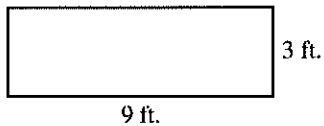


GEOMETRY

Area of Plane Figures

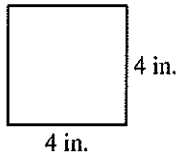
Don't confuse the two formulas for calculating the circumference and the area of circles. A good way to keep them straight is to remember the square in πr^2 . It should remind you that area must be in square units.

Area is the space enclosed by a plane (flat) figure. A rectangle is a plane figure with four right angles. Opposite sides of a rectangle are of equal length and are parallel to each other. To find the area of a rectangle, multiply the length of the base of the rectangle by the length of its height. Area is always expressed in square units.



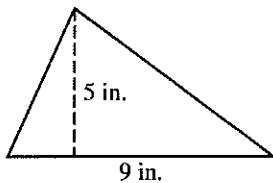
$$\begin{aligned} A &= bh \\ A &= 9 \text{ ft.} \times 3 \text{ ft.} \\ A &= 27 \text{ sq. ft.} \end{aligned}$$

A square is a rectangle in which all four sides are the same length. The area of a square is found by squaring the length of one side, which is exactly the same as multiplying the square's length by its width.



$$\begin{aligned} A &= s^2 \\ A &= 4 \text{ in.} \times 4 \text{ in.} \\ A &= 16 \text{ sq. in.} \end{aligned}$$

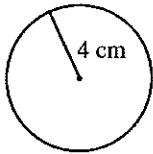
A triangle is a three-sided plane figure. The area of a triangle is found by multiplying the base by the altitude (height) and dividing by two.



$$\begin{aligned} A &= \frac{1}{2}bh \\ A &= \frac{1}{2}(9 \text{ in.})(5 \text{ in.}) = \frac{45}{2} \\ A &= 22\frac{1}{2} \text{ sq. in.} \end{aligned}$$

A circle is a perfectly round plane figure. The distance from the center of a circle to its rim is its radius. The distance from one edge to the other through the center is its diameter. The diameter is twice the length of the radius.

Pi (π) is a mathematical value equal to approximately 3.14 or $\frac{22}{7}$. Pi (π) is frequently used in calculations involving circles. The area of a circle is found by squaring the radius and multiplying it by π . You may leave the area in terms of pi unless you are told what value to assign π .



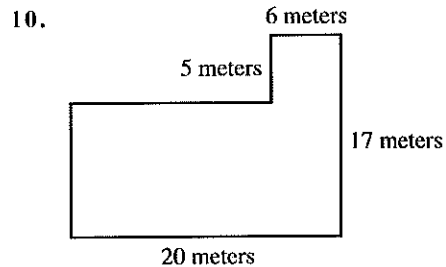
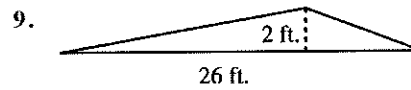
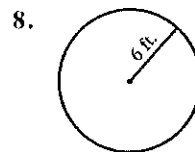
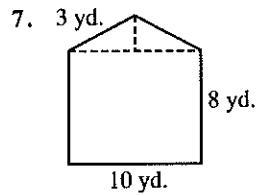
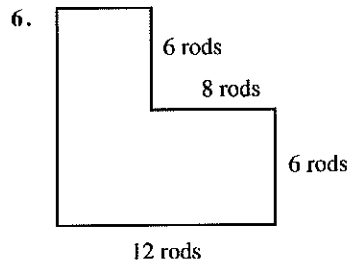
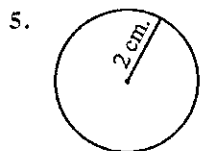
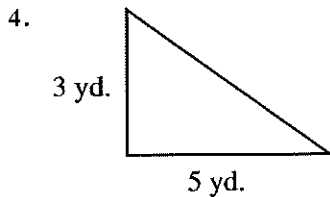
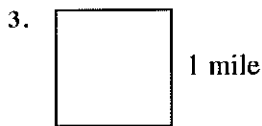
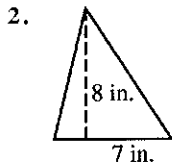
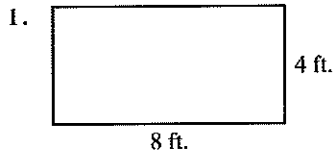
$$A = \pi r^2$$

$$A = \pi (4 \text{ cm.})^2$$

$$A = 16\pi \text{ sq. cm.}$$

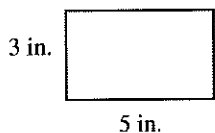
Test Yourself 14

Find the area of each figure.



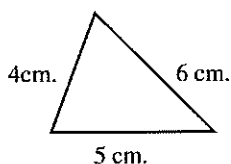
Perimeter of Plane Figures

The *perimeter* of a plane figure is the distance around the outside. To find the perimeter of a polygon (a plane figure bounded by straight lines), just add the lengths of the sides.



$$P = 3 \text{ in.} + 5 \text{ in.} + 3 \text{ in.} + 5 \text{ in.}$$

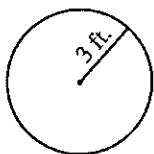
$$= 16 \text{ in.}$$



$$P = 4 \text{ cm.} + 6 \text{ cm.} + 5 \text{ cm.}$$

$$= 15 \text{ cm.}$$

The perimeter of a circle is called the circumference. The formula for the circumference of a circle is πd or $2\pi r$, which are both, of course, the same thing.

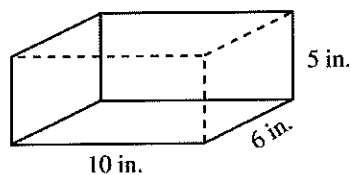


$$C = 2 \times 3 \times \pi = 6\pi$$

Volume of Solid Figures

The volume of a solid figure is the measure of the space within. To figure the volume of a solid figure, multiply the area of the base by the height or depth.

The volume of a rectangular solid is length \times width \times height. Volume is always expressed in cubic units.

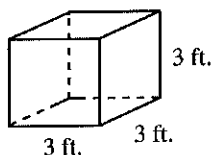


$$V = lwh$$

$$V = (10 \text{ in.}) (6 \text{ in.}) (5 \text{ in.})$$

$$V = 300 \text{ cu. in.}$$

The volume of a cube is the cube of one side.

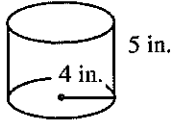


$$V = s^3$$

$$V = (3 \text{ ft.})^3$$

$$V = 27 \text{ cu. ft.}$$

The volume of a cylinder is the area of the circular base (πr^2) times the height.



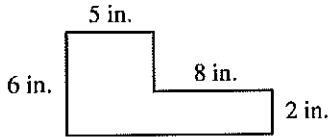
$$V = \pi r^2 h$$

$$V = \pi (4 \text{ in.})^2 (5 \text{ in.})$$

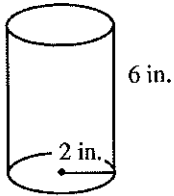
$$V = \pi(16)(5) = 80\pi \text{ cu. in.}$$

Test Yourself 15

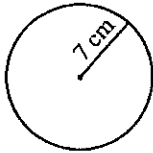
1. Find the perimeter.



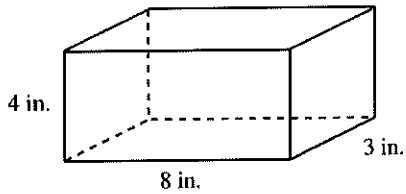
2. Find the volume.



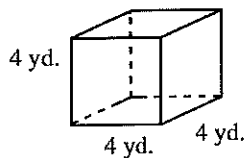
3. Find the circumference.



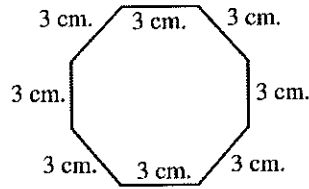
4. Find the volume.



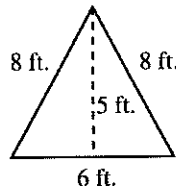
5. Find the volume.



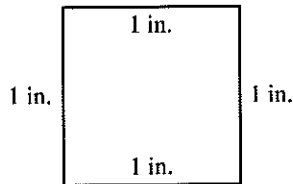
6. Find the perimeter.



7. Find the perimeter.

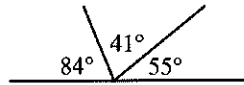


8. Find the perimeter.

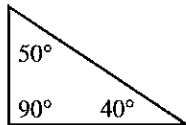


Angles

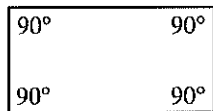
The sum of the angles of a straight line is 180° .



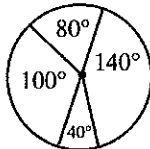
The sum of the angles of a triangle is 180° .



The sum of the angles of a rectangle is 360° .

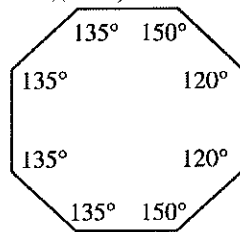


The sum of the angles of a circle is 360° .



The sum of the angles of a polygon of n sides is $(n - 2)180^\circ$.

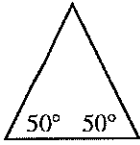
$$(8 - 2)(180^\circ) = 6 \times 180^\circ = 1080^\circ$$



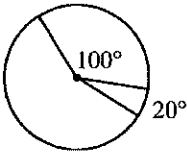
Test Yourself 16

What is the size of the unlabeled angle?

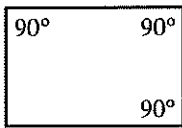
1.



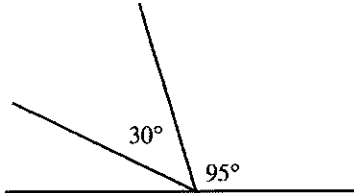
2.



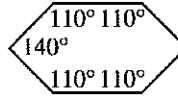
3.



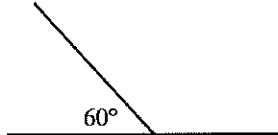
4.



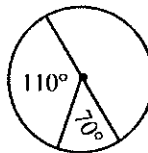
5.



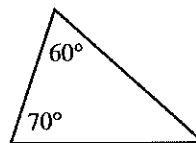
6.



7.



8.

**COORDINATE GEOMETRY**

Coordinate geometry is used to locate and to graph points and lines on a plane.

The coordinate system is made up of two perpendicular number lines that intersect at 0. Any point on the plane has two numbers, or coordinates, that indicate its location relative to the number lines.

The x -coordinate (abscissa) is found by drawing a vertical line from the point to the horizontal number line (the x -axis). The number found on the x -axis is the abscissa.

The y -coordinate (ordinate) is found by drawing a horizontal line from the point to the vertical number line (the y -axis). The number found on the y -axis is the ordinate.

The two coordinates are always written in the order (x, y) .