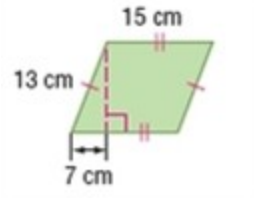
Practice Test - Chapter 11

Find the area and perimeter of each figure. Round to the nearest tenth if necessary.

1. 

SOLUTION:

Use the Pythagorean Theorem to find the height *h*, of the parallelogram.

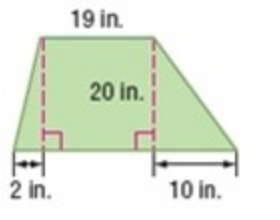
$$a^2 + b^2 = c^2$$
$$7^2 + h^2 = 13^2$$
$$h^2 = 13^2 - 7^2$$
$$h^2 = 169 - 49$$
$$h = \sqrt{120}$$
$$h \approx 11.0$$

$$A = bh$$
$$= 15\sqrt{120}$$
$$\approx 164.3$$

Each pair of opposite sides of a parallelogram is congruent to each other. So the perimeter is 2(13 + 15) = 56.

ANSWER:

P = 56 cm, $A = 164.3\ cm^2$

2. 

SOLUTION:

Use the Pythagorean Theorem to find the lengths of sides.

left side:

$$a^2 + b^2 = c^2$$
$$2^2 + 20^2 = c^2$$
$$4 + 400 = c^2$$
$$\sqrt{404} = c$$
$$20.10 \approx c$$

right side:

$$a^2 + b^2 = c^2$$
$$10^2 + 20^2 = c^2$$
$$100 + 400 = c^2$$
$$\sqrt{500} = c$$
$$22.36 \approx c$$

Find the perimeter and area.

$$P = 19 + 31 + \sqrt{500} + \sqrt{404}$$
$$\approx 92.5$$
$$A = \tfrac{1}{2}(b_1 + b_2)h$$
$$= \tfrac{1}{2}(19 + 31)(20)$$
$$= 25(20)$$
$$= 500$$

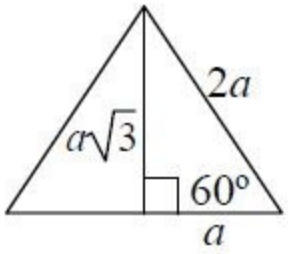
ANSWER:

P = 92.5 in., A = 500 in.^{2}

3. 

SOLUTION:

Draw a perpendicular to bisect the base. Use the 30-60-90 triangle to find the height.

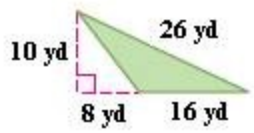


$$A = \frac{1}{2}bh$$
$$= \frac{1}{2}\left(a\sqrt{3}\right)(2a)$$
$$= a^2\sqrt{3}$$

The perimeter is $3(2a) = 6a$ mm.

ANSWER:

$P = 6a$ mm, $A = a^2\sqrt{3}$ mm^2



4.

SOLUTION:

$$A = \frac{1}{2}bh$$
$$= \frac{1}{2}(16)(10)$$
$$= 80$$

So, the area of the figure is 80 yd^2.

Use the Pythagorean Theorem to find the length of the third side of the triangle.

$$a^2 + b^2 = c^2$$
$$10^2 + 8^2 = c^2$$
$$100 + 64 = c^2$$
$$\sqrt{164} = c$$
$$12.8 \approx c$$

The perimeter is about 26 + 16 + 12.8 = 54.8 yd.

ANSWER:

P = 54.8 yd, A = 80 yd^2

5. **ARCHAELOGY** The tile pattern shown was used in Pompeii for paving. If the diagonals of each rhombus are 2 and 3 inches, what area makes up each "cube" in the pattern?

SOLUTION:

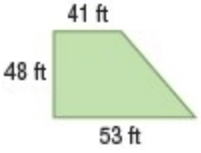
There are 3 rhombi in each "cube" in the pattern. So, the total area is three times the area of each rhombus.

$$\begin{aligned} A &= 3\left[\tfrac{1}{2}d_1d_2\right] \\ &= 3\left[\tfrac{1}{2}(2)(3)\right] \\ &= 9 \end{aligned}$$

ANSWER:

9 in^2

Find the area of each figure. Round to the nearest tenth if necessary.

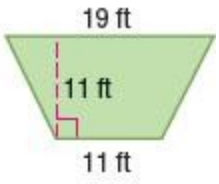
6. 

SOLUTION:

$$\begin{aligned} A &= \tfrac{1}{2}(b_1+b_2)h \\ &= \tfrac{1}{2}(41+53)(48) \\ &= 2256 \end{aligned}$$

ANSWER:

2256 ft^2

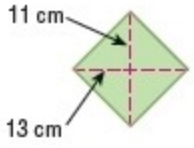
7. 

SOLUTION:

$$\begin{aligned} A &= \tfrac{1}{2}(b_1 + b_2)h \\ &= \tfrac{1}{2}(11+19)(11) \\ &= 165 \end{aligned}$$

ANSWER:

165 ft^2

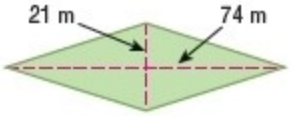
8. 

SOLUTION:

$$\begin{aligned} A &= \tfrac{1}{2}d_1d_2 \\ &= \tfrac{1}{2}(22)(26) \\ &= 286 \end{aligned}$$

ANSWER:

286 cm^2

9. 

SOLUTION:

$$\begin{aligned} A &= \tfrac{1}{2}d_1d_2 \\ &= \tfrac{1}{2}(42)(148) \\ &= 3108 \end{aligned}$$

ANSWER:

3108 m^2

10. **GEMOLOGY** A gem is cut in a kite shape. It is 6.2 millimeters wide at its widest point and 5 millimeters long. What is the area?

SOLUTION:

$$A = \frac{1}{2}d_1d_2$$
$$= \frac{1}{2}(5)(6.2)$$
$$= 15.5$$

ANSWER:

15.5 mm^2

11. **ALGEBRA** The area of a triangle is 16 square units. The base of the triangle is $x + 4$ and the height is x. Find x.

SOLUTION:

The area A of a triangle is one half the product of a base b and its corresponding height h.

$A = 16$, $b = x + 4$, and $h = x$

$$\text{area} = \frac{1}{2} \cdot bh$$
$$16 = \frac{1}{2} \cdot (x+4)(x)$$
$$16 = \frac{1}{2} \cdot \left(x^2 + 4x\right)$$
$$32 = x^2 + 4x$$
$$0 = x^2 + 4x - 32$$
$$0 = (x+8)(x-4)$$

$x = 4$ or -8

Since length cannot be negative, $x = 4$.

ANSWER:

4

12. **ASTRONOMY** A large planetarium in the shape of a dome is being built. When it is complete, the base of the dome will have a circumference of 870 meters. How many square meters of land were required for this planetarium?

SOLUTION:

The area required for the dome is equal to the area of the circular base of the dome. To find the area, first find determine the radius from the circumference.

$$C = 2\pi r$$
$$r = \frac{C}{2\pi}$$
$$r = \frac{87}{2\pi}$$

$$A = \pi r^2$$
$$= \pi\left(\frac{870}{2\pi}\right)^2$$
$$\approx 60,232$$

Therefore, about 60,232 m^2 of land was required for the planetarium.

ANSWER:

60,232 m^2

Find the area of each circle or sector. Round to the nearest tenth.

13. 

SOLUTION:

$$A = \pi r^2$$
$$= \pi(6)^2$$
$$= 36\pi$$
$$\approx 113.1$$

ANSWER:

113.1 cm^2

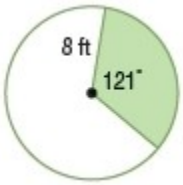
14. 

SOLUTION:

$$\begin{aligned} A &= \pi r^2 \\ &= \pi(111)^2 \\ &= 12,321\pi \\ &\approx 38,707.6 \end{aligned}$$

ANSWER:

38, 707.6 m^2

15. 

SOLUTION:

$$\begin{aligned} A &= \frac{x}{360} \cdot \pi r^2 \\ &= \frac{121}{360}\pi(8)^2 \\ &= \frac{121}{360}\pi(64) \\ &\approx 67.6 \end{aligned}$$

ANSWER:

67.6 ft^2

16.

SOLUTION:

$$A = \frac{x}{360} \cdot \pi r^2$$
$$= \frac{32}{360}\pi(3)^2$$
$$= \frac{4}{45}\pi(9)$$
$$\approx 2.5$$

ANSWER:

2.5 cm^2

17. **MURALS** An artisan is creating a circular street mural for an art festival. The mural is going to be 50 feet wide.
a. Find the area of the mural to the nearest square foot.
b. One sector of the mural spans 38°. What is the area of this sector to the nearest square foot?

SOLUTION:

a. The diameter of the mural is 50 ft.

$$\begin{aligned} A &= \pi r^2 \\ &= \pi\left(\frac{d}{2}\right)^2 \\ &= \pi\left(\frac{50}{2}\right)^2 \\ &= \pi \cdot 25^2 \\ &= 625\pi \\ &= 1963 \end{aligned}$$

The area of the mural is 1963 ft.^{2}

b. The ratio of the area A of a sector to the area of the whole circle is equal to the ratio of the degree measure of the intercepted arc to 360.

$$\begin{aligned} A &= \frac{38}{360} \cdot \pi r^2 \\ &= \frac{19}{180}\pi(25)^2 \\ &= 207 \end{aligned}$$

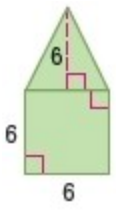
The area of the sector is 207 ft.^{2}

ANSWER:

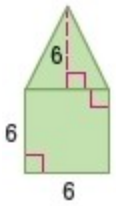
a. 1963 ft^2
b. 207 ft^2

Find the perimeter and the area of each figure. Round to the nearest tenth if necessary.

18.



SOLUTION:



The total area is the sum of the areas of the triangle and the square.

The base and height of the triangle is 6. The area of the triangle is

$$A = \frac{1}{2}bh$$
$$= \frac{1}{2}(6)(6)$$
$$= 18$$

The area of the square is

$$A = lw$$
$$= 6 \cdot 6$$
$$= 36$$

The total area is therefore 18 + 36 = 54.

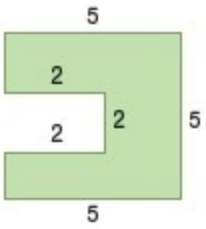
Use the Pythagorean Theorem to find the length of the diagonals of the triangle.

$$c^2 = a^2 + b^2$$
$$c^2 = 3^2 + 6^2$$
$$c = \sqrt{3^2 + 6^2}$$
$$c = \sqrt{45}$$
$$c \approx 6.7$$

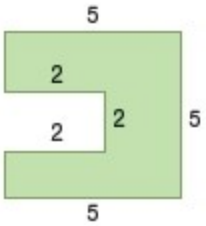
Therefore, the perimeter of the figure is about 3(6) + 2(6.7) = 31.4.

ANSWER:

31.4; 54

19. 

SOLUTION:



The area of the figure is the difference between the areas of the large square with sides of 5, and the small square with sides of 2.

$$\begin{aligned} A &= A_{\text{large}} - A_{\text{small}} \\ &= 5^2 - 2^2 \\ &= 25 - 4 \\ &= 21 \end{aligned}$$

The perimeter of the figure is the sum of the lengths of the sides.

$$\begin{aligned} P &= 5 + 5 + 5 + 2 + 2 + 2 + (5 - 2) \\ &= 24 \end{aligned}$$

ANSWER:

24; 21

20. **BAKING** Todd wants to make a cheesecake for a birthday party. The recipe calls for a 9-inch diameter round pan. Todd only has square pans. He has an 8-inch square pan, a 9-inch square pan, and a 10-inch square pan. Which pan comes closest in area to the one that the recipe suggests?

SOLUTION:

The area of a square of side *s* units is s^2 square units and that of a circle of radius *r* is given by the formula $A = \pi r^2$ sq.units.

The area of the round pan is $\pi(4.5)^2 \approx 63.6 \text{ in}^2$. Therefore, the 8-inch square pan whose area is 64 sq. in. will be the closest to the round pan in area.

ANSWER:

8 in.