6.G.1

SELECTED RESPONSE
Select the correct answer.

1. What is the area of the triangle below?

\[ \frac{1}{2} \times 2.5 \times 8.75 = 10.9375 \text{ cm}^2 \]

- **A** 5.625 cm²
- **B** 10.9375 cm²
- **C** 11.25 cm²
- **D** 21.875 cm²

2. What is the area of the triangle in the figure below?

\[ \frac{1}{2} \times 10 \times 12 = 60 \text{ mm}^2 \]

- **A** 12 mm²
- **B** 20 mm²
- **C** 36 mm²
- **D** 60 mm²

3. What is the area of this shape?

\[ \frac{1}{2} \times (6 + 16) \times 12 = 144 \text{ in}^2 \]

- **A** 48 in²
- **B** 96 in²
- **C** 144 in²
- **D** 288 in²

4. What is the area of the following rhombus?

\[ \frac{1}{2} \times 24 \times 14 = 168 \text{ cm}^2 \]

- **A** 76 cm²
- **B** 168 cm²
- **C** 336 cm²
- **D** 672 cm²

CONSTRUCTED RESPONSE

5. Draw a rectangle using this triangle and an exact copy of it. What is the area of the resulting rectangle?

\[ \frac{1}{2} \times 3 \times 10 = 15 \text{ cm}^2 \]

- **A** 10 cm²
- **B** 15 cm²
- **C** 20 cm²
- **D** 30 cm²
6. Find the area of the polygon below by dividing it into two rectangles using one vertical line. Show your work.

![Polygon Diagram]

$$1.5 \text{ cm}$$

$$3.5 \text{ cm}$$

$$5 \text{ cm}$$

7. A regular octagon can be divided into isosceles triangles. One triangle formed from this division is shown, where the base is 4 m and the approximate height is 4.83 m.

![Octagon Diagram]

a. Using the figure above as a start, finish dividing the octagon into isosceles triangles. How many triangles are there?

b. What is the approximate area of the octagon? Show your work.

8. Louis is building a birdhouse. He sketches the front of the birdhouse, which is shown below. The shaded region is a rectangular opening with a base of 4 in. and a height of 2 in. Louis divided the front into a rectangle, two squares, a trapezoid, and a triangle to find the area of the front, not including the opening. His work is shown below. What error did Louis make? Correct the error and find the actual area of the front of the birdhouse.

![Birdhouse Diagram]

Area of each of the two squares:

$$A = (2)(2) = 4 \text{ in}^2$$

Area of rectangle:

$$A = (6)(1) = 6 \text{ in}^2$$

Area of trapezoid:

$$A = \frac{1}{2}(3)(6 + 4) = \frac{1}{2}(3)(10) = 15 \text{ in}^2$$

Area of triangle:

$$A = \frac{1}{2}(4)(1) = 2 \text{ in}^2$$

The area of the front of the birdhouse is

$$4 \text{ in}^2 + 4 \text{ in}^2 + 6 \text{ in}^2 + 15 \text{ in}^2 + 2 \text{ in}^2 = 31 \text{ in}^2.$$
SELECTED RESPONSE

1. What is the volume of the rectangular prism?

![Rectangular Prism Diagram]

- **A** $18 \frac{1}{4}$ in$^3$
- **B** $28 \frac{7}{8}$ in$^3$
- **C** $52 \frac{1}{2}$ in$^3$
- **D** $144 \frac{3}{8}$ in$^3$

2. A brick has a length of $2 \frac{2}{5}$ cm, a width of $\frac{4}{5}$ cm, and a height of 1 cm. How many $\frac{1}{5}$ cm cubes can fit along the length of the brick?

- **A** 4
- **B** 5
- **C** 12
- **D** 240

3. If 300 cubes can fit in the rectangular prism below, what is the edge length of each cube?

![Rectangular Prism Diagram]

- **A** $\frac{1}{64}$ in
- **B** $\frac{7}{400}$ in
- **C** $\frac{1}{4}$ in
- **D** $4 \frac{11}{16}$ in

Select all correct answers.

4. Which dimensions describe a rectangular prism with a volume of $\frac{3}{50}$ cubic units?

- **A** $\frac{2}{5}$ unit, $\frac{1}{4}$ unit, $\frac{3}{5}$ unit
- **B** $1 \frac{2}{3}$ unit, $\frac{1}{4}$ unit, $\frac{5}{9}$ unit
- **C** $\frac{6}{7}$ unit, $\frac{7}{10}$ unit, $\frac{1}{5}$ unit
- **D** $\frac{3}{5}$ unit, $\frac{3}{10}$ unit, $\frac{1}{3}$ unit
- **E** $\frac{4}{7}$ unit, $\frac{5}{8}$ unit, $\frac{1}{25}$ unit
CONSTRUCTED RESPONSE

5. Use the formula for volume \( V = \frac{1}{2}wh \) to find the volume of the rectangular prism shown. Show your work.

6. How many cubes with side length \( \frac{1}{2} \) m would fit inside the rectangular prism shown below? Show your work.

7. A homeowner wants to construct a tank in the shape of a rectangular prism to collect rainwater runoff from her roof. The homeowner would like to hide the tank in a space under the deck between the supports. The space is \( 2 \frac{1}{2} \) ft wide by 12 ft long by \( 3 \frac{3}{4} \) ft high.

   a. If the tank is constructed using the entire length and width of the space, how high must the tank be in order to hold 50 ft\(^3\) of water? Show your work.

   b. If the tank is constructed using the entire length and height of the space, how wide must the tank be in order to hold 50 ft\(^3\) of water? Show your work.
SELECTED RESPONSE
Select the correct answer.

1. What is the length of $\overline{CD}$ in the figure?

- [A] 2 units
- [B] 3 units
- [C] 4 units
- [D] 5 units

2. Which name best describes the polygon with vertices (0, 0), (4, 8), (12, 8), and (16, 0)?

- [A] Triangle
- [B] Square
- [C] Trapezoid
- [D] Pentagon

3. A rectangular plot of land is represented on a map by the vertices (10, 10), (10, 90), (70.5, 90), and (70.5, 10), where the $x$- and $y$-coordinates are measured in yards. What is the area of the plot of land?

- [A] 1,560 yd$^2$
- [B] 4,840 yd$^2$
- [C] 5,445 yd$^2$
- [D] 6,345 yd$^2$

Select all correct answers.

4. A rectangle has one vertex at (0, 4). The rectangle has at least one side with a length of 6 units. Which vertices could represent the other three vertices of the rectangle?

- [A] (0, –2), (–2, –2), and (–2, 4)
- [B] (3, 4), (3, 1), and (0, 1)
- [C] (6, 4), (0, 2), and (6, 2)
- [D] (–6, 4), (0, 5), and (–6, 5)
- [E] (0, 6), (2, 6), and (2, 4)

Select the correct answer for all lettered parts.

5. A line segment has endpoints (–1, –1) and (–1, 2). Could the given vertex form a triangle if connected to the endpoints of the line segment?

- a. (6, 2) □ Yes □ No
- b. (–1, 6) □ Yes □ No
- c. (–1, 0) □ Yes □ No
- d. (–4, 8) □ Yes □ No

CONSTRUCTED RESPONSE

6. The figure below is a regular hexagon. One unit on the graph represents 1 centimeter. What is the perimeter of the hexagon? Explain how you found your answer.
7. A town requires that angled parking spaces have a “curb length” of 9 feet. The curb length is the distance from one angled line to the next as measured along the curb. One plan for angled spaces is shown below. Do these angled parking spaces meet the town’s requirement? Explain why or why not. Each unit on the graph represents 1 foot.

8. Graph the shape that has vertices $A(-3, -2), B(-1, 2), C(4, 2),$ and $D(2, -2)$. What kind of shape is it?

9. Sarah wants to plant a flower bed next to her driveway. The position of the driveway and the road are shown on the map below. She has chosen the point $(10, 10)$ to be one of the vertices of the flower bed. One unit on the graph represents 1 foot.

a. Sarah’s first plan is to make the flower bed a square with a side length of 5 feet. Graph two possible locations for the flower bed.

b. Sarah changes her mind and decides to make the flower bed a rectangle that measures 30 feet by 5 feet. She wants the side that measures 30 feet to lie along the edge of the driveway. She still wants $(10, 10)$ to be a vertex. Are there still two possible locations for Sarah’s flower bed? Explain why or why not, and graph all possible locations.
6.G.4

SELECTED RESPONSE
Select the correct answer.

1. What three-dimensional figure can be formed by folding the net shown?

A) Rectangular prism  
B) Square pyramid  
C) Triangular pyramid  
D) Triangular prism

2. The net of a square pyramid is shown. Find the surface area of the pyramid.

A) 27 ft²  
B) 28.5 ft²  
C) 45 ft²  
D) 57 ft²

3. An aquarium has the dimensions shown in the net below. What is the surface area of the aquarium?

A) 27 ft²  
B) 28.5 ft²  
C) 45 ft²  
D) 57 ft²

Select all correct answers.

4. Which of the following areas correspond to the area of a face of the rectangular prism that can be formed by the net shown?

A) 25 m²  
B) 40 m²  
C) 65 m²  
D) 80 m²  
E) 90 m²

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CONSTRUCTED RESPONSE

5. Hector is visiting the pyramids in Egypt. He wants to know the surface area of the Pyramid of Giza. The approximate dimensions are shown below, where all of the triangular faces have the same dimensions. Use a net to find the approximate surface area of the pyramid. Show your work.

6. An employee of a store’s gift wrapping center is wrapping 8 gifts, each in the same size box. The dimensions of the box are shown below.

   ![Box Diagram]

   a. Draw a net for this box.

   b. Find the surface area of the box. Show your work.

   c. If there is only 160 square feet of wrapping paper left, will the employee be able to wrap all of the gifts? Explain.
6.G.1 Answers

1. B
2. A
3. C
4. B
5.

The area of the rectangle is 
\[(10)(3) = 30 \text{ cm}^2\].

6.

Area of left rectangle: 
\[A = (1.5)(3.5) = 5.25 \text{ cm}^2\]
Area of right rectangle: 
\[A = (5 - 1.5)(3.5 - 1.5) = (3.5)(2) = 7 \text{ cm}^2\]
Total area: \[5.25 \text{ cm}^2 + 7 \text{ cm}^2 = 12.25 \text{ cm}^2\]

Rubric
1 point for area; 
2 points for reasonable work

7. a.

8 triangles are formed.
b. The approximate area of one triangle 
is \[\frac{1}{2}(4)(4.83) = 9.66 \text{ m}^2\]. There are 
8 triangles, so the approximate area of the octagon is \[8(9.66) = 77.28 \text{ m}^2\].

Rubric
a. 1 point for drawing; 1 point of triangles 
b. 1 point for answer; 1 point for work

8. Louis did not find the correct base of the rectangle, which is also the bottom base of the trapezoid. So, he incorrectly found the areas of the rectangle and trapezoid.
The correct base of the rectangle is the combined length of the two squares and the shaded region: 
2 in. + 2 in. + 4 in. = 8 in.
Area of rectangle: 
\[A = (8)(1) = 8 \text{ in}^2\]
Area of trapezoid: 
\[A = \frac{1}{2}(3)(8 + 4) = \frac{1}{2}(3)(12) = 18 \text{ in}^2\]
The correct area of the front of the birdhouse is \[4 \text{ in}^2 + 4 \text{ in}^2 + 8 \text{ in}^2 + 18 \text{ in}^2 + 2 \text{ in}^2 = 36 \text{ in}^2\].

Rubric
2 points for identifying error; 1 point for correct areas of rectangle and trapezoid; 
1 point for correct area
6.G.2 Answers

1. D
2. C
3. C
4. A, D, E
5. \[ V = \ell \cdot w \cdot h \]
   \[ = \left( \frac{2}{9} \right) \left( \frac{4}{9} \right) \left( \frac{7}{9} \right) \]
   \[ = \frac{56}{729} \text{ yd}^3 \]

Rubric
1 point for answer; 1 point for work using the formula

6. Find the dimensions of the prism in terms of the number of cubes with side length \( \frac{1}{2} \) m.

\[ \frac{6}{2} \quad \frac{1}{2} = 13 \cdot \frac{2}{1} = 13 \text{ cubes} \]

\[ \frac{4}{2} \quad \frac{1}{2} = 4 \cdot \frac{2}{1} = 8 \text{ cubes} \]

\[ \frac{1}{2} \quad \frac{1}{2} = 3 \cdot \frac{2}{1} = 3 \text{ cubes} \]

The prism is 13 cubes by 8 cubes by 3 cubes, so \( 13 \times 8 \times 3 = 312 \) cubes fit into the prism.

Rubric
1 point for answer; 2 points for appropriate work

7. a. \[ V = \ell \cdot w \cdot h \]
   \[ 50 = 12 \left( \frac{1}{2} \right) \left( \frac{1}{2} \right) \]
   \[ 50 = 12 \left( \frac{5}{2} \right) \]
   \[ 50 = 30h \]
   \[ \frac{50}{30} = h \]
   \[ \frac{2}{3} = h \]

The tank must be \( \frac{2}{3} \) ft high.

b. \[ V = \ell \cdot w \cdot h \]
   \[ 50 = 12 \left( \frac{3}{4} \right) \]
   \[ 50 = 12 \left( \frac{15}{4} \right) \]
   \[ 50 = 45w \]
   \[ \frac{50}{45} = w \]
   \[ \frac{1}{9} = w \]

The tank must be \( \frac{1}{9} \) ft wide.

Rubric
a. 1 point for answer; 1 point for reasonable work
b. 1 point for answer; 1 point for reasonable work
6.G.3 Answers

1. C
2. C
3. B
4. A, C, D
5. a. Yes
   b. No
   c. No
   d. Yes
6. The perimeter is 24 cm. Because the hexagon is regular, all six sides are the same length. The length of the bottom side, with vertices \((-2, -2)\) and \((2, -2)\), is 4 cm. The perimeter is \(6 \times 4 = 24\) cm.

**Rubric**
1 point for answer; 1 point for explanation

7. No. The curb lengths for all the spaces shown are 8 feet. For example, the distance between \((-8, 8)\) and \((0, 8)\) is 8 feet. This is less than the 9 feet required.

**Rubric**
1 point for answer; 1 point for explanation

8.

The shape is a parallelogram.

**Rubric**
1 point for the graph; 1 point for identifying the shape

9. a.

b. No; \((10, 10)\) could still be the upper-right corner of the flower bed, but \((10, 10)\) could not be the lower-right corner because the flower bed would extend into the road.
6.G.4 Answers

1. C
2. C
3. D
4. A, B
5. Possible net:

```
  0.18 km

  0.23 km
```

The area $A$ of a triangle is $A = \frac{1}{2}bh$. The base $b$ of each triangle is $0.23$ km, and the height $h$ of each triangle is $0.18$ km. So, the area of each triangle is $0.0207$ km$^2$. So, the area of all four triangles is $4(0.0207) = 0.0828$ km$^2$.

\[
A = \frac{1}{2} \cdot 0.23 \cdot 0.18 \\
= 0.115 \cdot 0.18 \\
= 0.0207
\]

The area $A$ of a square is $A = s^2$. The side length $s$ of the square is $0.23$ km. So, the area of the square is $0.0529$ km$^2$.

\[
A = 0.23^2 \\
= 0.0529
\]

So, the approximate surface area of the pyramid is the sum of the areas of each shape in the net, or $0.0828$ km$^2 + 0.0529$ km$^2 = 0.1357$ km$^2$.

Rubric
1 point for net; 1 point for surface area; 1 point for reasonable work

6. a. Possible net:

```
  1.5 ft

  2 ft

  2.5 ft
```

b. The area $A$ of a rectangle is $A = bh$, where $b$ is the base of the rectangle and $h$ is the height. The area of each rectangle with side lengths $1.5$ ft and $2$ ft is $1.5 \times 2 = 3$ ft$^2$. Since there are two rectangles with these dimensions, the combined area is $2 \times 3 = 6$ ft$^2$.

The area of each rectangle with side lengths $1.5$ ft and $2.5$ ft is $1.5 \times 2.5 = 3.75$ ft$^2$. The area of each rectangle with side lengths $2$ ft and $2.5$ ft is $2 \times 2.5 = 5$ ft$^2$. Since there are two rectangles of each type, the combined area is $2 \times 3.75 + 2 \times 5 = 17.5$ ft$^2$.

So, the total surface area of the box is $6$ ft$^2 + 17.5$ ft$^2 = 23.5$ ft$^2$.

c. The employee needs to wrap 8 boxes, each with a surface area of $23.5$ ft$^2$. So, the combined surface area needing to be wrapped is $8 \times 23.5 = 188$ ft$^2$. Since there is only $160$ square feet of wrapping paper left, the employee will not be able to wrap all of the gifts.

Rubric
a. 1 point
b. 1 point for surface area; 1 point for reasonable work
c. 1 point for answer; 1 point for explanation