Area of a Parallelogram \( A = bh \)
Area of a Trapezoid \( A = \frac{1}{2} h(b_1 + b_2) \)
Area of Rhombus/Kite \( A = \frac{1}{2} d_1 d_2 \)
Area of a Triangle \( A = \frac{1}{2} bh \)
Area of a Circle \( A = \pi r^2 \)

\[
\text{area of sector} = \frac{\text{central angle}}{360}\]

Find the perimeter and area of each parallelogram or triangle. Round to the nearest tenth if necessary.

1. \[
\begin{align*}
10^2 + 12^2 &= b^2 \\
100 + 144 &= b^2 \\
244 &= b^2 \\
15.6 &= b \\
P &= 18 + 15.6 + 30.5 = 64.1 \text{ mm} \\
A &= \frac{1}{2}(18)(12) \\
A &= 108 \text{ mm}^2
\end{align*}
\]

2. \[
\begin{align*}
38^2 + 12^2 &= c^2 \\
1444 + 144 &= c^2 \\
1588 &= c^2 \\
39.8 &= c
\end{align*}
\]

\[
\begin{align*}
P &= 17 + 17 + 24 \\
P &= 58 \text{ in}
\end{align*}
\]

3. The height of a parallelogram is 10 feet more than its base. If the area of the parallelogram is 1200 square feet, find its base and height.
\[
\begin{align*}
10 + b &= \text{base} \text{ } 10 + b &= \text{height} \\
1200 &= \frac{1}{2}(10 + b)(b) \\
1200 &= 10b + b^2 \\
0 &= b^2 + 10b - 1200 \\
0 &= (b + 40)(b - 30) \\
b &= -40, \quad b &= 30
\end{align*}
\]

\[
\begin{align*}
\text{base} &= 30 \text{ ft} \\
\text{height} &= 40 \text{ ft}
\end{align*}
\]

4. The base of a triangle is one half of its height. If the area of the triangle is 196 square millimeters, find its base and height.
\[
\begin{align*}
\text{height} &= 28 \text{ mm} \\
\frac{1}{2} \text{h} &= \text{base} \\
196 &= \frac{1}{2} \left( \frac{1}{2} h \right) (h) \\
196 &= \frac{1}{4} h^2 \\
784 &= h^2 \\
28 &= h
\end{align*}
\]

\[
\begin{align*}
\text{base} &= \frac{1}{2}(28) = 14 \text{ mm}
\end{align*}
\]

Find the area of each trapezoid, rhombus, or kite.

5. \[
\begin{align*}
A &= \frac{1}{2} (10 + 15) \\
A &= 105 \text{ m}^2
\end{align*}
\]

6. \[
\begin{align*}
A &= \frac{1}{2} (4)(12) \\
A &= 24 \text{ mm}^2
\end{align*}
\]

7. One diagonal of a kite is four times as long as the other diagonal. If the area of the kite is 72 square meters, what are the lengths of the diagonals?
\[
\begin{align*}
d &= \text{diagonal 1} \\
4d &= \text{diagonal 2} \\
72 &= \frac{1}{2} (d)(4d) \\
72 &= 2d^2 \\
36 &= d^2 \\
6 &= d
\end{align*}
\]

The diagonals are 6 m and 24 m.
8. A trapezoid has a height of 24 meters, a base of 4 meters, and an area of 264 square meters. What is the length of the other base?

\[ \text{base is 18 meters} \]

9. Find the diameter of a circle with an area of 1134.1 square millimeters.

\[ \text{diameter is 36 mm} \]

10. **GAMES** Jason wants to make a spinner for a new board game he invented. The spinner is a circle divided into 8 congruent pieces, what is the area of each piece to the nearest tenth?

\[ r = \frac{1}{2} d \]
\[ r = \frac{1}{2} (16) \]
\[ r = 8 \text{ cm} \]

\[ \frac{45}{360} = \frac{x}{4\pi r^2} \]
\[ \frac{45}{360} = \frac{x}{64\pi} \]
\[ 25.1 = x \]

Find the area of each regular polygon. Round to the nearest tenth.

11. \[ A = \frac{1}{2} bh \]
\[ A = \frac{1}{2} (8)(4\sqrt{3}) \]
\[ A = 16\sqrt{3} \text{ m}^2 \approx 27.7 \text{ m}^2 \]

12. \[ A = \frac{1}{2} aP \]
\[ A = \frac{1}{2} (8.1)(8.1) \]
\[ A = 33.85 \approx 33.9 \text{ cm}^2 \]

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

13. \[ A = \frac{1}{2} h(b_1 + b_2) \]
\[ A = \frac{1}{2} (12)(15) + 5(12) \approx A \]
\[ A = 150 + 60 \approx A \]
\[ A = 210 \text{ m}^2 \]

14. \[ A = 2 \left[ \frac{1}{2} h(b_1 + b_2) \right] \]
\[ A = 2 \left[ \frac{1}{2} (32)(20+40) \right] \]
\[ A = 1920 \text{ m}^2 \]
15. Find the area of the shaded figure.

\[ A = 200 \text{ in}^2 \]

Scale factor for area: \[ \frac{20}{\frac{3}{2}} = \frac{9}{4} \]

16. Find \( x \)

\[ A = 4590 \text{ m}^2 \]

Scale factor for area: \[ \frac{510}{4590} = \frac{1}{9} \]

Scale factor for length: \[ \sqrt{\frac{1}{9}} = \frac{1}{3} \]

\[ \frac{1}{3} = \frac{x}{21} \]

\[ 3x = 21 \]

\[ x = 7 \text{ m} \]

17. SCIENCE PROJECT Matt has two posters for his science project. Each poster is a rectangle. The length of the larger poster is 11 inches. The length of the smaller poster is 6 inches. What is the area of the smaller poster if the larger poster is 93.5 square inches?

\[ A = 93.5 \text{ in}^2 \]

18. If the length of a side of a rectangle is doubled, what happens to its area?

Area is multiplied by \( 2^2 = 4 \)

19. If the scale factor between the area of two similar figures is 9, what is the scale factor of their bases?

Scale factor of the bases is \( 1 \sqrt{9} = 3 \)