○ **SOL G.11:** *The student will find arc lengths and areas of sectors in circles*
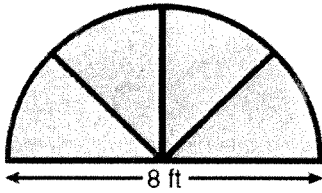**SOL G.13:** *The student will use formulas for surface area and volume of 3-D objects to solve real-world problems.*

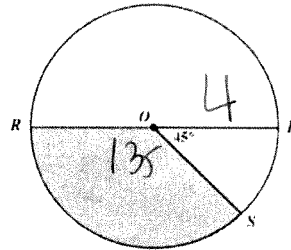**1.** This is a sketch of a stained-glass window in the shape of a semicircle.

$$\frac{\pi(4)^2}{\underset{2}{16\pi}}$$

8π

Ignoring the seams, how much glass is needed for the window?

 A 4π sq ft
 B 8π sq ft (circled)
 C 12π sq ft
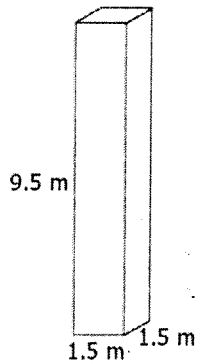 D 16π sq ft

2.

$$16\pi \cdot \frac{135}{360}$$

A circle for a game spinner is divided into 3 regions as shown. $\overline{RP}$ is a diameter. What is the area of the shaded sector *ROS* if $\overline{RP} = 8$?

 F $1.5\,\pi$
 G $6\,\pi$ (circled)
 H $24\,\pi$
 J $72\,\pi$

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3. A concrete pillar shaped as a rectangular prism is designed as follows.

Which is closest to the volume of concrete needed to fill the pillar?

 A $12.5\,m^3$
 B $14.3\,m^3$
 C $21.4\,m^3$ (circled)
 D $28.5\,m^3$

9.5 m

1.5 m 1.5 m

$(1.5)(1.5)(9.5)$

4.
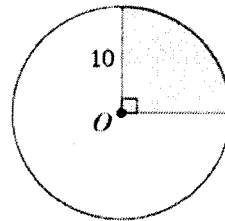
$$\pi(10)^2 \cdot \frac{90}{360}$$

$$25\pi$$

The area of the *shaded* sector of circle O is —

 F 5π
 G 20π
 H 25π (circled)
 J 50π

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5. The surface area of a plastic ball in 196π. A sponge ball has a radius twice that of the plastic ball. What is the surface area of the sponge ball?

 A $9,604\pi$
 B 993π
 C 784π (circled)
 D 546π

Sponge

Plastic

$\frac{SA}{196\pi} \frac{r}{}$ $2r$

$$196\pi = 4\pi r^2 \qquad r = 14$$
$$49 = r^2 \qquad 4\pi(14)^2$$
$$7 = r \qquad 784\pi$$

6. ABCD and DECF are both squares. If AC = 28 millimeters, what is the perimeter of DECF?

 F   14 mm
 G   28 mm
 H   42 mm
 J   56 mm (circled)

$14 \cdot 4 = 56$

$14\sqrt{2}$
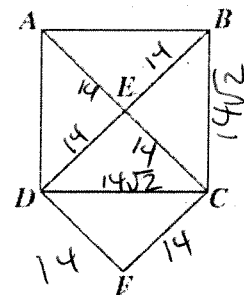
7. What is the volume in cubic feet of a refrigerator whose interior is 4.5 feet tall, 2.5 feet wide, and 2 feet deep?

F 15 cu ft
G 19 cu ft
H 22.5 cu ft
J 25 cu ft

$(4.5)(2.5)(2)$

22.5

8. A right triangular pyramid has a height of 10 inches and a base area of 41.57 square inches. What is the volume, in cubic inches, of the pyramid?
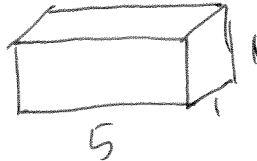
F 138.56
G 207.85
H 277.13
J 415.69

$V = \frac{1}{3} B \cdot h$

$10 \mid \frac{1}{3}(41.57)(10)$

138.56

9. What is the total surface area of a rectangular prism box that measures 5 feet by 1 foot by 1 foot?

A 5 sq ft
B 20 sq ft
C 22 sq ft
D 30 sq ft

$2(5)(1) + 2(5)(1) + 2(1)(1)$

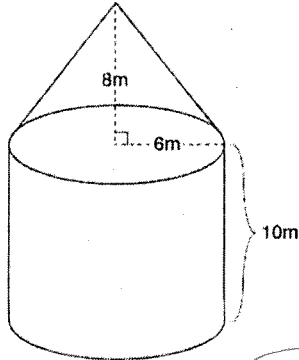**10.** Which is closest to the volume of a sphere with a radius equal to 8 centimeters?

F 267.9 cm³
G 803.8 cm³
H 1,607.7 cm³
J 2,143.6 cm³

$\frac{4}{3}\pi(8)^3$

2143.57

2144.66

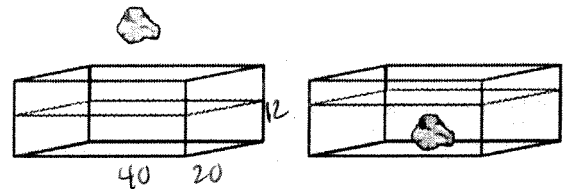**11.**

$V = \frac{1}{3}\pi(6^2)(8)$
$+ \pi(6^2)(10)$

301.59

34560

Rounded to the nearest hundred cubic meters, what is the total capacity (cone and cylinder) of the storage container?

A 1,400
B 2,000
C 5,700
D 8,100

1432.566

12.

40   20

The water level in a rectangular prism tank 40 centimeters by 20 centimeters is 12 centimeters high. A rock submerged in the tank raises the water level 0.4 centimeters. What is the volume of the rock?

A 320 cm³
B 960 cm³
C 2,000 cm³
D 9,920 cm³
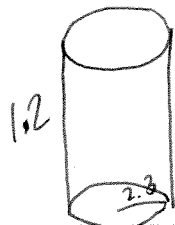
$9920 - 9600$

$40 \cdot 20 \cdot 12$
$9600 = container$

$40 \cdot 20 \cdot 12.4 \quad 9920$

13. A cylindrical water container is 1.2 meters high and has a diameter of 4.6 meters. Approximately how many cubic meters of water will the container hold when it is *half full?*
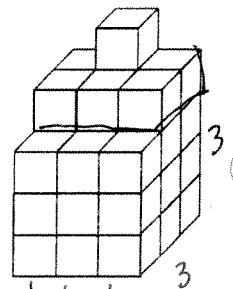
A 4.33
B 9.97
C 29.93
D 39.87

$V =$

$\frac{\pi(2.3)^2 \cdot 1.2}{2}$

9.97

$d = 4.6$

14. Assuming the solid is constructed from cubes measuring one unit on each edge and that the figure is completely solid, what is the volume of the cubic solid shown?

F 12 cubic units
G 34 cubic units
H 59 cubic units
J 68 cubic units

$3 \times 3 \times 3 + 3 \times 2 \times 1 + 1 \times 1 \times 1$

15. A machine for baling hay produces cylindrical bales that are 6 feet in diameter and $5\frac{1}{3}$ feet in height.
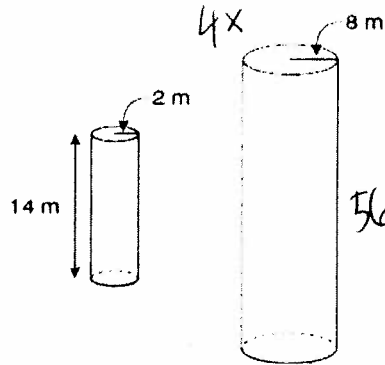
r = 3
V

Which is closest to the number of (cubic) feet in each bale of hay the machine produces?

A 100
B 151
C 301
D 603

$\pi(3^2)(\frac{16}{3})$
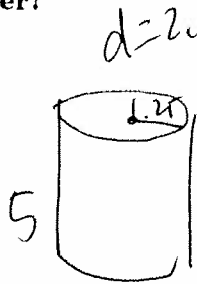
150.79

16. The cylinders shown are similar.

4X
8 m
2 m
14 m
56

$\pi(8^2)(56)$

What is the volume of the larger cylinder?

A 56π m³
B 224π m³
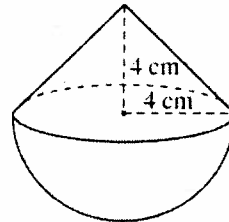C 896π m³
D $3,584\pi$ m³

17. What is the approximate volume of a can that is 5 inches tall and has a 2.5 inch diameter?

F 19.6 cu in.
G 24.5 cu in.
H 39.3 cu in.
J 98.1 cu in.

d = 2.5
1.25
5

$\pi(1.25^2)(5)$

24.54

**18.** The figure shows a right circular cone on top of a hemisphere with the same radius.

4 cm
4 cm

$V = \frac{1}{3}\pi(4^2)(4) + \frac{1}{2}\frac{4}{3}\pi(4^3)$

201.06

To the nearest whole number, what is the volume of this solid?

A 201 cm³
B 256 cm³
C 278 cm³
D 309 cm³

19. What is the volume of a right square pyramid with a height of 3 centimeters and a base that measures 8 centimeters by 8 centimeters?
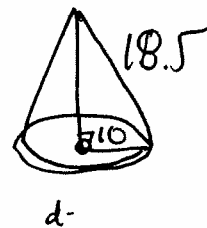
F 64 cm³
G 72 cm³
H 144 cm³
J 225 cm³

8 *8*
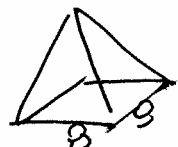
$\frac{1}{3}B \cdot h$
$\frac{1}{3}(64)(3)$

20. A tepee in the shape of a right cone has a slant height of 18.5 feet and a diameter of 20 feet. Approximately how much canvas would be needed to cover the tepee?
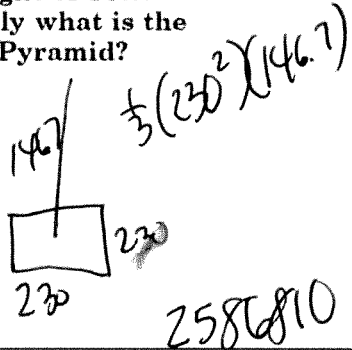
F 581 sq ft
G 116 sq ft
H 89 sq ft
J 58 sq ft

18.5
10
d -

$LA = \pi r l$
$\pi(10)(18.5)$

581.19

21. The Great Pyramid at Giza has a square base with sides of length 230 meters and a height of 146.7 meters. Approximately what is the volume of the Great Pyramid?

A 1,650,000 m³
B 2,590,000 m³
C 4,950,000 m³
D 7,760,000 m³

$$\tfrac{1}{3}(230^2)(146.7)$$
$$2586810$$

22. The distance between the points

$$(^-2, ^-4) \text{ and } (3, 8) \text{ is —}$$

A $\sqrt{17}$
B 13
C 17
D 169

$$\sqrt{5^2 + 12^2}$$
$$\sqrt{25 + 144}$$
$$\sqrt{169}$$

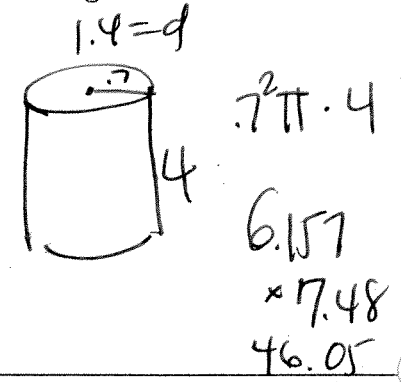**23.** A spherical paintball measures 1.5 centimeters in diameter. Approximately how much paint is in it?

A 1.77 cm³
B 7.07 cm³
C 9.42 cm³
D 14.13 cm³

$$r = .75$$
$$V = \tfrac{4}{3}\pi(.75)^3$$
$$1.767$$

24. To the nearest gallon, what is the volume of a cylindrical water heater 1.4 feet in diameter and 4 feet tall? (1 cubic foot = 7.48 gallons)

F 34 gal
G 46 gal
H 59 gal
J 132 gal

$$1.4 = d$$
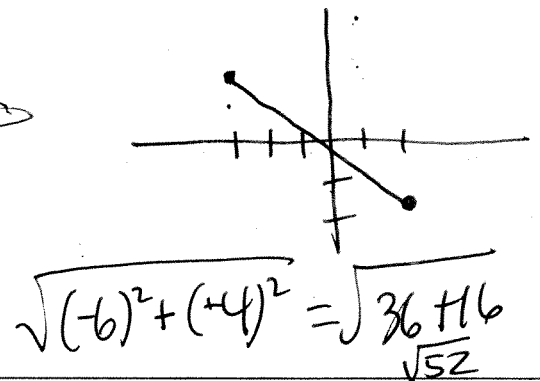$$.7^2\pi \cdot 4$$
$$6.157$$
$$\times 7.48$$
$$46.05$$

#5

25. The surface area of a plastic ball is 196π. A sponge ball has a radius twice that of the plastic ball. What is the surface area of the sponge ball?

A. 9,604π
B. 993π
C. 784π
D. 546π

$$4\pi r^2 = 196\sqrt{}$$

26. The diameter of a circle has endpoints (-3,2) and (3,-2). Which is closest to the length of the diameter of the circle?

F. 1.4
G. 3.2
H. 7.2
J. 10.0

$$\sqrt{(-6)^2 + (-4)^2} = \sqrt{36 + 16}$$
$$\sqrt{52}$$

27. A line segment has an endpoint at (3, 2). If the midpoint of the line segment is (6, ⁻2), what are the coordinates of the point at the other end of the line segment?

F (4.5, 0)
G (0, 6)
H (9, 4)
J (9, ⁻6)

$$\frac{x+3}{2} = 6 \qquad \frac{y+2}{2} = -2 \qquad (9, -6)$$
$$x + 3 = 12 \qquad y + 2 = -4$$
$$x = 9 \qquad y = -6$$