

CALCULATING AREA

The ability to calculate area accurately is an important skill in the trades.



KEY POINTS

Area:

- is two-dimensional: it is the amount of space inside a flat object such as a rectangle or circle
- answers are expressed as “square” units, such as, square metres (m²) or square feet (ft²)
- can only be accurately calculated when all measurements are in the same unit of measurement

Area of a straight-sided figure:

- is calculated as length (L) x width (W)
- the formula is *Area = length x width* which is written like this $A = L \times W$

Area of a circle:

- is calculated using radius (r) and pi (π)
 - radius is half the length of the diameter
 - diameter is the length of a line through the center of the circle that touches the circumference on both sides
 - pi (π), is the ratio of a circle’s circumference to its diameter
- the formula is *Area = pi x the radius squared* which is written like this $A = \pi r^2$

An Important Note about pi

The most accurate way to complete a calculation that includes pi is to use a calculator with the π key option. If you do not have access to this sort of calculator, you can use the value of 3.14 for pi, when practicing. However, 3.14 is not as accurate a measurement and should not be used in situations where accuracy is important.

An example is shown on page 4.

Area of a triangle:

- can be thought of as one half of a square or “parallelogram” (a four-sided shape with two pairs of sides of equal length)
- the height of a triangle is measured as a right-angled line from the bottom line to the top point (apex) of the triangle



- the formula is *Area = Base x Height divided by 2*, which is written like this $A = B \times H \div 2$



STEPS

Calculate the area of a rectangle:

1. Measure the length and width of the rectangle.
2. Write the measurements into the formula: $A = L \times W$
3. Express the answer as a squared number, for example, m^2 or cm^2 .

Calculate the area of a circle:

1. Measure the diameter of the circle.
2. Calculate the radius of the circle by dividing the diameter by 2.
3. Write the measurements you know into the formula: $A = \pi r^2$
4. Multiply the radius by itself, for example, if $r = 7$ then multiply 7×7
5. Multiply the result by 3.14.
6. Express the answer as a squared number, for example, m^2 or cm^2 .

Calculate the area of a triangle:

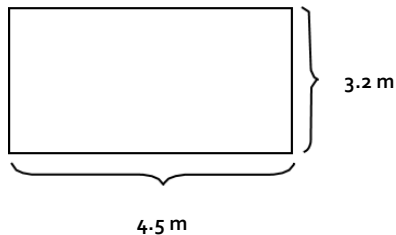
1. Measure the base (width) and height of the triangle.
2. Write the measurements into the formula: $A = B \times H \div 2$
3. Express the answer as a squared number, for example, m^2 or cm^2 .

EXAMPLES

The area of the floor of a room must be calculated, in order that the correct amount of carpet can be purchased.

Area of a rectangle:

Calculate the area of a room that is 4.5 m long and 3.2 m wide.



$$A = L \times W$$

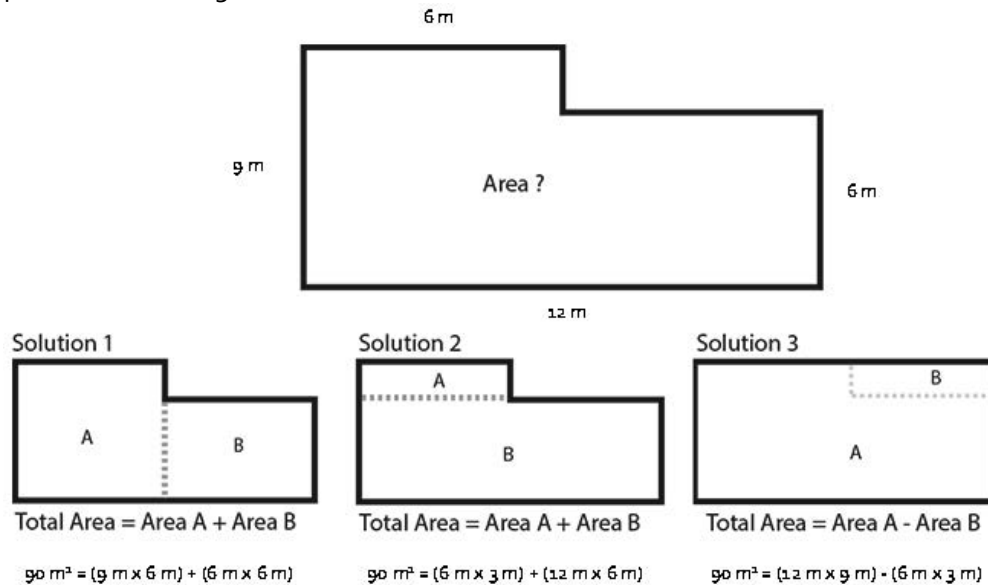
$$A = 4.5 \text{ m} \times 3.2 \text{ m}$$

$$A = 14.4 \text{ m}^2$$

The area of the floor of this room is 14.4 square metres. Enough carpet to cover 14.4 m^2 will need to be purchased.

Area of more complex straight-sided shapes:

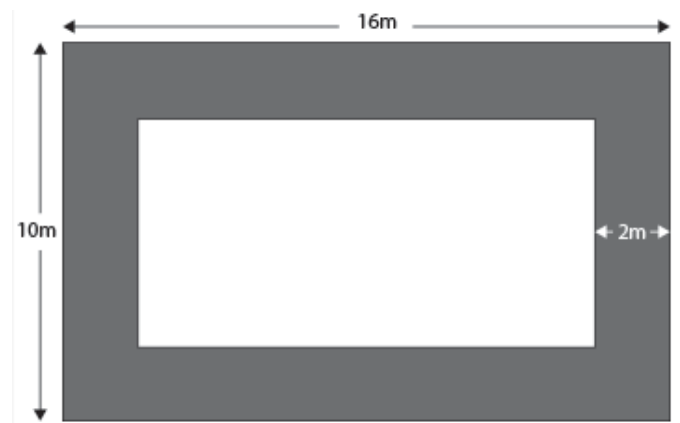
Very often the shape is not a simple rectangle or square. In that case you need to measure area by splitting the shape into more than one square or rectangle, as in the examples below. It does not matter how the shape is split up, in this case. As you can see, the result would be the same in each solution. Two of the solutions require adding the areas together and the third solution requires subtracting the area of the missing part of the rectangle.



Edited from source: <https://www.skillsyouneed.com/num/area.html>

Area of a shape around or within another shape:

The need to find the area of a border is also a common requirement. For example, the total area of a garden to be landscaped is to be 16 m x 10 m, but there is to be a 2 m brick pathway around the perimeter of the garden. In order to calculate materials needed for the pathway, it is necessary to calculate the area of it.



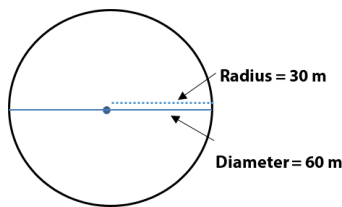
Edited from source: <https://www.skillsyouneed.com/num/area.html>

- Calculate the area of the whole shape - 16 m x 10 m
- Calculate the dimensions of the middle section

- path around the edge is 2m wide on each side
- length of the whole shape 16m - 4m of pathway (2m on the left of the shape and 2m on the right) 16m - 4m = **12m**
- width of the whole shape is 10 m - 4 m (2m on the top of the shape and 2m on the bottom) 10 m - 4 m = **6 m**
- middle rectangle is 12m × 6m.
- Area of the middle rectangle is 12 m × 6 m = 72 m²
- Subtract the area of the middle rectangle from the area of the whole shape.
160 - 72 = 88 m²
- Area of the pathway is 88 m²

Area of a circle:

Find the area of a large circular patio for a new restaurant. The patio has a radius of 30 metres.



π by calculator

$$A = \pi r^2$$

$$A = \pi (30 \text{ m} \times 30 \text{ m})$$

$$A = \pi (900 \text{ m}^2)$$

$$A = \pi \times 900 \text{ m}^2$$

$$A = 2827.433 \text{ m}^2$$

π as 3.14

$$A = \pi r^2$$

$$A = 3.14(30 \text{ m} \times 30 \text{ m})$$

$$A = 3.14 (900 \text{ m}^2)$$

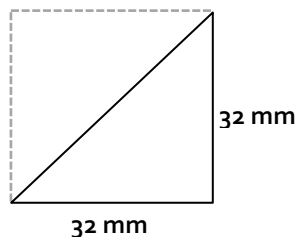
$$A = 3.14 \times 900 \text{ m}^2$$

$$A = 2826 \text{ m}^2$$

The area of this patio is 2827.433 metres squared or 2826 metres squared. In this case, it is likely either result could be used to estimate the amount of materials to be ordered, however, the 3.14 result does leave more room for error.

Area of a triangle:

Find the area of the space for the glass in a triangular decorative window.



$$A = B \times H \div 2$$

$$A = 32 \times 32 \div 2$$

$$A = 512 \text{ mm}^2$$

The area of the space for the glass is 512 mm².

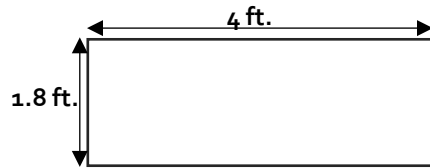
Think you understand how to calculate area? Try it yourself on the next page.

USING THE SKILL

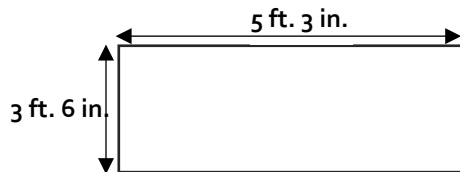


In the Workplace: Calculations of area are often used to determine amounts of material required to cover the surface of various shapes. Accurate calculations save time and money.

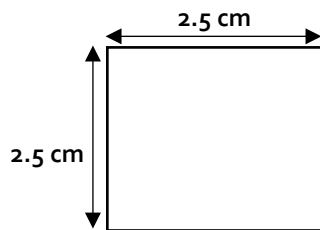
Calculate the area of each of the shapes below. Remember to show the units in your answer (cm^2 , m^2 , etc.).



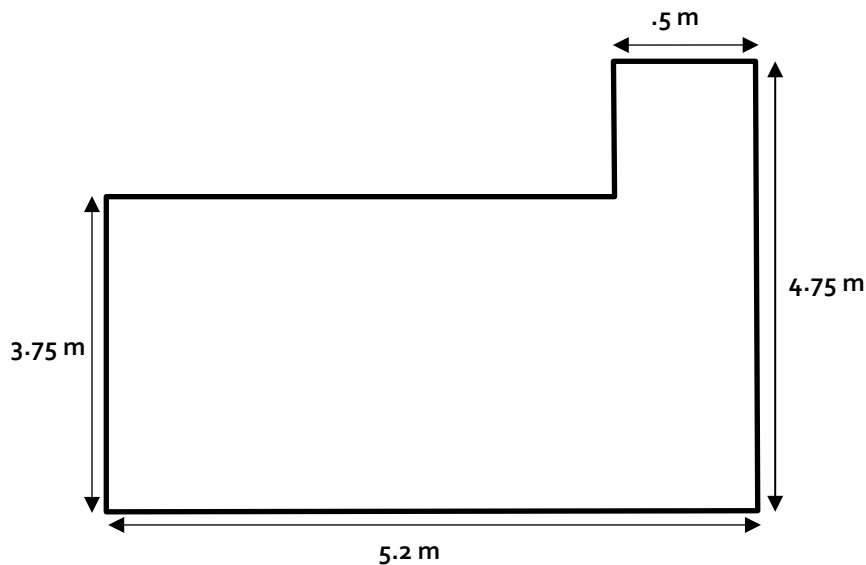
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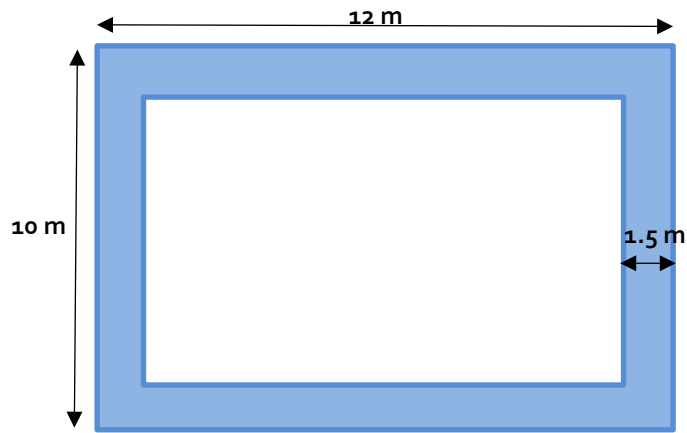
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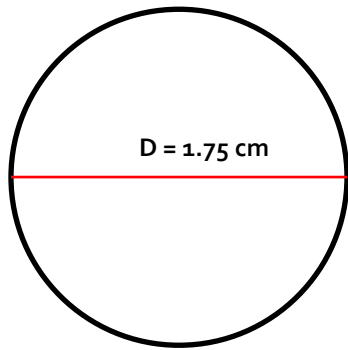


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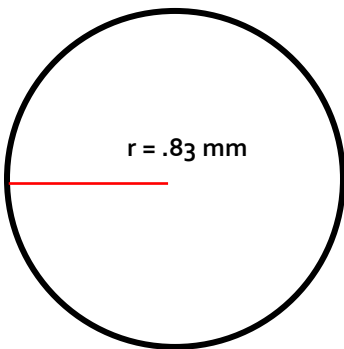


Area of the pathway

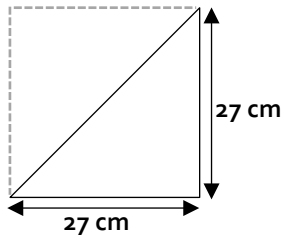
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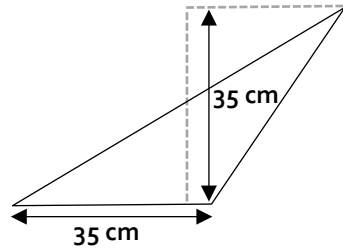
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REFLECTION

How do you use area at work? When do you use it?