NJ ADK / Farce Geometry Practice Class Date Name

SELECTED RESPONSE Select the correct answer.

7.G.1

- 1. A blueprint shows a layout of a building. Every 3 inches in the blueprint represents 5 feet of the actual building. One of the walls on the blueprint is 21 inches long. What is the length of the actual wall?
 - (A) 35 inches
 - (B) 21 feet
 - (C) 35 feet
 - (D) 50 feet
- 2. The diagram below shows the layout of an enclosure for horses. In the diagram, every 4 centimeters represents 7 meters of the actual enclosure. To the nearest whole number, what is the area of the enclosure?



- (A) 336 cm²
- (B) 110 m²
- (C) 588 m²
- (\mathbf{D}) 1,029 m²
- On a road map that uses a scale of 1 inch:20 miles, two cities are 7 inches apart. If you are making a map that uses a scale of 3 inches:35 miles, how far apart are the same two cities on your map?

(A) 4 inches

(B)
$$4\frac{1}{12}$$
 inches
(C) 12 inches

(D)
$$12\frac{1}{4}$$
 inches

4. The scale drawing has a scale of 1 inch:9 yards. What is the total area of the composite figure?



- (A) 51 square inches
- (B) 459 square yards
- (C) 4,131 square yards
- (D) 4,860 square yards

Select all correct answers.

5. A fence is in the shape of a triangle. A scale drawing of the fence is shown, where every 24 mm on the drawing represents 5 m of the fence. Which of the following measurements are the actual lengths of the sides of the fence?



(A) 7.5 m (B) 10 m 🛈 12.5 m (**D**) 15 m (E) 17.5 m (F) 20 m

end

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Answers attached at

37

A map has a scale such that 3 inches on the map represents 400 yards. Match the actual distance to the corresponding distance on the map.

6. 2,000 yd	A $1\frac{1}{8}$ in.
7. 150 yd	B $5\frac{3}{4}$ in.
8. 900 yd	C 15 in.
9. 2,600 yd	D $19\frac{1}{2}$ ir
	E 12 in.

in. F $6\frac{3}{4}$ in.

CONSTRUCTED RESPONSE

10. A fence is shown on a blueprint and has sides of length 17 cm, 18 cm, 15 cm, and 19 cm. If the scale on the blueprint is 2 cm:7 m, what is the total length of the fence? Show your work.

11. Every 2 centimeters on a floor plan represents 1 meter of the house. The dining room is 8 cm by 14 cm on the floor plan, and the bedroom is 7 cm by 12 cm on the floor plan. If installing tile costs \$76 per square meter and installing carpet costs \$52 per square meter, how much would it cost to install tile in the dining room and install carpet in the bedroom? Show your work.

12. The figure below is a map of four different cities with the distances between the cities on the map labeled.



- a. If the actual distance from city P to city Q is 269.5 kilometers, find the actual distance that is represented by 1 cm on the map.
- b. Find the distance to travel from city Q to city S by going through city R. Show your work.
- c. Find the distance to travel directly from city Q to city S. Show your work.
- d. Find how much farther it is to travel from city Q to city S by going through city R than it is to travel directly from city Q to city S. Show your work.

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SELECTED RESPONSE

Select the correct answer.

- 1. Which of the following conditions produces a unique triangle?
 - A triangle with angles that have a measure of 20° and 110° with an included side of 7 inches
 - (B) A triangle with sides of length 4 feet and 3 feet with a non-included angle that measures 70°
 - C A triangle with a 25° angle, an 85° angle, and a 60° angle
 - (D) A triangle with a 14° angle, a 31° angle, and a 135° angle
- 2. How many triangles are formed given

side lengths of 1 in. and $1\frac{1}{4}$ in. with a 50°

- non-included angle?
- (A) No triangles
- (B) Exactly one triangle
- C Exactly two triangles
- (D) The number of triangles cannot be determined.

Select all correct answers.

- 3. Which of the following side lengths forms a unique triangle?
 - (A) 5 cm, 5 cm, 10 cm
 - (B) 11 cm, 14 cm, 17 cm
 - (C) 109 cm, 214 cm, 414 cm
 - (D) 2 m, 7 m, 8 m
 - (E) 8 miles, 15 miles, 26 miles

Select the correct answer for each lettered part.

- 4. Determine whether each triangle with the given characteristics forms no triangle, a unique triangle, or more than one triangle.
 - a. A triangle with 5 cm and 7 cm side lengths and an included 50° angle
- O No triangle O Unique triangle

O No triangle

triangle

O More than one triangle

O Unique triangle

O More than one

- b. A triangle with 70° and 120°. angles and an included side of 10 m
- c. A triangle with 40° and 130° angles and a non-included side of 48 yards
- d. A triangle with 14 in. and 24 in. side lengths and a non-included 142° angle
- e. A triangle with 52°, 42°, and 88° angles
- f. A triangle with side lengths 5 cm, 10 cm, and

- O No triangle O Unique triangle O More than one
- triangle
- O No triangle
- O Unique triangle
- O More than one triangle
- O No triangle
- O Unique triangle
- O More than one triangle
- O No triangle
- O Unique triangle
- O More than one triangle

CONSTRUCTED RESPONSE

5. Make a drawing using a ruler to determine whether line segments that are 1 cm, 3 cm, and 5 cm long form a unique triangle, more than one triangle, or no triangle, Explain.

18 cm

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Name	Date	Class
 Use a ruler, protractor, and compass to draw a triangle that has 7 cm and 5 cm sides and a non-included angle of 80°. 	9.	a. Draw a triangle that has angles of 40°, 50°, and 90°.
7. Draw a freehand sketch of a triangle with a right angle and two other angles that have the same measure. Explain how you made your drawing. Is the triangle you made a unique triangle? Explain.		 b. Can you draw another triangle with the same angles but with different side lengths? Justify your answer. c. If you are given three angles to construct a triangle, will the triangle be unique? Explain your reasoning.
8. Describe the process of constructing a triangle with sides that have the same length as \overrightarrow{AB} , \overrightarrow{CD} , and \overrightarrow{FG} using a straightedge and compass.	10.	Mason claims that he can form two triangles with different side lengths that have 30° and 70° angles and an included side of $1\frac{1}{2}$ inches. Use a protractor and a ruler to construct a triangle with the given characteristics. Then try to construct a different triangle with the same characteristics. Evaluate Mason's claim.
	-	

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SELECTED RESPONSE Select the correct answer.

1. Which of the following describes the horizontal cross section of the right rectangular prism shown?



- (A) A square with side length 5 meters
- (B) A rectangle with dimensions 5 meters by 8 meters
- C A rectangle with dimensions 5 meters by 6 meters
- (D) A rectangle with dimensions 8 meters by 6 meters
- Which of the following figures has a horizontal cross section that is a square? (All of the figures have a horizontal base.)
 - A right rectangular prism that has a length of 24 meters, a width of 42 meters, and a height of 33 meters
 - (B) A right rectangular pyramid that has a length of 19 inches, a width of 14 inches, and a height of 19 inches
 - C A right square pyramid that has a length of 10 feet, a width of 10 feet, and a height of 16 feet
 - (D) A right rectangular prism that has a length of 2 cm, a width of 3 cm, and a height of 5 cm

3. Which of the following describes the vertical cross section of the right rectangular pyramid shown that contains the vertex of the pyramid and the midpoints of the sides of the base that are 8 yards long?



- (A) A rectangle with dimensions 8 yards by 12 yards
- (B) A rectangle with dimensions 12 yards by 14 yards
- C An isosceles triangle with base 8 yards and height 14 yards
- (D) An isosceles triangle with base 12 yards and height 14 yards

Select all correct answers.

- 4. Determine which of the cross sections shapes below are possible for a right rectangular pyramid, where the length and width of the base are not equal.
 - (A) Circle
 - (B) Hexagon
 - C Rectangle
 - (D) Square
 - (E) Trapezoid
 - (F) Triangle

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41

Select the correct answer for each lettered part.

5. Determine whether the following geometric shapes are possible cross sections for a right rectangular prism, where the lengths of the dimensions are not equal to each other. (The plane intersecting the prism is not necessarily parallel to the faces of the prism.)

a. Circle	OYes ONo
b. Parallelogram	OYes ONo
c. Rectangle	OYes ONo
d. Square	o Yes O No
e. Trapezoid	⊖Yes ⊖No
f. Triangle	O Yes O No

CONSTRUCTED RESPONSE

6. Charlie is slicing a cheese block for appetizers. His slices are vertical cross sections that are parallel to the left and right face of a prism, as shown below. Describe the shape and dimensions of the cross sections. Then describe another vertical cross section that Charlie could use to slice the cheese.



7. Are all of the vertical slices of a rectangular pyramid the same kind of shape? Explain your reasoning.

8. The figures shown are not to scale.



- a. Use the dimensions of figure 1 to describe a vertical cross section that is parallel to the front and back faces.
- b. Use the dimensions of figure 2 to describe a vertical cross section that is parallel to the left and right faces.
- c. Which cross section has the larger area, the one described in part a or the one described in part b? Justify your answer.
- 9. A right rectangular pyramid has length 12 feet, width 9 feet, and height 26 feet. A horizontal plane intersects the faces of the pyramid. A vertical plane intersects the vertex, perpendicular to the base and parallel to the sides that are 12 feet long. Describe the figures resulting from the intersections. For what heights above the base is the area of the horizontal cross section greater than the area of the vertical cross section? Show your work.

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SELECTED RESPONSE

Select the correct answer.

 Which of the following is the correct formula for the area of a circle, where A is the area and r is the radius?

(A)
$$A = 2\pi r$$

(B) $A = \pi r$
(C) $A = \pi r^2$
(D) $A = \sqrt{\frac{r}{\pi}}$

- 2. A circle is 75.36 yards in circumference. What is its diameter? Use 3.14 for π and round to the nearest yard.
 - A 12 yards
 - (B) 24 yards
 - C 237 yards
 - D 473 yards
- 3. A flying disc has a $4\frac{3}{4}$ -inch radius. What

is its circumference? Use 3.14 for π and round to the nearest inch.

- (A) 15 inches
- (B) 30 inches
- C 31 inches
- D 71 inches

Select all correct answers.

- 4. Which of the following circles has an area greater than 400 square meters and less than 600 square meters? Use 3.14 for π .
 - A Radius: 8 meters
 - B Radius: 12 meters
 - C Radius: 14 meters
 - Diameter: 12 meters
 - E Diameter: 22 meters
 - Diameter: 26 meters

Match the diameter of the circle with its approximate area. Use 3.14 for π .

5, 30 m	A 78.5 m ²
6_40 m	B 314 m ²
0, 40 m	C 706.5 m ²
7.10 m	D 1,256 m ²
8. 52 m	E 2,122.64 m ²
	F 2.826 m ²

CONSTRUCTED RESPONSE

- 9. A wheel has a radius of 9 inches and travels as it spins. How far does the wheel travel in one revolution? Show your work. Use 3.14 for π and round to the nearest inch.
- 10. Rewrite the formula for the circumference of a circle $C = 2\pi r$ in terms of its diameter *d*. Show your work.
- 11. Verify that the equation $C^2 = 4\pi A$ is true for a circle with a radius of 5 cm. Show your work, using 3.14 for π .
- 12. An amusement park has two merry-gorounds. The first merry-go-round has a platform with a diameter of 13 meters and the second merry-go-round has a platform with a diameter of 19 meters. How much larger is the area of the larger merry-go-round's platform compared to the area of the smaller merry-go-round's platform? Show your work, using 3.14 for π .

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13. One circle has a 96 cm diameter and another circle has a 295.16 cm circumference. Which circle has a larger radius? Explain using 3.14 for π .

Name

- 14. Each sprinkler in Rob's sprinkler system waters a circular area.
 - a. Sprinkler A is in an open part of Rob's lawn and waters up to 18 feet away. What is the area sprinkler A can water? Show your work. Use 3.14 for π and round to the nearest square foot.
 - b. A different sprinkler is installed close to Rob's house. Sprinkler B waters only up to 6 feet away. What is the area sprinkler B can water? Show your work. Use 3.14 for π and round to the nearest square foot.
 - c. Use the results from parts a and b to find the ratio of the area sprinkler A can water to the area sprinkler B can water. Interpret the meaning of this ratio.
- 15. The circumference of a circular stage is 157 feet. If Katie paints the stage at a rate of 400 square feet per hour, how long would it take, to the nearest hour, for Katie to paint the entire stage? Explain your reasoning using 3.14 for π .

- 16. Find the relationship between the circumference and the area of a circle.
 - a. Write the formula for the circumference of a circle *C* in terms of its radius *r*. Then solve the equation for *r*.
 - b. Substitute the result from part a in the formula for the area of a circle.
 - c. Simplify the result from part b and solve for C^2 . Show your work.

17. Raquel incorrectly found the area of a circle with a 68 m diameter. Her work is shown. Identify Raquel's error, and then find the correct area of the circle. Show your work, using 3.14 for π .

 $A = \pi r^{2}$ = $\pi \cdot 68^{2}$ = $\pi \cdot 4,624$ $\approx 14,519.36$ The area of the circle is about 14,519.36 m².

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SELECTED RESPONSE

Select the correct answer.

1. Use the fact that $\angle ABC$ and $\angle CBD$ are complementary angles to find m $\angle EBF$.



2. Which of the following is NOT a measure of an angle in the figure below?



(B) 29° **(D)** 66°

3. In the figure below, ∠BFC and ∠CFD are complementary angles. If m∠AFB is 6° less than m∠DFE, what is m∠AFB?



Select all correct answers.

4. Which of the following angles have a measure that is less than 40° if ∠BHC and ∠CHD are complementary angles?



- ▲ ∠AHB▲ ∠BHC
- C ZCHD
- D ZDHF
- E) ZFHG

Suppose $m\angle BFD = 122^\circ$. Match the angle to its measure.



- ____ C 67° ___ 7. ∠CFE D 113° 8. ∠AFE E 122°
 - ZAFE E 122⁻ F 125°

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SELECTED RESPONSE Select the correct answer.

1. What is the surface area of the right rectangular prism shown in the figure?



2. What is the volume of the right triangular prism shown?



3. What is the area of the composite figure shown?



Select all correct answers.

- 4. Which of the following figures have an area greater than 40 cm²?
 - A triangle that has a base of 8 cm and a height of 9 cm
 - (B) A square that has a side length of 7 cm
 - C A rectangle that has a base of 14 cm and a height of 3 cm
 - (D) A parallelogram that has a base of 5 cm and a height of 6 cm
 - (E) A trapezoid that has 8 cm and 10 cm bases and a height of 5 cm

Match the description of the figure with its surface area.

- 5. A cube with side length 13 cm
- 6. A right rectangular prism with length
 6 cm, width 3 cm, and height 7 cm
- _____7. A cube with side length 8 cm
- 8. A right rectangular prism with length
 17 cm, width 15 cm, and height 10 cm

A 162 cm^2 B 169 cm^2 C 384 cm^2 D $1,014 \text{ cm}^2$ E $1,150 \text{ cm}^2$ F $2,197 \text{ cm}^2$

CONSTRUCTED RESPONSE

9. The school's cafeteria is a rectangle and a parallelogram as shown in the figure. A carpenter is installing linoleum for the floor. It costs \$32.50 to install a square meter of linoleum. How much will it cost to install linoleum for the whole cafeteria? Show your work.



10. Dakota has a snow plow that also sands the roads. The container that holds the sand is a right trapezoidal prism as shown in the figure.



- a. Find the volume of the container. Explain your reasoning.
- b. If Dakota is picking up sand that costs \$1.25 per cubic foot and completely fills the container, what is the cost of the sand? Show your work.

11. Mitchell incorrectly finds the surface area of the right trapezoidal prism. His work is shown below. Identify Mitchell's error and find the correct value for the surface area. Show your work.



12. Jessie and Tim are painting a barn that has rectangular sides. They are painting all sides except the rectangular faces of the roof and the bottom. If they can paint 30 m² per hour, how long will it take, to the nearest hour, for them to paint the barn? Explain your reasoning.



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- 1. C
- 2. D
- 3. C
- 4. C
- 5. C, E, F
- 6. C
- 7. A
- 8. F
- 9. D

10. Find the perimeter of the blueprint.

19 cm + 15 cm + 18 cm + 17 cm = 69 cm

Multiply 69 cm by the ratio $\frac{7 \text{ m}}{2 \text{ cm}}$.

$$69 \text{ cm} \times \frac{7 \text{ m}}{2 \text{ cm}} = 241.5 \text{ m}$$

So, the length of the fence is 241.5 meters.

Rubric

1 point for answer; 1 point for showing work

11. Find the dimensions of the dining room. Use the ratio $\frac{1m}{2 \text{ cm}}$ to convert to meters.

$$8 \text{ cm} \times \frac{1\text{ m}}{2 \text{ cm}} = 4 \text{ m}$$

$$14 \text{ cm} \times \frac{1 \text{ m}}{2 \text{ cm}} = 7 \text{ m}$$

Multiply the dimensions to find the area of the dining room.

 $4 \text{ m} \times 7 \text{ m} = 28 \text{ m}^2$

Multiply the area of the dining room by the cost per square meter for tile.

$$28 \text{ m}^2 \times \frac{\$76}{1 \text{ m}^2} = \$2,128$$

Find the dimensions of the bedroom.

Use the ratio $\frac{1m}{2 \text{ cm}}$ to convert to meters.

$$7 \,\mathrm{cm} \times \frac{1 \,\mathrm{m}}{2 \,\mathrm{cm}} = 3.5 \,\mathrm{m}$$

$$12 \text{ cm} \times \frac{1 \text{ m}}{2 \text{ cm}} = 6 \text{ m}$$

Multiply the dimensions to find the area of the bedroom.

$$3.5 \text{ m} \times 6 \text{ m} = 21 \text{ m}^2$$

Multiply the area of the bedroom by the cost per square meter for carpet.

$$21 \,\mathrm{m}^2 \times \frac{\$52}{1 \,\mathrm{m}^2} = \$1,092$$

Add the costs of installing carpet in the bedroom and installing tile in the dining room.

\$2,128 + \$1,092 = \$3,220

It costs \$3,220 to install tile in the dining room and to install carpet in the bedroom.

Rubric

2 points for total cost; 2 points for showing work

^{12. a.} $\frac{269.5 \text{ km}}{9.8 \text{ cm}} = \frac{269.5 \text{ km} + 9.8}{9.8 \text{ cm} + 9.8}$ = $\frac{27.5 \text{ km}}{1 \text{ cm}}$

So, 1 cm on the maps represents 27.5 km of actual distance.

b. Add the distance from city Q to city R and from city R to city S on the map.
8,6 cm + 7.8 cm = 16.4 cm

Use the ratio $\frac{27.5 \text{ km}}{1 \text{ cm}}$ to find the

total distance.

$$\frac{27.5 \text{ km}}{1 \text{ cm}} = \frac{27.5 \text{ km} \times 16.4}{1 \text{ cm} \times 16.4}$$
$$= \frac{451 \text{ km}}{16.4 \text{ cm}}$$

The distance to travel from city Q to city S through city R is 451 km.

c. Use the ratio
$$\frac{27.5 \text{ km}}{1 \text{ cm}}$$
 to find the

distance from city Q to city S.

$$\frac{27.5 \text{ km}}{1 \text{ cm}} = \frac{27.5 \text{ km} \times 12.1}{1 \text{ cm} \times 12.1}$$
$$= \frac{332.75 \text{ km}}{12.1 \text{ cm}}$$

The distance to travel directly from city Q to city S is 332.75 km.

d. Subtract 332.75 km from 451 km.

451 km - 332.75 km = 118.25 kmTraveling from city Q to city S by going through city R is 118.25 km farther than traveling directly from city Q to city S.

(Also accept reasoning that uses the fact that the map distance is 4.3 cm farther, and

 $4.3 \text{ cm} \times \frac{27.5 \text{ km}}{1 \text{ cm}} = 118.25 \text{ km.}$

Rubric

- a. 1 point
- b. 0.5 point for answer; 0.5 point for showing work
- c. 0.5 point for answer; 0.5 point for showing work
- d. 0.5 point for answer; 0.5 point for showing work

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7.G.2 Answers

- 1. A
- 2. C
- 3. B, D
- 4. a. Unique triangle
 - b. No triangle
 - c. Unique triangle
 - d. More than one triangle
 - e. No triangle
 - f. No triangle
- 5.



Line segments that are 1 cm, 3 cm, and 5 cm long do not form a triangle. The 1 cm and 3 cm sides cannot intersect when the included side is 5 cm long because the sum of 1 cm and 3 cm, 4 cm, is shorter than 5 cm.

Rubric

1 point for drawing a figure; 1 point for answer; 1 point for explanation

6. Possible answer:



Rubric

1 point for drawing a line segment that is 5 cm; 1 point for drawing an 80° angle; 1 point for drawing a line segment that is 7 cm



The sum of the angles in a triangle is 180°. Since the measure of a right angle is 90°, the measures of the remaining two angles add to 90° because 180° - 90° = 90°. Since the two remaining angles have the same measure, divide 90° by 2.

$$\frac{90^\circ}{2} = 45^\circ$$

The measure of the two other angles is 45°, so I made 45° angles with the perpendicular sides to form the third side.

The triangle I made is not a unique triangle because many triangles of different sizes have the same angle measures as the triangle I made above.

Rubric

1 point for sketch; 1 point for explanation of drawing; 1 point for answer; 1 point for explanation

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- 8. Possible answer: Use a straightedge to draw a line segment with one endpoint *P*.
 - Copy \overrightarrow{AB} using a compass, and then place the point of the compass on *P* and draw an arc that intersects the segment. Label the point where the arc and segment intersect as *Q*. Copy \overrightarrow{CD} using a compass, and then place the point of the compass on *P* and draw an arc. Copy \overrightarrow{FG} using a compass, and then place the point of the compass on *Q* and draw an arc. The arcs intersect at two different points. Label one of the points where the arcs intersect as *R*. Use the straightedge to draw \overrightarrow{PR} and \overrightarrow{QR} . So, $\triangle PQR$ has sides with the same length as \overrightarrow{AB} , \overrightarrow{CD} , and \overrightarrow{FG} .

Rubric

1 point for describing using compass to copy segment length *AB* to form new segment; 1 point for each arc described; 1 point for mentioning that the arcs intersect at third point

9. a. Possible answer:



- b. Yes. I can draw another triangle that has angles of 40°, 50°, and 90°, like the one below whose side lengths are
 - $\frac{2}{3}$ the first triangle's side lengths.



c. No. Many triangles of different sizes can be formed when any three angles are given because there is no restriction on the side lengths of the triangle.

Rubric

- a. 1 point
- b. 1 point for answer; 1 point for a different sized triangle
- c. 1 point for answer; 1 point for explanation
- 10.





Mason is incorrect. Every triangle with a 30° angle, a 70° angle, and an included

side of $1\frac{1}{2}$ inches will have the same side

lengths for the other two sides.

Rubric

1 point for each constructed triangle; 1 point for answer; 2 points for explanation

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- 1. B
- 2. C
- 3. D
- 4. C, E, F
- 5. a. No
 - b. Yes
 - c. Yes
 - d. Yes
 - e. Yes
 - f. Yes
- The vertical cross sections that Charlie is cutting are rectangles that are 7 cm by 5 cm.

Possible answer: Another vertical cross section Charlie could use is a rectangle that is 5 cm by 18 cm.

Rubric

1 point for each vertical cross section description

7. No. Possible answer: If a vertical slice intersects the vertex of the pyramid, then the cross section is an isosceles triangle. If a vertical slice intersects the base and just two adjacent faces of the pyramid, then the cross section is a triangle. If a vertical slice intersects the base and three faces of the pyramid, then the cross section is a quadrilateral.

Rubric

1 point for answer; 2 points for explanation

- a. This cross section is a rectangle of length 32 meters and width 17 meters.
 - b. This cross section is a rectangle of length 53 meters and width 9 meters.
 - c. The vertical cross section of figure 1 is larger.

The area of the cross section from figure 1 is 544 m², and the area of the cross section from figure 2 is 477 m². Notice that 544 m² is greater than 477 m^2 .

Rubric

- a. 1 point
- b. 1 point
- c. 1 point for answer; 1 point for justification
- 9. The horizontal cross section ranges from the vertex to the base. So, the horizontal cross section is a rectangle whose length is less than or equal to 12 feet and whose width is less than or equal to 9 feet. The horizontal cross section with the greatest area is taken at the base and is a rectangle with a length of 12 feet and a width of 9 feet. To find its area, use the formula for the area of a rectangle.

 $A = \ell w = (12)(9) = 108$

The area of the horizontal cross section is greater than 0 square feet and less than or equal to 108 square feet.

The vertical cross section is a triangle whose base is 12 feet and height is 26 feet. To find its area, use the formula for the area of a triangle and substitute 12 for *b* and 26 for *h*.

$$A = \frac{1}{2}bh = \frac{1}{2}(12)(26) = 156$$

The area of the vertical cross section is 156 square feet.

The area of the vertical cross is greater than the greatest area of the horizontal cross section. So, the area of the horizontal cross section is never greater than the area of the vertical cross section for any height above the base.

Rubric

- 1 point for each cross section description;
- 1 point for the area of each cross section;
- 1 point for conclusion

- 1. C
- 2. B
- 3. B
- 4. B, F
- 5. C
- 6. D
- 7. A
- 8.E
- 9. The wheel travels about 57 inches. The formula for the circumference of a circle is $C = 2\pi r$, where *r* is the radius.

Substitute 9 for *r*, and then evaluate. $C = 2\pi r$

- $= 2\pi \cdot 9$
- $= 18 \cdot \pi$
- = 10 *n* ≈ 56.52

Rubric

- 1 point for answer;
- 1 point for showing work
- 10. Since the diameter of a circle is twice its radius, d = 2r. Substitute d for 2r in the formula.

 $C = 2\pi r$

- $= 2r \cdot \pi$ $= d \cdot \pi$
- $=\pi d$

So, the formula for the circumference of a circle in terms of its diameter *d* is $C = \pi d$.

Rubric

1 point for rewritten formula; 1 point for showing work

11. Find the circumference of the circle.

- $C = 2\pi r$
 - $=2\pi \cdot 5$
 - $=2 \cdot 5\pi$
 - $=10\pi$
 - *≈* 31.4

Find the area of the circle. $A = \pi r^2$ $=\pi \cdot (5)^2$ $=\pi \cdot 25$ ≈78.5 Substitute 31.4 for C and 78.5 for A in $C^2 = 4\pi A$. $C^2 = 4\pi A$ $(31.4)^2 \stackrel{?}{=} 4 \cdot 3.14 \cdot 78.5$ 985.96 = 985.96Rubric 1 point for finding circumference; 1 point for finding area; 1 point for verifying the formula; 1 point for showing work 12. The area of the larger merry-go-round's platform is greater than the area of the smaller merry-go-round's platform by 150,72 m². Find the radius of the larger merry-go-round. $19 \div 2 = 9.5$ Substitute 9.5 for r in the formula for the area of a circle. $A = \pi \cdot 9.5^2$ $=\pi \cdot 90.25$ = 283.385 Find the radius of the smaller merry-go-round. $13 \div 2 = 6.5$

Substitute 6.5 for r in the formula for the area of a circle.

 $A = \pi \cdot 6.5^2$ $= \pi \cdot 42.25$ ≈ 132.665

Subtract the area of the smaller merrygo-round from the area of the larger merry-go-round.

283.385 - 132.665 = 150.72

Rubric

1 point for answer; 2 points for showing work

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13. The circle with the 96 cm diameter has a larger radius.

The circle with a 96 cm diameter has a $96 \div 2 = 48$ cm radius.

Use the formula for the circumference of a circle to find the radius of the circle that has a 295.16 cm circumference.

 $C = 2\pi r$ $295.16 = 2\pi r$ $295.16 \approx 2 \cdot 3.14 \cdot r$ $295.16 \approx 6.28 \cdot r$ $\frac{295.16}{6.28} \approx \frac{6.28r}{6.28}$ $47 \approx r$

The radius of this circle is about 47 cm.

Rubric

1 point for answer; 2 points for explanation

14. a. Sprinkler A can water an area of 1,017 square feet.

 $A = \pi r^{2}$ = $\pi (18)^{2}$ = $\pi \cdot 324$ \$\approx 1.017.36\$

- b. Sprinkler B can water an area of 113 square feet.
 - $A = \pi r^2$

$$=\pi(6)^2$$

- $=\pi$ 36
- **≈1**13.04

c. Divide the area for sprinkler A by the area for sprinkler B.

 $\frac{1,017 \text{ square feet}}{113 \text{ square feet}} = 9$

The area that sprinkler A can water is 9 times the area that sprinkler B can water.

Rubric

- a. 0.5 point for answer; 0.5 point for showing work
- b. 0.5 point for answer; 0.5 point for showing work
- c. 1 point for ratio; 1 point for interpretation
- 15. Find the radius of the stage using $C = 2\pi r$. Substitute 157 for C and 3.14 for π . $C = 2\pi r$ 157 = 2 • 3.14 • r 157 = 6.28r 157 = 0.00

 $\frac{157}{6.28} \approx \frac{6.28r}{6.28}$ $25 \approx r$

The radius of the stage is about 25 feet.

Use the formula for the area of a circle to find the area of the stage.

 $A = \pi r^{2}$ $\approx \pi (25)^{2}$ $\approx \pi \cdot 625$ $\approx 1,962.5$

Divide the area of the stage by the rate at which Katie can paint.

 $\frac{1,962.5}{400} \approx 5$

Katie can paint the stage in about 5 hours.

Rubric

1 point for answer; 3 points for appropriate explanation

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16. a. The formula for the circumference of a circle is $C = 2\pi r$.

$$C = 2\pi r$$
$$\frac{C}{2\pi} = \frac{2\pi r}{2\pi}$$
$$\frac{C}{2\pi} = r$$

b. The formula for the area of a circle A in terms of its radius r is $A = \pi r^2$.

Substitute
$$\frac{C}{2\pi}$$
 for *r*.
 $A = \pi r^2$

 $A = \pi \left(\frac{C}{2\pi} \right)$

c.

$$A = \pi \left(\frac{C}{2\pi}\right)^{2}$$
$$= \pi \left(\frac{C^{2}}{2^{2} \cdot \pi^{2}}\right)$$
$$= \frac{\pi \cdot C^{2}}{4 \cdot \pi^{2}}$$
$$= \frac{C^{2}}{4 \cdot \pi}$$
Solve for C².
$$A = \frac{C^{2}}{4\pi}$$
$$(4\pi)A = 4\pi \cdot \frac{C^{2}}{4\pi}$$

$$4\pi A = C^2$$

Rubric

a. 1 point

- b. 1 point
- c. 1 point for simplifying; 1 point for solving; 1 point for showing work

17. Raquel substituted the diameter of the circle instead of its radius for 7 in the formula. She found the area of a circle that has a 136 m diameter.

The radius of the circle is $68 \div 2 = 34$ m. Substitute 34 for *r* in the formula.

 $A = \pi r^2$ $= \pi \cdot 34^2$

= π • 1,156

≈ 3,629.84

The area of the circle is about $3,629.84 \text{ m}^2$.

Rubric

2 points for identifying error; 1 point for finding the correct area of the circle; 1 point for showing work



5 . . ***** .

5. C 6. A 7. D 8. E 9. $m \angle AFB = 72^{\circ}$; $m \angle BFC + m \angle CFD = m \angle BFD$. Substitute 31° for $m \angle CFD$ and 57° for $m \angle BFD$, and there are the form (BFC)	$p^\circ \rightarrow 22^\circ = 34^\circ$.
8. E 9. $m \angle AFB = 72^{\circ}$; $m \angle BFC + m \angle CFD = m \angle BFD$. Substitute 31° for $m \angle CFD$ and 57° for $m \angle BFD$, and there each the form (BFC)	ubric point for answer; 2 points for planation
then solve for $m \angle BFC$. $m \angle BFC + 31^\circ = 57^\circ$ $m \angle BFC + 31^\circ - 31^\circ = 57^\circ - 31^\circ$ $m \angle BFC = 26^\circ$ Similarly, $m \angle AFB + m \angle BFC = m \angle AFC$. Substitute 26° for $m \angle BFC$ and 98° for $m \angle AFC$, and then solve for $m \angle AFB$. $m \angle AFB + 26^\circ = 98^\circ$ $m \angle AFB + 26^\circ = 98^\circ - 26^\circ$ $m \angle AFB = 72^\circ$ Rubric 1 point for answer; 2 points for	$\angle AFB + m \angle BFD = 90^{\circ}$ $32^{\circ} + m \angle BFD = 90^{\circ}$ $m \angle BFD = 58^{\circ}$ $\angle BFC + m \angle CFD = 58^{\circ}$ $x + 9)^{\circ} + (2x - 8)^{\circ} = 58^{\circ}$ $x + 2x + 9 - 8 = 58$ $3x + 1 = 58$ $3x + 1 = 58 - 1$ $\frac{3x}{3} = \frac{57}{3}$ $x = 19$ $\angle CFD = (2x - 8)^{\circ} = [2(19) - 8]^{\circ} = 30^{\circ}$ ubric point for answer; 1 point for powing work

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12. a. $m \angle ABD = 132^{\circ}$. Since $\angle ABD$ and $\angle EBF$ are supplementary angles, the sum of their measures is 180°. To find $m \angle ABD$, write an equation that represents this relationship. $m\angle ABD + m\angle EBF = 180^{\circ}$ $m\angle ABD + 48^\circ = 180^\circ$ $m\angle ABD = 180^\circ - 48^\circ$ m∠ABD = 132° b. $x^{\circ} + (x + 10)^{\circ} = (x^{\circ} + x^{\circ}) + 10^{\circ} =$ $2x^{\circ} + 10^{\circ} = (2x + 10)^{\circ}$ c. 2x + 10 = 132d. 2x + 10 - 10 = 132 - 102x = 122 $\frac{2x}{2} = \frac{122}{2}$ x = 61Since x = 61, m $\angle ABC = 61^\circ$. Rubric

- a. 1 point for answer; 1 point for explanation
- b. 0.5 point for expression; 0.5 point for simplified expression
- c. 1 point
- d. 1 point for answer; 1 point for showing work
- 13. No. Since $\angle BAC$, $\angle CAD$, and $\angle DAE$ form a straight line, the sum of their angle measures is 180°. Write an equation that relates their angle measures and solve for $m \angle CAD$. $m\angle BAC + m\angle CAD + m\angle DAE = 180^{\circ}$ $53^{\circ} + m\angle CAD + 76^{\circ} = 180^{\circ}$ $m\angle CAD + 53^{\circ} + 76^{\circ} = 180^{\circ}$ $m\angle CAD + 129^{\circ} = 180^{\circ}$ $m \angle CAD = 51^{\circ}$ So, m $\angle CAD = 51^{\circ}$. $m\angle CAE \Rightarrow m\angle CAD + m\angle DAE$ $=51^{\circ}+76^{\circ}$ =127° Since $m \angle CAE = 127^\circ$, and $\angle BAF$ and $\angle CAE$ are vertical angles, $m\angle BAF = 127^{\circ}$. Since $\angle BAC$ and $\angle EAF$ are vertical angles, their measures are equal. So, m $\angle EAF = 53^\circ$. $m \angle DAF = m \angle DAE + m \angle EAF$ $\Rightarrow 76^{\circ} + 53^{\circ}$ =129° So, m∠DAF is not equal to m∠BAF. Rubric 1 point for answer; 1 point for writing

appropriate equations; 1 point for writing appropriate equations; 1 point for solving appropriate equations correctly; 2 points for a reasonable explanation

45

- 1. B
- 2. C
- 3. D
- 4. B, C, E
- 5. D
- 6. A
- 7. C
- 8. E

9. Area of rectangle:

- $A = \ell W$
- = 25 20
- ⇔ 500

The area of the rectangle is 500 m^2 .

Area of parallelogram:

A = bh

=180

The area of the parallelogram is 180 m^2 .

Area of cafeteria:

500 + 180 = 680

The area of the cafeteria is 680 m^2 .

Multiply the area of the cafeteria by the cost per square meter.

680 • 32.50 = 22,100

It will cost \$22,100 to install linoleum flooring for the whole cafeteria.

Rubric

1 point for answer; 2 points for showing work

10. a. 160 ft³; Since the base of the prism is a trapezoid, the formula for the area of the base is $B = \frac{1}{2} \cdot h(b_1 + b_2)$, where *h* is the height and b_1 and b_2 are the lengths of the bases. The height of the prism is 8 ft. The volume of a prism is the product of the base area and the height.

$$V = \left\lfloor \frac{1}{2} \cdot 5 \cdot (5+3) \right\rfloor \cdot 8$$
$$= (20) \cdot 8$$
$$= 160$$

The volume of the container is 160 ft^3 .

b. Multiply the volume, 160 ft^3 , by the cost of each cubic foot, \$1.25. 160 • 1.25 = 200

The cost of the sand is \$200.

Rubric

- a. 1 point for answer;2 points for explanation
- b. 1 point for answer;1 point for showing work

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11. Mitchell found the volume of the prism, not the surface area. Find the area of each face of the prism.

Front face:

$$A = \frac{1}{2} \cdot h \cdot (b_1 + b_2)$$

= $\frac{1}{2} \cdot 28 \cdot (33 + 25)$
= $\frac{1}{2} \cdot 28 \cdot 58$
= 812

The area of the back face, 812 cm^2 , is the same as the area of the front face.

Left face:

 $A = b \cdot h$ $= 29 \cdot 17$

= 493

The area of the left face is 493 cm^2 .

Right face:

$$A = b \cdot h$$
$$= 28 \cdot 17$$
$$= 476$$

The area of the right face is 476 cm^2 .

Top face:

 $A = b \cdot h$ $= 33 \cdot 17$ = 561

The area of the top face is 561 cm^2 .

Bottom face:

A=b • h = 25 • 17 = 425

The area of the bottom face is 425 cm^2 .

Add the areas of all of the faces.

S = 812 + 812 + 493 + 476 + 561 + 425 = 3,579

The surface area of the prism is $3,579 \text{ cm}^2$.

Rubric

1 point for identifying error; 0.5 point for finding area of each face; 1 point for total surface area 12. 7 hours; Find the area of each face of the barn that Jessie and Tim are painting.

Front rectangular face:

 $A = \ell \cdot w$ $= 10 \cdot 4$ = 40

The area of the front rectangular face, 40 m^2 , is the same as the back rectangular face.

Right rectangular face:

$$A = \ell \cdot w$$

$$\Rightarrow 14 \cdot 4$$

$$= 56$$

The area of the right rectangular face, 56 m^2 , is the same as the left rectangular face.

Front triangular face:

$$A = \frac{1}{2} \cdot b \cdot h$$
$$= \frac{1}{2} \cdot 10 \cdot 1.5$$
$$= 7.5$$

The area of the front triangular face, 7.5 m^2 , is the same as the back triangular face.

Add the areas of the faces they are painting.

S = 40 + 40 + 56 + 56 + 7.5 + 7.5 = 207

Divide the surface area they are painting, 207 m^2 , by 30 m^2 per hour to find how long it would take for them to paint the barn.

$$\frac{207}{30} = 7$$

It will take Jessie and Tim about 7 hours to paint the barn.

Rubric

1 point for finding areas of 4 rectangular regions; 1 point for finding areas of 2 triangular regions; 1 point for correct total surface area; 1 point for number of hours

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