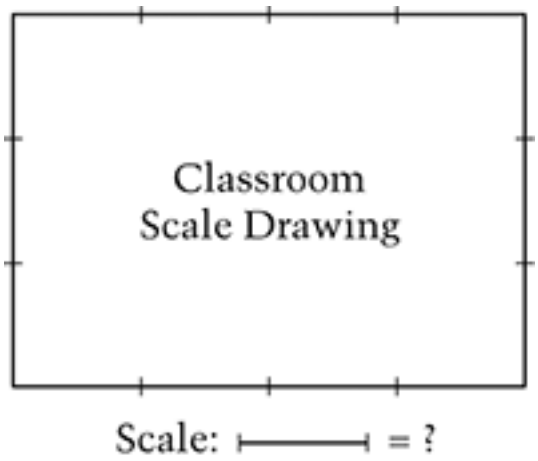
NAEP Released Items Aligned to the Iowa Core

4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...



The picture shows Jackie's scale drawing of her classroom. Which scale did she use?

A. = 1 inch
B. = 10 feet
C. = 100 feet
D. = 1 mile

2011-4-8-10

Source: National Assessment of Educational Progress, 2011, Grade 4 Mathematics Assessment.

Which unit would be best to measure the amount of liquid in a spoonful of lemon juice?

A. Milliliters
B. Liters
C. Millimeters
D. Meters

2011-4-8-16

Source: National Assessment of Educational Progress, 2011, Grade 4 Mathematics Assessment.

It takes Ms. Wylie 15 minutes to drive from her house to the store. Which is the best estimate of the distance from her house to the store?

A. 5 feet
B. 5 miles
C. 20 feet
D. 200 miles

2009-4-10-6

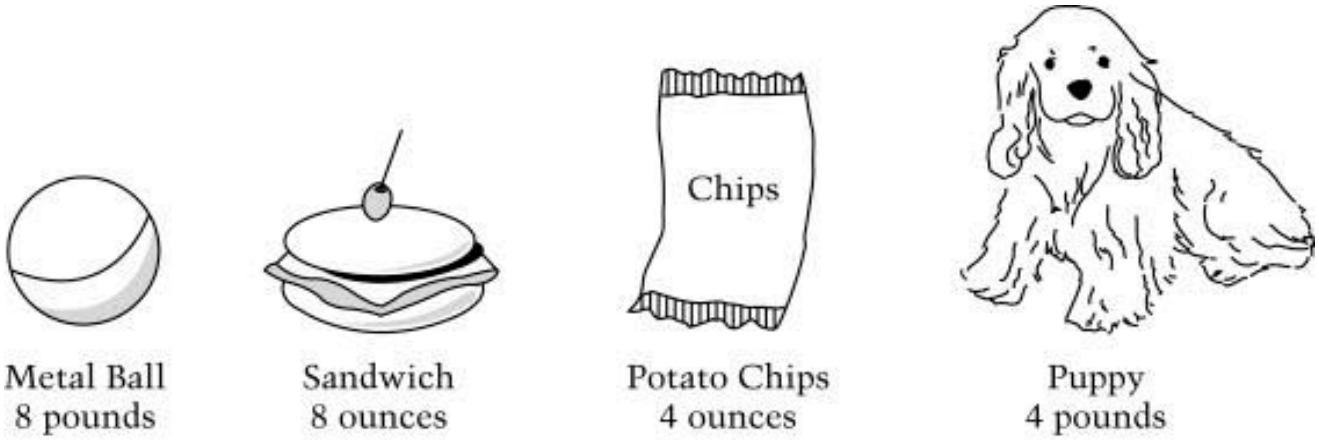
Source: National Assessment of Educational Progress, 2009, Grade 4 Mathematics Assessment.

Which of these units would be the best to use to measure the length of a school building?

A. Millimeters
B. Centimeters
C. Meters
D. Kilometers

2007-4-9-12

Source: National Assessment of Educational Progress, 2007, Grade 4 Mathematics Assessment.



In the figure above, which object is heaviest?

A. The metal ball
B. The sandwich
C. The bag of potato chips
D. The puppy

2003-4-6-4

Source: National Assessment of Educational Progress, 2003, Grade 4 Mathematics Assessment.

Rudy takes a 2-mile walk along a nature trail. Which of the following is a reasonable amount of time for Rudy to take to walk the trail?

A. 60 seconds
B. 60 minutes
C. 60 hours
D. 60 days

2003-4-7-2

Source: National Assessment of Educational Progress, 2003, Grade 4 Mathematics Assessment.

Which of the following is the most reasonable distance for a person to walk in one hour?

A. 2 miles
B. 2 yards
C. 2 inches
D. 2 feet

1990-4-7-3

Source: National Assessment of Educational Progress, 1990, Grade 4 Mathematics Assessment.

A measurement of 60 inches is equal to how many feet? (12 inches = 1 foot)

1990-4-9-10

Source: National Assessment of Educational Progress, 1990, Grade 4 Mathematics Assessment.

Which of the following is the largest unit of measurement?

A. centiliter
B. kiloliter
C. liter
D. milliliter

2008-9-21-4

Source: National Assessment of Educational Progress, 2008, Age 9 Mathematics Assessment.

Which one of the following is the LARGEST unit of measurement?

A. centimeter
B. kilometer
C. meter
D. millimeter

2004-9-23-22

Source: National Assessment of Educational Progress, 2004, Age 9 Mathematics Assessment.

Of the following, which is the best unit to use when measuring the growth of a plant every other day during a 2-week period?

A. Centimeter
B. Meter
C. Kilometer
D. Foot
E. Yard

1996-8-12-3

Source: National Assessment of Educational Progress, 1996, Grade 8 Mathematics Assessment.

How many grams are in one kilogram?

A. 1
B. 10
C. 100
D. 1,000

2008-13-21-20

Source: National Assessment of Educational Progress, 2008, Age 13 Mathematics Assessment.

One liter is how many milliliters?

A. 10
B. 100
C. 1000

2004-13-23-26

Source: National Assessment of Educational Progress, 2004, Age 13 Mathematics Assessment.

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1 gallon = 4 quarts
1 quart = 2 pints

The number of pints in 10 gallons could be determined by performing which of the following operations?

A. Multiplying 10 by 2
B. Dividing 10 by 6
C. Multiplying 10 by 6
D. Dividing 40 by 2
E. Multiplying 40 by 2

1992-12-5-7

Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.

Which of the following is closest to the height of the door to your classroom?

A. 1 meter
B. 2 meters
C. 4 meters
D. 7 meters

1992-12-5-10

Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.

4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

4 quarts = 1 gallon

Amy wants to put 8 gallons of water into her aquarium. She has a 2-quart pitcher to carry water from the sink. How many times will she need to fill her pitcher?

A. 4
B. 10
C. 16
D. 32

2011-4-8-18

Source: National Assessment of Educational Progress, 2011, Grade 4 Mathematics Assessment.

Michelle has a container with 3 quarts of juice. She pours 1 cup of juice for each person. At most, how many people can she serve? (1 quart = 4 cups)

A. 4
B. 7
C. 8
D. 12

2009-4-10-3

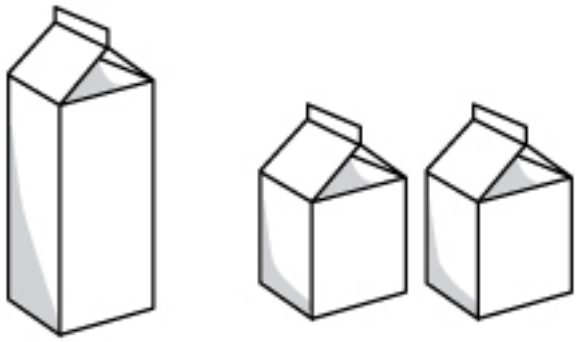
Source: National Assessment of Educational Progress, 2009, Grade 4 Mathematics Assessment.

Emily needs to measure the length of a table. She has a dollar bill that is about 6 inches long. It fits, end to end, 10 times along the length of the table. Which is the best estimate for the length of the table?

A. 5 feet
B. 6 feet
C. 10 feet
D. 12 feet

2009-4-10-14

Source: National Assessment of Educational Progress, 2009, Grade 4 Mathematics Assessment.



1 quart = 2 pints

Mr. Harper bought 6 pints of milk. How many quarts of milk is this equal to?

A. 3
B. 4
C. 6
D. 12

2007-4-7-5

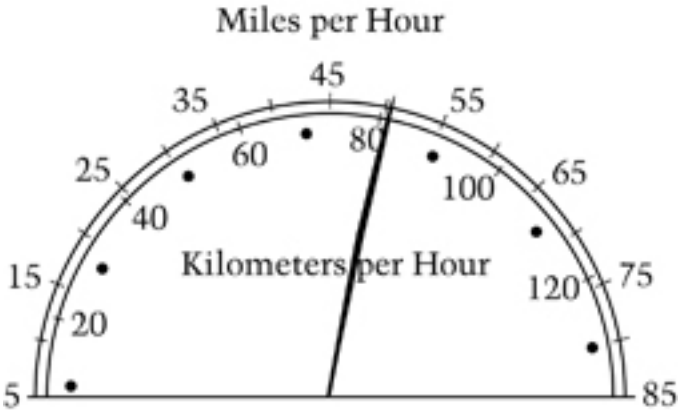
Source: National Assessment of Educational Progress, 2007, Grade 4 Mathematics Assessment.

The clock shows the time that Bill leaves his house in the morning. He returns 6 hours and 25 minutes later. At what time does he return?

A. 5:15 A.M.
B. 5:40 A.M.
C. 5:15 P.M.
D. 5:40 P.M.

2007-4-7-8

Source: National Assessment of Educational Progress, 2007, Grade 4 Mathematics Assessment.



The speedometer shows how fast Dale is driving. If the speed limit is 55 miles per hour (mph), which of the following is true?

A. Dale is going about 5 mph over the speed limit.
B. Dale is going about 25 mph over the speed limit.
C. Dale is going about 5 mph under the speed limit.
D. Dale is going about 25 mph under the speed limit.

2007-4-9-7

Source: National Assessment of Educational Progress, 2007, Grade 4 Mathematics Assessment.

Ted went to the beach at 10:30 a.m. and came home at 2:00 p.m. How many hours was he gone?

A. $8\frac{1}{2}$

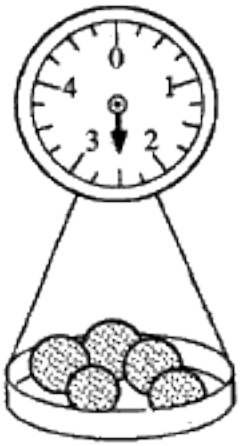
B. $4\frac{1}{2}$

C. $3\frac{1}{2}$

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

2003-4-7-17

Source: National Assessment of Educational Progress, 2003, Grade 4 Mathematics Assessment.

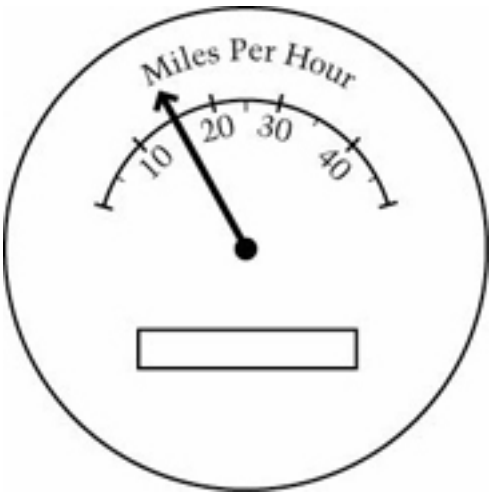


The scale shown above measures weight in pounds. What is the total weight of the oranges in the picture?

A. 2½ pounds
B. 3½ pounds
C. 5 pounds
D. 10 pounds

1990-4-7-5

Source: National Assessment of Educational Progress, 1990, Grade 4 Mathematics Assessment.



The bicycle speedometer above shows about what speed?

A. 10 miles per hour
B. 15 miles per hour
C. 20 miles per hour
D. 45 miles per hour

2008-9-21-19

Source: National Assessment of Educational Progress, 2008, Age 9 Mathematics Assessment.

Rico bought 10 cards, which cost $12.20 before tax. How many packages of each type did he buy?

_____ Packages of postcards

_____ Packages of greeting cards

Explain how you know your answer is correct.

Rico said that one postcard is cheaper than one greeting card. Show that Rico is correct.

2007-4-7-16

Source: National Assessment of Educational Progress, 2007, Grade 4 Mathematics Assessment.

Sue bought a notebook for $3.59. She gave the clerk a $5 bill. Which of these is the correct amount of change?

A. One dollar, four dimes, and a penny
B. One dollar, five dimes, and a penny
C. Two dollars, four dimes, and a penny
D. Two dollars, five dimes, and nine pennies

2005-4-12-16

Source: National Assessment of Educational Progress, 2005, Grade 4 Mathematics Assessment.

At a picnic cider is served in cups. If 1 pint will fill 2 cups, how many cups can be filled from 8 pints of cider?

A. 4
B. 8
C. 11
D. 16

2003-4-7-8

Source: National Assessment of Educational Progress, 2003, Grade 4 Mathematics Assessment.

Estela wants to buy 2 notebooks that cost $2.79 each, including tax. If she has one-dollar bills and no coins, how many one-dollar bills does she need?

A. 3
B. 4
C. 5
D. 6

2003-4-10-15

Source: National Assessment of Educational Progress, 2003, Grade 4 Mathematics Assessment.

Sam can purchase his lunch at school. Each day he wants to have juice that costs 50¢, a sandwich that costs 90¢ and fruit that costs 35¢. His mother has only $1.00 bills. What is the least number of $1.00 bills that his mother should give him so he will have enough money to buy lunch for 5 days?

1996-4-12-7

Source: National Assessment of Educational Progress, 1996, Grade 4 Mathematics Assessment.

George buys two calculators that cost $3.29 each. If there is no tax, how much change will he receive from a $10 bill?

1992-4-12-11

Source: National Assessment of Educational Progress, 1992, Grade 4 Mathematics Assessment.

A package of birdseed costs $2.58 for 2 pounds. A package of sunflower seeds costs $3.72 for 3 pounds. What is the difference in the cost per pound?

A. $0.05
B. $1.14
C. $1.24
D. $1.29

1992-4-14-9

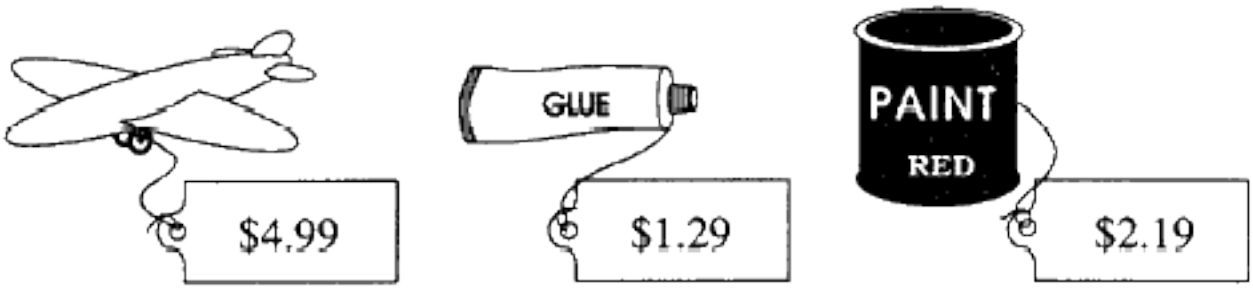
Source: National Assessment of Educational Progress, 1992, Grade 4 Mathematics Assessment.

Mr. Garcia bought 5 dozen eggs at $0.89 per dozen. What was the total cost of the eggs?

A. $ 4.05
B. $ 4.45
C. $ 5.89
D. $ 10.68

1992-4-7-10

Source: National Assessment of Educational Progress, 1992, Grade 4 Mathematics Assessment.



Chen bought one model plane, one tube of glue, and one can of paint. The cost of each item is shown in the figure above. There was no sales tax. How much change should he have gotten back from $10?

A. $1.50
B. $1.53
C. $1.63
D. $1.73

1990-4-9-7

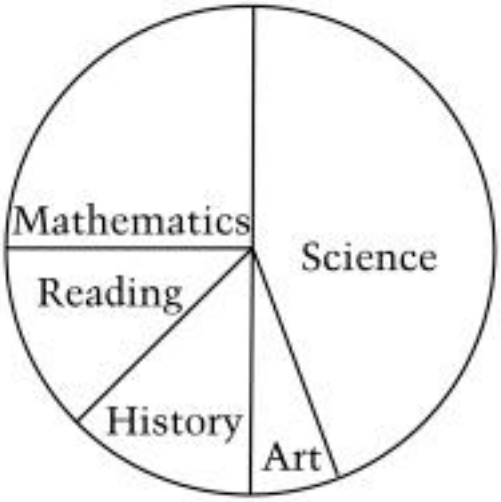
Source: National Assessment of Educational Progress, 1990, Grade 4 Mathematics Assessment.

Carol buys a ball for 55 cents and a game for 37 cents. How much change does she get back from $1.00?

A. 8¢
B. 18¢
C. 45¢
D. 63¢
E. 92¢

2004-9-23-24

Source: National Assessment of Educational Progress, 2004, Age 9 Mathematics Assessment.



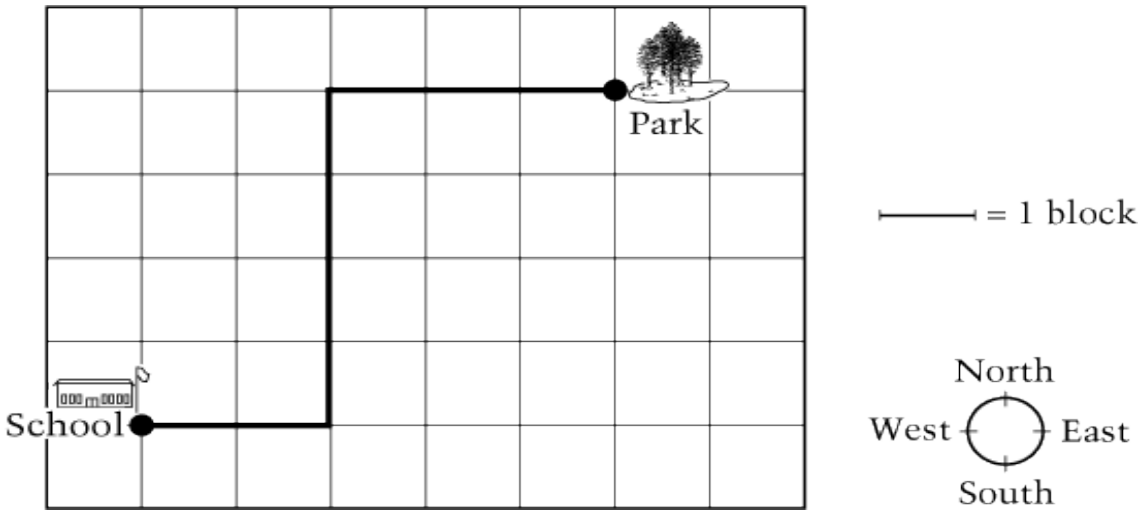
The pie chart above shows the portion of time Pat spent on homework in each subject last week. If Pat spent 2 hours on mathematics, about how many hours did Pat spend on homework altogether?

A. 4
B. 8
C. 12
D. 16

2003-4-6-6
2003-8-6-6

Source: National Assessment of Educational Progress, 2003, Grade 4 and 8 Mathematics Assessments.

The map below shows how to go from the school to the park. Complete the written directions that are started below.



Directions:

Go 2 blocks east. _____

_____

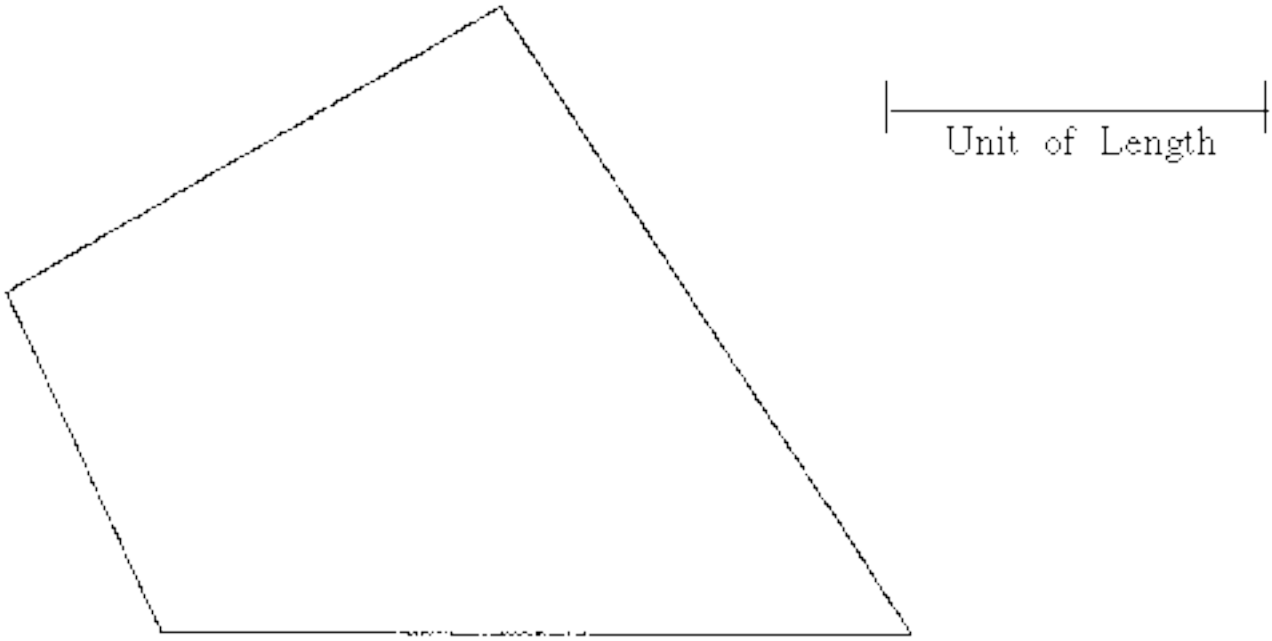
_____

(Use directions such as north, south, east, and west)

2005-4-12-17

Source: National Assessment of Educational Progress, 2005, Grade 4 Mathematics Assessment.

Use the unit of length below to estimate the perimeter of the figure shown. Between which two consecutive whole-number units does the perimeter lie?



Answer: Between _____ and _____

1996-8-3-11

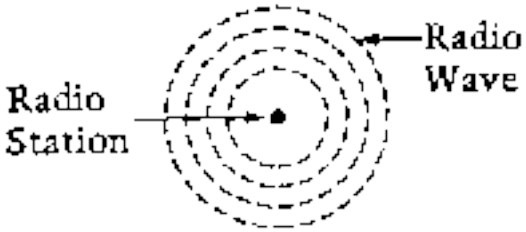
Source: National Assessment of Educational Progress, 1996, Grade 8 Mathematics Assessment.

This question requires you to show your work and explain your reasoning. You may use drawings, words, and numbers in your explanation. Your answer should be clear enough so that another person could read it and understand your thinking. It is important that you show all your work.

Radio station KMAT in Math City is 200 miles from radio station KGEO in Geometry City. Highway 7, a straight road, connects the two cities.

KMAT broadcasts can be received up to 150 miles in all directions from the station and KGEO broadcasts can be received up to 125 miles in all directions.

Radio waves travel from each radio station through the air, as represented below.



Draw a diagram that shows the following.

- Highway 7
- The location of the two radio stations
- The part of Highway 7 where both radio stations can be received

Be sure to label the distances along the highway and the length in miles of the part of the highway where both stations can be received.

1992-8-7-13

Source: National Assessment of Educational Progress, 1992, Grade 8 Mathematics Assessment.

Debbie runs 0.6 of a mile every day. How many miles will Debbie run in 45 days?

1992-12-7-1

Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.

Sally buys a package of 6 candy bars for $3.30 and then sells the candy bars at the school play for 75 cents each. How much money does Sally earn on each candy bar?

2008-17-21-14

Source: National Assessment of Educational Progress, 2008, Age 17 Mathematics Assessment.

4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

Mark's room is 12 feet wide and 15 feet long. Mark wants to cover the floor with carpet. How many square feet of carpet does he need?

Answer: _____ square feet

The carpet costs $2.60 per square foot. How much will the carpet cost?

Answer: $ _____

2007-4-7-13

Source: National Assessment of Educational Progress, 2007, Grade 4 Mathematics Assessment.

Jaime knows the following facts about points *A, B,* and *C*.

- Points *A, B,* and *C* are on the same line, but might not be in that order.
- Point *C* is twice as far from point *A* as it is from point *B*.

Jaime concluded that point *C* is always between points *A* and *B*.

Is Jaime's conclusion correct?

○ Yes ○ No

In the space provided, use a diagram to explain your answer.

1996-8-3-12

Source: National Assessment of Educational Progress, 1996, Grade 8 Mathematics Assessment.

Megan 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

2009-8-10-2

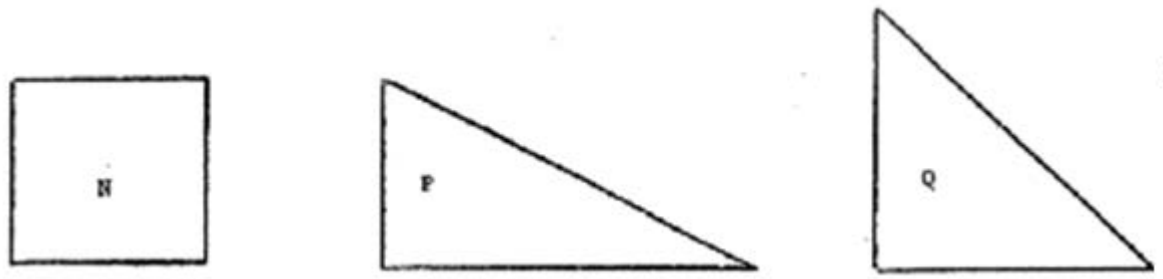
Source: National Assessment of Educational Progress, 2009, Grade 8 Mathematics Assessment.

Mr. Hardt 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

2007-8-7-12

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.



Which of the shapes *N*, *P*, and *Q* has the longest perimeter (distance around)?

Shape with longest perimeter: _____

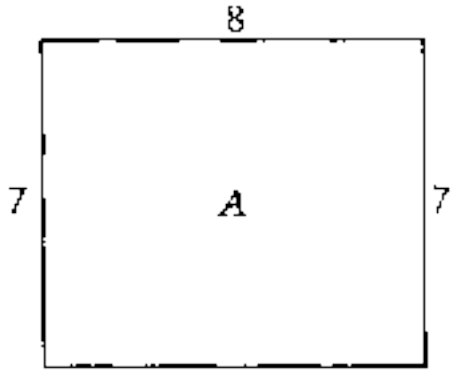
Use words or pictures (or both) to explain why.

1996-8-10-6

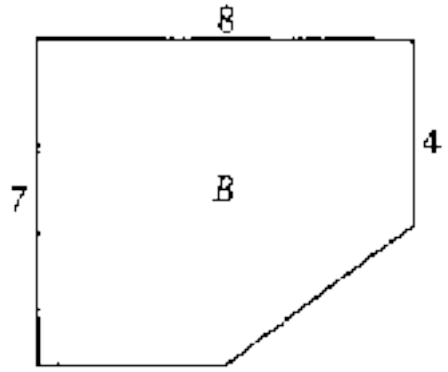
Source: National Assessment of Educational Progress, 1996, Grade 8 Mathematics Assessment.

For each figure below, the lengths of 3 sides are given. Which figure could have a perimeter of 28?

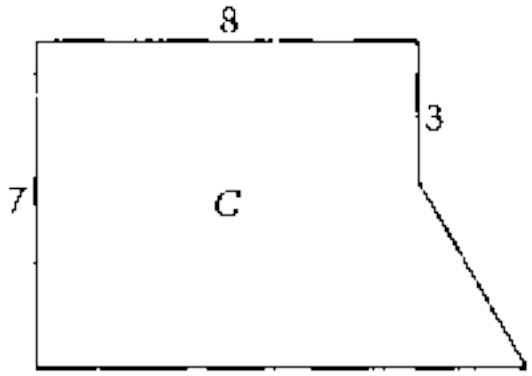
A.



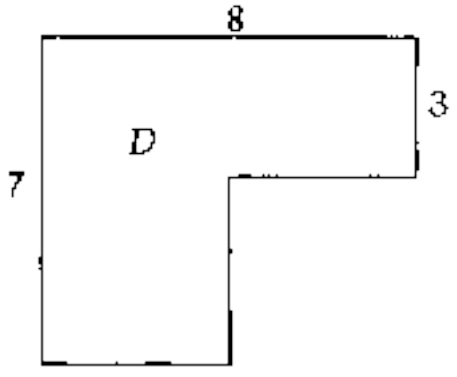
B.

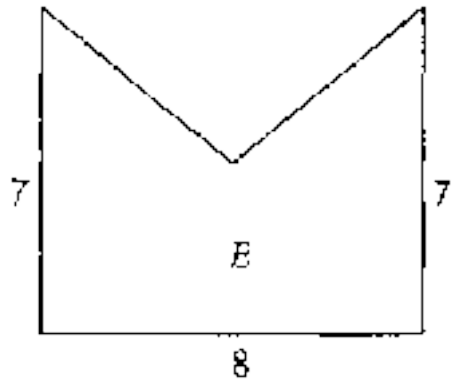


C.



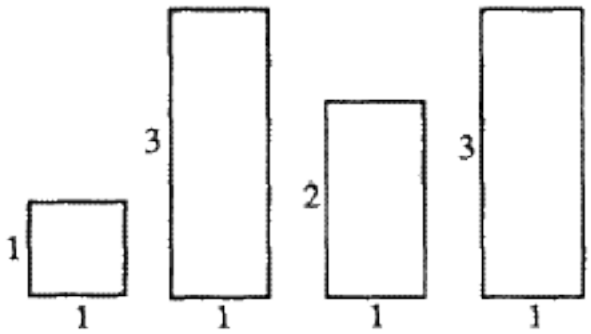
D.



E. 

1992-8-15-14

Source: National Assessment of Educational Progress, 1996, Grade 8 Mathematics Assessment.



A certain rectangle has area equal to the sum of the areas of the four rectangles shown above. If its length is 4, what is its width?

A. 2
B. 2¼
C. 2½
D. 3
E. 3½

1990-8-9-19

Source: National Assessment of Educational Progress, 1990, Grade 8 Mathematics Assessment.

The Morrisons are going to build a new one-story house. The floor of the house will be rectangular with a length of 30 feet and a width of 20 feet.

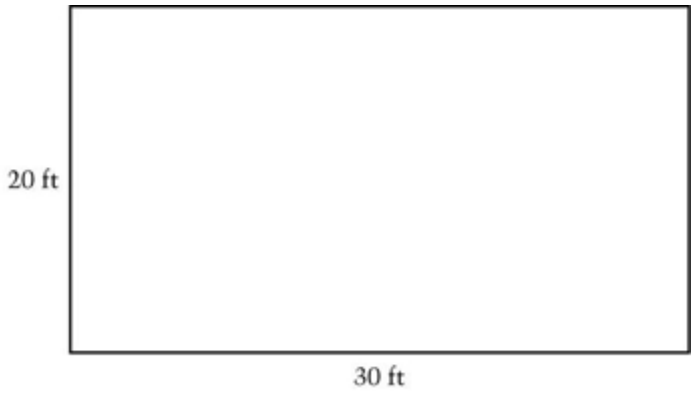
The house will have a living room, a kitchen, two bedrooms, and a bathroom. In part (a) below create a floor plan that shows these five rooms by dividing the rectangle into rooms.

Your floor plan should meet the following conditions.

- Each one of the five rooms must share at least one side with the rectangle in part (a); that is, each room must have at least one outside wall.
- The floor area of the bathroom should be 50 square feet.
- Each of the other four rooms (not the bathroom) should have a length of at least 10 feet and a width of at least 10 feet.

Be sure to label each room by name (living room, kitchen, bedroom, etc.) and include its length and width, in feet. (Do not draw any hallways on your floor plan.)

(a) Draw your floor plan on the figure below. Remember to label your rooms by name and include the length and width, in feet, for each room.



(b) Complete the table below by filling in the floor area, in square feet, for each room in your floor plan.

Room	Floor Area (in square feet)
Living	
Kitchen	
Bedroom	
Bedroom	
Bathroom	
Total Floor Area	600

2009-8-10-16

Source: National Assessment of Educational Progress, 2009, Grade 8 Mathematics Assessment.

If a 2 by 18 rectangle has the same area as a square, what is the length of a side of the square?

A. 4
B. 6
C. 8
D. 10
E. 12

2005-12-3-10

Source: National Assessment of Educational Progress, 2005, Grade 12 Mathematics Assessment.

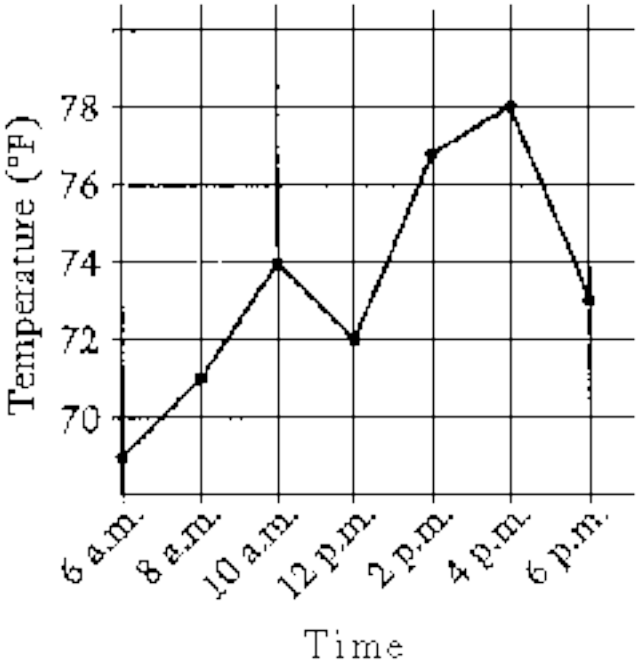
The perimeter of a square is 36 centimeters. What is the area of the square?

A. 6 square cm
B. 9 square cm
C. 18 square cm
D. 81 square cm

2008-17-21-3

Source: National Assessment of Educational Progress, 2008, Age 17 Mathematics Assessment.

4.MD.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection. (4.MD.4.)



According to the graph above, the temperature at 10 a.m. is approximately how many degrees greater than the temperature at 8 a.m.?

A. 1
B. 1.5
C. 2
D. 2.5
E. 3

1996-12-13-1

Source: National Assessment of Educational Progress, 1996, Grade 12 Mathematics Assessment.

4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

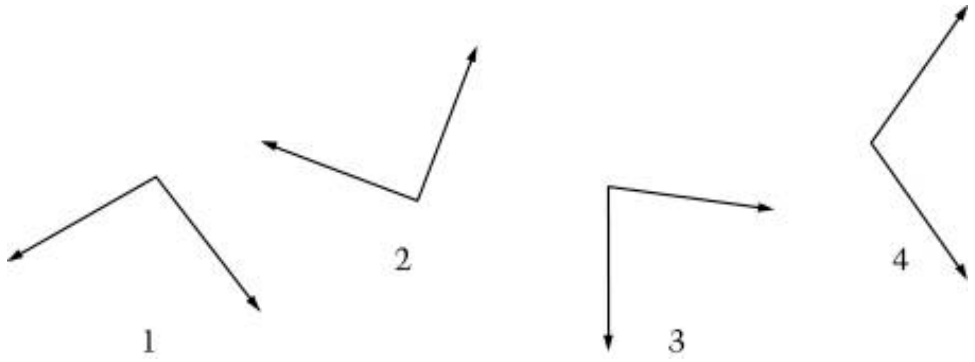
a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.
b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees.

How many degrees are in the acute angle formed by the hands of the clock in the figure above?

A. 10°
B. 30°
C. 36°
D. 60°
E. 120°

2009-8-10-122009-8-10-2

Source: National Assessment of Educational Progress, 2008, Grade 8 Mathematics Assessment.

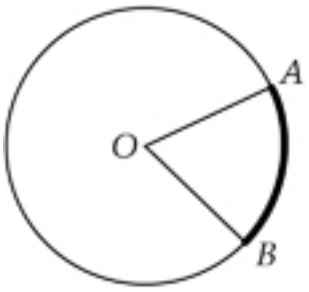


Which of the following lists the angles shown above in order of measure from smallest to largest?

A. 1, 2, 3, 4
B. 2, 3, 4, 1
C. 3, 2, 1, 4
D. 3, 1, 4, 2
E. 4, 2, 1, 3

2005-8-3-1

Source: National Assessment of Educational Progress, 2005, Grade 8 Mathematics Assessment.



The circle above has center *O* . If the length of the darkened arc is $\frac{1}{6}$ of the circumference, what is the degree measure of $\angle AOB$?

A. 75°
B. 60°
C. 45°
D. 36°
E. 30°

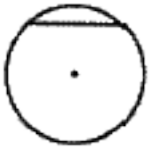
2007-8-9-16

Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

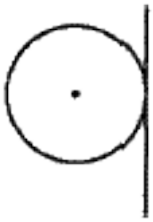
In which of the following circles is the line segment a diameter?

A.

B.

C. 

D.

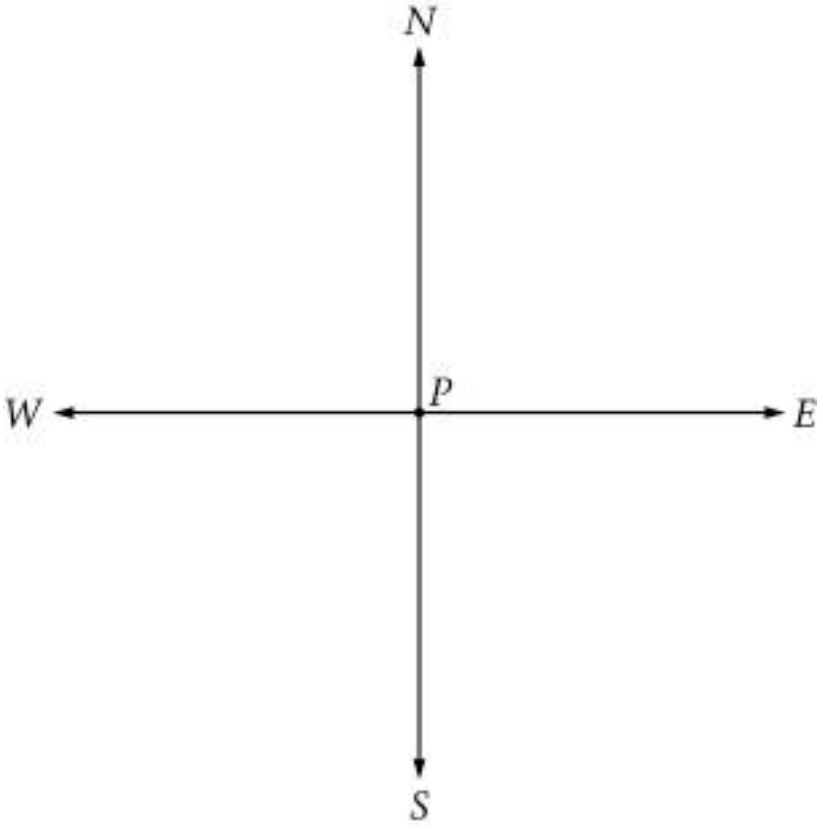
E. 

1990-8-9-3

Source: National Assessment of Educational Progress, 1990, Grade 8 Mathematics Assessment.

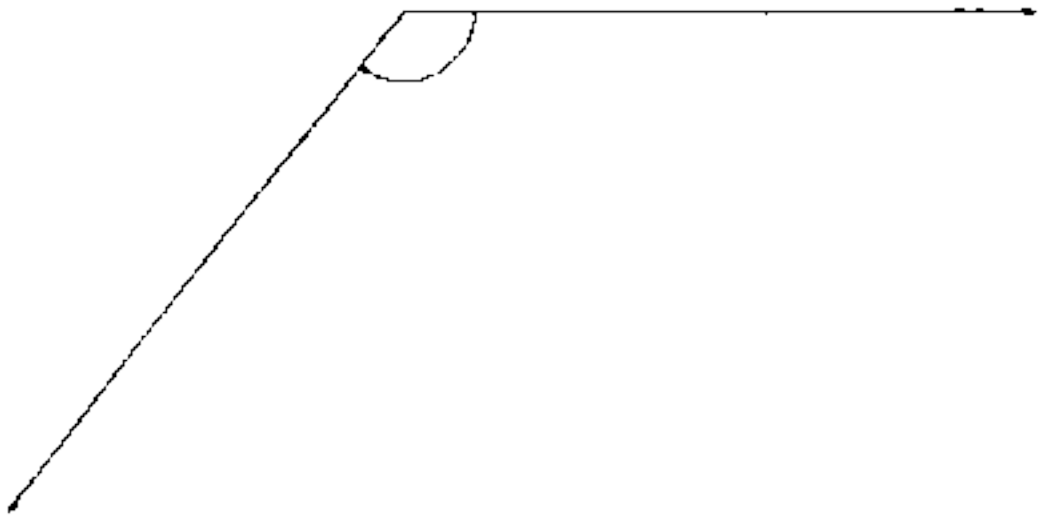
4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

The weather service reported a tornado 75° south of west. On the figure below, use your protractor to draw an arrow from *P* in the direction in which the tornado was sighted.



2005-8-3-2

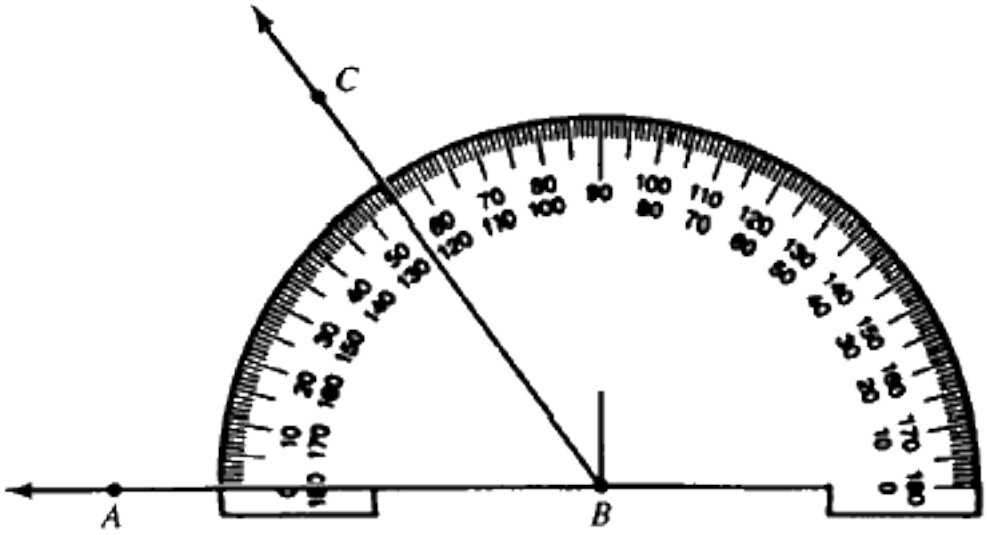
Source: National Assessment of Educational Progress, 2005, Grade 8 Mathematics Assessment.



Use your protractor to find the degree measure of the angle shown above.

1992-8-5-20

Source: National Assessment of Educational Progress, 1992, Grade 8 Mathematics Assessment.



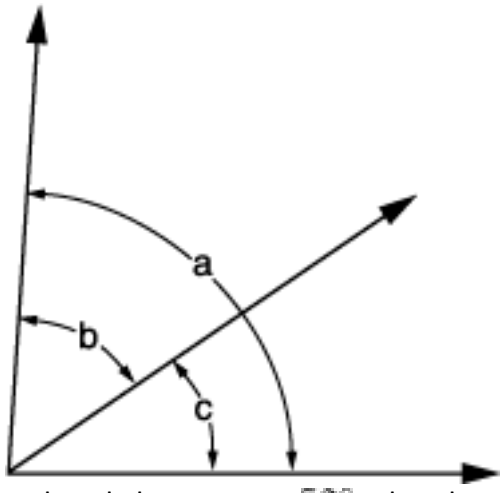
In the figure above, the measure of angle *ABC* is

A. 55°
B. 60°
C. 65°
D. 125°
E. 135°

1992-12-5-4

Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.

4.MD.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.



2. If angle a measures $85°$ and angle b measures $52°$, what does angle c measure?
   A. 33°
   B. 38°
   C. 137°
   D. Not enough information given

2004-17-23-19

Source: National Assessment of Educational Progress, 2004, Age 17 Mathematics Assessment.