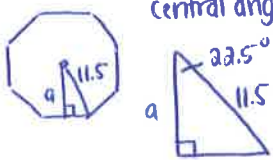


1. A regular octagon has a radius of 11.5 inches. What is the length of its apothem? Round your answer to the nearest tenth.

central angle =  $360 \div 8 = 45^\circ$

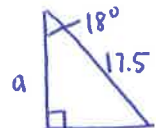


$$\frac{\cos 22.5}{1} = \frac{a}{11.5}$$

$$a = 11.5 \cos 22.5 \Rightarrow \boxed{a \approx 10.6 \text{ in}}$$

2. A regular decagon has a diameter of 35 meters. What is the length of its apothem? Round your answer to the nearest tenth.  $\hookrightarrow$  radius = 17.5 m

central angle =  $360 \div 10 = 36^\circ$

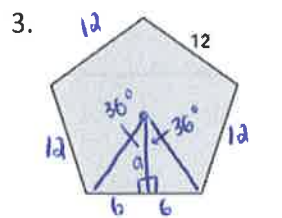
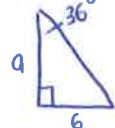


$$\frac{\cos 18}{1} = \frac{a}{17.5}$$

$$a = 17.5 \cos 18 \Rightarrow \boxed{a = 16.6 \text{ m}}$$

Find the perimeter and area of the regular polygon. Round answers to the nearest tenth, if necessary.

central angle =  $360 \div 5 = 72^\circ$

$$\tan 36 = \frac{6}{a}$$

$$a = \frac{6}{\tan 36}$$

$$a = 8.3$$

$$A = \frac{1}{2} a P$$

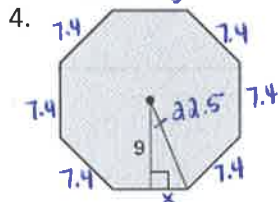
$$A = \frac{1}{2} (8.3)(5 \times 12)$$

$$A = \frac{1}{2} (8.3)(60)$$

$$\boxed{A = 249 \text{ units}^2}$$

$$\boxed{P = 60 \text{ units}}$$

central angle =  $360 \div 8 = 45^\circ$



$$\tan 22.5 = \frac{x}{9}$$

$$x = 9 \tan 22.5$$

$$x = 3.7$$

$$\text{Each side} = 2 \times 3.7 = 7.4$$

$$\boxed{P = 59.2 \text{ units}}$$

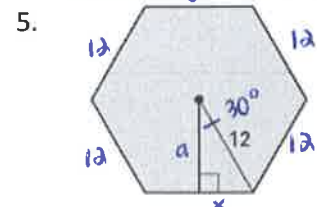
$$A = \frac{1}{2} a P$$

$$A = \frac{1}{2} (9)(7.4 \times 8)$$

$$A = \frac{1}{2} (9)(59.2)$$

$$\boxed{A = 266.4 \text{ units}^2}$$

central angle =  $360 \div 6 = 60^\circ$



$$\frac{\cos 30}{1} = \frac{a}{12}$$

$$a = 12 \cos 30$$

$$a = 10.4$$

$$\frac{\sin 30}{1} = \frac{x}{12}$$

$$x = 12 \sin 30$$

$$x = 6$$

$$\text{Each side} = 6 \times 2 = 12$$

$$A = \frac{1}{2} a P$$

$$A = \frac{1}{2} (10.4)(12 \times 6)$$

$$A = \frac{1}{2} (10.4)(72)$$

$$\boxed{A = 374.4 \text{ units}^2}$$

$$\boxed{P = 72 \text{ units}}$$

Decide whether the statement is *always*, *sometimes*, or *never* true.

6. If the number of sides of a regular polygon is  $n$ , then the measure of the central angle is  $360^\circ \div n$ .

$\boxed{\text{True} \rightarrow \text{always}}$

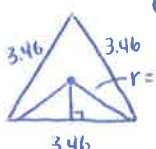
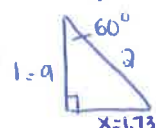
7. The radius of a regular polygon is greater than the apothem.

$\boxed{\text{True} \rightarrow \text{always}}$

8. The area of a regular hexagon of radius  $r$  is six times greater than the area of a regular triangle of radius  $r$ .

$\boxed{\text{False}}$

central angle =  $360 \div 3 = 120^\circ$

$$\frac{\cos 60}{1} = \frac{a}{r}$$

$$a = r \cos 60$$

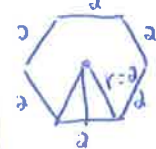
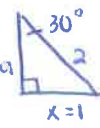
$$a = 1$$

$$\frac{\sin 60}{1} = \frac{x}{r}$$

$$x = r \sin 60$$

$$x = 1.73$$

Hexagon: central angle =  $360 \div 6 = 60^\circ$

$$\frac{\cos 30}{1} = \frac{a}{r}$$

$$a = r \cos 30$$

$$a = 1.7$$

$$\frac{\sin 30}{1} = \frac{x}{r}$$

$$x = r \sin 30$$

$$x = 1$$

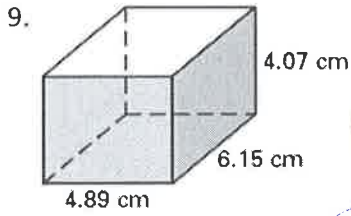
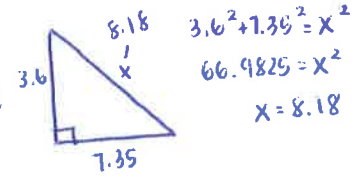
$$A = \frac{1}{2} a P$$

$$= \frac{1}{2} (1.7)(12)$$

$$\boxed{A = 10.2}$$

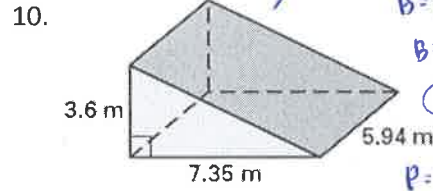
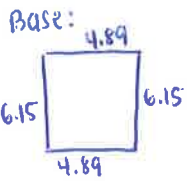
$A = \frac{1}{2} (1)(3.46)$   
 $A = 5.19$

Find the surface area of the right prism. Round your answer to two decimal places.



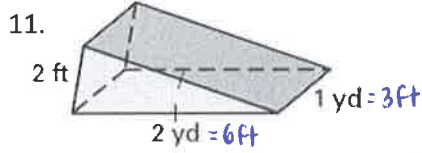
$B = bh$   
 $B = (4.89)(6.15)$   
 $B = 30.0735$   
 $P = 6.15 + 6.15 + 4.89 + 4.89$   
 $P = 22.08$   
 $h = 4.07$

$SA = 2B + Ph$   
 $= 2(30.0735) + 22.08(4.07) = 150.01 \text{ cm}^2$

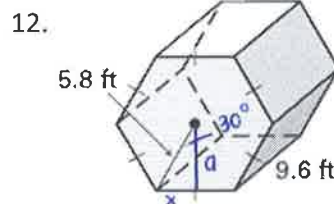
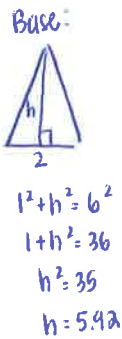


$B = \frac{1}{2}bh$   
 $B = \frac{1}{2}(7.35)(3.6)$   
 $B = 13.23$   
 $P = 3.6 + 7.35 + 8.18$   
 $P = 19.13$   
 $h = 5.94$

$SA = 2B + Ph$   
 $= 2(13.23) + 19.13(5.94)$   
 $SA = 140.09 \text{ m}^2$



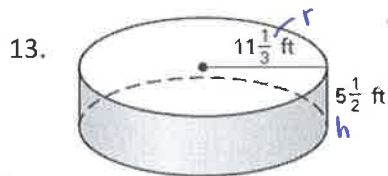
$B = \frac{1}{2}bh$   
 $B = \frac{1}{2}(a)(5.92)$   
 $B = 5.92$   
 $P = 2 + 6 + 6$   
 $P = 14$   
 $h = 3$   
 $SA = 2B + Ph$   
 $= 2(5.92) + 14(3)$   
 $= 11.84 + 42$   
 $SA = 53.84 \text{ ft}^2$



central angle =  $60^\circ$   
 $\cos 30 = \frac{a}{5.8}$   
 $a = 5.8 \cos 30$   
 $a = 5.02$   
 $\sin 30 = \frac{x}{5.8}$   
 $x = 5.8 \sin 30$   
 $x = 2.9 \Rightarrow$  Each side = 5.8

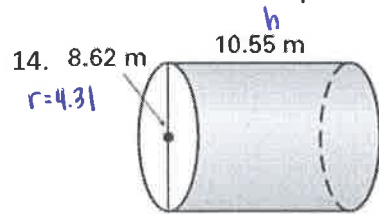
$B = \frac{1}{2}aP$   
 $B = \frac{1}{2}(5.02)(5.8 \times 6)$   
 $B = \frac{1}{2}(5.02)(34.8)$   
 $B = 87.348$   
 $P = 5.8 \times 6$   
 $P = 34.8$   
 $h = 9.6$   
 $SA = 2B + Ph$   
 $= 2(87.348) + 34.8(9.6)$   
 $SA = 508.78 \text{ ft}^2$

Find the surface area of the right cylinder. Round your answer to two decimal places.



$SA = 2\pi r^2 + 2\pi rh$   
 $= 2\pi(11.3333)^2 + 2\pi(11.3333)(5.5)$   
 $= 806.6264 + 391.4522$

$SA = 1198.08 \text{ ft}^2$

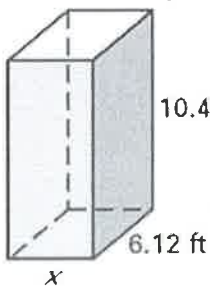


$SA = 2\pi r^2 + 2\pi rh$   
 $= 2\pi(4.31)^2 + 2\pi(4.31)(10.55)$   
 $= 2\pi(18.5761) + 2\pi(4.31)(10.55)$   
 $= 116.66 + 285.55$

$SA = 402.21 \text{ m}^2$

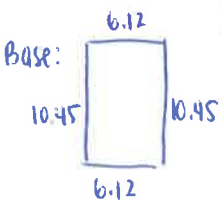
Solve for x given the surface area S of the right prism or cylinder. Round your answer to two decimal places.

15.  $S = 274.39 \text{ ft}^2$

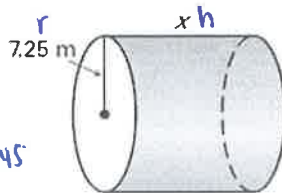


$B = bh$   
 $B = (6.12)(10.45)$   
 $B = 63.954$   
 $P = 6.12 + 6.12 + 10.45 + 10.45$   
 $P = 33.14$   
 $h = x$

$SA = 2B + Ph$   
 $274.39 = 2(63.954) + 33.14x$   
 $274.39 = 127.908 + 33.14x$   
 $146.482 = 33.14x \Rightarrow x = 4.42 \text{ ft}$



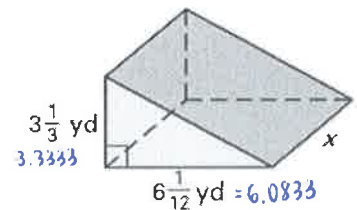
16.  $S = 958.89 \text{ m}^2$



$SA = 2\pi r^2 + 2\pi rh$   
 $958.89 = 2\pi(7.25)^2 + 2\pi(7.25)x$   
 $958.89 = 330.0925 + 45.53x$   
 $628.7975 = 45.53x$

$x = 13.81 \text{ m}$

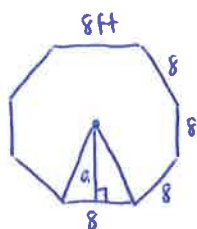
17.  $S = 114.33 \text{ yd}^2$



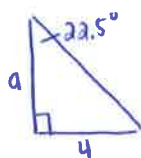
work on back page

↑ including h

18. Find the surface area of a right octagonal prism with all edges measuring 8 feet. Round your answers to two decimal places.



central angle =  $360 \div 8 = 45^\circ$



$$\frac{\tan 22.5}{1} = \frac{4}{a}$$

$$a = \frac{4}{\tan 22.5}$$

$a = 9.66$

$B = \frac{1}{2} a P$

$B = \frac{1}{2} (9.66) (8 \times 8)$

$B = \frac{1}{2} (9.66) (64)$

$B = 309.12$

$P = 8 \times 8$

$P = 64$

$h = 8$

$SA = 2B + Ph$

$SA = 2(309.12) + 64(8)$

$SA = 618.24 + 512$

$SA = 1130.24 \text{ ft}^2$

19. The surface area of a cylinder is  $1000\pi$  square centimeters. The radius of the cylinder is four times the height. What is the height of the cylinder?

$SA = 1000\pi$

$r = 4x$

$h = x$

$SA = 2\pi r^2 + 2\pi r h$

$1000\pi = 2\pi (4x)^2 + 2\pi (4x)(x)$

$1000\pi = 2\pi (16x^2) + 2\pi (4x^2)$

$1000\pi = 32x^2\pi + 8x^2\pi$

$\frac{1000\pi}{\pi} = \frac{\pi(32x^2 + 8x^2)}{\pi} \leftarrow \text{Factor out a common } \pi$

$1000 = 40x^2 \Rightarrow 25 = x^2$   
 $x = 5$

height of cylinder = x

$= 5 \text{ cm}$

Answer Key

1. 10.6 in. ✓
2. 16.6 m ✓
3. 60 units; 247.8 square units ✓
4. 59.7 units; 268.4 square units ✓
5. 72 units; 374.1 square units ✓
6. Always ✓
7. Always ✓
8. Never ✓
9. 150.01 cm<sup>2</sup> ✓
10. 140.12 m<sup>2</sup> ✓
11. 53.84 ft<sup>2</sup> or 5.98 yd<sup>2</sup> ✓
12. 508.88 ft<sup>2</sup> ✓
13. 1198.69 ft<sup>2</sup> ✓
14. 402.42 m<sup>2</sup> ✓
15. 4.42 ft ✓
16. 13.8 m ✓
17. 5.75 yd ✓
18. 1130.24 ft<sup>2</sup> ✓
19. 5 cm ✓

WORK for #17:

$B = \frac{1}{2} b h$

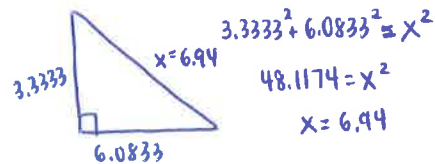
$B = \frac{1}{2} (6.0833)(3.3333)$

$B = 10.1387$

$P = 3.3333 + 6.0833 + 6.94$

$P = 16.3566$

$h = x$



$SA = 2B + Ph$

$114.33 = 2(10.1387) + 16.3566 x$

$114.33 = 20.2774 + 16.3566 x$

$94.0526 = 16.3566 x$

$x = 5.75 \text{ yd}$