Area Applications

Learning Goals

- find areas of composite figures
- look at a practical application of area calculations

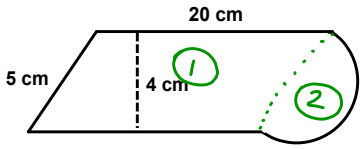
Area of Composite Figures

Composite figure - a shape that is made up of two or more basic shapes

Finding the Area of Composite Figures

1. **Break shape down into smaller shapes.**
2. **Calculate area of each shape.**
3. **Add the areas. May have to subtract areas that are missing.**

Examples: Find the area



$A_{①} = bh$
$= 20(4)$
$= 80$

$A_{②} = \frac{\pi r^2}{2}$ ← half

$= \frac{(3.14)(\frac{5}{2})^2}{2}$

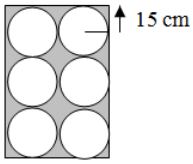
$= 9.8$

$A_{Total} = A_{①} + A_{②}$
$= 80 + 9.8$
$= 89.8$
$\therefore 89.8\ cm^2$

2. Determine the shaded area to 1 decimal place.

$4(15) = 60$

$6(15) = 90$



$A_{1\ circle} = \pi r^2$
$= (3.14)(15)^2$
$= 706.5$

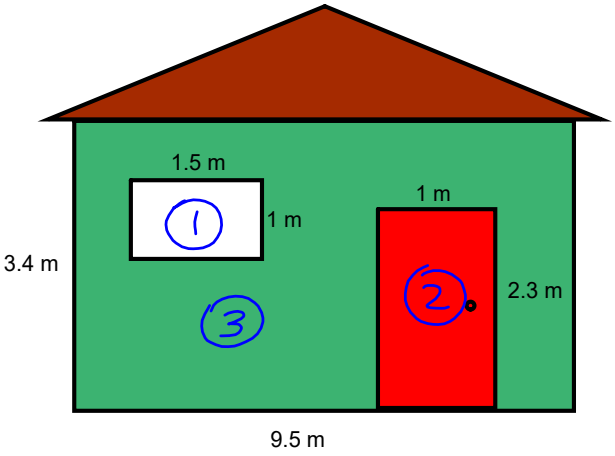
$A_{6\ circles} = 6(706.5)$
$= 4239$

$A_{\square} = lw$
$= 90(60)$
$= 5400$

$A_{Total} = A_{\square} - A_{6\ circles}$
$= 5400 - 4239$
$= 1161$
$\therefore 1161\ cm^2$

On the Boards...

3. Paint costs $34/can. One can covers 22 m^2.
How much does the green paint costs? → wall
How much does the red paint cost? → door



$A_1 = (1.5)(1) = 1.5$

$A_2 = (2.3)(1) = 2.3$

$A_3 = 3.4(9.5)$
$= 32.3$

$A_{Total} = 32.3 - 2.3 - 1.5$
$= 28.5$

$\#\text{ of cans} = \frac{28.5}{22}$

$= 1.3$

$\therefore$ 2 cans

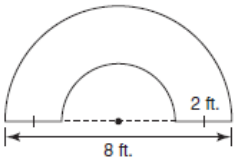
price $2(34) = 68$

tax $68(1.13)$
$= 76.84$

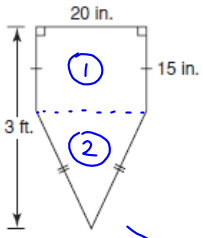
$\therefore$ credit \$76.84
cash \$76.85

4. Describe the figures that make up each composite figure.
Determine the area of each composite figure. All curves are semicircles.

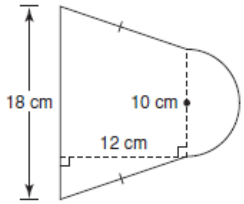
a)



b)



c)



$A_{big} = \frac{\pi(4)^2}{2}$

$= 25.12$

$A_{small} = \frac{\pi(2)^2}{2}$

$= 6.28$

$A_{Total} = 25.12 - 6.28$

$= 18.84 \text{ ft}^2$

$A_{①} = 20(15)$

$= 300$

$A_{②} = \frac{bh}{2}$

$= \frac{20(21)}{2}$

$= 210$

$A_{Total} = 300 + 210$

$= 510 \text{ in}^2$

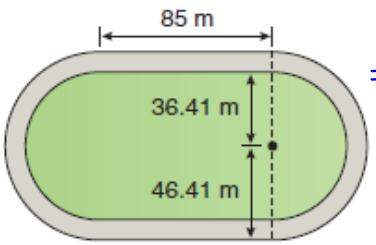
$A_{trapezoid} + A_{\cap}$

$= \frac{(a+b)(h)}{2} + \frac{\pi r^2}{2}$

$= \frac{(10+18)(12)}{2} + \frac{\pi(5)^2}{2}$

$= 207.25 \text{ cm}^2$

5. **Assessment Focus** The running track in this diagram consists of two parallel sections with semicircular sections at each end. Determine the area of the track.



$A_{inside} = 85(36.41)(2) + \pi(36.41)^2$

$= 10352.36$

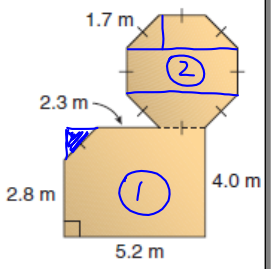
$A_{outside} = 85(46.41)(2) + \pi(46.41)^2$

$= 14652.91$

$A_{track} = 14652.91 - 10352.36$

$= 4300.55$ $\therefore 4300.55\ m^2$

6. The design for a backyard deck is shown. It will be built using plastic lumber made from recycled materials.
   a) Determine the area of the deck.
   b) A circular hot tub with diameter 2 m is to be installed in the octagonal portion of the deck. How much wood needs to be cut out to make room for the hot tub?
   c) The backyard is a rectangle measuring 65 feet by 45 feet. What is the area of the backyard not covered by the deck?



$A_{①} = A_{\square} - A_{\triangledown}$

$= 20.08$

$A_{②} = 4\triangle + \square + 2\square$

$= 13.93$

$A_{Total} = 20.08 + 13.93$

$= 34.01$

b.) $A = \pi r^2$

$= \pi (1)^2$

$= 3.14$

c.) $A_{yard} = (65)(45)$

$= (19.81)(13.716)$ ← change to meters

$= 271.7$

$A = A_{yard} - A_{deck}$

$= 271.7 - 34.01$

$= 237.7$ $\therefore 237.7\ m^2$

If you have NOT finished question 6, try it for homework.