Composite Figures

Objective A: Perimeter of a composite plane figure

Composite geometric figures are made from two or more geometric figures. The composite figure below is made from parts of a rectangle and a circle.

Composite figure = 3 sides of a rectangle + ½ the circumference of a circle.

Perimeter = 2L + W + ½ (π)d

Example: Find the perimeter of the composite figure shown above if the width of the rectangle is 4 m and the length of the rectangle is 8 m. Round to the nearest hundredth.

Use the equation given above. L = 8, W = 4. The diameter of the circle equals the width of the rectangle, 4

$P = 2L + W + 1/2\,\pi\, d$

$P = 2(8) + 4 + 1/2\,\pi\,(4)$

To approximate the perimeter, use $\pi \cong 3.14$

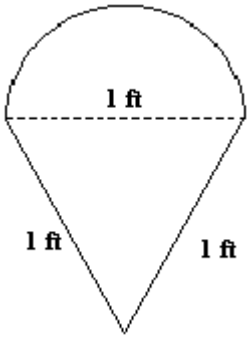
$P = 20 + 2\pi$

To the nearest hundredth, the perimeter of the Figure is 26.28 m.

$P = 26.28$

Example 1

Find the perimeter of the figure. Round to the nearest hundredth.



Strategy
The perimeter is equal to 2 sides of a triangle plus ½ the circumference of a circle. An approximation is asked for; use $\pi \cong 3.14$.

Solution

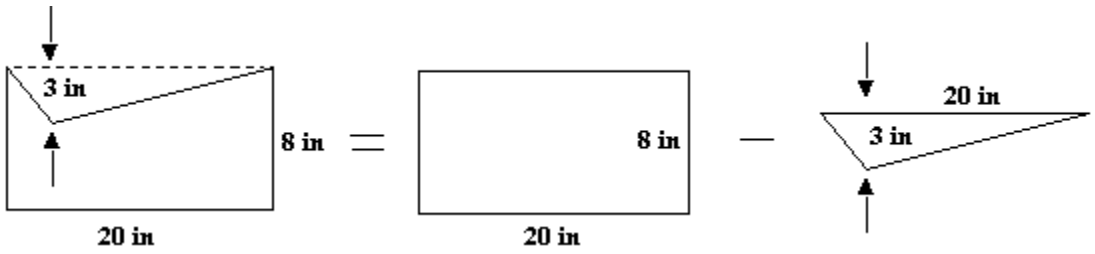
$P = a + b + 1/2\,\pi\, d$

$P = 1 + 1 + 1/2\,\pi\,(1) = 2 + 0.5\,\pi \cong 3.57$

The perimeter is approximately 3.57 ft.

Objective B: Area of a composite plane figure

The area of the composite figure shown below is found by calculating the area of the rectangle and then subtracting the area of the triangle.



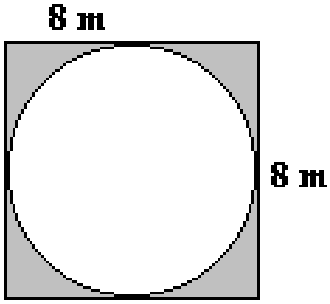
Area of the composite figure = area of the rectangle – area of the triangle

=	LW	-	1/2bh
=	20(8)	-	½(20)(3)
=	160	-	30
=	130		

The area of the composite figure is 130 in^2

Example 2

Find the area of the shaded portion of the figure. Round to the nearest hundredth.



Strategy

The area is equal to the area of the square minus the area of the circle. The radius of the circle is one-half the length of a side of the square (8). An approximation is asked for; use $\pi \cong 3.14$.

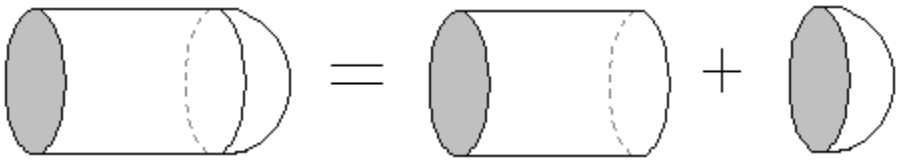
Solution

$R = 1/2s = ½(8) = 4$
$A = s^2 - \pi r^2$
$A = 8^2 - \pi (4)^2 = 64 - 16\pi \cong 13.73$

The area is approximately 13.73 m^2.

Objective C
Volume of a composite solid

Composite geometric solids are made from two or more geometric solids. The following solid is made from a cylinder and one-half of a sphere.



Composite solid	=	a cylinder	+	one-half of a sphere
Volume of the composite solid	=	$\pi r^2 h$	+	$\frac{1}{2} * 4/3 \pi r^3$

Find the volume of the solid shown above if the radius of the base of the cylinder is 3 in. and the height of the cylinder is 10 in. Give the exact measure.

Use the equation given above. R = 3,

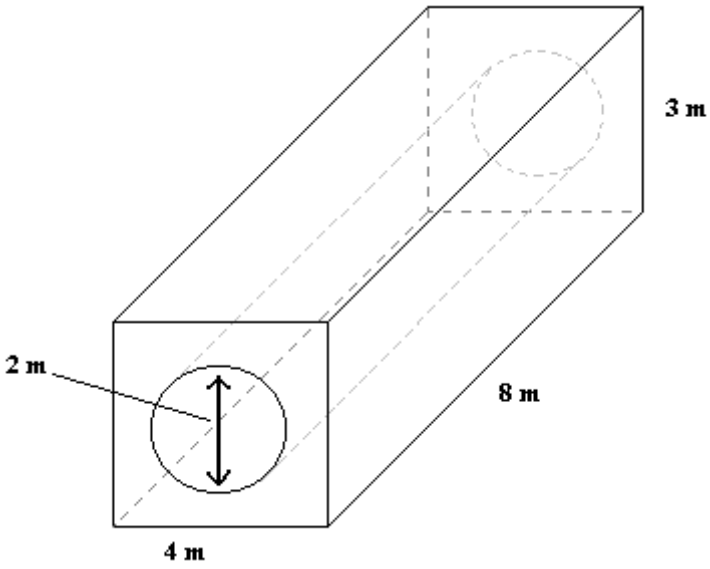
H = 10. The radius of the sphere equals
The radius of the base of the cylinder, 3.

$V = \pi r^2 h + \frac{1}{2} * 4/3 \pi r^3$

$V = \pi (3)^2 (10) + \frac{1}{2} * 4/3 \pi (3)^3$
$V = \pi (9)(10) + 2/3 \pi (27)$
$V = 90\pi + 18\pi = 108\pi$

The volume of the solid is 108π in^3.

Example 3
Find the volume of the solid. Round to the nearest hundredth



Strategy

The volume is equal to the volume of the rectangular solid minus the volume of the cylinder. The radius of the circle is one-half the diameter of the circle. An approximation is asked for, use $\pi \cong 3.14$.

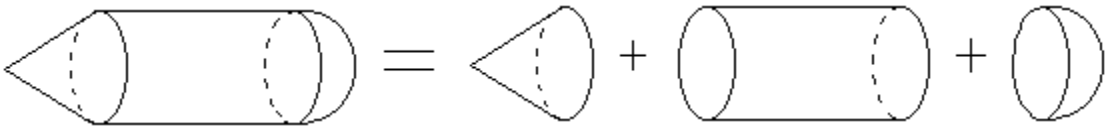
Solution

$R = 1/2d = \frac{1}{2}(2) = 1$
$V = LWH - \pi r^2 h$
$V = 8(4)(3) - \pi\ (1)^2(8) = 96 - 8\pi \cong 70.87$

The volume is approximately 70.87 m^3.

Objective D
Surface area of a composite solid

The composite solid shown below is made from a cone, a cylinder, and one-half of a sphere.



Surface area of the solid = the surface area of a cone minus the base + the surface area of the sides of a cylinder + ½ of the surface area of a cylinder.

$= \quad \pi * r * l \quad + \quad 2\pi * r * h \quad + \quad \frac{1}{2}4\pi r^2$

Find the surface area of the solid shown above. The radius of the base of the cylinder is 4 m and the height is 5 m. The slant height of the cone is 6 m. Give the exact measure.

Use the equation given above. $r = 4$, $h = 5$, $l = 6$. The radius of the base of the cone and the radius of the sphere equal the radius of the base of the cylinder, 4.

$SA = \pi rl + 2\pi rh + \frac{1}{2}4\pi r^2$

$SA = \pi (4)(6) + 2\pi (4)(5) + 1/2[4\pi (4)^2]$
$SA = \pi (24) + 40\pi + 2\pi (16)$
$SA = 24\pi + 40\pi + 32\pi = 96\pi$

The surface area of the solid is 96π m^2.