



Grade 8 Mathematics Sample Questions



This booklet contains sample Grade 8 Mathematics items from the National Assessment of Educational Progress (NAEP). Additional NAEP items can be accessed at www.nces.ed.gov/nationsreportcard/itmrls.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (NCES), National Assessment of Educational Progress (NAEP).

This Grade 8 Mathematics Sample Questions Booklet and the corresponding answer document are posted at <http://www.fldoe.org/asp/naep/naep-pt.asp>.

NAEP GRADE 8 MATHEMATICS

CONTENTS

Grade 8 Mathematics	1
Sample Questions	1
INTRODUCTION.....	5
Question 1 - Translate from words to numbers	6
Question 2 - Identify expression that represents odd integer	6
Question 3 - Use measuring cups to describe a fraction.....	6
Question 4 - Find wages earned	7
Question 5 - Recognize a counterexample about prime numbers.....	7
Question 6 - Use estimation to find a difference	7
Question 7 - Identify pictorial representation of equivalent fractions.....	8
Question 8 - Identify operation resulting from odd integer.....	8
Question 9 - Determine a quantity based on given percent	8
Question 10 - Solve a story problem involving costs and profit.....	9
Question 11 - Divide large numbers in a given context.....	9
Question 12 - Identify fractions listed in ascending order	9
Question 13 - Identify number rounded to nearest hundred	10
Question 14 - Estimate time given rate and distance	10
Question 15 - Determine distance given rate and time	10
Question 16 - Use number properties to determine the parity of an unknown number	11
Question 17 - Determine number that satisfies given conditions.....	11
NAEP GRADE 8 ALGEBRA	12
Question 1 - Identify equation modeling a scenario	12
Question 2 - Identify a non-equivalent equation	12
Question 3 - Evaluate equation for a given value in context.....	12
Question 4 - Identify equation modeling perimeter	13
Question 5 - Determine equation to model a situation	13
Question 6 - Determine equation of a line given a point and the slope	13
Question 7 - Find interval of largest change on graph	14
Question 8 - Find solution to equation.....	14
Question 9 - Interpret a linear equation in content	15
Question 10 - Recognize effect of sign on operations.....	15
Question 11 - Write expression to calculate cost.....	15
Question 12 - Find the next term in a geometric sequence	16

NAEP GRADE 8 MEASUREMENT	17
Question 1 - Determine distance using similar triangles.....	17
Question 2 - Convert dollars to yen.....	17
Question 3 - Find area of irregular-shaped region on a grid.	18
Question 4 - Recognize a unit of volume.....	18
Question 5 - Convert between units of measurement.....	19
Question 6 - Solve arithmetic problem involving time.....	19
Question 7 - Determine possible dimensions of rectangle given area.....	20
Question 8 - Determine area of a right trapezoid	20
Question 9 - Solve story problem involving milliliters and liters.....	20
Question 10 - Determine degree measure formed by clock hands.....	21
Question 11 - Estimate side length of a square given area	21
Question 12 - Recognize unit associated with specific attribute.....	21
Question 13 - Determine dimensions that give greatest volume.....	22
Question 14 - Approximate the length of the radius of a circle	22
Question 15 - Find length of a rectangle given perimeter and width	22
Question 16 - Determine value of marks on scale.....	23
Question 17 - Determine how many tiles would cover a table top.....	23
NAEP GRADE 8 GEOMETRY	24
Question 1 - Reflect a figure over a line	24
Question 2 - Determine how three lines are related.....	24
Question 3 - Analyze subdivision of regular polygons.....	25
Question 4 - Compare similar parallelograms	25
Question 5 - Identify net that folds into box	26
Question 6 - Determine radius of a circle inscribed in a square.....	27
Question 7 - Identify students who correctly classify a figure	27
Question 8 - Identify image of figure after rotation	28
Question 9 - Determine coordinates after reflection.....	28
Question 10 - Find length of hypotenuse	28
Question 11 - Determine number of edges.....	29
Question 12 - Identify side with same length in congruent figures	29
Question 13 - Identify piece used to form figure	30
Question 14 - Sketch polygon based on description	30
Question 15 - Find container height given dimensions of contents.....	31

NAEP GRADE 8 DATA ANALYSIS AND PROBABILITY	32
Question 1 - Make an inference given a probability	32
Question 2 - Find how many 3-digit numbers can be written.....	32
Question 3 - Use experimental results to make a prediction.....	32
Question 4 - Determine the probability of a particular outcome	33
Question 5 - Read and interpret information in a graph.....	33
Question 6 - Identify which statistic is represented by response	34
Question 7 - Determine most appropriate graph for a situation	34
Question 8 - Find total cost based on unit price for a quantity.....	34
Question 9 - Determine an expected outcome	35
Question 10 - Find number of combinations satisfying a condition.....	35
Question 11 - Explain a probability concept.....	36
Question 12 - Explain which statistic is best in given situation	36

Mathematics Common Core (MACC) State Standards (CCSS) Domains

EE = Expressions and Equations	F = Functions
G = Geometry	MD = Measurement and Data
NBT = Number and Operations in Base Ten	NF = Number and Operations Fractions
NS = Number Systems	OA = Operations and Algebraic Thinking
RP = Ratios and Proportional Relationships	SP = Statistics and Probability

INTRODUCTION

The sample items included in this document are taken from previously administered, publicly released Grade 8 Mathematics National Assessment of Educational Progress (NAEP) assessments. The answers to the sample items are included in a companion document. For the multiple-choice questions, the correct answers (indicated by an asterisk) and the distracters; the percentage of the Florida's or the Nation's responses to each of the possible answers; and the Description, Difficulty, and Complexity of each item are provided. Score descriptors are shown for short- and extended-constructed response items. All released NAEP items and sample responses can be found in the NAEP Questions Tool (NQT) at <http://nces.ed.gov/nationsreportcard/itmrlsx/default.aspx>.

The NQT is an interactive tool containing over 2,000 released questions from NAEP assessments in all NAEP subject areas. The questions are examples of what NAEP asks students on the assessments and can be used as a supplement to classroom instruction. Also available are the scoring rubrics; sample student responses; and scoring results by subject, grade, item type, difficulty, content area, complexity, framework, year, and key words.

For more information about NAEP results, go to the NAEP Data Explorer (NDE) at <http://nces.ed.gov/nationsreportcard/naepdata/>. The NDE is an interactive tool that provides access to a wide variety of data about what students know and can do, as well as demographic and contextual factors that may affect their performance. The NDE produces charts, customized tables, and graphics based on NAEP results by year and jurisdiction; significance between jurisdictions, within variables, and across years; and gap analyses between jurisdictions or across years and between groups, between years, and between groups and years.

Additional information about the knowledge and skills the mathematics assessment is designed to measure can be found in the 2011 Mathematics Framework, <http://www.nagb.org/publications/frameworks/math-2011-framework.pdf>. The current NAEP Mathematics Framework has guided the development of all mathematics assessments since 2005. The previous NAEP Mathematics Framework guided the development of the mathematics assessments between 1990 and 2003.

NAEP GRADE 8 NUMBER PROPERTIES AND OPERATIONS

Question 1, Translate from words to numbers

Which of the following numbers is twenty-three and eight-thousandths?

- a. 230.8
- b. 23.8
- c. 23.08
- d. 23.008
- e. 23.0008

Question 2, Identify expression that represents odd integer

If n is any integer, which of the following expressions must be an odd integer?

- a. $n + 1$
- b. $2n$
- c. $2n + 1$
- d. $3n$
- e. $3n + 1$

Question 3, Use measuring cups to describe a fraction

A recipe requires $1 \frac{1}{3}$ cups of sugar. Which of the following ways describe how the measuring cups shown can be used to measure $1 \frac{1}{3}$ cups of sugar accurately?



- a. Use the $\frac{1}{2}$ cup three times
- b. Use the $\frac{1}{4}$ cup three times
- c. Use the $\frac{1}{2}$ cup twice and the $\frac{1}{3}$ cup once
- d. Use the $\frac{1}{3}$ cup twice and the $\frac{1}{2}$ cup once
- e. Use the $\frac{1}{4}$ cup once, the $\frac{1}{3}$ cup once, and the $\frac{1}{2}$ cup once

Question 4, Find wages earned

Last week Bianca earned \$288.00 (before taxes) for working 40 hours. This week Bianca worked 29 hours at the same rate of pay. How much did Bianca earn (before taxes) this week?

- a. \$72.00
- b. \$72.50
- c. \$203.00
- d. \$208.80
- e. \$397.24

Question 5, Recognize a counterexample about prime numbers

Which of the following true statements proves that 119 is not a prime number?

- a. $17 \times 7 = 119$
- b. $119 \times 1 = 119$
- c. 119 is $>$ than 100
- d. 119 is an odd number
- e. 119 is not divisible by 3

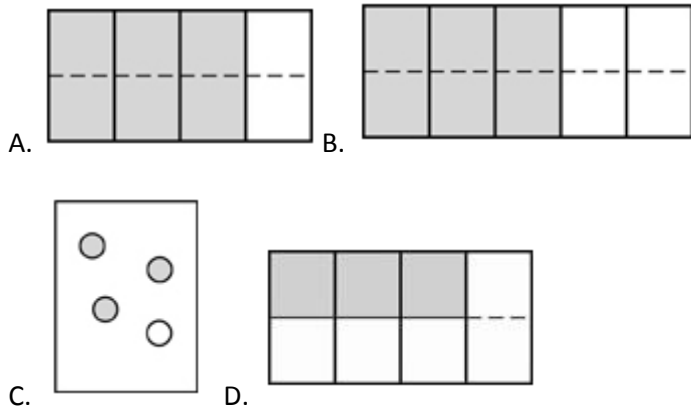
Question 6, Use estimation to find a difference

A loaded truck weighs 26,643 kilograms. When the trailer truck is empty, it weighs 10,547 kilograms. About how much does the load weigh?

- a. 14,000 kilograms
- b. 16,000 kilograms
- c. 18,000 kilograms
- d. 36,000 kilograms

Question 7, Identify pictorial representation of equivalent fractions

Which picture shows that $\frac{3}{4}$ is the same as $\frac{6}{8}$?



Question 8, Identify operation resulting from odd integer

Which of the following is always an odd integer?

- a. The product of two odd integers
- b. The product of two consecutive integers
- c. The sum of three even integers
- d. The sum of two odd integers
- e. The sum of three consecutive integers

Question 9, Determine a quantity based on given percent

The school carnival committee sold a total of 200 tickets for the grand prize drawing. Sue bought enough tickets so that she had a 20 percent chance of winning the grand prize. How many tickets did Sue buy?

- a. 20
- b. 40
- c. 160
- d. 400
- e. 1,000

Question 10, Solve a story problem involving costs and profit

Peter bought 45 sheets of plywood at a total cost of \$400. He plans to sell each sheet for \$15. If Peter has no other expenses, what is the fewest number of sheets he must sell to make a profit?

- a. 3
- b. 15
- c. 16
- d. 26
- e. 27

Question 11, Divide large numbers in a given context

In a contest, a prize of 2.72 million dollars was split equally among 32 winners. How much money did each of the 32 winners receive?

- a. \$0.085
- b. \$62,500
- c. \$62,502.25
- d. \$85,000
- e. \$850,000

Question 12, Identify fractions listed in ascending order

In which of the following are the three fractions arranged from least to greatest?

- a. $\frac{2}{7}, \frac{1}{2}, \frac{5}{9}$
- b. $\frac{1}{2}, \frac{2}{7}, \frac{5}{9}$
- c. $\frac{1}{2}, \frac{5}{9}, \frac{2}{7}$
- d. $\frac{5}{9}, \frac{1}{2}, \frac{2}{7}$
- e. $\frac{5}{9}, \frac{2}{7}, \frac{1}{2}$

Question 13, Identify number rounded to nearest hundred

The weight of an object is 1,700 pounds, rounded to the nearest hundred. Of the following, which could be the actual weight of the object?

- a. 1,640
- b. 1,645
- c. 1,649
- d. 1,749
- e. 1,751

Question 14, Estimate time given rate and distance

Mika and her mother noticed the road sign shown below while on their way to Rockville. If their speed is about 65 miles per hour, approximately how many more hours are needed to finish the trip?

- a. 1
- b. 2
- c. 3
- d. 4
- e. 5



Question 15, Determine distance given rate and time

An airplane climbs at a rate of 66.8 feet per minute. It descends at twice the rate that it climbs. Assuming it descends at a constant rate, how many feet will the airplane descend in 30 minutes?

- a. 96.8
- b. 133.6
- c. 1,002
- d. 2,004
- e. 4,008

Question 16, Use number properties to determine the parity of an unknown number

Stella found the torn piece of paper shown below.



Six numbers originally appeared in a column on this paper. The fourth number from the top of the column had been completely torn away. Stella wondered whether the sum of the six numbers was odd or even.

Give an example of a number that could be the fourth number in the column if the sum of the six numbers is an odd number.

Answer: _____

Explain why you chose that number.

Question 17, Determine number that satisfies given conditions

A certain even number is divisible by 9. This number is between 100 and 120. What is the number?

NAEP GRADE 8 ALGEBRA

Question 1, Identify equation modeling a scenario

The admission price to a movie theatre is \$7.50 for each adult and \$4.75 for each child. Which of the following equations can be used to determine T , the total admission price, in dollars, for x adults and y children?

- a. $T = (7.50 + 4.75)(x + y)$
- b. $T = 7.50x + 4.75y$
- c. $T = 7.50y + 4.75x$
- d. $T = (7.50x)(4.75y)$
- e. $T = (7.50 + 4.75) + (x + y)$

Question 2, Identify a non-equivalent equation

Which of the following equations is NOT equivalent to the equation $n + 18 = 23$?

- a. $23 = n - 18$
- b. $23 = 18 + n$
- c. $18 = 23 - n$
- d. $18 + n = 23$
- e. $n = 23 - 18$

Question 3, Evaluate equation for a given value in context

A reasonable prediction of the distance d in feet that a car travels after the driver has applied the brakes can be found by using the formula $d = 0.055r^2$, where r is the speed of the car in miles per hour.

If Mario is driving 60 miles per hour and applies the brakes, then according to the formula, how many feet will Mario's car travel before it stops?

- a. 330
- b. 198
- c. 10.89
- d. 6.6
- e. 3.3

Question 4, Identify equation modeling perimeter

A rectangle has a width of m inches and a length of k inches. If the perimeter of the rectangle is 1,523 inches, which of the following equations is true?

- a. $2(m + k) = 1,523$
- b. $2m + k = 1,523$
- c. $m + k = 1,523$
- d. $mk = 1,523$
- e. $m^2 k^2 = 1,523$

Question 5, Determine equation to model a situation

David had x books. Marie has twice as many books as David has. Together they have 18 books. Which of the following equations can be used to find the number of books that David has?

- a. $x + 2 = 18$
- b. $x + x + 2 = 18$
- c. $x + 2x = 18$
- d. $2x = 18$
- e. $2x = 2x = 18$

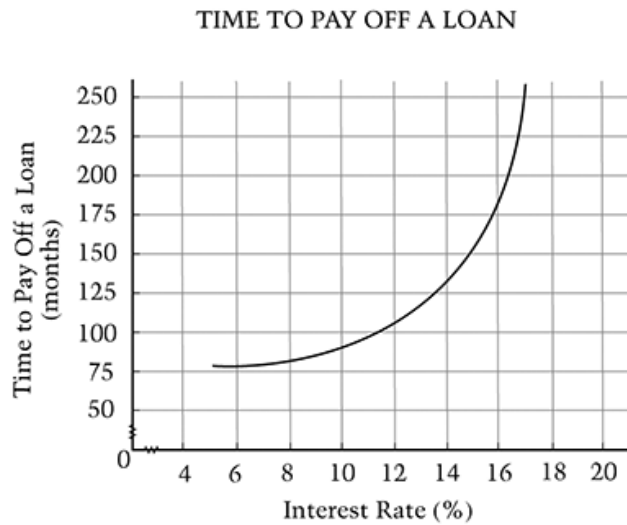
Question 6, Determine equation of a line given a point and the slope

Which of the following is an equation of a line that passes through the point (0,5) and has a negative slope?

- a. $y = 5x$
- b. $y = 5x - 5$
- c. $y = 5x = 5$
- d. $y = -5x - 5$
- e. $y = 5x = 5$

Question 7, Find interval of largest change on graph

According to the graph above, between which of the following pairs of interest rates will the increase in the number of months to pay off a loan be greatest?



- a. 7% and 9%
- b. 9% and 11%
- c. 11% and 13%
- d. 13% and 15%
- e. 15% and 17%

Question 8, Find solution to equation

The point $(4, k)$ is a solution to the equation $3x + 2y = 12$. What is the value of k ?

- a. -3
- b. 0
- c. 2
- d. 3
- e. 4

Question 9, Interpret a linear equation in content

The number of gallons of water, y , in a tank after x hours may be modeled by the linear equation $y = 800 - 50x$. Which of the following statements about the tank is true?

- a. It is filling at a rate of 800 gallons per hour.
- b. It is filling at a rate of 50 gallons per hour.
- c. It is emptying at a rate of 16 gallons per hour.
- d. It is emptying at a rate of 50 gallons per hour.
- e. It is emptying at a rate of 800 gallons per hour.

Question 10, Recognize effect of sign on operations

If $a > 0$ and $b < 0$, which of the following must be true?

- a. $ab > 0$
- b. $a - b > 0$
- c. $b - a > 0$
- d. $a + b > 0$
- e. $a + b < 0$

Question 11, Write expression to calculate cost

The Music Palace is having a sale.

Music Palace Sale

\$12 for the first CD

\$6 for each additional CD

(Prices include tax.)

Write an expression that shows how to calculate the cost of buying n CD's at the sale.

Answer: _____

Question 12, Find the next term in a geometric sequence

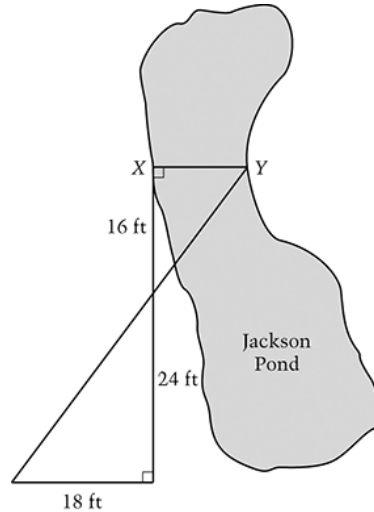
In the sequence below, the ratio of each term to the term immediately following it is constant. What is the next term of this sequence after 2240?

35, 280, 2240, _____

NAEP GRADE 8 MEASUREMENT

Question 1, Determine distance using similar triangles

The figure below shows Jackson Pond. What is the distance across Jackson Pond from point X to point Y ?



- a. 8 feet
- b. 10 feet
- c. 12 feet
- d. 14 feet
- e. 22 feet

Question 2, Convert dollars to yen

A company from Japan was doing business in the United States. In 2007, it had an annual income of \$1,000,000 and annual expenses of \$800,000. The formula below shows the relationship between income, expenses, and profit.

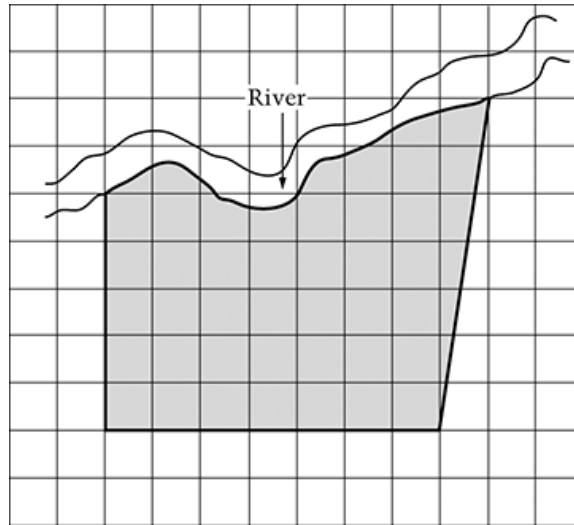
$$\text{Income} = \text{Expenses} + \text{Profit}$$

About how much was this company's profit in Japanese yen, in 2007? (In 2007, 1 United States dollar was approximately 127 yen.)

- a. 1,600 yen
- b. 2,000,000 yen
- c. 2,500,000 yen
- d. 18,000,000 yen
- e. 25,000,000 yen

Question 3, Find area of irregular-shaped region on a grid.

On the scale drawing below, the shaded area represents a piece of property along the river. Which of the following measurements is the best estimate of the area of the property?



represents 25 square meters

- a. 750 square meters
- b. 850 square meters
- c. 900 square meters
- d. 1,050 square meters
- e. 1,200 square meters

Question 4, Recognize a unit of volume

Which of the following is a unit of volume?

- a. Acre
- b. Gram
- c. Liter
- d. Meter
- e. Ton

Question 5, Convert between units of measurement

The table below shows the distance of each planet from the Sun, to the nearest million kilometers.

Planet	Distance from Sun (in millions of kilometers)
Mercury	58
Venus	108
Earth	150
Mars	228
Jupiter	778
Saturn	1,427
Uranus	2,871
Neptune	4,497
Pluto	5,914

One Astronomical unit (AU) is defined as the distance between Earth and the Sun (1 AU \approx 150 million kilometers). To the nearest whole number, how many astronomical units is Pluto from the Sun?

- a. 6,064 AU
- b. 5,914 AU
- c. 5,764 AU
- d. 150 AU
- e. 39 AU

Question 6, Solve arithmetic problem involving time

A turkey is put in the oven at 10:30 a.m. If the turkey takes $2\frac{3}{4}$ hours to cook, at what time should it be taken out of the oven?

- a. 12:15 p.m.
- b. 12:45 p.m.
- c. 1:15 p.m.
- d. 1:45 p.m.

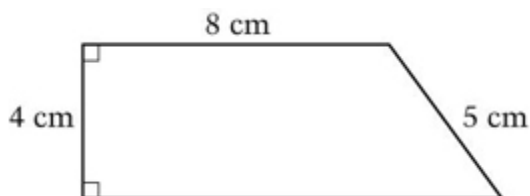
Question 7, Determine possible dimensions of rectangle, given area

Sarah drew a rectangle that has an area of 24 square centimeters. Which of the following could be the dimensions of her rectangle?

- a. 2 centimeters by 12 centimeters
- b. 3 centimeters by 9 centimeters
- c. 4 centimeters by 20 centimeters
- d. 6 centimeters by 6 centimeters
- e. 12 centimeters by 12 centimeters

Question 8, Determine area of a right trapezoid

What is the area of the figure shown below?



- a. 28 square centimeters
- b. 32 square centimeters
- c. 38 square centimeters
- d. 44 square centimeters
- e. 64 square centimeters

Question 9, Solve story problem involving milliliters and liters

How many 200-milliliter servings can be poured from a pitcher that contains 2 liters of juice?

- a. 20
- b. 15
- c. 10
- d. 5
- e. 1

Question 10, Determine degree measure formed by clock hands

How many degrees are in the acute angle formed by the clock in the figure below?



- a. 10°
- b. 30°
- c. 36°
- d. 60°
- e. 120°

Question 11, Estimate side length of a square given area

Mr. Williams bought a square piece of carpet with an area of 39 square yards. The length of each side of this carpet is between which of the following?

- a. 4 yards and 5 yards
- b. 5 yards and 6 yards
- c. 6 yards and 7 yards
- d. 7 yards and 8 yards
- e. 9 yards and 10 yards

Question 12, Recognize unit associated with specific attribute

Of the following, which is the best estimate for the area of a typical classroom floor?

- a. 700 feet
- b. 700 square feet
- c. 700 cubic feet
- d. 700 yards
- e. 700 square yards

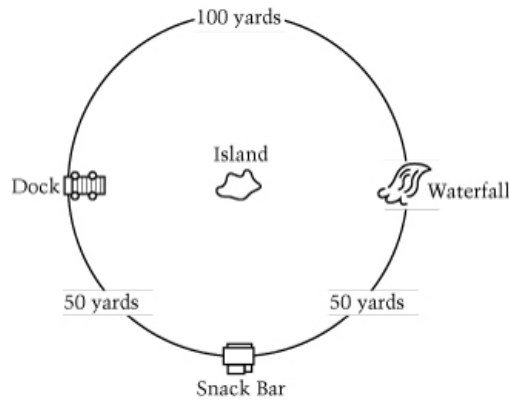
Question 13, Determine dimensions that give greatest volume

Mr. Fernandez plans to buy a refrigerator. He can choose from five different refrigerators whose interior dimensions, in inches, are given below. Which refrigerator has the greatest capacity?

- a. 42 x 34 x 30
- b. 42 x 30 x 32
- c. 42 x 28 x 30
- d. 40 x 34 x 30
- e. 40 x 30 x 28

Question 14, Approximate the length of the radius of a circle

The distance around a circular pond is shown below. From the snack bar, Alan notices an island in the center of the pond. Using the diagram below, which of the choices is the best approximation of the distance from the snack bar to the center of the island?



- a. 16 yards
- b. 20 yards
- c. 32 yards
- d. 50 yards
- e. 64 yards

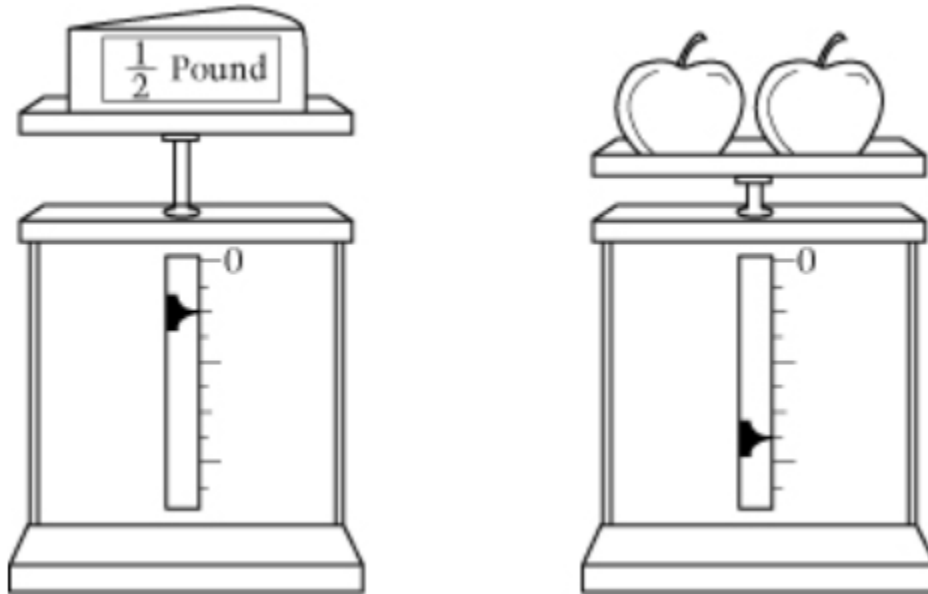
Question 15, Find length of a rectangle given perimeter and width

A rectangular playground has a perimeter of 390 feet. The width of the playground is 75 feet. What is the length?

- a. 5.2 feet
- b. 97.5 feet
- c. 120 feet
- d. 130 feet
- e. 240 feet

Question 16, Determine value of marks on scale.

Both figures below show the same scale. The marks on the scale have no labels except the zero point.



The weight of the cheese is $\frac{1}{2}$ pound. What is the total weight of the two apples?

Total weight of the two apples = _____ pounds.

Question 17, Determine how many tiles would cover a table top

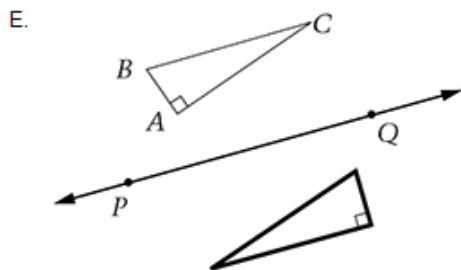
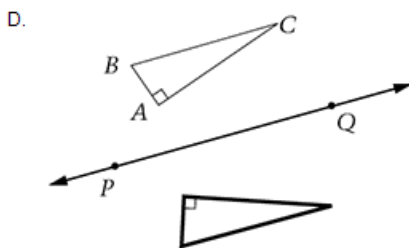
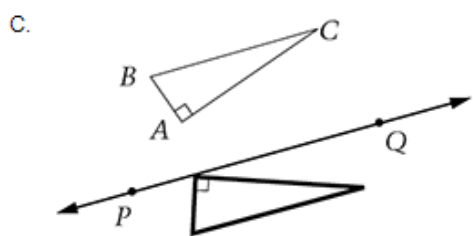
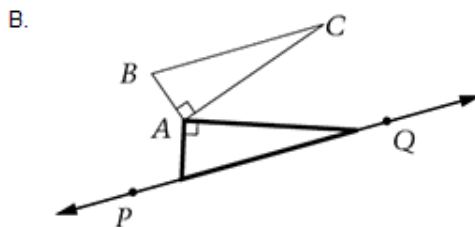
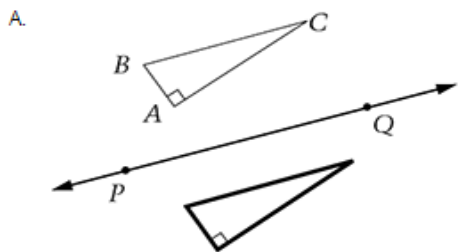
How many square tiles, 5 inches on a side, does it take to cover a rectangular area that is 50 inches wide and 100 inches long?

Answer: _____

NAEP GRADE 8 GEOMETRY

Question 1, Reflect a figure over a line

Which of the following figures below shows the reflection of triangle ABC over line PQ ? Please circle the letter of the correct answer.



Question 2, Determine how three lines are related

Lines k , l , and m are three different lines. If line k is parallel to line l and line l is parallel to line m , which of the following statements must be true?

- Line k is perpendicular to line l
- Line k is perpendicular to line m
- Line k is parallel to line m
- Line k intersects line l
- Line k intersects line m

Question 3, Analyze subdivision of regular polygons

Figure 1 below is a regular hexagon with its center at point P . The dotted lines divide the hexagon completely into 6 congruent triangles sharing a vertex at point P .

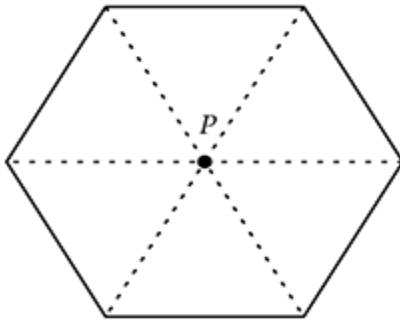


Figure 1

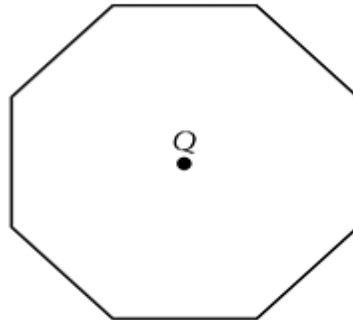
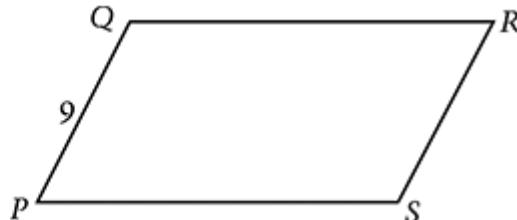
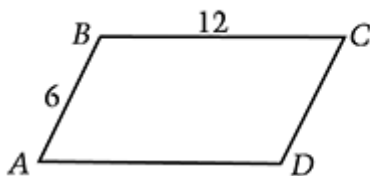


Figure 2

The division should produce

- a. Sixteen congruent equilateral triangles
- b. Sixteen congruent isosceles triangles
- c. Eight congruent right triangles
- d. Eight congruent equilateral triangles
- e. Eight congruent isosceles triangles

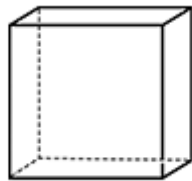
Question 4, Compare similar parallelograms



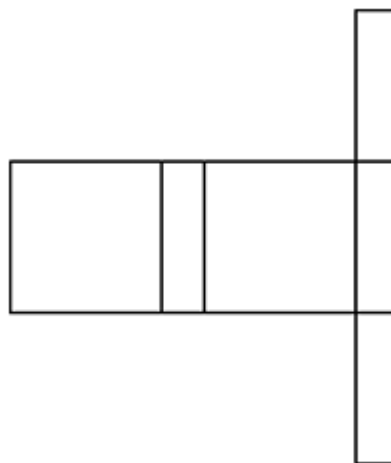
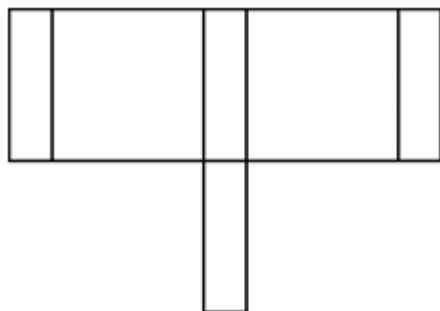
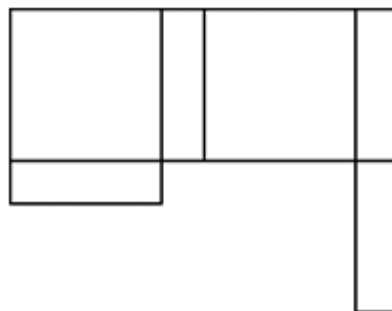
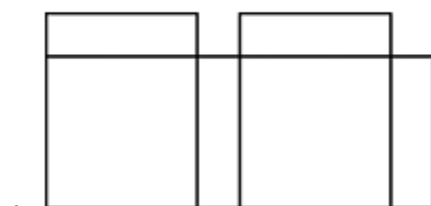
Parallelograms $ABCD$ and $PQRS$ above are similar. What is the length of side QR ?

- a. 4.5
- b. 9
- c. 12
- d. 15
- e. 18

Question 5, Identify net that folds into box

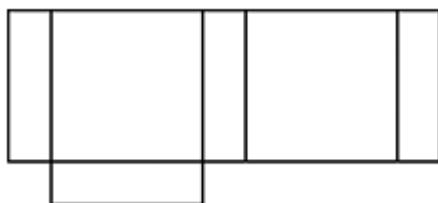


The box pictured above has six faces that do not overlap. The box will unfold into one of the figures below. Which figure is it?



C.

D.



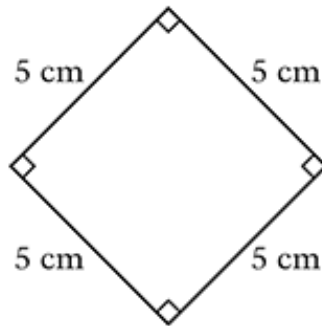
E.

Question 6, Determine radius of a circle inscribed in a square

What is the radius of the largest circle that can be drawn on a 36-by-36-inch square piece of poster board?

- a. 3 inches
- b. 6 inches
- c. 9 inches
- d. 18 inches
- e. 36 inches

Question 7, Identify students who correctly classify a figure



When asked to classify the figure above, here is what four students said.

Anton: "It's a parallelogram."

Ella: "It's a square or a rhombus."

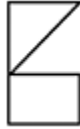
Gary: "It's a polygon."

Jessica: "I think it's both a quadrilateral and a rectangle."

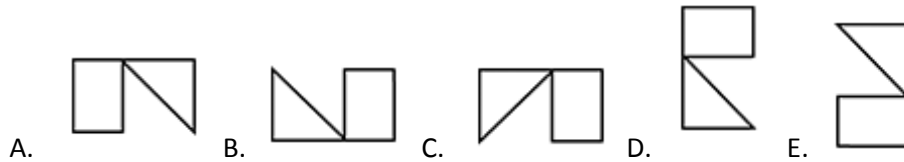
Which student or students correctly classified the figure?

- a. Ella only
- b. Anton and Gary only
- c. Ella and Jessica only
- d. Anton, Ella, and Jessica only
- e. Anton, Ella, Gary, and Jessica

Question 8, Identify image of figure after rotation



When the figure above is rotated 90 degrees clockwise, which of the following is the resulting figure?

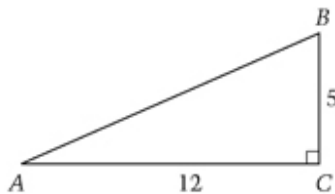


Question 9, Determine coordinates after reflection

The point $(3, 7)$ is a vertex of a triangle. When the triangle is reflected over the y -axis, what are the coordinates of the image of the vertex?

- a. $(-3, -7)$
- b. $(-3, 7)$
- c. $(3, -7)$
- d. $(3, 7)$
- e. $(7, 3)$

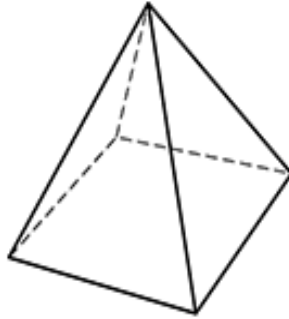
Question 10, Find length of hypotenuse



In the right triangle above, what is the length of AB ?

- a. 8.5
- b. 12
- c. 13
- d. 17
- e. 30

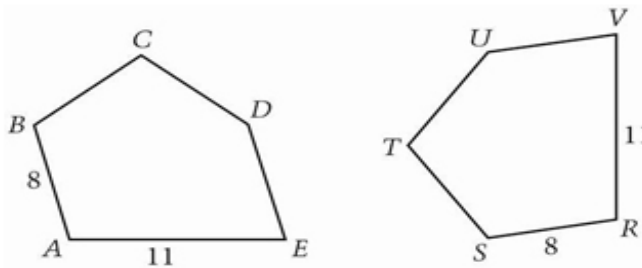
Question 11, Determine number of edges



The figure above shows a pyramid with a square base. How many edges does the pyramid have?

- a. Three
- b. Four
- c. Five
- d. Seven
- e. Eight

Question 12, Identify side with same length in congruent figures

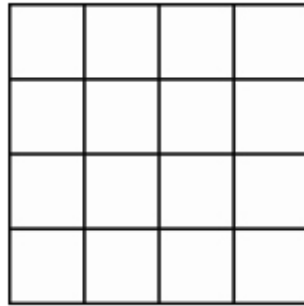


In the figure above, polygons $ABCDE$ and $RSTUV$ are congruent. Which side must have the same length as side BC ?

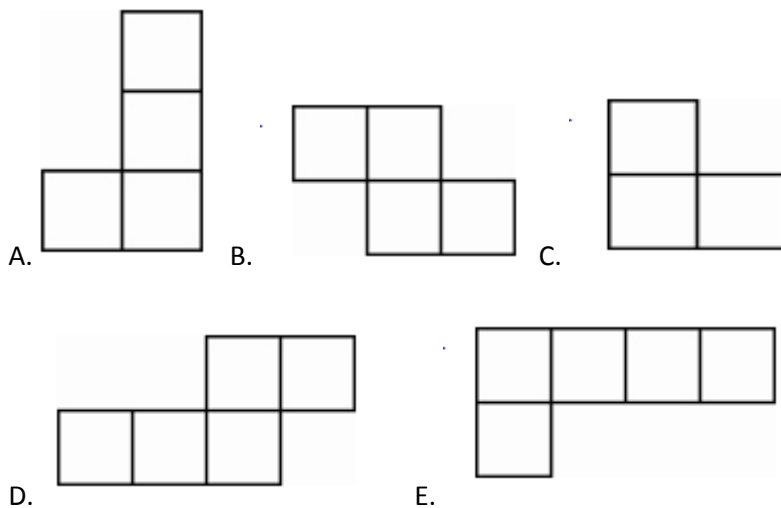
- a. CD
- b. DE
- c. ST
- d. TU
- e. UV

Question 13, Identify piece used to form figure

Identical puzzle pieces have been put together to form the large square shown below.



Which of the following could be the shape of each puzzle piece?



Question 14, Sketch polygon based on description

Sketch a four-sided polygon that has the following properties

- One pair of opposite sides is parallel but not equal in length.
- The other pair of opposite sides is equal in length but not parallel.

Question 15, Find container height given dimensions of contents

Three tennis balls are to be stacked one on top of another in a cylindrical can. The radius of each tennis ball is 3 centimeters. To the nearest whole centimeter, what should be the minimum height of the can? Explain why you chose the height that you did. Your explanation should include a diagram.

NAEP GRADE 8 DATA ANALYSIS AND PROBABILITY

Question 1, Make an inference given a probability

Michele has a box that contains 12 marbles. The table below shows the number of marbles of each color that are in the box.

Color	Number of Marbles
Yellow	5
Green	3
Orange	2
Blue	2

Michele randomly selects 2 marbles from the box and keeps them. If Michele randomly selects a third marble from the box, the probability that she will select a green marble is $\frac{2}{10}$. Which of the following statements could be true about the first two marbles Michele selected?

- a. One was yellow and one was green.
- b. One was orange and one was yellow.
- c. One was orange and one was blue.
- d. Both were green.
- e. Both were yellow.

Question 2, Find how many 3-digit numbers can be written

How many different three-digit whole numbers can be written using each of the digits 4, 5, and 6 exactly once?

- a. 3
- b. 6
- c. 9
- d. 24
- e. 27

Question 3, Use experimental results to make a prediction

Reginald has 6 red pencils, 4 green pencils, and 5 blue pencils. If he picks out one pencil without looking, what is the probability that the pencil he picks will be green?

- a. 1 out of 3
- b. 1 out of 4
- c. 1 out of 15
- d. 4 out of 15

Question 4, Determine the probability of a particular outcome

Each of the 6 faces of a fair cube is painted red, yellow, or blue. This cube is rolled 500 times. The table below shows the number of times each color landed face up.

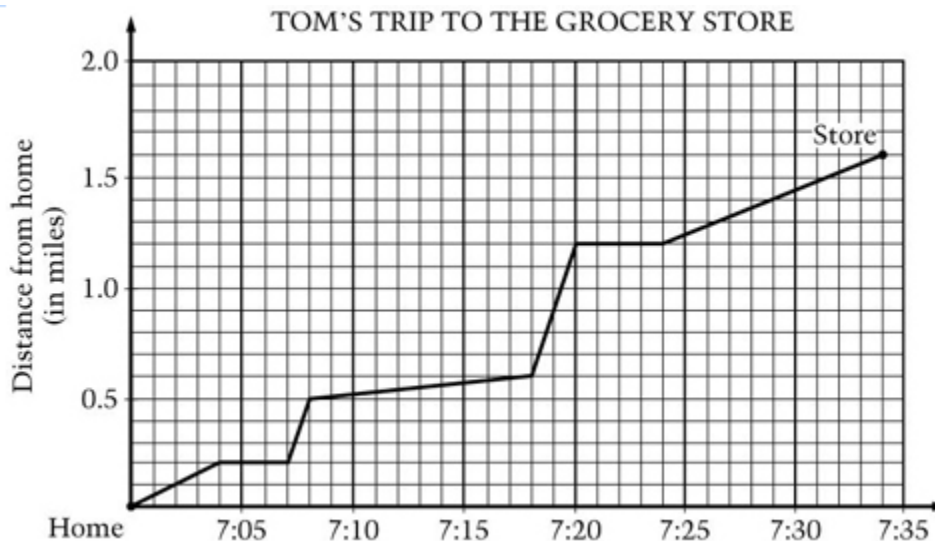
Color	Red	Yellow	Blue
Total	100	340	60

Based on these results, what is the most likely number of yellow faces on the cube?

- a. One
- b. Two
- c. Three
- d. Four
- e. Six

Question 5, Read and interpret information in a graph

Mario went to the grocery store. The graph below shows Mario's distance from home during his trip.



Mario stopped twice to rest on his trip to the store. What is the total amount of time that he spent resting?

- a. 5 minutes
- b. 7 minutes
- c. 8 minutes
- d. 10 minutes
- e. 25 minutes

Question 6, Identify which statistic is represented by response

For a school report, Tamika contacted a car dealership to collect data on recent sales. She asked, “What color do buyers choose most often for their car?” White was the response. What statistical measure does the response “white” represent?

- a. Mean
- b. Median
- c. Mode
- d. Range
- e. Interquartile range

Question 7, Determine most appropriate graph for a situation

Which of the following types of graph would be best to show the change in temperature recorded in a city every 15 minutes over a 24-hour period?

- a. Pictograph
- b. Circle graph
- c. Line graph
- d. Box-and-whisker plot
- e. Stem-and-leaf plot

Question 8, Find total cost based on unit price for a quantity

The booster club is planning to buy peanuts to serve at its meetings. The cost of the peanuts depends on the amount purchased, as shown in the table below.

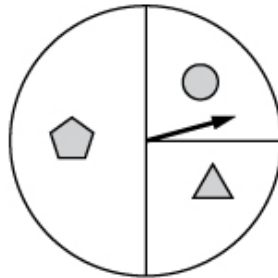
Total Number of Pounds Purchased	Cost of Peanuts Per Pound
0–5	\$2.50
6–10	\$2.25
11–20	\$2.00
Over 20	\$1.75

How much will 18 pounds of peanuts cost?

- a. \$31.50
- b. \$34.00
- c. \$36.00
- d. \$40.50
- e. \$45.00

Question 9, Determine an expected outcome

If Wanda spins a spinner like the one below 300 times, about how many times should she expect it to land on the space with a circle?



- a. 75
- b. 90
- c. 100
- d. 120
- e. 150

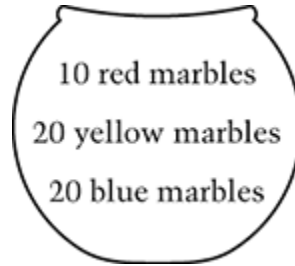
Question 10, Find number of combinations satisfying a condition

Ying's English book weighs 3 pounds, her math book weighs 5 pounds, her history book weighs 4 pounds, and her science book weighs 6 pounds. How many different combinations of one or more books can Ying pack in her backpack so that the total weight of the books is 12 pounds or less?

- a. 9
- b. 10
- c. 11
- d. 12
- e. 18

Question 11, Explain a probability concept

The bowl below contains the indicated number of marbles. The marbles are well mixed in this bowl. Juan believes that his chance of picking a blue marble is the same as his chance of picking a yellow marble. Is Juan correct?



Fill in the correct oval below.

Yes No

Explain your answer.

Question 12, Explain which statistic is best in given situation

The table below shows the number of customers at Salih’s Bike Shop for 5 days, as well as the mean (average) and the median number of customers for these 5 days.

Number of Customers at Malcolm’s Bike Shop	
Day 1	100
Day 2	87
Day 3	90
Day 4	10
Day 5	91
Mean (average)	75.6
Median	90

Which statistic, the mean or the median, best represents the typical number of customers at Salih’s Bike Shop for these 5 days?