1. **PERIMETER, CIRCUMFERENCE, AND AREA FORMULAS**

Formulas for the perimeter $P$, area $A$, and circumference $C$ of some common plane figures are given below.

**Square**
- side length $s$
- \[ P = 4s \]
- \[ A = s^2 \]

**Rectangle**
- length $l$ and width $w$
- \[ P = 2(l + w) \]
- \[ A = lw \]

**Triangle**
- side lengths $a$, $b$, and $c$, base $b$, and height $h$
- \[ P = a + b + c \]
- \[ A = \frac{1}{2}bh \]

**Circle**
- radius $r$
- \[ C = \pi d \]
- \[ A = \pi r^2 \]

Pi ($\pi$) is the ratio of the circle's circumference to its diameter.

* In terms of $\pi$ (exact answer) means that $\pi$ will appear in your answer.

Perimeter = unit

Area = unit $^2$

\[ 2(l + w) \]

\[ d = 2r \]
EXAMPLE 1
Find the area and the perimeter/circumference of the figure. Leave in terms of $\pi$.

A. $P = 42 \text{ m}$  
$A = 104 \text{ m}^2$

B. $P = 48 \text{ mm}$  
$A = 144 \text{ mm}^2$

C. $P = 60 \text{ in}$  
$A = 150 \text{ in}^2$

D. $C = 22\pi \text{ cm}$  
$A = 121\pi \text{ cm}^2$  
$d = 22$  
$r = 11$
EXAMPLE 2
Find the area and the perimeter of the given triangle in the coordinate plane.

\[ JL = \sqrt{3^2 + 4^2} = \sqrt{25} = 5 \]

\[ KL = \sqrt{5^2 + 4^2} = \sqrt{41} \]

\[ P = 8 + 5 + \sqrt{41} \]
\[ \approx 13 + \sqrt{41} \]
\[ \approx 19.403 \]

2. Area Addition Postulate
- The area of a region is the sum of the areas of its nonoverlapping parts.

EXAMPLE 3
Find the area of the shaded region.

A.
\[ I: 3 \times 6 = 18 \]
\[ II: 6 \times 6 = 36 \]
\[ III: 9 \times 6 = 54 \]
\[ \frac{54}{10.8} \]  

\[ 108 \text{ m}^2 \]

B.
Whole - Part
\[ 18 \times 12 - \frac{3 \times 4}{216 - 12} \]
\[ 204 \text{ cm}^2 \]
EXAMPLE 4
A restaurant owner wants to put a cement patio behind his restaurant so people can eat outside. The patio will be 16 ft wide and 25 yd long. What will the area of the patio be?

\[16 \text{ ft} \times 75 \text{ ft} = 1200 \text{ ft}^2\]

EXAMPLE 5
Find the area of each circle in terms of \( \pi \).

A. \( r = 9 \text{ in.} \)
   \[81\pi \text{ in}^2\]

B. \( d = 13 \text{ m} \)
   \[r = 6.5 \text{ m} \]
   \[42.25\pi \text{ m}^2\]

C. \( r = 5.8 \text{ ft} \)
   \[33.64\pi \text{ ft}^2\]