Worksheet 69

Area of composite shapes

To find areas of composite shapes with straight edges:

- split the shape into rectangles and triangles;
- find the areas of the individual bits;
- add or deduct the areas to get the total area.

Example 1

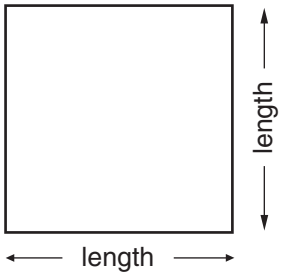
We use **formulae** to calculate area.

RECTANGLE

Area = length × breadth

SQUARE

Area = length × length



Note

length and breadth in same units

- If a rectangle measures 5m by 3m, its area is 5 x 3 = 15 m^2 (square metres).
- If a square is 12 mm along each side, its area is 12 x 12 = 144 mm^2 (square millimetres).

See how all the measurements are in the same 'family' –

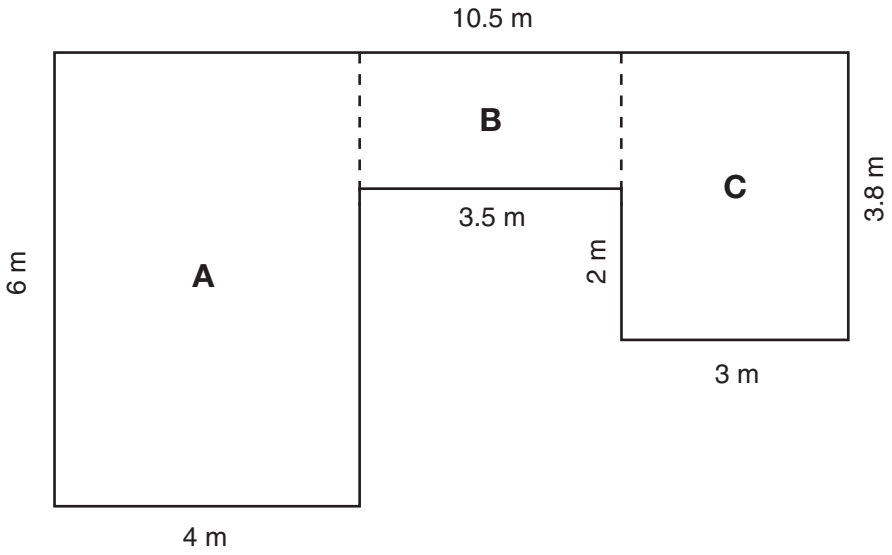
lengths in metres (m) give area in square metres (m^2)

lengths in millimetres (mm) give area in square millimetres (mm^2).

Hint

Keep the units the same.

More complicated shapes can often be split into rectangles, like this:



Hint

Setting out is important as it makes it easier to total your individual areas and find any mistakes.

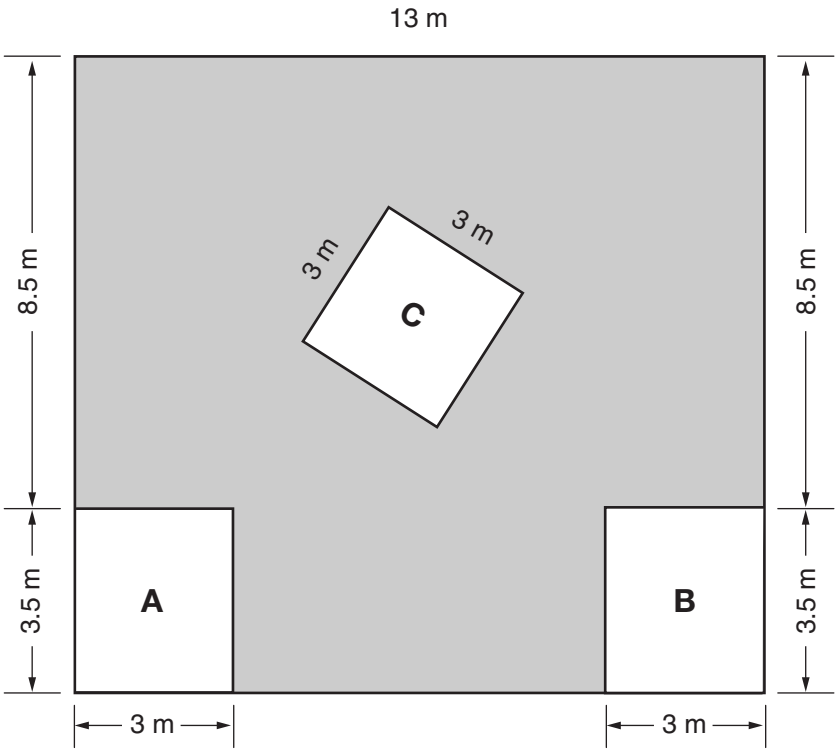
Area A = $6 \times 4 = 24$ m^2

Area B = $3.5 \times 1.8 = 6.3$ m^2

Area C = $3 \times 3.8 = 11.4$ m^2

Total area = A + B + C = 41.7 m^2

Or we can treat them as larger rectangles with smaller rectangles or squares removed, as below.



Shaded area = area of large rectangle – (total area of A + B + C)

Area of large rectangle = 13 × 12 = 156 m^2

Area A = 3 × 3.5 = 10.5 m^2

Area B = 3 × 3.5 = 10.5 m^2

Area C = 3 × 3 = 9 m^2

Total area of A + B + C = 30 m^2

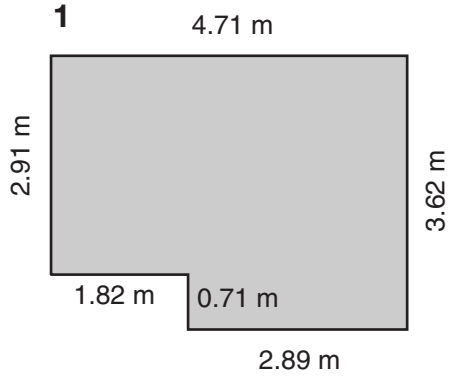
Area of shaded area = 156 m^2 – 30 m^2 = 126 m^2

Exercise 1

Make sketches of these diagrams and calculate the shaded areas.

Where there are decimals in an answer, round the final answer to two decimal places. In some cases, you may have to work out missing measurements before you start.

1



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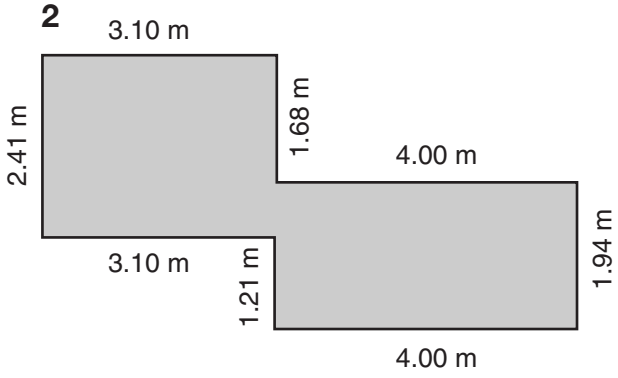

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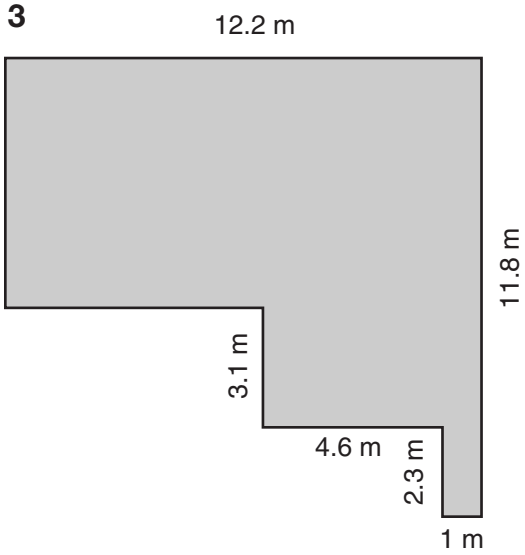

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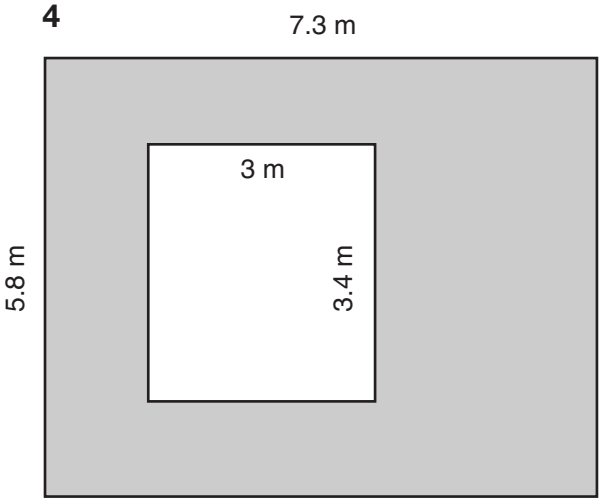

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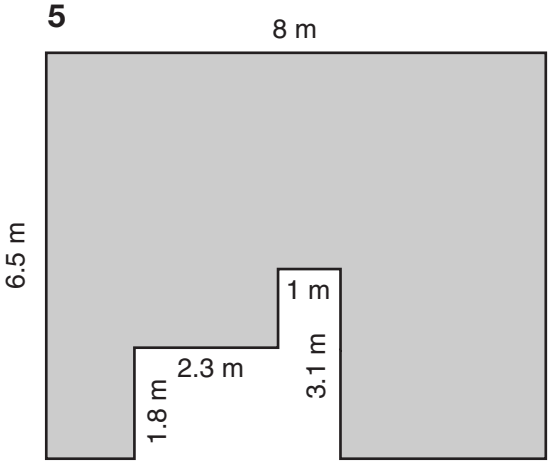

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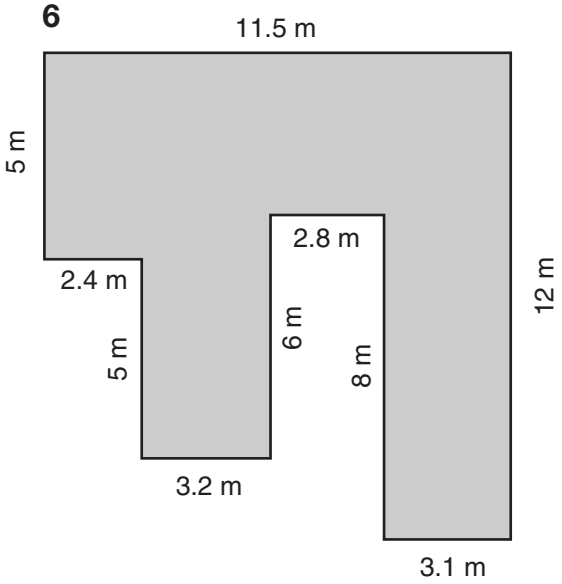


Area of a triangle

Sometimes, the shapes might be triangular.

Example 2

It is quicker to work out the area of a triangle by this rule:

Area of triangle = $\frac{1}{2}$ × base × height

The base can be any side.

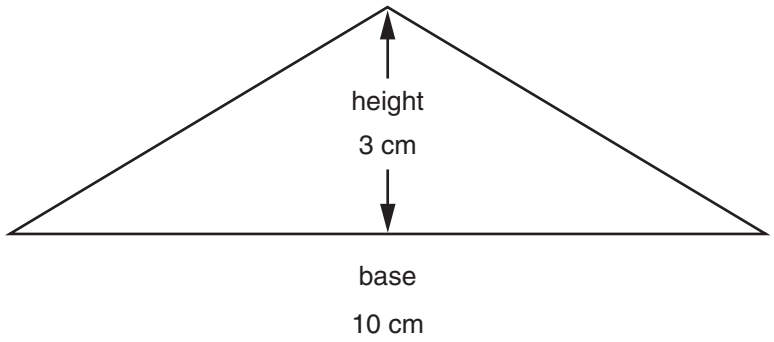
The height is the line from the base to the opposite corner.

Example:

Area of triangle $= \frac{1}{2} \times 10 \times 3$

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

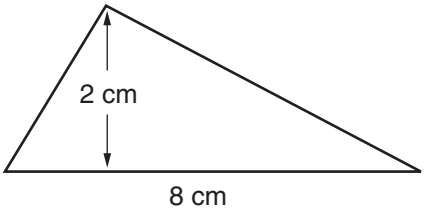
$= 15\ \text{cm}^2$



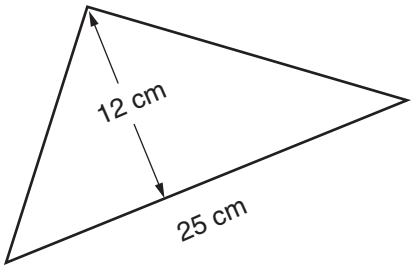
Exercise 2

1 Find the areas of these triangles.

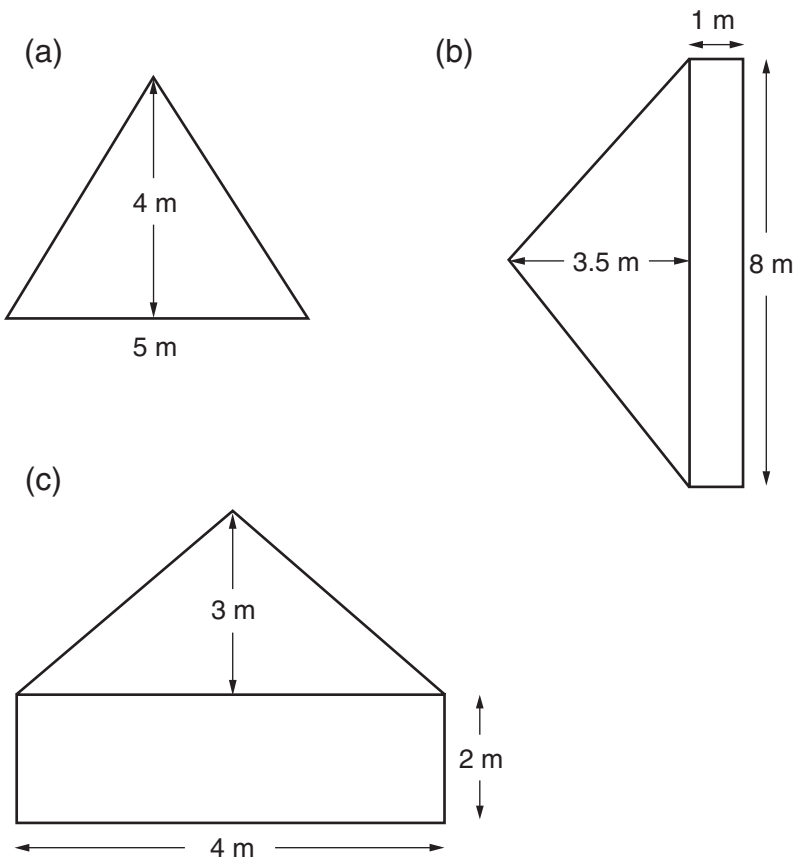
(a)



(b)

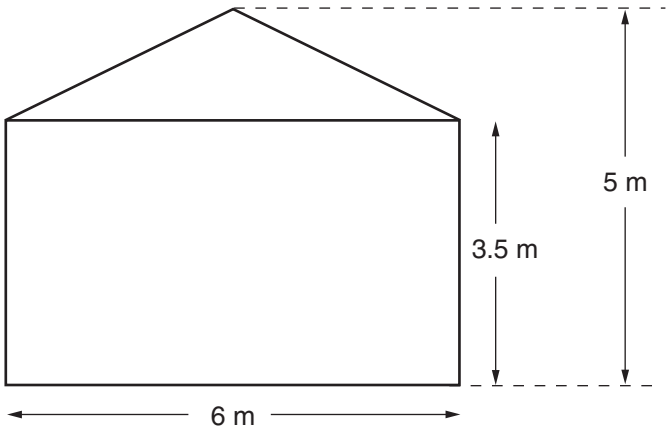


2 *Find the total areas of these shapes.*



Exercise 3

Find the area of the gable end of this building.

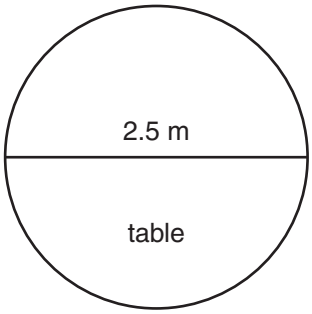


Area of a circle

Hint

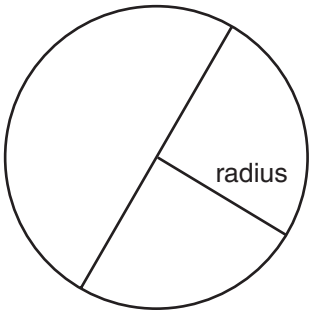
π (pronounced pie) is usually rounded to 3.14, or 3.142.

Use the formula: π × radius × radius



The radius is 2.5 ÷ 2 = 1.25 m.

Hint



The radius is half the diameter.

The surface area of the table is:

π × radius × radius

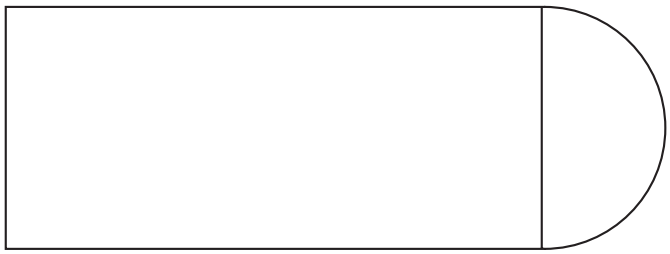
3.14 × 1.25 × 1.25

= 4.90625 m^2.

Exercise 4

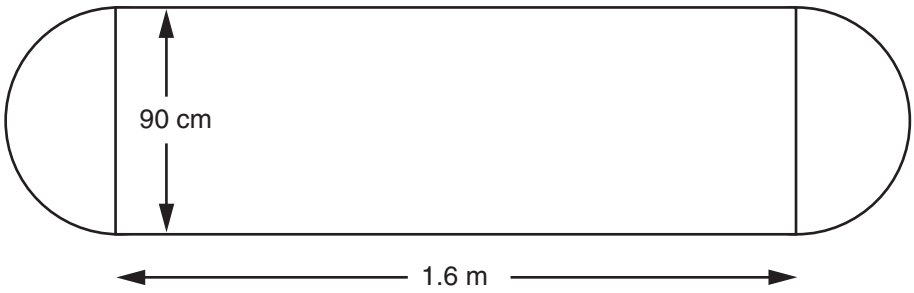
Calculate the surface area of the table above using π = 3.142 (to 3 decimal places).

Sometimes you have composite shapes that consist of, say, rectangles and circles (or semi-circles). For example, an ironing board:



Example 3

Find the surface area of the shape below, using $\pi = 3.142$.



The two ends are semi-circular, with diameter 90 cm = 0.9 m.

1 Area of rectangle = $1.6 \times 0.9 = 1.44$ m^2

Hint

Note the change to common units of measurement.

2 Area of semi-circles = area of a full circle with radius $0.9 \div 2 = 0.45$ m.

$A = \pi r^2 = 3.142 \times 0.45 \times 0.45 = 0.64$ m^2 (2 decimal places)

Total area = $1.44 + 0.64 = 2.08$ m^2

Exercise 5

Find the surface of the ironing board shown below. (Use $\pi = 3.142$.)