MEASUREMENT AND GEOMETRY

The following ten California mathematics academic content standards from the Measurement and Geometry strand are assessed on the CAHSEE by 17 test questions and are represented in this booklet by 45 released test questions. These questions represent only a few of the ways in which these standards may be assessed on the CAHSEE.

GRADE 7 — MEASUREMENT AND GEOMETRY	
Standard Set 1.0	**Students choose appropriate units of measure and use ratios to convert within and between measurement systems to solve problems:**
1.1	Compare weights, capacities, geometric measures, times, and temperatures within and between measurement systems (e.g., miles per hour and feet per second, cubic inches to cubic centimeters).
1.2	Construct and read drawings and models made to scale.
1.3	Use measures expressed as rates (e.g., speed, density) and measures expressed as products (e.g., person-days) to solve problems; check the units of the solutions; and use dimensional analysis to check the reasonableness of the answer.
Standard Set 2.0	**Students compute the perimeter, area, and volume of common geometric objects and use the results to find measures of less common objects. They know how perimeter, area and volume are affected by changes of scale:**
2.1	Use formulas routinely for finding the perimeter and area of basic two-dimensional figures and the surface area and volume of basic three-dimensional figures, including rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, and cylinders.
2.2	Estimate and compute the area of more complex or irregular two- and three-dimensional figures by breaking the figures down into more basic geometric objects.
2.3	Compute the length of the perimeter, the surface area of the faces, and the volume of a three-dimensional object built from rectangular solids. Understand that when the lengths of all dimensions are multiplied by a scale factor, the surface area is multiplied by the square of the scale factor and volume is multiplied by the cube of the scale factor.
2.4	Relate the changes in measurement with a change of scale to the units used (e.g., square inches, cubic feet) and to conversions between units (1 square foot = 144 square inches or [1 ft^2] = [144 in^2], 1 cubic inch is approximately 16.38 cubic centimeters or [1 in^3] = [16.38 cm^3]).

Measurement and Geometry

Standard Set 3.0	Students know the Pythagorean theorem and deepen their understanding of plane and solid geometric shapes by constructing figures that meet given conditions and by identifying attributes of figures:
3.2	Understand and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine their image under translations and reflections.
3.3	Know and understand the Pythagorean theorem and its converse and use it to find the length of the missing side of a right triangle and the lengths of other line segments and, in some situations, empirically verify the Pythagorean theorem by direct measurement.
3.4	Demonstrate an understanding of conditions that indicate two geometrical figures are congruent and what congruence means about the relationships between the sides and angles of the two figures.

109. One millimeter is—

A $\frac{1}{1000}$ of a meter.

B $\frac{1}{100}$ of a meter.

C 100 meters.

D 1000 meters.

M00276

110. A boy is two meters tall. About how tall is the boy in feet (ft) and inches (in.)? $\left(\text{1 meter} \approx \text{39 inches}\right)$

A 5 ft 0 in.

B 5 ft 6 in.

C 6 ft 0 in.

D 6 ft 6 in.

M02044

— 43 —

111. Juanita exercised for one hour. How many seconds did Juanita exercise?

   A   60

   B   120

   C   360

   D 3,600

M03074

112. If Jill is driving at 65 miles per hour, what is her approximate speed in kilometers per hour?
$(1 \text{ mile} \approx 1.6 \text{ kilometers})$

   A   16

   B   41

   C 104

   D 173

M13251

113. In Sacramento, the temperature at noon was **35° Celsius (C)**. What was the temperature in degrees Fahrenheit (F)?

$$\left(F = \frac{9}{5}C + 32\right)$$

   A 35°

   B 63°

   C 67°

   D 95°

M02693

114. The actual width (w) of a rectangle is 18 centimeters (cm). Use the scale drawing of the rectangle to find the actual length (l).
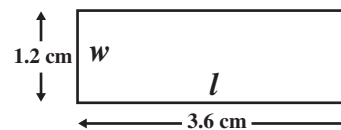
   A   6 cm

   B 24 cm

   C 36 cm

   D 54 cm

M02087

— 44 —

115. The scale drawing of the basketball court shown below is drawn using a scale of 1 inch (in.) = 24 feet (ft).
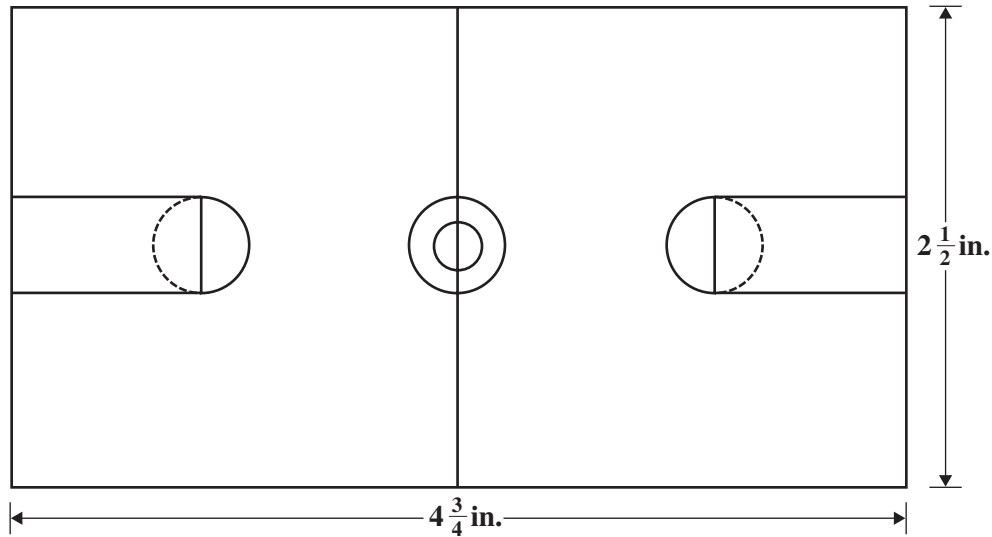
What is the length, in feet, of the basketball court?

A 90 ft

B 104 ft

C 114 ft

D 120 ft

M02233

116. Javier is using a ruler and a map to measure the distance from Henley to Sailport.

Mt. Roger

Seaside

Henley

Burton

Sailport

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

Centimeters (cm)
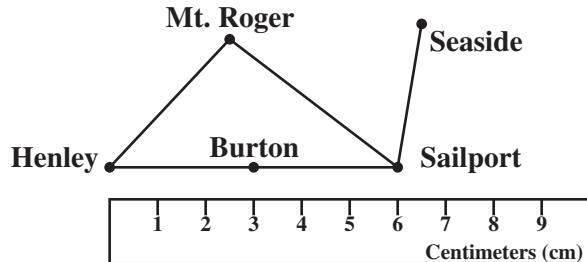
The actual distance from Henley to Sailport is 120 kilometers (km). What scale was used to create the map?

A 1 cm = 6 km

B 1 cm = 12 km

C 1 cm = 15 km

D 1 cm = 20 km

M21169

117. A scale drawing of a horse is shown below.

? in.
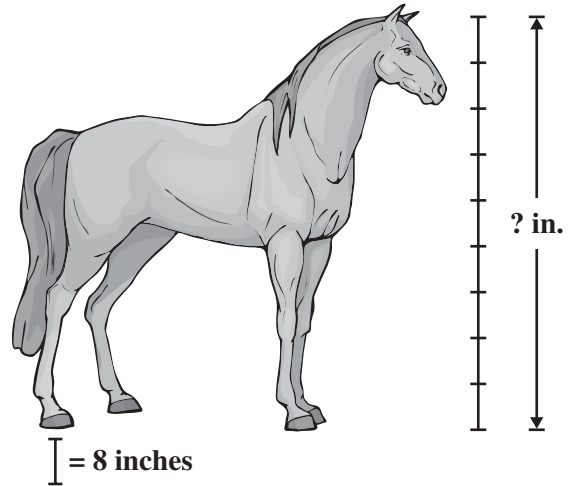
= 8 inches

What is the actual height of the horse, in inches (in.), from the hoof to the top of the head?

A 56

B 64

C 72

D 80

M32040

118. Sixty miles per hour is the same rate as which of the following?

A 1 mile per minute

B 1 mile per second

C 6 miles per minute

D 360 miles per second

M02473

— **46** —

119. Beverly ran six miles at the speed of four miles per hour. How long did it take her to run that distance?

A $\frac{2}{3}$ hr

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

C 4 hrs

D 6 hrs

M02041

120. Marcus can type about 42 words per minute. If he types at this rate for 30 minutes without stopping, about how many words will he type?

A 1260

B 2100

C 2520

D 4200

M21029

121. A landscaper estimates that landscaping a new park will take 1 person 48 hours. If 4 people work on the job and they each work 6-hour days, how many days are needed to complete the job?

A 2

B 4

C 6

D 8

M11541
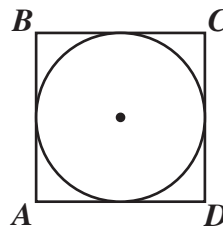
122. In the figure above, the radius of the inscribed circle is 6 inches (in.). What is the perimeter of square *ABCD*?

A 12π in.

B 36π in.

C 24 in.

D 48 in.

M02236

10 feet
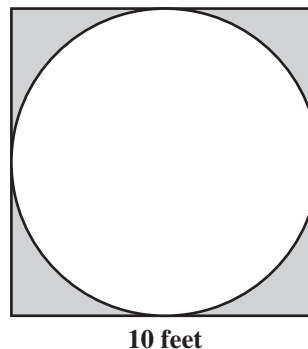
123. The largest possible circle is to be cut from a 10-foot square board. What will be the approximate area, in square feet, of the remaining board (shaded region)? ($A = \pi r^2$ and $\pi \approx 3.14$)

A 20

B 30

C 50

D 80

M00404

— **47** —
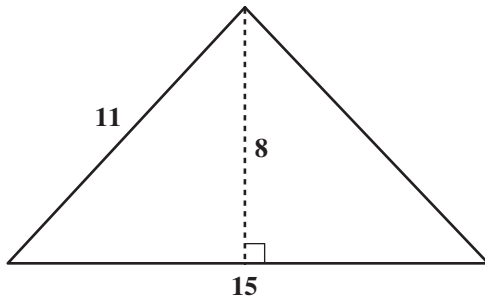
124. What is the area of the triangle shown above?

   A   44 square units

   B   60 square units

   C   88 square units

   D 120 square units

M00101
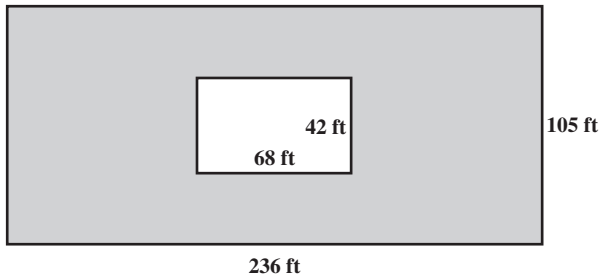
125. A rectangular pool 42 feet by 68 feet is on a rectangular lot 105 feet by 236 feet. The rest of the lot is grass. Approximately how many square feet is grass?

   A   2,100

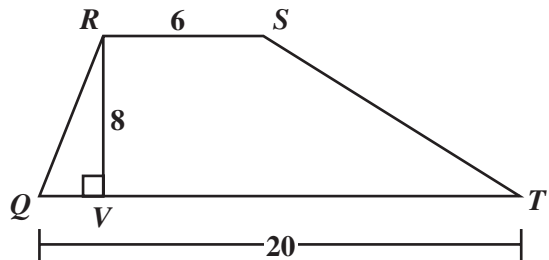   **B**   2,800

   C 21,000

   D 28,000

M00311
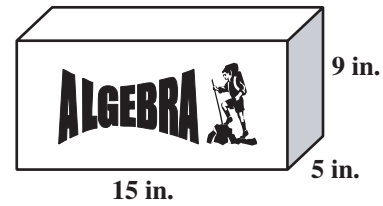
126. What is the volume of the shoebox shown above in cubic inches (in.³)?

   A   29

   B   75

   C 510

   D 675

M02629

127. What is the area, in square units, of trapezoid *QRST* shown below?

$$\left[A = \frac{1}{2}h\left(b_1 + b_2\right) \right]$$

   A   68

   B 104

   C 208

   D 960

M12087

128. One-inch cubes are stacked as shown in the drawing below.
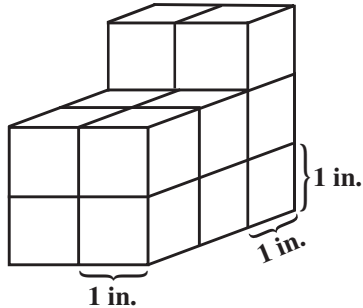
What is the total surface area?

A   19 in.^{2}

B   29 in.^{2}

C   32 in.^{2}

D   38 in.^{2}

M02812

129. In the figure shown above, all the corners form right angles. What is the area of the figure in square units?

A   67

B   73

C   78

D   91

M00318

130. What is the area of the shaded region in the figure shown below?

A   4 cm^2

B   6 cm^2

C   8 cm^2

D   16 cm^2

M02814

131. A right triangle is removed from a rectangle as shown in the figure below. Find the area of the remaining part of the rectangle.
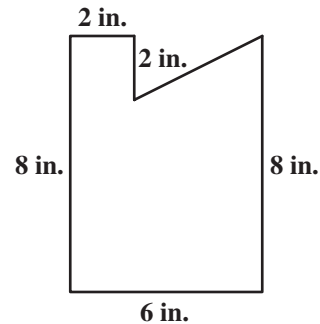
A   40 in.^{2}

B   44 in.^{2}

C   48 in.^{2}

D   52 in.^{2}

M02093

— **49** —

132. In the figure below, every angle is a right angle.
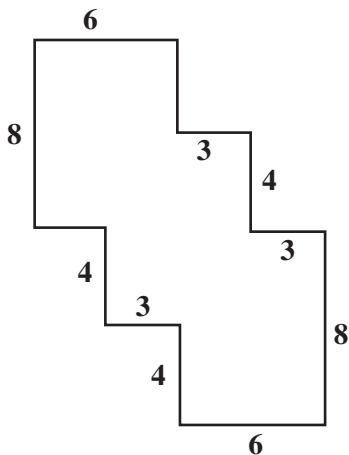
What is the area, in square units, of the figure?

A   96

B   108

C   120

D   144

M10790

133. What is the area of the shaded figure below?

= 1 square centimeter (cm^2)
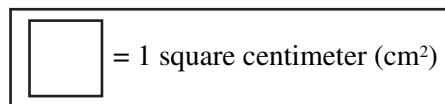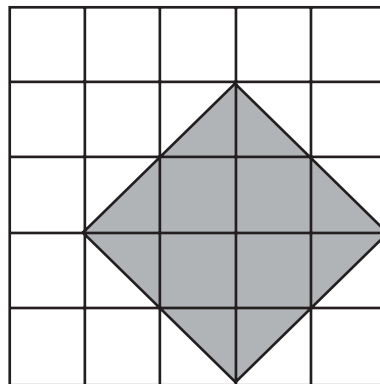
A   8 cm^2

B   9 cm^2

C   10 cm^2

D   12 cm^2

M13827

134. The short stairway shown below is made of solid concrete. The height and width of each step is 10 inches (in.). The length is 20 inches.
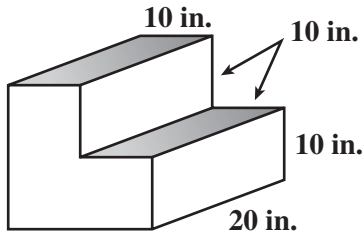
What is the volume, in cubic inches, of the concrete used to create this stairway?

A 3000

B 4000

C 6000

D 8000

M02990

135. Bonni has two similar rectangular boxes. The dimensions of box 1 are twice those of box 2. How many times greater is the volume of box 1 than the volume of box 2?

A 3

B 6

C 8

D 9

M21061

136. Gina is painting the rectangular tool chest shown in the diagram below.
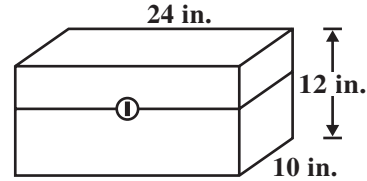
If Gina paints only the outside of the tool chest, what is the total surface area, in square inches $\left(\text{in.}^2\right)$, she will paint?

A 368

B 648

C 1296

D 2880

M20643

— **51** —

137. The object below is made of ten rectangular prisms, each with dimensions of 5 centimeters (cm) by 3 cm by 2 cm. What is the volume, in cubic centimeters, of the object?

3 cm

2 cm

5 cm
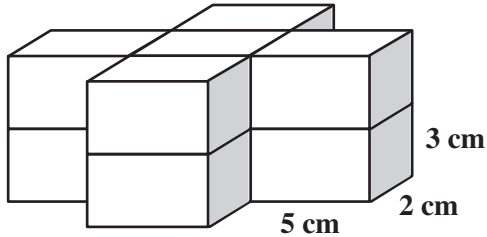
- **A** 100
- **B** 150
- **C** 250
- **D** 300

M30226

138. The width of the rectangle shown below is 6 inches (in.). The length is 2 feet (ft).

6 in.

2 ft
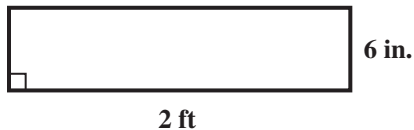
What is the area of the rectangle in square inches?

- **A** 12
- **B** 16
- **C** 60
- **D** 144

M03243

139. One cubic inch is approximately equal to 16.38 cubic centimeters. Approximately how many cubic centimeters are there in 3 cubic inches?

- **A** 5.46
- **B** 13.38
- **C** 19.38
- **D** 49.14

M02700

140. A rectangular field is 363 feet long and 240 feet wide. How many acres is the field? $(1 \text{ acre } = 43{,}560 \text{ square feet})$

- **A** 2
- **B** 3
- **C** 4
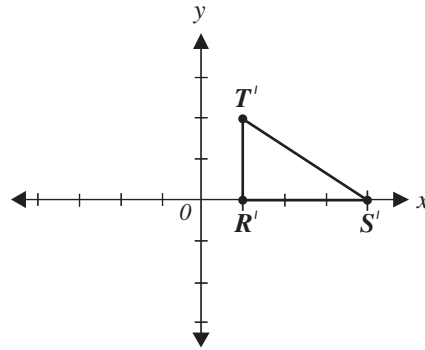- **D** 5

M13918

— 52 —

Measurement and Geometry
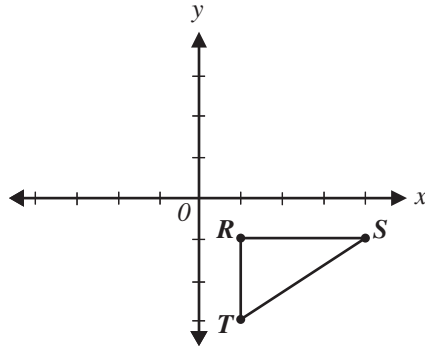
141. Which of the following triangles $R'S'T'$ is the image of triangle RST that results from reflecting triangle RST across the y-axis?
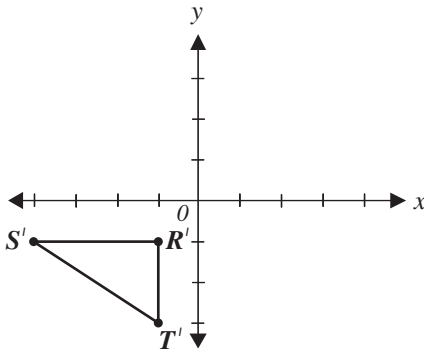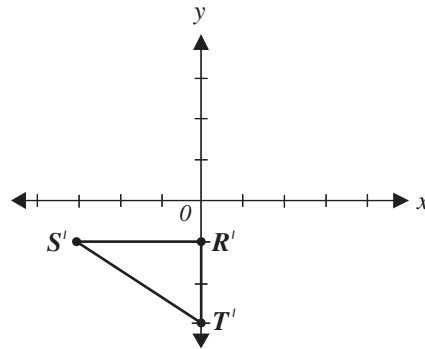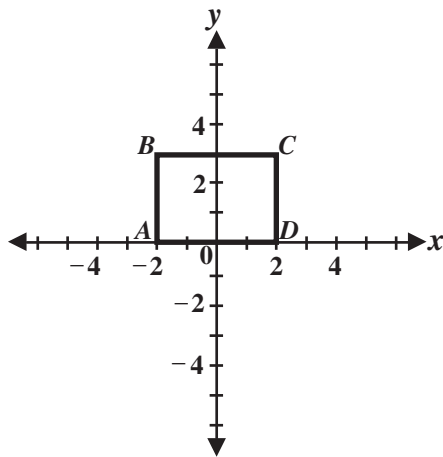
A

C

B

D

M02861

— **53** —
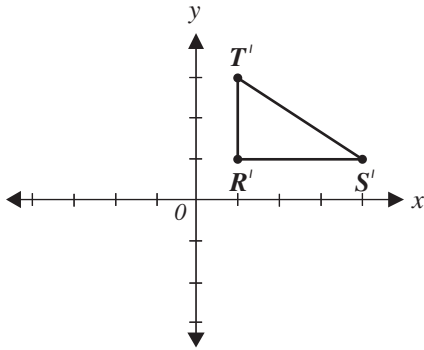
142. The points (1, 1), (2, 3), (4, 3), and (5, 1) are the vertices of a polygon. What type of polygon is formed by these points?

   A Triangle

   B Trapezoid

   C Parallelogram

   D Pentagon

M02718

143. The graph of rectangle *ABCD* is shown below.

What is the area, in square units, of rectangle *ABCD*?

   A 6

   B 10

   C 12

   D 14

M03136
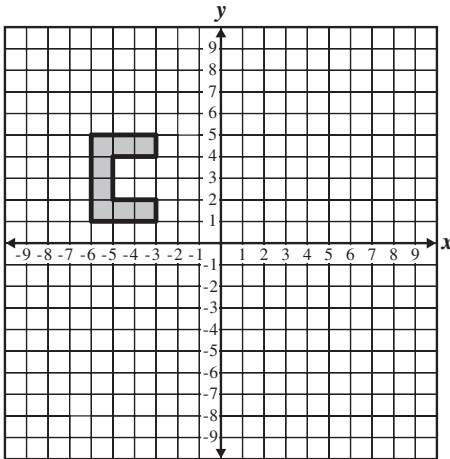
144. A clothing company created the following diagram for a vest.
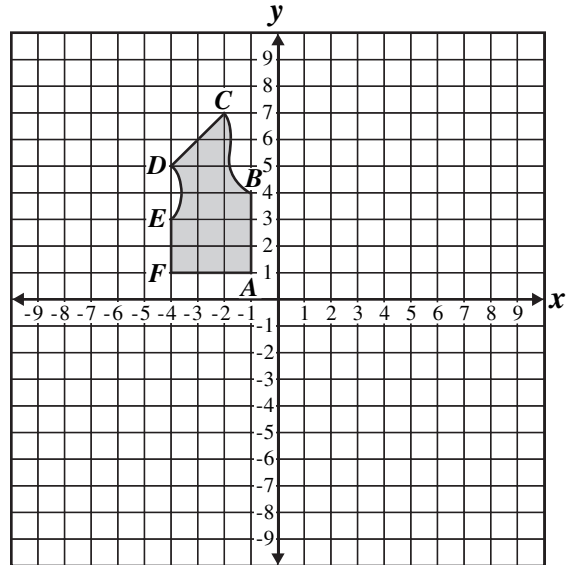
To show the other side of the vest, the company will reflect the drawing across the *y*-axis. What will be the coordinates of *C* after the reflection?
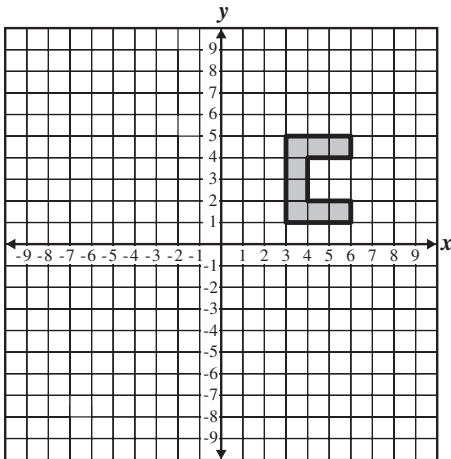
   A $(2, 7)$

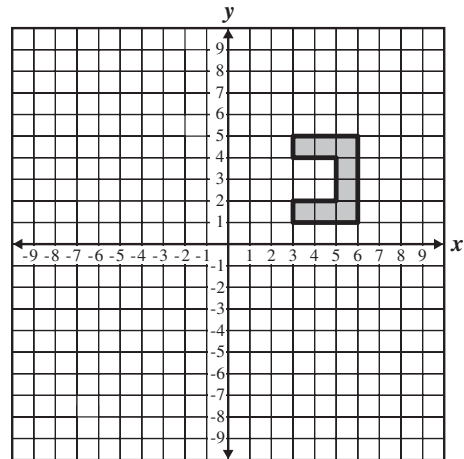   **B** $(7, 2)$

   C $(-2, -7)$

   D $(-2, 7)$

M10640

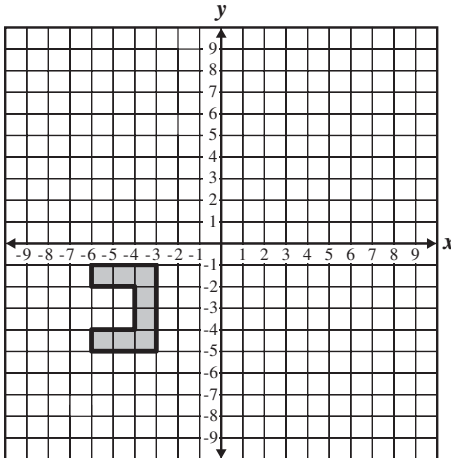**145. Which graph shows the figure below reflected across the *y*-axis?**
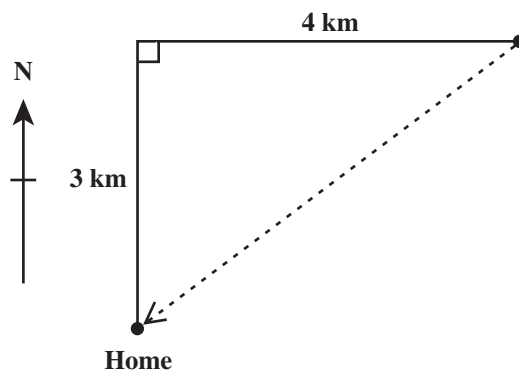

A

C

B

D

M11789
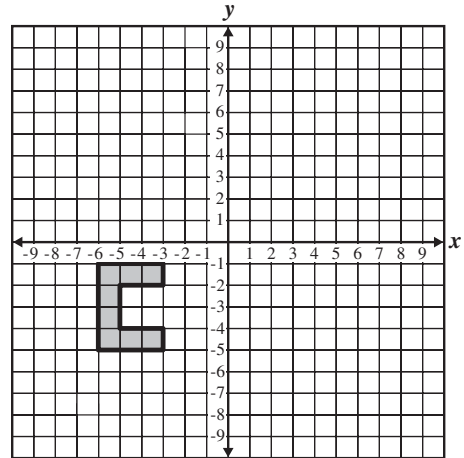
146. **What is the value of *x* in the right triangle shown below?**
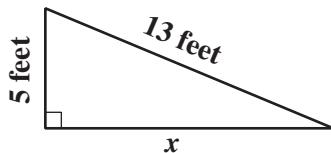
A 8 feet

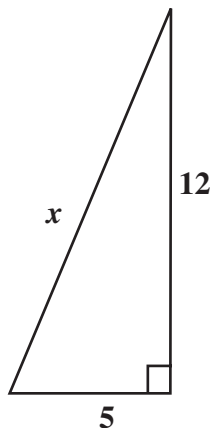**B** 12 feet

C 18 feet

D 23 feet

M03181

147. **The club members hiked 3 kilometers north and 4 kilometers east, but then went directly home as shown by the dotted line. How far did they travel to get home?**

A 4 km

B 5 km

C 6 km
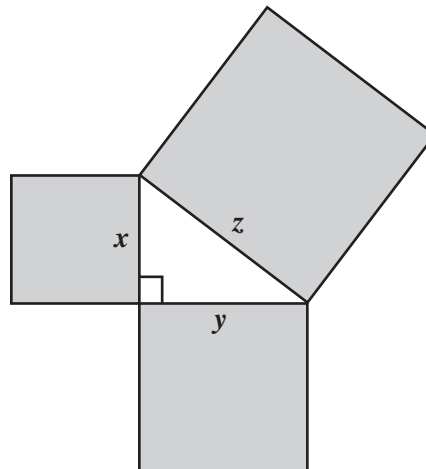
D 7 km

M00120

12

x

5

148. What is the value of *x* in the triangle shown above?

A   11

B   13

C   17

D   169

M02446

149. In the drawing below, the figure formed by the squares with sides that are labeled *x*, *y*, and *z* is a right triangle.
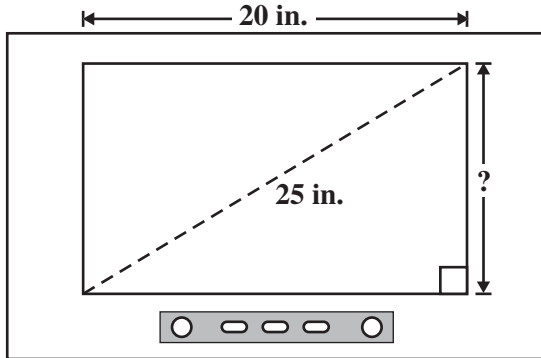

x

z

y

Which equation is true for all values of *x*, *y*, and *z*?

A $x + y = z$

B $x^2 + y^2 = z^2$

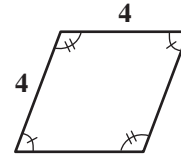C $x^2 \cdot y^2 = z^2$

D $\dfrac{1}{2} xy = z$

M25150

150. **The size of a television screen is measured along its diagonal. A 25-inch (in.) television screen is shown below.**
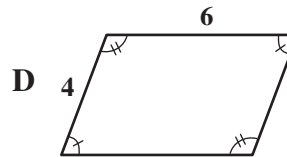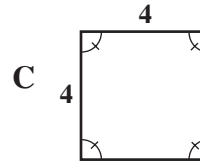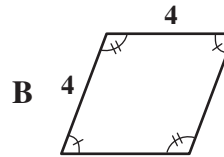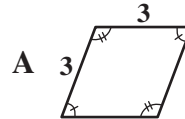

If the television screen shown above is 20 inches wide, what is the height, in inches, of the screen?

A $\sqrt{45}$

B $\sqrt{90}$

C 10

D 15

M32331

151. **Which figure is congruent to the figure shown above?**

A

B

C

D

M00020

152. In the diagram below, hexagon *LMNPQR* is congruent to hexagon *STUVWX*.
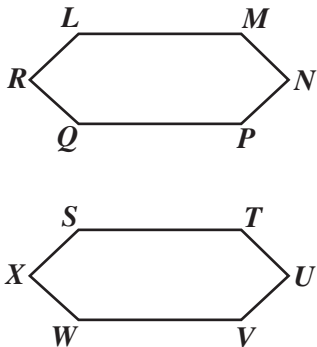
Which side is the same length as $\overline{MN}$?

A $\overline{NP}$

B $\overline{TU}$

C $\overline{UV}$

D $\overline{WX}$

M13069

153. If triangles *EFG* and *JKL* are congruent, then which two segments MUST be congruent?

A $\overline{EF}$ and $\overline{JK}$

B $\overline{EF}$ and $\overline{JL}$

C $\overline{FG}$ and $\overline{JK}$

D $\overline{FG}$ and $\overline{JL}$

M25163

Measurement and Geometry

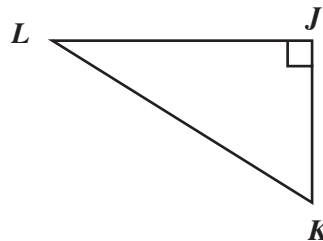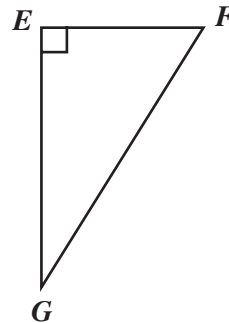| Question Number	Correct Answer	Standard	School Year of Exam
109	A	7MG1.1	2002–2003
110	D	7MG1.1	2001–2002
111	D	7MG1.1	2001–2002
112	C	7MG1.1	2004–2005
113	D	7MG1.1	2007–2008
114	D	7MG1.2	2001–2002
115	C	7MG1.2	2000–2001
116	D	7MG1.2	2005–2006
117	C	7MG1.2	2006–2007
118	A	7MG1.3	2001–2002
119	B	7MG1.3	2001–2002
120	A	7MG1.3	2003–2004
121	A	7MG1.3	2004–2005
122	D	7MG2.1	2001–2002
123	A	7MG2.1	2000–2001
124	B	7MG2.1	2000–2001
125	C	7MG2.1	2000–2001
126	D	7MG2.1	2000–2001
127	B	7MG2.1	2005–2006
128	D	7MG2.2	2001–2002
129	A	7MG2.2	2001–2002
130	A	7MG2.2	2000–2001
131	B	7MG2.2	2000–2001
132	C	7MG2.2	2004–2005
133	A	7MG2.2	2007–2008
134	C	7MG2.3	2002–2003
135	C	7MG2.3	2003–2004
136	C	7MG2.3	2004–2005
137	D	7MG2.3	2006–2007
138	D	7MG2.4	2002–2003
139	D	7MG2.4	2000–2001
140	A	7MG2.4	2004–2005
141	B	7MG3.2	2000–2001
142	B	7MG3.2	2000–2001
143	C	7MG3.2	2003–2004
144	A	7MG3.2	2005–2006
145	C	7MG3.2	2007–2008
146	B	7MG3.3	2002–2003
147	B	7MG3.3	2001–2002

Measurement and Geometry

Question Number	Correct Answer	Standard	School Year of Exam
148	B	7MG3.3	2000–2001
149	B	7MG3.3	2005–2006
150	D	7MG3.3	2007–2008
151	B	7MG3.4	2001–2002
152	B	7MG3.4	2003–2004
153	A	7MG3.4	2006–2007