inside radius of 12 inches. Which expression could be used to find the inside circumference of this wheel?



- A $2 \times 6 \times \pi$
 B $2 \times 12 \times \pi$
 C $9 \times 9 \times \pi$
 D $12 \times 12 \times \pi$

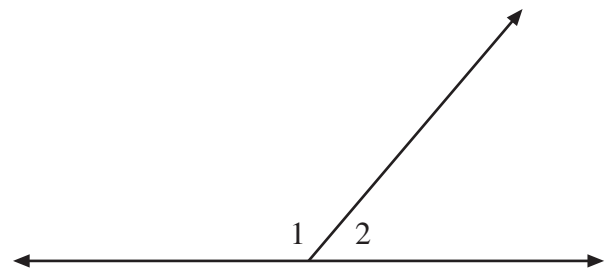
- 37** The top part of this hat is shaped like a cylinder with a diameter of 7 inches.



Which measure is *closest* to the length of the band that goes around the outside of the hat?

- A 10.1 inches
 B 11.0 inches
 C 22.0 inches
 D 38.5 inches

- 38** Which is a true statement about angles 1 and 2 shown below?



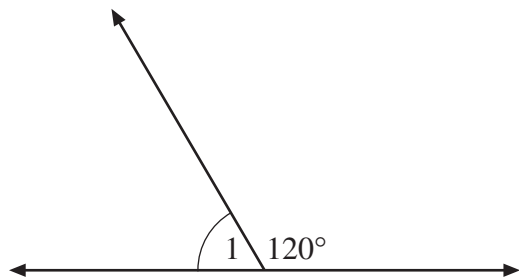
- A $\angle 1$ is complementary to $\angle 2$.
 B $\angle 1$ is supplementary to $\angle 2$.
 C Both angles are obtuse.
 D Both angles are acute.

Released Test Questions

Math

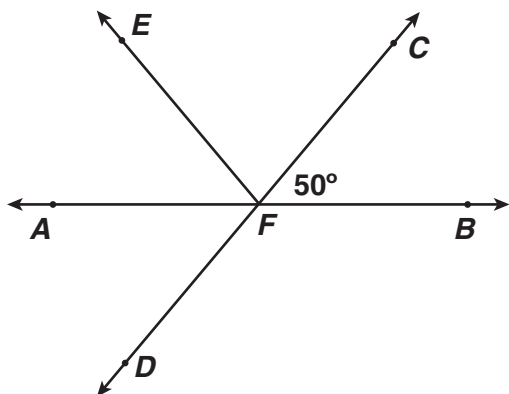
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- 39 What is the measure of angle 1 in the figure below?



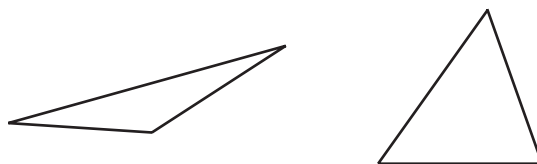
- A 30°
- B 40°
- C 60°
- D 80°

- 40 In the figure below, \overleftrightarrow{CD} intersects \overleftrightarrow{AB} at F , $m\angle CFB = 50^\circ$, and $\angle EFA \cong \angle AFD$. What is $m\angle EFC$?



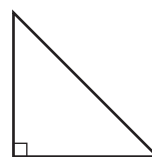
- A 40°
- B 50°
- C 70°
- D 80°

- 41 Which figure is an acute triangle?

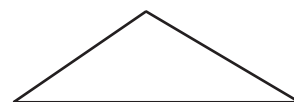


A

C



B



D

- 42 Abe found the mean and median of this list of numbers.

1, 3, 3

If the number 6 were added to the list, then

- A the mean would increase.
- B the mean would decrease.
- C the median would increase.
- D the median would decrease.

- 43** Wendy wants to take a survey to determine which flavor of ice cream is the most popular at her school. Which of the following methods is the *best* way for her to choose a random sample of the students at her school?

- A selecting ten students from each homeroom
- B selecting members of the girl's softball team
- C selecting members of the boy's basketball team
- D selecting students who like her favorite flavor of ice cream

- 44** The table shows the annual profit for five companies.

2003 Profits

Company	Profit
I	\$300,000
II	\$275,000
III	\$250,000
IV	\$325,000
V	\$300,000

Which statement is valid about the annual profits of these five companies?

- A Companies II and V made the same profit.
- B No company made less than \$275,000 profit.
- C No company made more than \$300,000 profit.
- D Company IV made \$75,000 more profit than Company III.

- 45** Ms. Hatley is going to choose one person from each of the two lists below to represent the class in student council.

List 1	List 2
Ann	Dave
Carlos	Mia
Lisa	

Which set shows *all* the possible choices of two people?

- A $\{(Ann, Carlos), (Ann, Lisa)\}$
- B $\{(Ann, Dave), (Ann, Mia)\}$
- C $\{(Ann, Dave), (Carlos, Mia), (Lisa, Dave), (Lisa, Mia)\}$
- D $\{(Ann, Dave), (Ann, Mia), (Carlos, Dave), (Carlos, Mia), (Lisa, Dave), (Lisa, Mia)\}$

Released Test Questions

Math

6

- 46** The table shows how many T-shirts of each color Paul has in his closet.

Color	Number of Shirts
Green	3
Red	4
White	5
Blue	8
Total	20

If Paul chooses a T-shirt without looking, what is the probability that it will be blue?

- A 4%
- B 8%
- C 40%
- D 60%

- 47** Mason has 10 black, 12 white, and 3 brown pairs of socks in one drawer. What is the probability that, without looking, Mason will pick a brown pair of socks from the drawer?

- A 4%
- B 12%
- C 14%
- D $33\frac{1}{3}\%$

- 48** In her pocket, Kira has 2 red marbles, 2 green marbles, and 2 blue marbles that are all the same size. If Kira picks one marble out of her pocket without looking, what is the probability that it will be either red or green?

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

Question Number	Correct Answer	Standard	Year of Test
1	<i>B</i>	6NS1.1	2003
2	<i>C</i>	6NS1.1	2004
3	<i>A</i>	6NS1.1	2005
4	<i>D</i>	6NS1.2	2004
5	<i>B</i>	6NS1.3	2003
6	<i>B</i>	6NS1.3	2004
7	<i>D</i>	6NS1.3	2005
8	<i>B</i>	6NS1.3	2005
9	<i>C</i>	6NS1.4	2003
10	<i>C</i>	6NS1.4	2004
11	<i>A</i>	6NS2.1	2004
12	<i>B</i>	6NS2.2	2005
13	<i>D</i>	6NS2.3	2003
14	<i>D</i>	6NS2.3	2003
15	<i>D</i>	6NS2.3	2004
16	<i>A</i>	6NS2.3	2005
17	<i>C</i>	6NS2.4	2003
18	<i>C</i>	6NS2.4	2005
19	<i>A</i>	6AF1.1	2003
20	<i>B</i>	6AF1.1	2004
21	<i>A</i>	6AF1.1	2005
22	<i>A</i>	6AF1.1	2005
23	<i>A</i>	6AF1.2	2003
24	<i>C</i>	6AF1.3	2004
25	<i>D</i>	6AF1.4	2005
26	<i>D</i>	6AF2.1	2003
27	<i>C</i>	6AF2.2	2003
28	<i>B</i>	6AF2.2	2004
29	<i>B</i>	6AF2.2	2005
30	<i>B</i>	6AF2.2	2005
31	<i>A</i>	6AF2.3	2004
32	<i>B</i>	6AF3.1	2004
33	<i>C</i>	6AF3.2	2003

Released Test Questions

Math

6

Question Number	Correct Answer	Standard	Year of Test
34	<i>D</i>	6MG1.1	2003
35	<i>B</i>	6MG1.1	2004
36	<i>B</i>	6MG1.1	2005
37	<i>C</i>	6MG1.2	2003
38	<i>B</i>	6MG2.1	2004
39	<i>C</i>	6MG2.2	2003
40	<i>D</i>	6MG2.2	2005
41	<i>C</i>	6MG2.3	2004
42	<i>A</i>	6PS1.2	2004
43	<i>A</i>	6PS2.2	2005
44	<i>D</i>	6PS2.5	2005
45	<i>D</i>	6PS3.1	2003
46	<i>C</i>	6PS3.3	2003
47	<i>B</i>	6PS3.3	2004
48	<i>D</i>	6PS3.4	2005