Composite Area Problems

Key

Sometimes you may have to find the area of a shape that is composed of two or more simple shapes. Your job is to partition the figure into simpler shapes. Then, find the area of each simple shape and finally add or subtract the areas. Let's first review the area formulas for the "simple shapes" listed below.

Circle $\underline{A = \pi r^2}$

Square $\underline{A = s^2}$ also $A = lw$, $A = bh$

Rectangle $\underline{A = l \cdot w}$ also $A = bh$

Parallelogram $\underline{A = bh}$

Triangle $\underline{A = \dfrac{bh}{2}}$

Trapezoid $\underline{A = \dfrac{(b_1 + b_2)h}{2}}$

Now, let's try some examples!

1. The unshaded regions are quarter circles. Find the area of the shaded region to the nearest tenth.
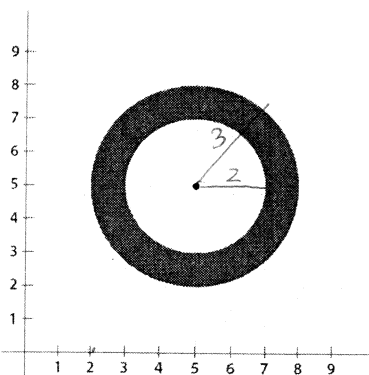
22 m
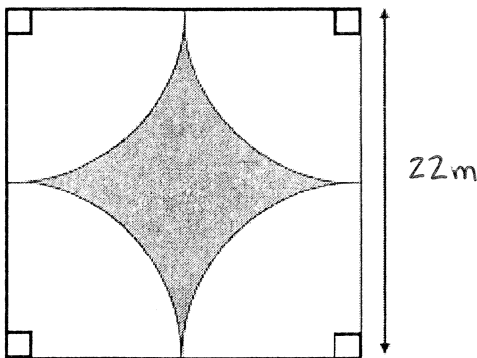
Area of the shaded region = [square: 22] − [circle: 11]

Area of entire square

Area of a full circle

$A = s^2 = 22^2$
$A = 484$

$A = \pi r^2$
$A = \pi (11^2)$

$484 - 121\pi$
$\approx 103.9 \text{ m}^2$

2. Find the area of the shaded region. Leave your answer in terms of π.

$A = \text{large circle} - \text{inner circle}$

(outer) (inner)
$\pi r^2 - \pi r^2$

$3^2\pi - 2^2\pi$

$9\pi - 4\pi$

$5\pi \text{ units}^2$

3. The figure shows a semicircle and a square. Find the area of the shaded region. Round your answer to the nearest whole number.
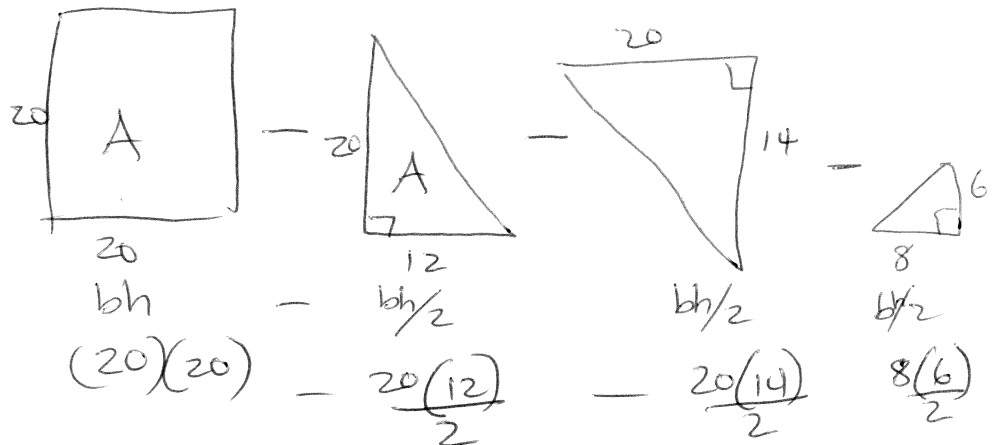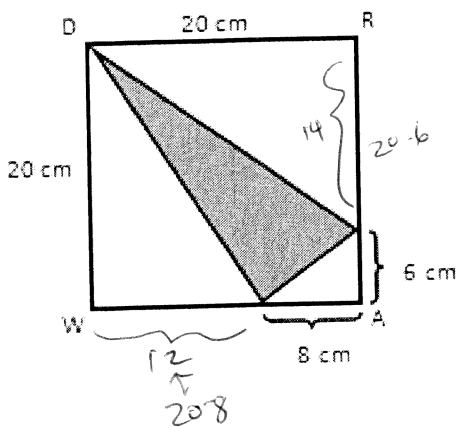

24 cm

$$\square \quad - \quad \text{D} \, 12$$
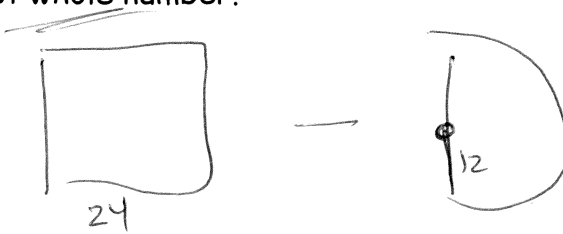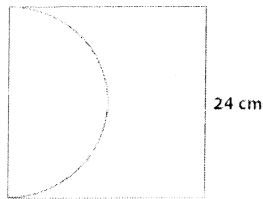
$$(24)(24) \qquad \frac{1}{2}\left(\pi r^2\right)$$

5^2 ... 12^2

$$576 - \frac{1}{2}\left(\underline{144\,\pi}\right)$$

$$576 - 72\pi \approx \boxed{350 \, cm^2}$$

4. Find the area of the shaded region.

D   20 cm   R
20 cm
14
20·6
6 cm
W
8 cm   A
12
208

$$\boxed{A} - \boxed{A} - \diagdown - \triangle$$

20   20   20   6
20   14   8

$$bh \qquad - \qquad bh/2 \qquad - \qquad bh/2 \qquad bh/2$$

12

$$(20)(20) - \frac{20(12)}{2} - \frac{20(14)}{2} \qquad \frac{8(6)}{2}$$

$$400 - 120 - 140 - 24 = \boxed{116 \text{ sq cm.}}$$

5. Find the area of the shaded region.

2 m
G
3 cm
2 cm   3 cm
II   III

3·3
2·2   9   3
2   4
2   3
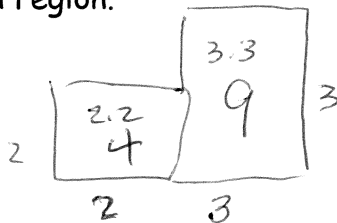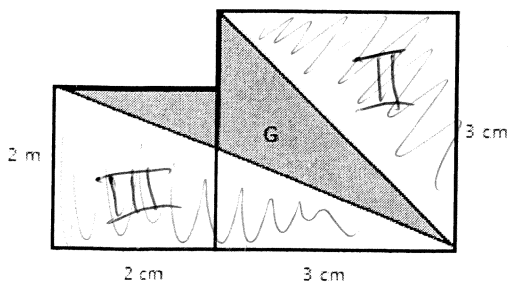
$$13 - 5 - 4.5$$

$$\boxed{3.5 \text{ cm}^2}$$

Both squares together are $4 + 9 = 13 \text{ cm}^2$

Now subtract regions II & III.

$$II = 2 \, \triangleright \qquad A = \frac{2 \cdot (5)}{2} = 5$$

2+3=5

$$III = \diagdown \quad \frac{3 \cdot 3}{2} = 4.5$$