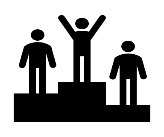
**Skill Sheet: Areas**

***What You Need to Know:***

The area of a component may be needed to calculate, for example:



***Examiners***

***Top Tip***

*The area of a complicated shape can be calculated by breaking it down into a number of simple shapes*

* the amount of material required to make a number of parts;
* how much waste will be created when a part is cut out;
* the volume or mass of material needed to make a product.

The formulae for the areas of simple shapes are:

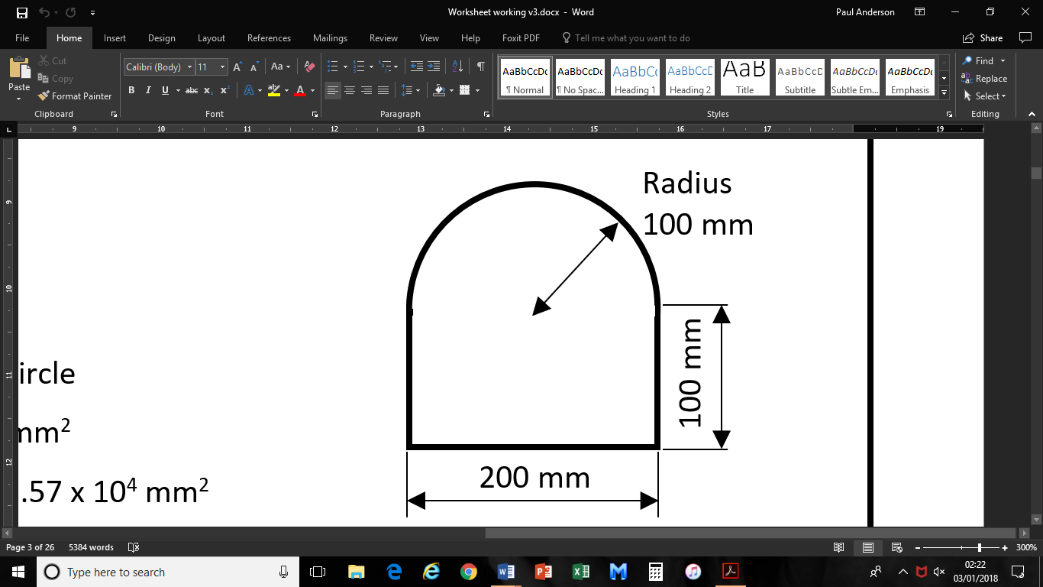
Area of a rectangle = length x width = L x W

Area of a triangle= half (base x height) = ½ (B x H)

Area of a circle = π r2

A square is a rectangle where the length and width are the same. A cube is a 3D square with six faces. Therefore the surface area of a cube = 6 x length x length = 6 x L2.

***Example:***



Calculate the area of the part shown in figure 1.

***Answer:***

Treat the shape as 2 parts: a rectangle and a semi-circle

Area of the rectangle = L x W = 200 x 100 = 2 x 104 mm2

Area of the semi-circle = ½ π r2 = ½ x 3.14 x 1002 = 1.57 x 104 mm2

**Figure 1**

Total area = 2 x 104 + 1.57 x 104 = 3.57 x 104 mm2

***Now Try These:***

**Figure 2**

30 mm

110 mm

1. Calculate the area of the part in Figure 2.

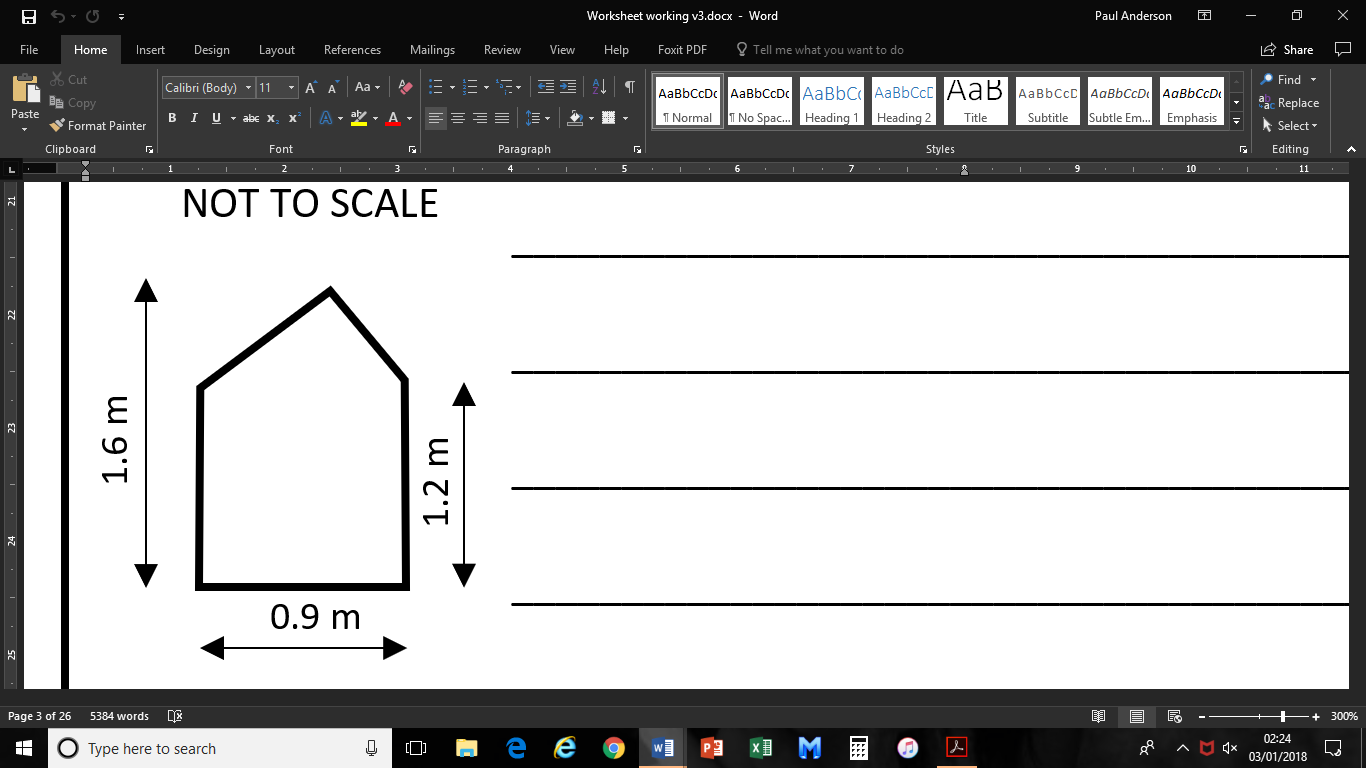
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1. The shape in Figure 3 needs to be cut out for use in a repair. Calculate the area of the shape.

NOT TO SCALE

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**Figure 3**

**Practice Sheet: Areas**

***Now Try These:***

1. A rectangle with sides of 450 mm and 200 mm needs to be cut to make a side panel for a machine.

Calculate the area of a rectangle, using standard form.

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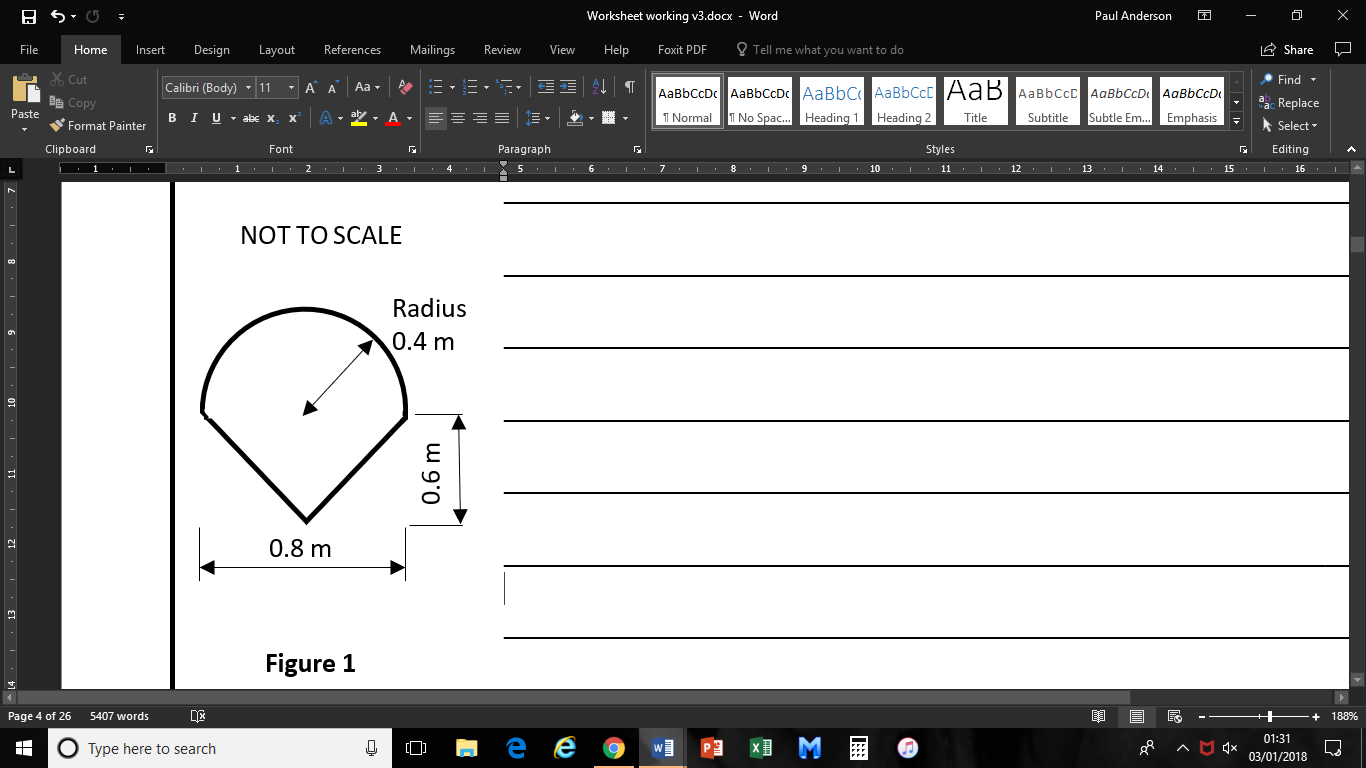
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1. Calculate the surface area of a cube where each side is 0.6 m.

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1. Calculate the area of the shape shown in Figure 1.



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**Figure 1**

1. A manufacturer has a rectangular sheet of steel that is 1.2 m by 1.4 m. This will be used to cut out four circles of radius 0.3 m. Once the circles have been cut out the remaining material will be scrap.
2. Determine the area of one circle.

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1. Calculate the percentage of material that will be scrap.

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**Answers:**

**Skill Sheet: Areas**

1. Area = ½ (B x H) = ½ (30 x 110) = 1650 mm2
2. The shape is made up of a rectangle and a triangle

Area of the rectangle = L x W = 1.2 x 0.9 = 1.08 m2

Area of the triangle = ½ (B x W) = ½ (0.9 x 0.4) = 0.18 m2

Total area = 1.08 + 0.18 = 1.26 m2

**Practice Sheet: Areas**

1. Area of the rectangle = L x W = 450 x 200 = 90000 mm2= 9 x 104 mm2
2. Area of the cube = 6 x L2 = 6 x 0.36 = 2.16 m2
3. The shape is made up of a semi-circle and a triangle

Area of the semi-circle = π r2 / 2 = 3.14 x 0.42 /2 = 0.251 m2

Area of the triangle = ½ (B x W) = ½ (0.8 x 0.6) = 0.24 m2

Total area = 0.251 + 0.24 = 0.491 m2

1. a) Area = π r2 = 3.14 x 0.32 = 0.2826 m2

b) Area of the sheet = L x W = 1.2 x 1.4 m2 = 1.68 m2

Total area of the 4 circles = 4 x 0.2826 = 1.1304 m2

Waste = 1.68 – 1.1304 = 0.5496 m2

% waste = 0.5496 / 1.68 x 100 / 1 = 32.71 %