

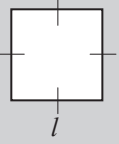
25. [Area]

Skill 25.1 Calculating the area of squares and rectangles.

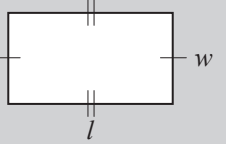
MMMauve 11 22 33 44
MMLime 11 22 33 44

- Substitute known values into the appropriate formula.

Area of a square = length \times length
 $A = l^2$



Area of a rectangle = length \times width
 $A = lw$



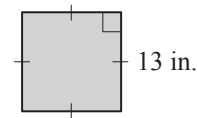
Q. A boxing ring is a square with side length 5.2 m. What is the area of the ring?

A. $A = l^2$ where $l = 5.2$
 $= 5.2 \times 5.2$
 $= 27.04 \text{ m}^2$

a) What is the area of a rectangular billiard table with a length of 3.7 m and a width of 1.9 m?

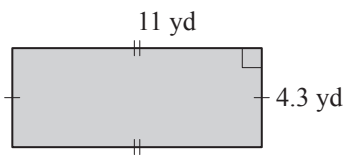
$A = l \times w$ where $l = 3.7$ and $w = 1.9$
 $= 3.7 \times 1.9 = \boxed{7.03 \text{ m}^2}$

b) Find the area of the square.



$A =$
 $= \boxed{169 \text{ in.}^2}$

c) Find the area of the rectangle.



$A =$
 $= \boxed{47.3 \text{ yd}^2}$

d) A baseball diamond is a square of side length of 90 ft. What is its area?

$A =$
 $= \boxed{8100 \text{ ft}^2}$

e) The rectangular grounds of the Taj Mahal are 360 m long and 260 m wide. What is this area?

$A = l \times w$
 $= \boxed{93600 \text{ m}^2}$

f) A rectangular badminton court measures 44 ft long and 20 ft wide. What is the area?

$A =$
 $= \boxed{880 \text{ ft}^2}$

g) The sport of fencing uses a rectangular space with a length of 14 m and a width of 2 m. What is the area of the fencing surface?

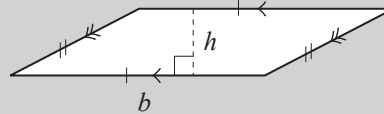
$= \boxed{28 \text{ m}^2}$

h) Paddy's rectangular iPod screen has a length of 30 mm and a width of 24 mm. What is the area of the iPod screen?

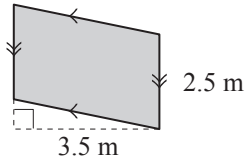
$= \boxed{720 \text{ mm}^2}$

- Substitute known values into the formula.

Area of a parallelogram = base \times height
 $A = bh$

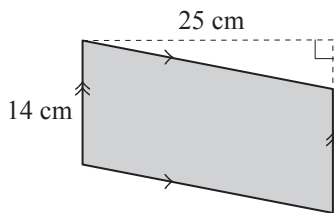


Q. Find the area of the parallelogram.



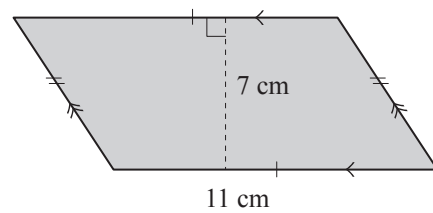
A. $A = bh$ where $b = 2.5$ and $h = 3.5$
 $= 2.5 \times 3.5 \text{ m}$
 $= 8.75 \text{ m}^2$

a) Find the area of the parallelogram.



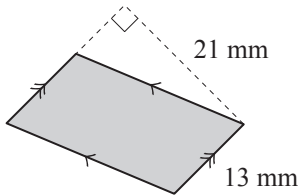
$A = bh$ where $b = 14$ and $h = 25$
 $= 14 \times 25 = \boxed{} \text{ cm}^2$

b) Find the area of the parallelogram.



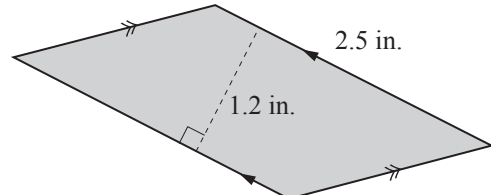
$A = $
 $= = \boxed{} \text{ cm}^2$

c) Find the area of the parallelogram.



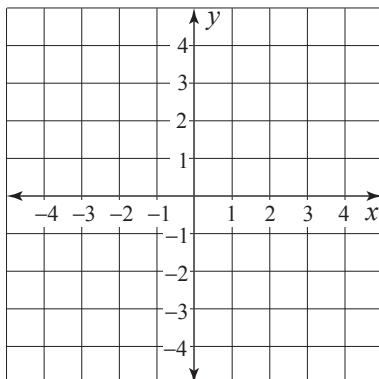
$A = $
 $= = \boxed{} \text{ mm}^2$

d) Find the area of the parallelogram.

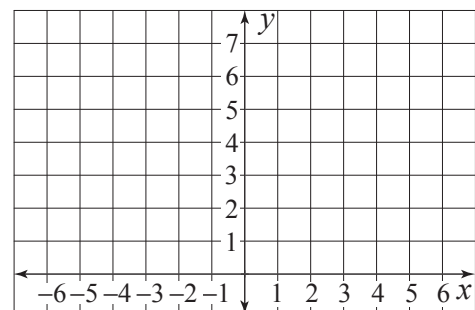


$A = $
 $= = \boxed{} \text{ in.}^2$

e) Plot the points $A(-4,3)$, $B(2,3)$, $C(3,-2)$ and $D(-3,-2)$ and use them to find the area of $ABCD$.

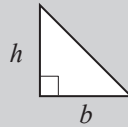


f) Plot the points $A(1,5)$, $B(5,5)$, $C(-1,2)$ and $D(-6,2)$ and use them to find the area of $ABCD$.

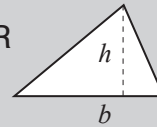


- Substitute known values into the formula.

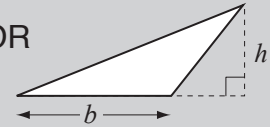
Area of a triangle = $\frac{1}{2} \times \text{base} \times \text{height}$
 $A = \frac{1}{2}bh$



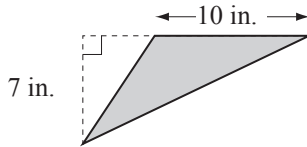
OR



OR

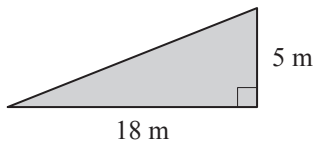


Q. Find the area of the scalene triangle.



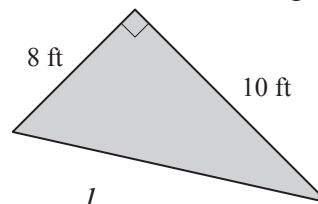
A. $A = \frac{1}{2}bh$ where $b = 10$ and $h = 7$
 $= \frac{1}{2} \times 10 \times 7$ *Simplify: $\div 2$*
 $= 35 \text{ in.}^2$

a) Find the area of the right triangle.



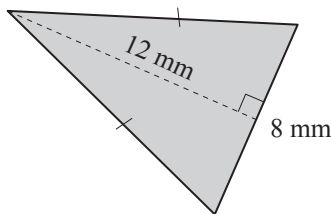
$A = \frac{1}{2}bh$ where $b = 18$ and $h = 5$
 $= \frac{1}{2} \times 18 \times 5 = \boxed{\text{m}^2}$

b) Find the area of the right triangle.



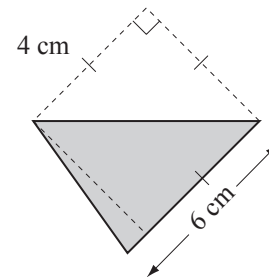
$A = \frac{1}{2}bh$
 $= \quad = \boxed{\text{ft}^2}$

c) Find the area of the isosceles triangle.



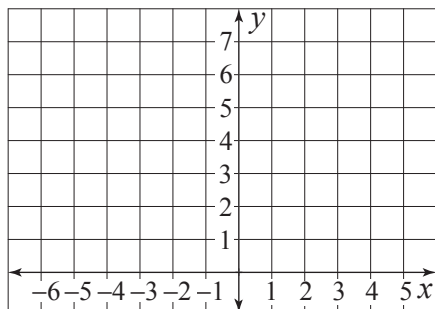
$A = \frac{1}{2}bh$
 $= \quad = \boxed{\text{mm}^2}$

d) Find the area of the shaded scalene triangle.

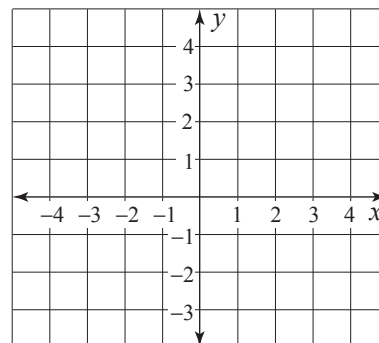


$A = \quad = \boxed{\text{cm}^2}$

e) Plot the points $A(-6,2)$, $B(-2,6)$ and $C(5,2)$ and use them to find the area of $\triangle ABC$.



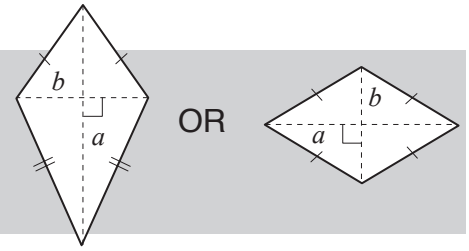
f) Plot the points $A(-2,3)$, $B(3,3)$ and $C(-2,-3)$ and use them to find the area of $\triangle ABC$.



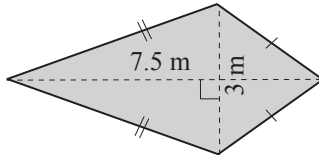
- Substitute known values into the formula.

Area of a kite or rhombus = $\frac{1}{2} \times a \times b$ (where a is the long diagonal and b is the short diagonal)

$$A = \frac{1}{2} ab$$



Q. Find the area of the kite.

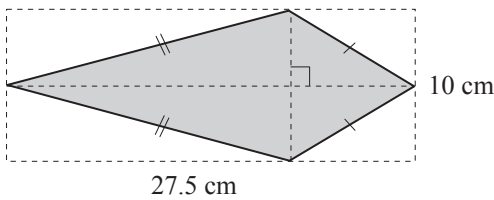


A. $A = \frac{1}{2} ab$ where $a = 7.5$ and $b = 3$

$$= \frac{1}{2} \times 7.5 \times 3$$

$$= 11.25 \text{ m}^2$$

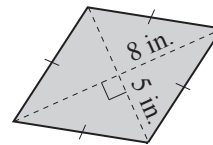
a) Find the area of the kite.



$$A = \frac{1}{2} ab \text{ where } a = 27.5 \text{ and } b = 10$$

$$= \frac{1}{2} \times 27.5 \times 10 = \boxed{\text{cm}^2}$$

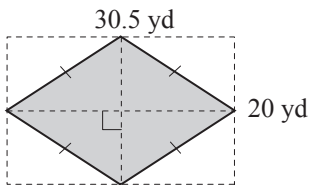
b) Find the area of the rhombus.



$$A = \frac{1}{2} ab$$

$$= \quad = \boxed{\text{in.}^2}$$

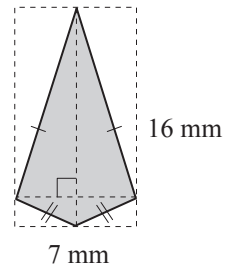
c) Find the area of the rhombus.



$$A =$$

$$= \quad = \boxed{\text{yd}^2}$$

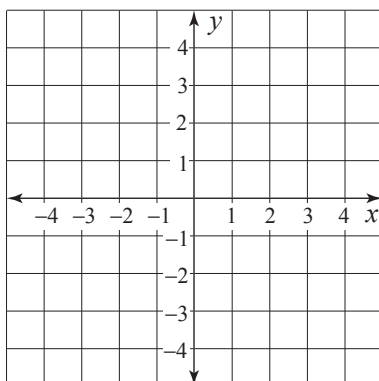
d) Find the area of the kite.



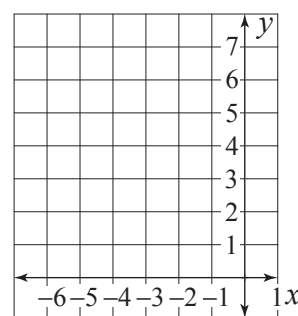
$$A =$$

$$= \quad = \boxed{\text{mm}^2}$$

e) Plot the points $A(0,4)$, $B(2,2)$, $C(0,-3)$ and $D(-2,2)$ and use them to find the area of the kite $ABCD$.



f) Plot the points $A(-4,6)$, $B(-2,3)$, $C(-4,0)$ and $D(-6,3)$ and use them to find the area of the rhombus $ABCD$.

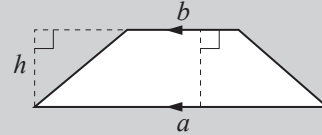


Skill 25.5 Calculating the area of trapezoids.

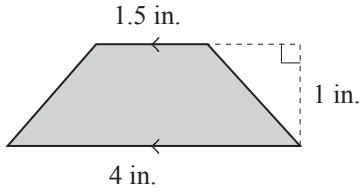
- Substitute known values into the formula.

Area of a trapezoid = $\frac{1}{2} \times (a + b) \times \text{height}$ (where a and b are the parallel side lengths)

$$A = \frac{1}{2} (a + b)h$$



Q. Find the area of the trapezoid.



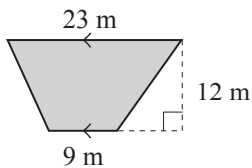
A. $A = \frac{1}{2}(a + b)h$ where $a = 4$, $b = 1.5$ and $h = 1$

$$= \frac{1}{2} \times (4 + 1.5) \times 1$$

$$= \frac{1}{2} \times 5.5$$

$$= \mathbf{2.75 \text{ in.}^2}$$

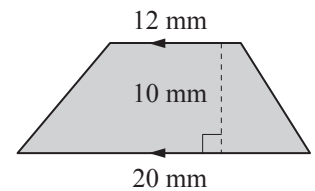
a) Find the area of the trapezoid.



$$A = \frac{1}{2}(a + b)h = \frac{1}{2} \times (23 + 9) \times 12$$

$$= \frac{1}{2} \times 32 \times 12 = \boxed{\text{m}^2}$$

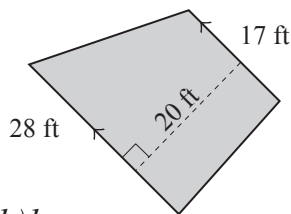
b) Find the area of the trapezoid.



$$A = \frac{1}{2}(a + b)h =$$

$$= \boxed{\text{mm}^2}$$

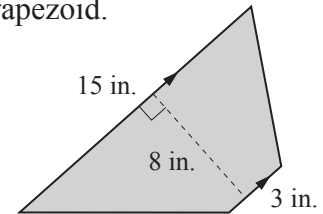
c) Find the area of the trapezoid.



$$A = \frac{1}{2}(a + b)h =$$

$$= \boxed{\text{ft}^2}$$

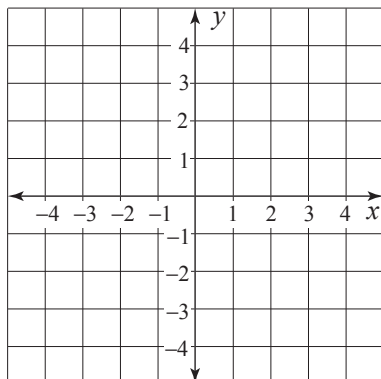
d) Find the area of the trapezoid.



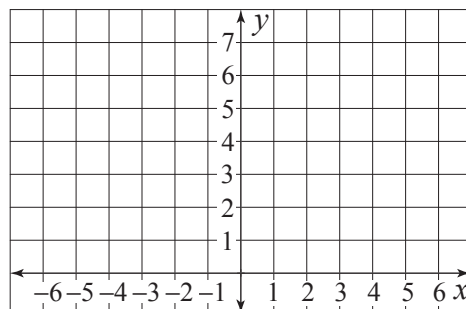
$$A =$$

$$= \boxed{\text{in.}^2}$$

e) Plot the points $A(0,4)$, $B(3,4)$, $C(3,-2)$ and $D(-4,-2)$ and use them to find the area of the trapezoid $ABCD$.



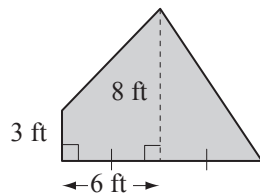
f) Plot the points $A(-4,5)$, $B(4,6)$, $C(4,1)$ and $D(-4,4)$ and use them to find the area of the trapezoid $ABCD$.



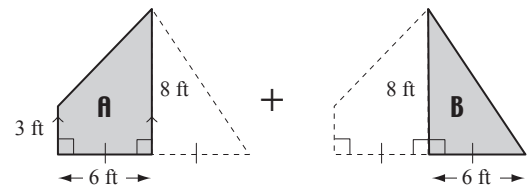
Skill 25.6 Calculating the area of composite shapes (1).

- Find and label the length of all sides.
- Break the shape into workable parts.
- Where possible substitute values into a known area formula.
(see skills 25.1, page 278 to skill 25.5, page 282)
- Add or subtract the area totals where necessary.

Q. Find the area of the plane figure.



A.



$$A_1 = \frac{1}{2}(a + b)h \text{ where } a = 3, b = 8 \text{ and } h = 6$$

$$= \frac{1}{2} \times (3 + 8) \times 6$$

$$\mathbf{A} = \frac{1}{2} \times 11 \times 6 = \mathbf{33}$$

trapezoid A

$$A_2 = \frac{1}{2}bh \text{ where } b = 6 \text{ and } h = 8$$

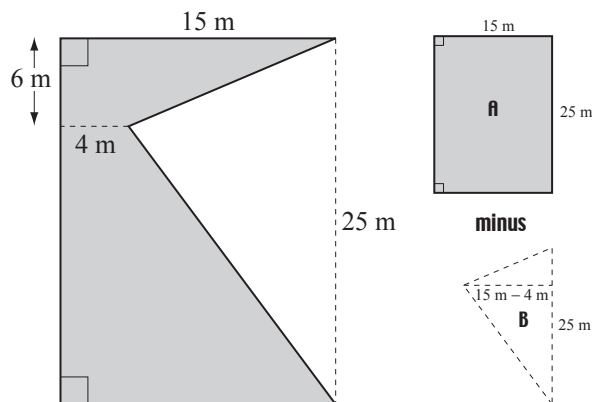
$$= \frac{1}{2} \times 6 \times 8$$

$$\mathbf{B} = \frac{1}{2} \times 48 = \mathbf{24}$$

triangle B

$$A = 33 + 24 = \mathbf{57 \text{ ft}^2}$$

a) Find the area of the shape.



$$A_1 = lw \text{ where } l = 25 \text{ and } w = 15 \text{ (for rectangular area } \mathbf{A})$$

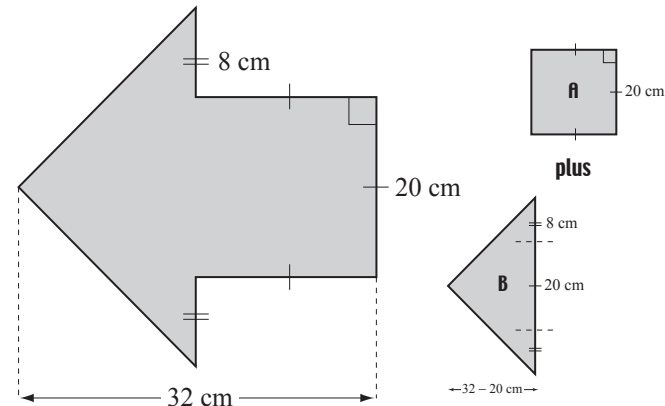
$$= 25 \times 15 = \mathbf{375}$$

$$A_2 = \frac{1}{2}bh \text{ where } b = 25 \text{ and } w = 11 \text{ (for triangular area } \mathbf{B})$$

$$= \frac{1}{2} \times 25 \times 11 = \frac{1}{2} \times 275 = \mathbf{137.5}$$

$$A = 375 - 137.5 = \boxed{ \text{ m}^2}$$

b) Find the area of the plane figure.



$$A_1 = l^2 \text{ (for square area } \mathbf{A})$$

$$=$$

$$A_2 = \frac{1}{2}bh \text{ (for triangular area } \mathbf{B})$$

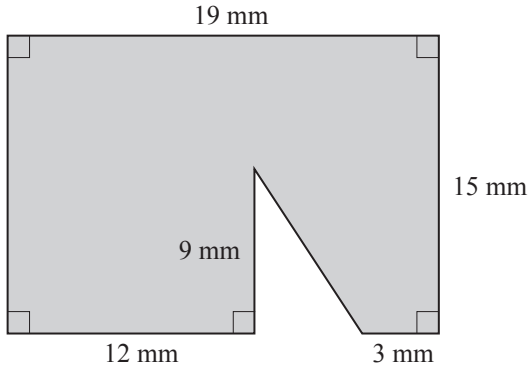
$$= \quad = \quad =$$

$$A = \quad = \boxed{ \text{ cm}^2}$$

Skill 25.6 Calculating the area of composite shapes (2).

MMMaue 1 1 2 2 3 3 4 4
 MMLime 1 1 2 2 3 3 4 4

c) Find the area of the shape.



$A_1 =$

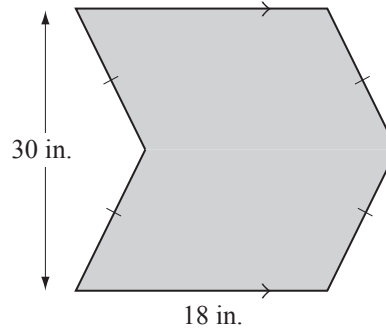
=

$A_2 =$

=

shape = = mm^2

d) Find the area of the plane figure.



$A_1 =$

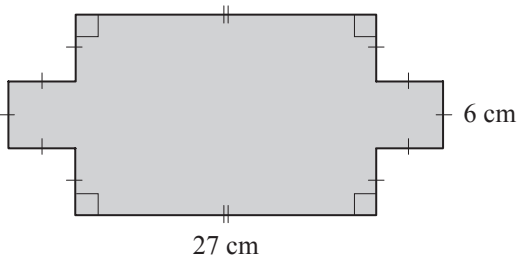
=

$A_2 =$

=

shape = = in.^2

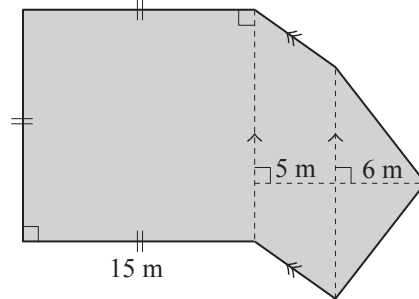
e) Find the area of the shape.



.....

shape = = cm^2

f) Find the area of the plane figure.



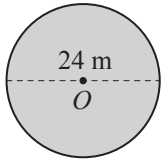
.....

shape = = m^2

- Substitute known values into the formula.
Hint: The diameter of a circle is equal to twice the radius.
Pi (π) gets its value because the diameter of any circle fits approximately 3.14 times around the circumference.

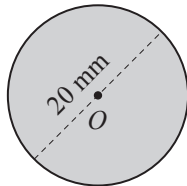
Area of a circle = $\pi \times \text{radius} \times \text{radius}$
 $A = \pi r^2$
 where $\pi \approx 3.14\dots$ or $\frac{22}{7}$

- Q.** Using $A = \pi r^2$ where $\pi \approx 3.14$, find the area of the circle.



A. $A = \pi r^2$ where $d = 24$ so $r = 12$
 $= 3.14 \times 12 \times 12$
 $= 3.14 \times 144$
 $= 452.16 \text{ m}^2$

- a)** Using $A = \pi r^2$ where $\pi \approx 3.14$, find the area of the circle.

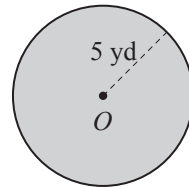


$A = \pi r^2$ where $d = 20$ and $r = 10 \text{ mm}$

$= 3.14 \times 10 \times 10$

$= 3.14 \times 100 = \boxed{\text{mm}^2}$

- b)** Using $A = \pi r^2$ where $\pi \approx 3.14$, find the area of the circle.

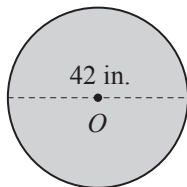


$A = \pi r^2$

$=$

$= \boxed{\text{yd}^2}$

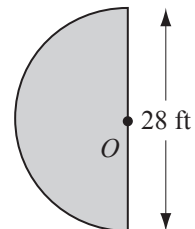
- c)** Using $A = \pi r^2$ where $\pi \approx \frac{22}{7}$, find the area of the circle.



$A =$

$= \boxed{\text{in.}^2}$

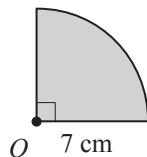
- d)** Using $\pi \approx \frac{22}{7}$ find the area of the semicircle.



$A =$

$\text{shape} = \boxed{\text{ft}^2}$

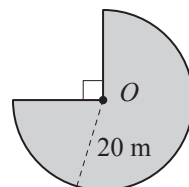
- e)** Using $\pi \approx \frac{22}{7}$ find the area of the quarter circle.



$A =$

$\text{shape} = \boxed{\text{cm}^2}$

- f)** Using $\pi \approx 3.14$ find the area of the shape.



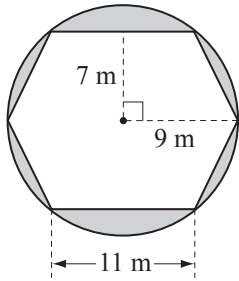
$A =$

$\text{shape} = \boxed{\text{m}^2}$

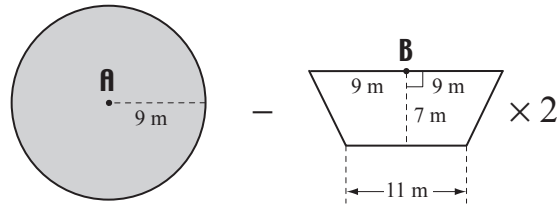
Skill 25.8 Calculating the area of composite circular shapes (1).

- Find and label the length of all sides.
- Break the shape into workable parts.
- Where possible substitute values into a known area formula.
(see skills 25.1, page 278 to skill 25.5, page 282 and 25.7, page 285)
- Add or subtract the area totals where necessary.

Q. Use $A = \pi r^2$ where $\pi \approx 3.14$ to find the area of the shaded shape.



A.



$$A_1 = \pi r^2 \text{ where } r = 9$$

$$= 3.14 \times 9 \times 9$$

$$= 3.14 \times 81$$

$$\mathbf{A} = 254.34$$

circle A

$$A_2 = \frac{1}{2}(a + b)h \text{ where } a = 18, b = 11 \text{ and } h = 7$$

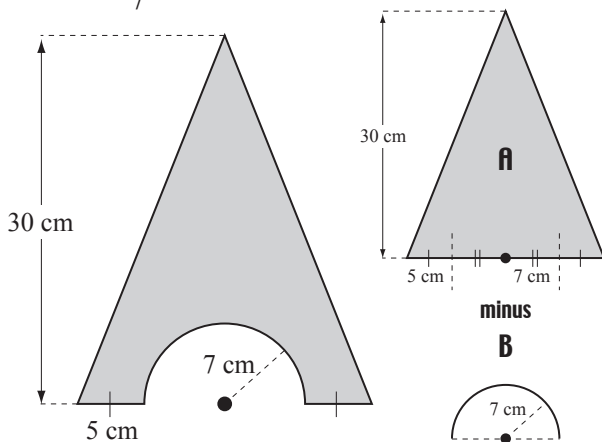
$$= \frac{1}{2} \times (18 + 11) \times 7 = \frac{1}{2} \times 203$$

$$\mathbf{B} = \frac{1}{2} \times 203 \times 2 = 203$$

trapezoid x2 B

$$A = 254.34 - 203 = 51.34 \text{ m}^2$$

a) Use $\pi \approx \frac{22}{7}$ to find the shaded area.



$$A_1 = \frac{1}{2}bh \text{ where } b = 5 + 7 + 7 + 5 \text{ and } h = 30 \text{ (for triangular area A)}$$

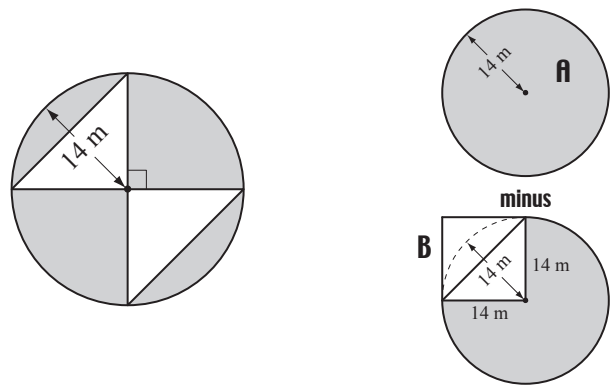
$$= \frac{1}{2} \times 24 \times 30 = 360$$

$$A_2 = \frac{1}{2}\pi r^2 \text{ where } r = 7 \text{ (for semicircular area B)}$$

$$= \frac{1}{2} \times \frac{22}{7} \times 7 \times 7 = 11 \times 7 = 77$$

$$A = 360 - 77 = \boxed{} \text{ cm}^2$$

b) Use $\pi \approx \frac{22}{7}$ to find the shaded area.



$$A_1 = \pi r^2 \text{ where } r = 14 \text{ (for circular area A)}$$

$$= = $$

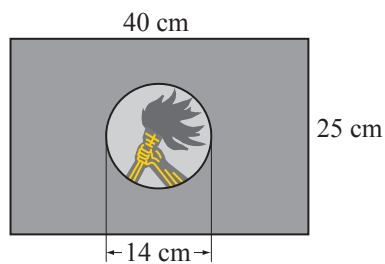
$$A_2 = l^2 \text{ (for square area B)}$$

$$= = $$

$$A = = \boxed{} \text{ m}^2$$

Skill 25.8 Calculating the area of composite circular shapes (2).

c) Use $\pi \approx \frac{22}{7}$ to find the area of the background color of the flag of Zaire, without the central circle.



$$=$$

$$=$$

$$=$$

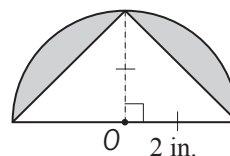
$$=$$

$$=$$

$$A =$$

$$=$$
 cm^2

d) Use $\pi \approx 3.14$ to find the area of the shaded shape.



$$=$$

$$=$$

$$=$$

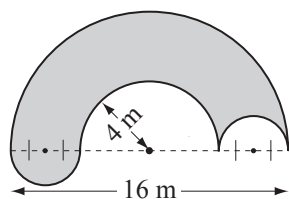
$$=$$

$$=$$

$$A =$$

$$=$$
 in.^2

e) Use $\pi \approx 3.14$ to find the area of the shaded shape.



$$=$$

$$=$$

$$=$$

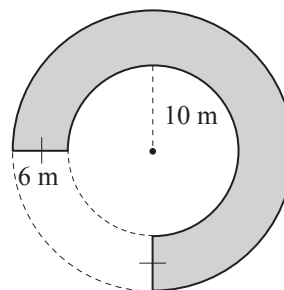
$$=$$

$$=$$

$$A =$$

$$=$$
 m^2

f) Use $\pi \approx 3.14$ to find the area of the shaded shape.



$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

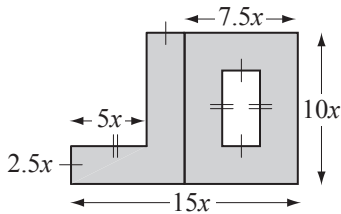
$$A =$$

$$=$$
 m^2

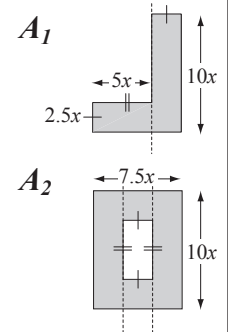
Skill 25.9 Expressing the area of two dimensional shapes in algebraic form (1).

- Break the shape up into workable parts.
- Write the formula for each part separately.
- Add the parts.

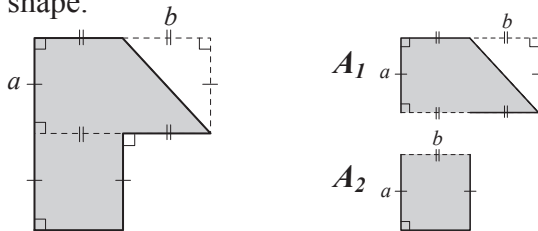
Q. Write a formula for the perimeter A of the shape.



A. $A_1 = 10x \cdot 2.5x + 5x \cdot 2.5x$
 $= 25x + 12.5x$
 $= 37.5x$
 $A_2 = 10x \cdot 7.5x - 5 \cdot 2.5x$
 $= 75x - 12.5x$
 $= 62.5x$
 $A = A_1 + A_2$
 $= 37.5x + 62.5x$
 $= 100x$



a) Write a formula for the area A of the shaded shape.



$A_1 = lw - \frac{1}{2}bh = a \cdot 2b - \frac{1}{2}ba = \frac{3ab}{2}$

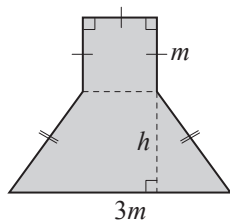
$A_2 = lw = a \cdot b = ab$

$A = A_1 + A_2$

$A = \frac{3ab}{2} + ab$

$A = \frac{5ab}{2}$

c) Write a formula for the area A of the shaded shape.



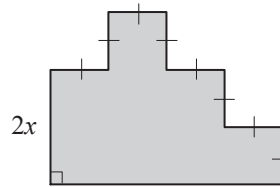
=

 =

 =

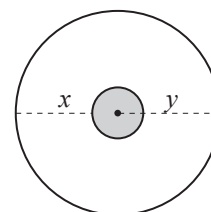
 $A =$ $A =$

b) Write a formula for the area A of the shaded shape.



$A_1 =$
 $A_2 =$
 $A_3 =$
 $A =$ $A =$

d) Write a formula for the area A of the shaded shape.

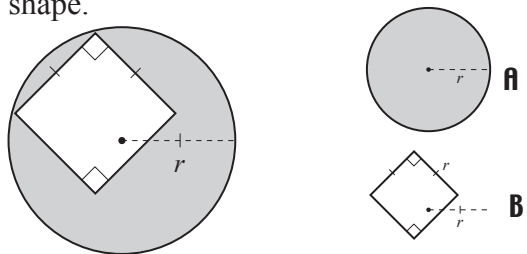


=

 $A =$ $A =$

Skill 25.9 Expressing the area of two dimensional shapes in algebraic form (2).

e) Write a formula for the area A of the shaded shape.



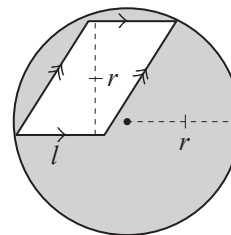
$A_1 = \pi r^2$ (for circular area **A**)

$A_2 = l^2$ (for square area **B**)

$= r^2$

$A =$ $A =$

f) Write a formula for the area A of the shaded shape.



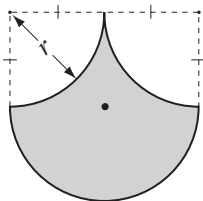
$A_1 =$

$A_2 =$

$=$

$A =$ $A =$

g) Write a formula for the area A of the shaded shape.



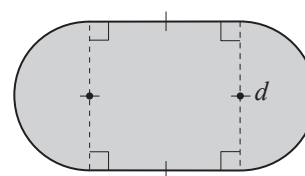
$=$

$=$

$=$

$A =$ $A =$

h) Write a formula for the area A of the shaded shape.



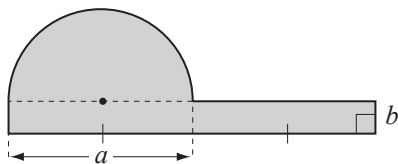
$=$

$=$

$=$

$A =$ $A =$

i) Write a formula for the area A of the shaded shape.



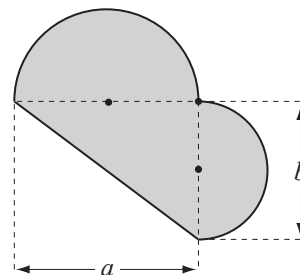
$A_{rectangle} =$

$A_{semicircle} =$

$=$

$A =$ $A =$

j) Write a formula for the area A of the shaded shape.



$A_{triangle} =$

$A_{semicircle 1} =$

$A_{semicircle 2} =$

$A =$ $A =$

Skill 25.10 Finding the area of a shape when the height, or the diagonal, or the perimeter of that shape is given.

- Draw a diagram if necessary and mark all the information given.
- Use the appropriate formulae to deduce the area.

Q. If the circumference of a round pizza is 22 inches, its area will be $\frac{121}{\pi}$ in.² True or false?

A. $C = 2\pi r$ where $C = 22$ in.

$$22 = 2\pi r$$

$$r = \frac{22}{2\pi} \Rightarrow r = \frac{11}{\pi}$$

$$A = \pi r^2$$

Substitute the value of r into the area formula:

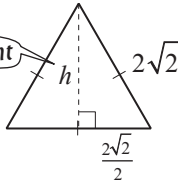
$$A = \pi \times \left(\frac{11}{\pi}\right)^2 = \pi \times \frac{121}{\pi^2} = \frac{121}{\pi}$$

The answer is **true**.

a) If the side length of an equilateral triangle is $2\sqrt{2}$, find its area.

Use Pythag. to find height

$$h^2 + \left(\frac{2\sqrt{2}}{2}\right)^2 = (2\sqrt{2})^2$$



$$h^2 + 2 = 8 \Rightarrow h^2 = 6 \Rightarrow h = \sqrt{6}$$

Use Area of Δ

$$A = \frac{1}{2}(2\sqrt{2} \times \sqrt{6}) = \sqrt{12} = \boxed{} \text{ in.}^2$$

b) The area of a square pen is 361 yd². What length is a side of the pen?

.....

.....

..... = yd

c) If the diagonal of a square is 10 in., find its area.

.....

.....

..... = in.²

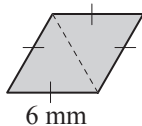
d) What is the area of an equilateral triangle with a side length of $2\sqrt{5}$ ft? [Hint: Pythagorean theorem will help.]

.....

.....

..... = ft²

e) What is the area of the rhombus? [Reduce the radical to simplest form.]



.....

.....

..... = mm²

f) If the circumference of a circle is 30 mm, its area will be $\frac{215}{\pi}$ mm². True or false?

.....

.....

..... =