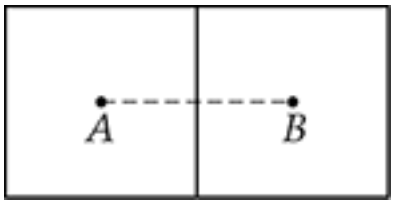
NAEP Released Items Aligned to the Iowa Core

7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

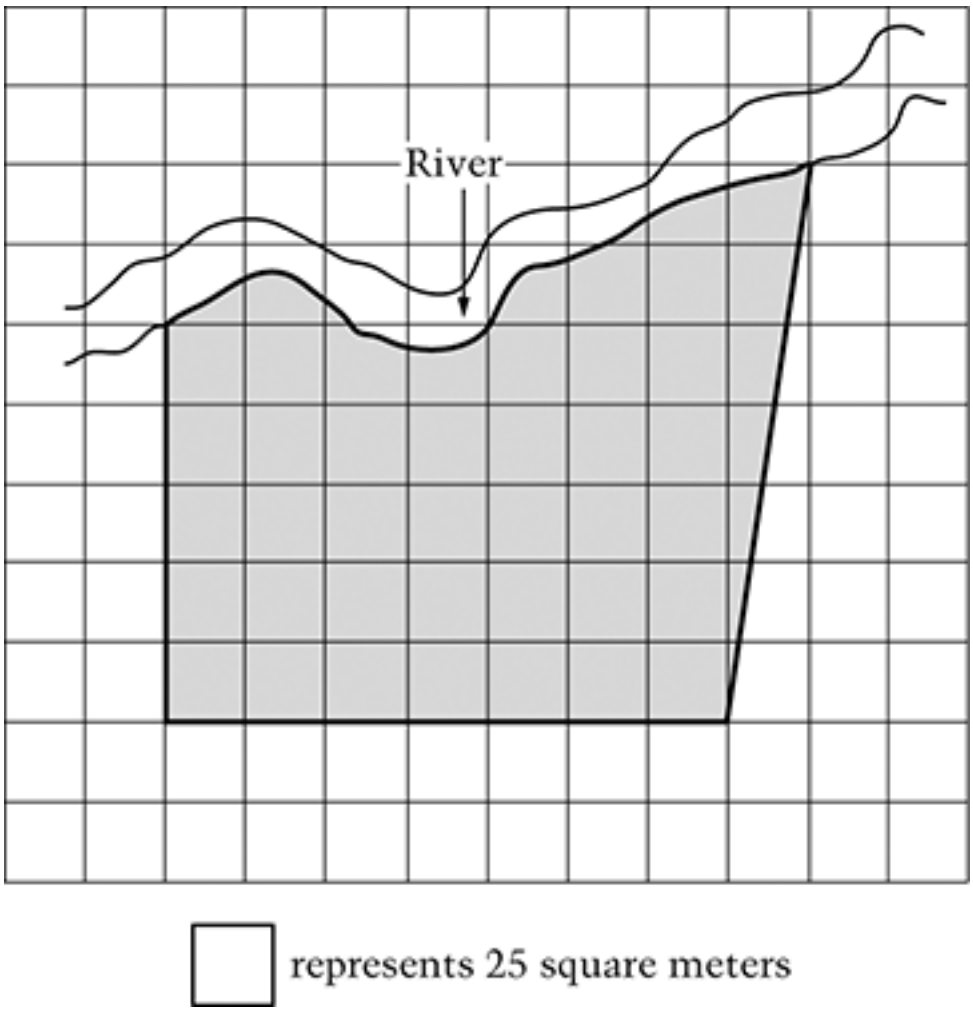


Each square above is 10 units on a side. Points A and B are the centers of the squares. What is the distance between A and B?

A. 5 units
B. 10 units
C. 15 units
D. 20 units

2011-4-8-12

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



On the scale drawing above, 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?

A. 750 square meters
B. 850 square meters
C. 900 square meters
D. 1,050 square meters
E. 1,200 square meters

2011-8-9-9

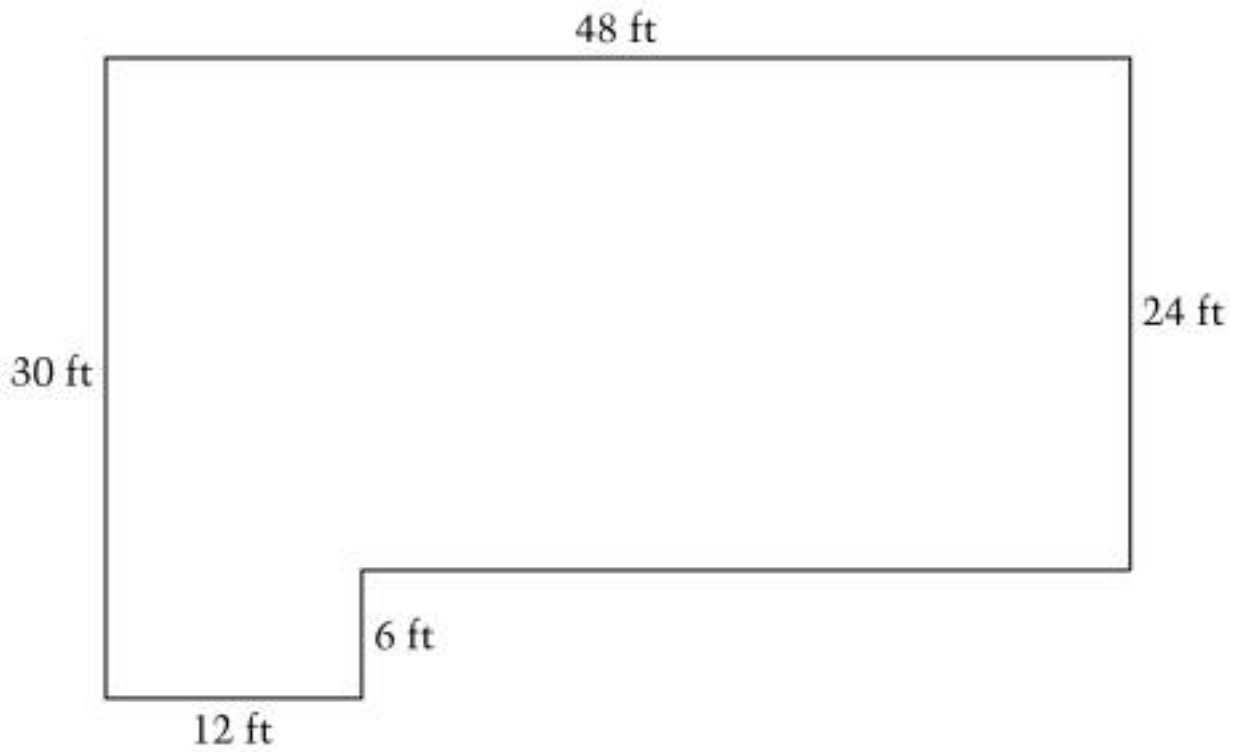
Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

In the model town that a class is building, a car 15 feet long is represented by a scale model 3 inches long. If the same scale is used, a house 35 feet high would be represented by a scale model how many inches high?

A. $\frac{45}{35}$
B. 3
C. 5
D. 7
E. $\frac{35}{3}$

1990-8-9-7

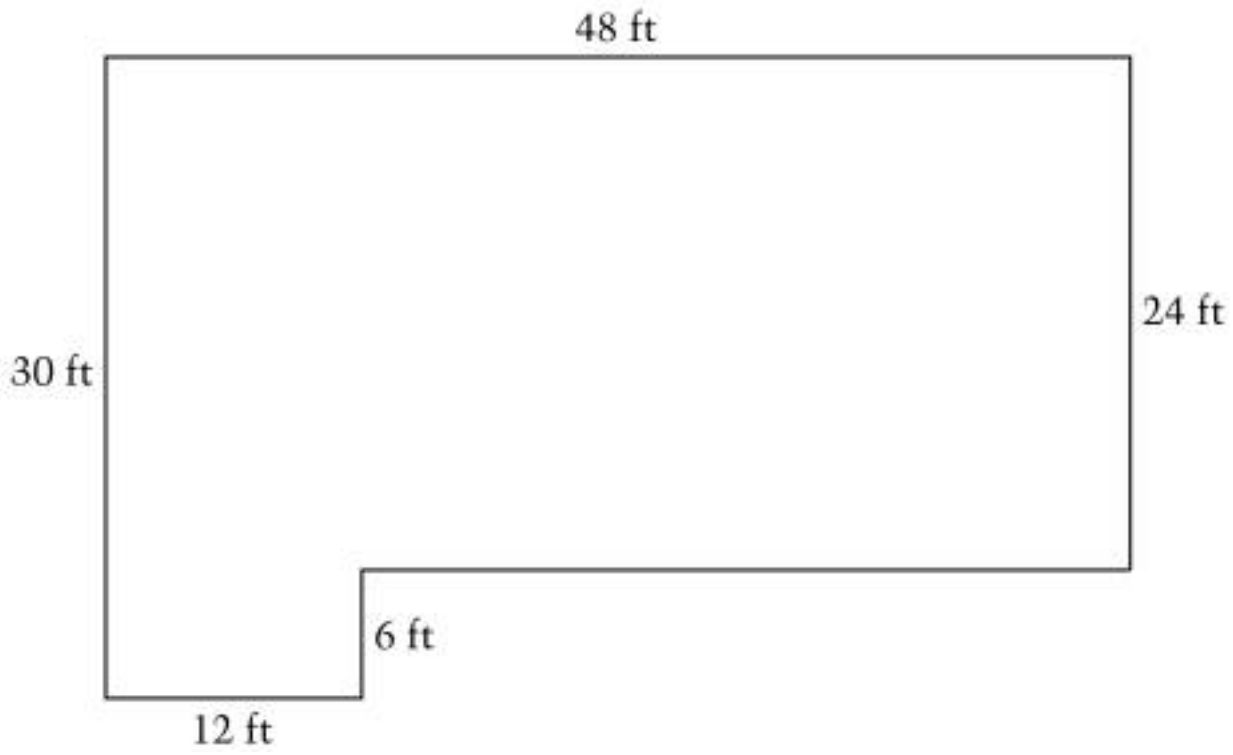
Source: National Assessment of Educational Progress, 1990, Grade 8 Mathematics Assessment.



Use a ruler to find, in terms of inches and feet, what scale has been used to construct the diagram.

2005-12-4-2

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



If you were to redraw the diagram using a scale of $\frac{3}{4}$ inch = 10 feet, what would be the length of the side that is 48 feet?

A. 3.0 in
B. 3.6 in
C. 5.6 in
D. 7.5 in
E. 12.0 in

2005-12-4-3

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

A scale drawing of a rectangular room is 5 inches by 3 inches. If 1 inch on this scale drawing represents 3 feet, what are the dimensions of the room?

A. 5 feet by 3 feet
B. 5 feet by 9 feet
C. 15 feet by 3 feet
D. 15 feet by 5 feet
E. 15 feet by 9 feet

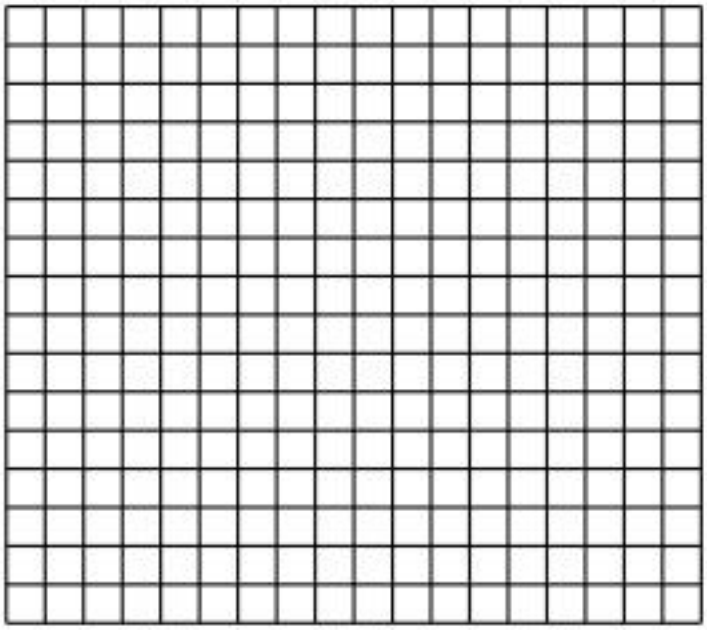
2005-12-12-8

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

7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

Piece Q:

On the grid below, use piece *Q* to draw a right triangle. The angles of the right triangle should measure the same as the angles in piece *Q*. The area of the right triangle should be four times the area of piece *Q*.



2005-8-4-14

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

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.

2011-8-8-11

Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

A triangle has two sides, each of length 8 centimeters, and the angle formed by these two sides measures 40°.

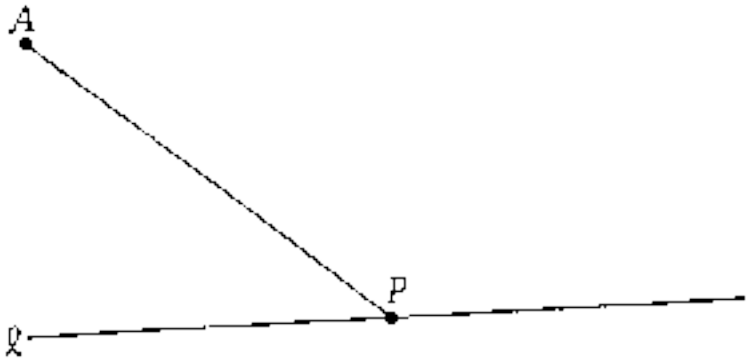
a. Use your protractor and ruler to accurately draw the triangle.

b. What is the measure of <u>one</u> of the other two angles of the triangle?

2005-12-3-4

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

In the figure below, use the protractor to draw a line *m* through point *P* perpendicular to segment *AP*. In the answer space provided, give the measure of the smaller angle formed by lines ℓ and *m*.

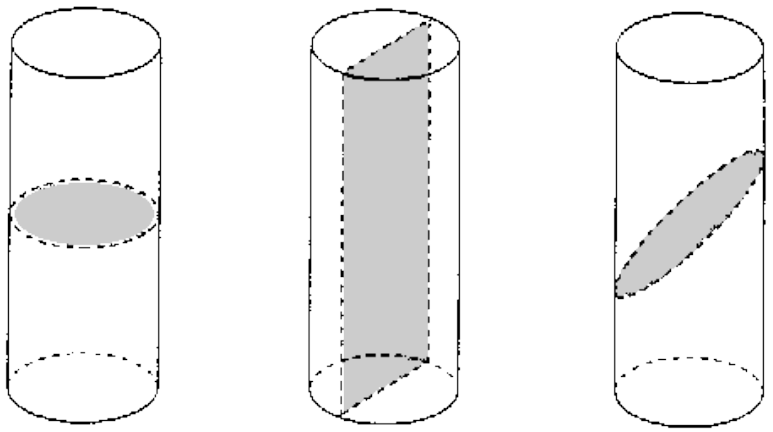


1996-12-13-8

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

7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

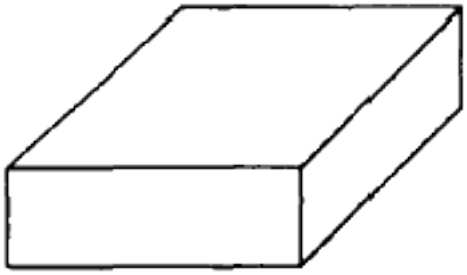
Each of the cylinders shown below was cut in a different way. The shaded part shows the shape of the cut. Under each figure, write the name of the shape of the cut.



Answer: _____ Answer: _____ Answer: _____

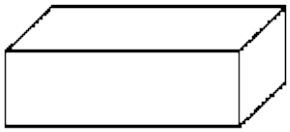
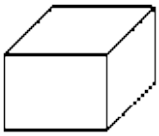
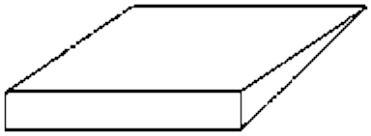
1992-8-7-10

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



The piece of fudge shown above is in the shape of a rectangular solid. If a knife makes one straight cut through the fudge, which of the following can be the piece cut off?

Fill in the oval to indicate YES or NO for each shape.

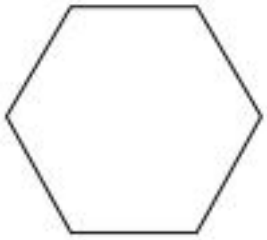
		Yes	No
(a)		ⓐ	ⓑ
(b)		ⓐ	ⓑ
(c)		ⓐ	ⓑ
(d)		ⓐ	ⓑ

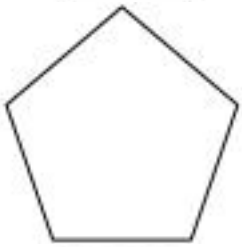
1992-12-7-3

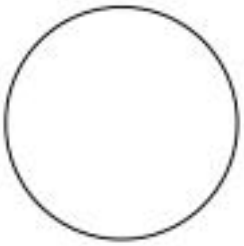
Source: National Assessment of Educational Progress, 1992, Grade 12 Mathematics Assessment.

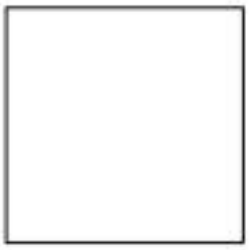
7.G.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

A cow is tied to a post in the middle of a flat meadow. If the cow's rope is several meters long, which of the following figures shows the shape of the region where the cow can graze?

A. 

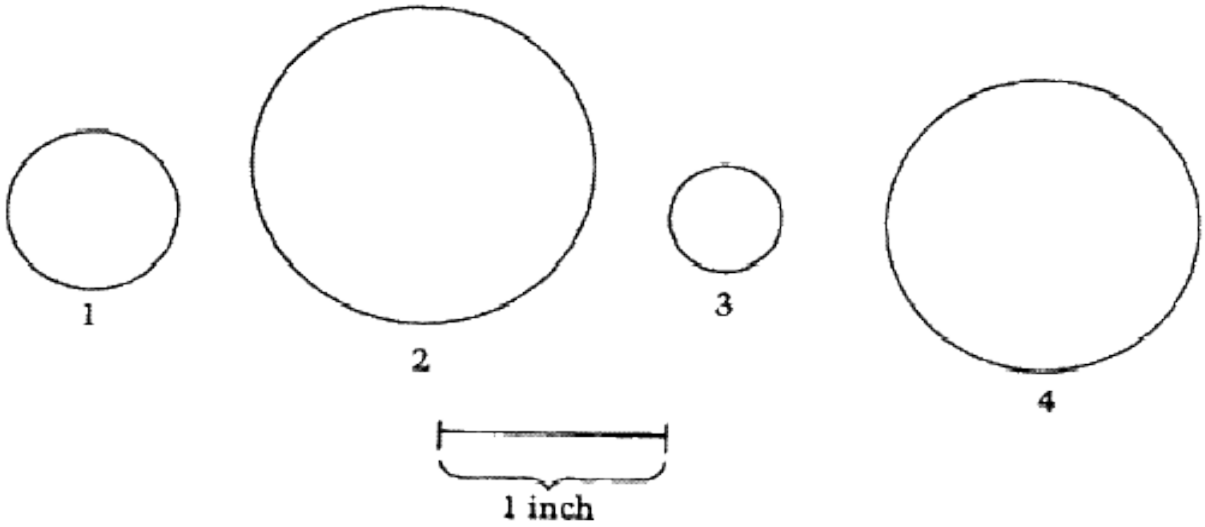
B. 

C. 

D. 

2003-4-10-14

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



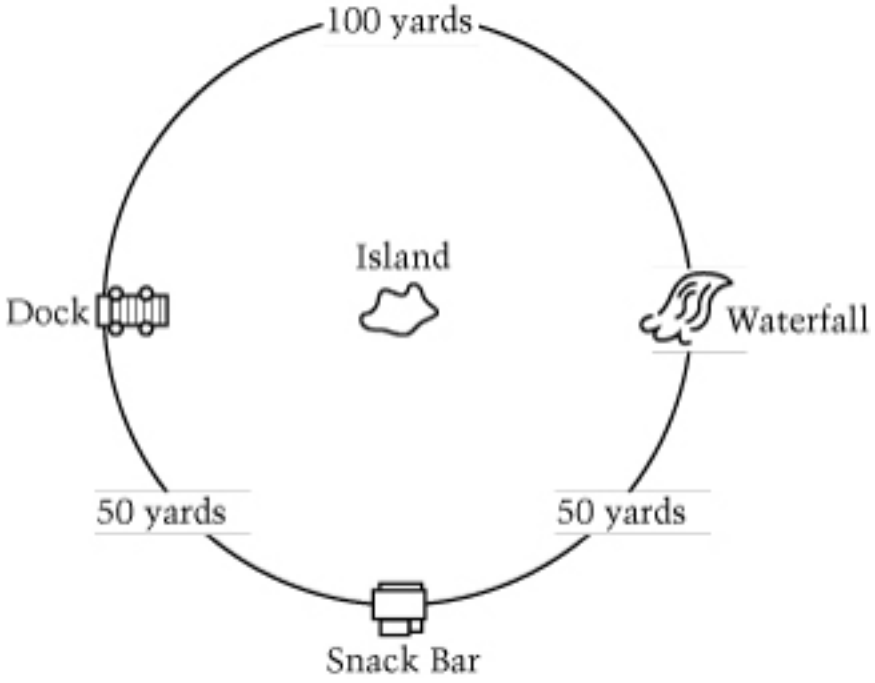
In which of the circles is the diameter less than 1 inch?

A. 3 only
B. 1 and 3 only
C. 1, 2, and 3 only
D. 1, 2, 3, and 4

1992-4-14-4

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

The distance around a circular pond are shown below. From the snack bar, Jake notices an island in the center of the pond.

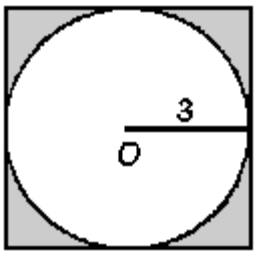


Of the following, which is the best approximation of the distance from the snack bar to the center of the island?

A. 16 yards
B. 20 yards
C. 32 yards
D. 50 yards
E. 64 yards

2007-8-11-17

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



In the figure above, a circle with center O and radius of length 3 is inscribed in a square. What is the area of the shaded region?

A. 3.86
B. 7.73
C. 28.27
D. 32.86
E. 36.00

1996-8-10-5

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

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

2011-8-9-12

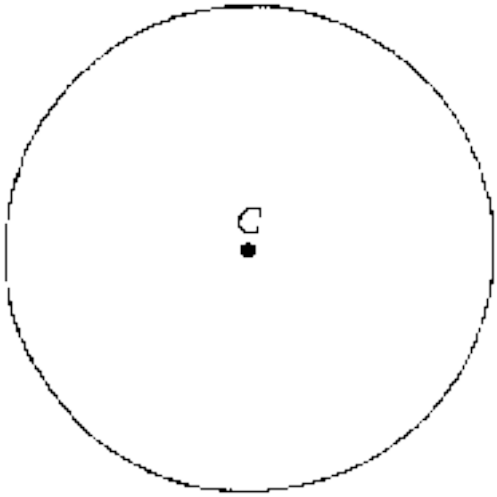
Source: National Assessment of Educational Progress, 2011, Grade 8 Mathematics Assessment.

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.

2007-8-9-13

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



Using a centimeter ruler, find the circumference of the circle with center *C* above. (Use π = 3.14.)

Answer:_____centimeters

1996-12-13-4

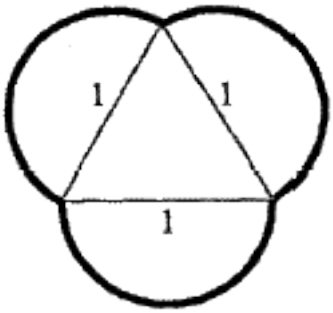
Source: National Assessment of Educational Progress, 1996, Grade 12 Mathematics Assessment.

A circle with diameter 10 centimeters is to be cut from a square of paper 10 centimeters on a side. Of the following, which is closest to the amount of paper left over after the circle is cut out?

A. 9 square centimeters
B. 21 square centimeters
C. 24 square centimeters
D. 69 square centimeters
E. 84 square centimeters

1990-12-9-8

Source: National Assessment of Educational Progress, 1990, Grade 12 Mathematics Assessment.



Semicircles are constructed on the sides of an equilateral triangle, as shown in the figure above. Of the following, which best approximates the sum of the lengths of the three darkened arcs?

A. 4.4258
B. 4.7124
C. 6.0000
D. 6.7124
E. 9.4258

1990-12-9-14

Source: National Assessment of Educational Progress, 1990, Grade 12 Mathematics Assessment.

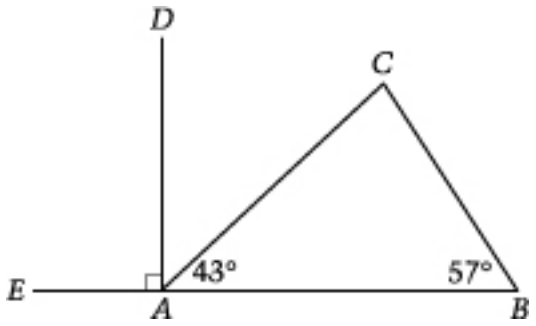
If the diameter of a circle is 30 centimeters, what is the radius of the circle?

A. 10 cm
B. 15 cm
C. 60 cm
D. 90 cm
E. 180 cm

1990-12-9-5

Source: National Assessment of Educational Progress, 1990, Grade 12 Mathematics Assessment.

7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.



In the figure above, what is the measure of angle *DAC*?

A. 47°
B. 57°
C. 80°
D. 90°
E. 137°

2007-8-7-4

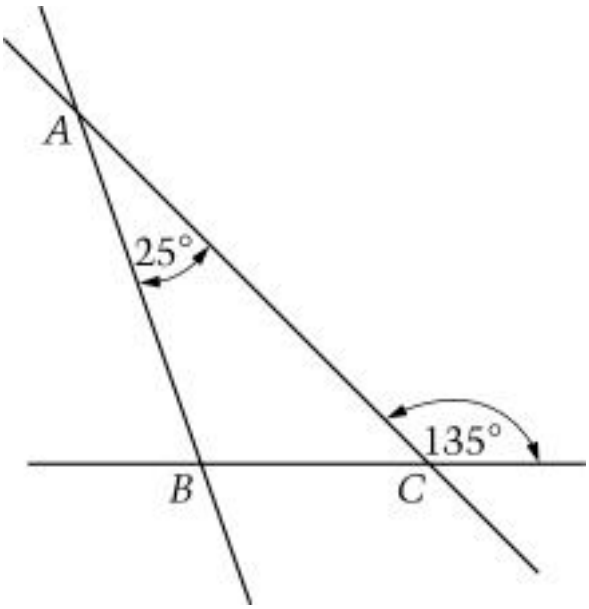
Source: National Assessment of Educational Progress, 2007, Grade 8 Mathematics Assessment.

One of the acute angles in a right triangle measures 28 degrees. What is the measure, in degrees, of the other acute angle?

A. 17°
B. 28°
C. 62°
D. 90°
E. 152°

2005-8-12-15

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

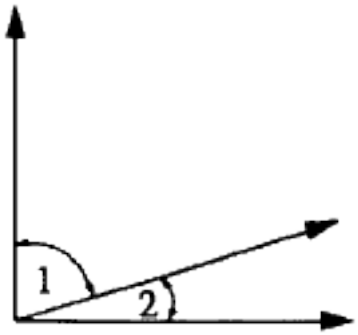


In the triangle, what is the degree measure of $\angle ABC$?

A. 45
B. 100
C. 110
D. 135
E. 160

2003-8-10-9

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



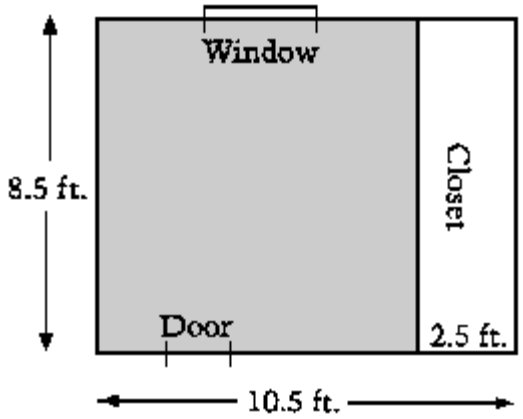
The sum of the measures of angles 1 and 2 in the figure above is 90°. What is the measure of the angle formed by the bisectors of these two angles?

A. 60°
B. 45°
C. 30°
D. 20°
E. 15°

2011-12-2-2

Source: National Assessment of Educational Progress, 2011, Grade 12 Mathematics Assessment.

7.G.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.



Chris wishes to carpet the rectangular room shown above. To the nearest square yard, how many square yards of carpet are needed to carpet the floor of the room if the closet floor will not be carpeted? (1 square yard = 9 square feet)

A. 8
B. 10
C. 11
D. 19
E. 22

1992-8-14-8
1992-12-14-8

Source: National Assessment of Educational Progress, 1992, Grade 8 and Grade 12 Mathematics Assessments.

John is going to cover an attic floor with insulation. The floor measures 25 feet by 35 feet. If one roll of insulation will cover 64 square feet, how many rolls of insulation does John need?

A. 1
B. 2
C. 8
D. 14
E. 110

2009-12-7-2

Source: National Assessment of Educational Progress, 2009, Grade 12 Mathematics Assessment.

Use your centimeter ruler to help answer this question.

Of the following, which is closest to the area of parallelogram *ABCD* above?

A. 20 square centimeters
B. 30 square centimeters
C. 40 square centimeters
D. 50 square centimeters
E. 52 square centimeters

2005-12-3-3

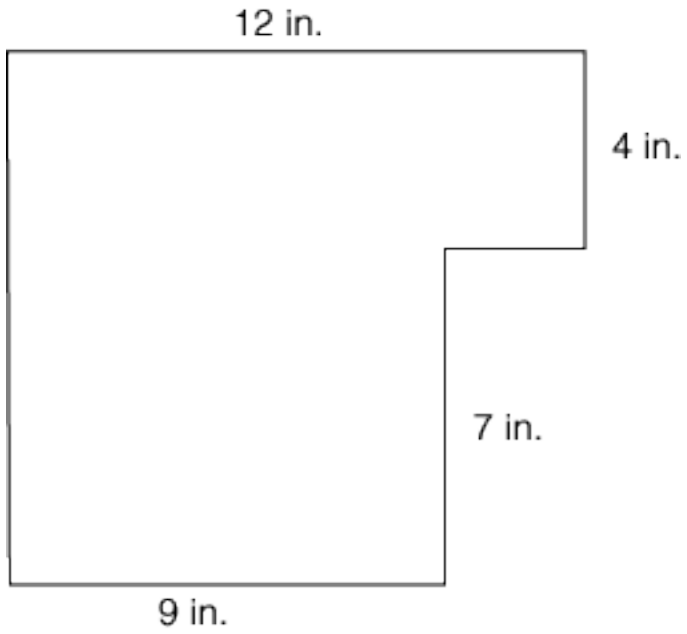
Source: National Assessment of Educational Progress, 2005, Grade 12 Mathematics Assessment.

A rectangular pool 24 feet long, 8 feet wide, and 4 feet deep is filled with water. Water is leaking from the pool at the rate of 0.40 cubic foot per minute. At this rate, how many <u>hours</u> will it take for the water level to drop 1 foot?

A. 4
B. 8
C. 12
D. 16
E. 32

1992-12-5-13

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



What is the area of this figure?

ANSWER: _____ square in.

2004-17-23-35

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