

Calculating Cost

To calculate Cost you need to:

- Firstly work out the cost of machining by multiplying the hours by the cost per hour.
- Then add the materials onto the cost of machining.

To calculate the percentage profit you need to:

- Work out the profit by subtracting the Sales price from the total cost.
- Then you divide the Profit by the sales price and multiple by 100 to get the % profit.

MATHEMATICAL UNDERSTANDING

Calculating costs (M14: use ratios, fractions and percentages)

Question

A company buys in materials and machines them to make a final product.

The cost of materials used in a product is £53.20.

The product requires a total of 2.5 hours machining, at a rate of £30 per hour (which includes labour and allowances for all other business costs).

- Calculate the total cost of manufacturing the product.
- The sales price of the product is £160.25.
Calculate the percentage profit that the company makes on each product.

Solution

a Cost of machining = $2.5 \times 30 = £75$

Total manufacturing cost = cost of materials + cost of machining = $53.20 + 75.00 = £128.20$

b Profit per product = $160.25 - 128.20 = £32.05$

Percentage profit = $\frac{32.05}{160.25} \times \frac{100}{1} = 20\%$

Calculating Cost

1, A company buys in materials and machines them to make a new product. The cost of materials used in the product is £20. The product requires a total of 2hrs machining time at a rate of £30 per hour.

A, Calculate the total cost of manufacturing the product

B, The sales price of the product is £160. Calculate the percentage profit that the company makes on each product.

2, A company buys in materials and machines them to make a new product. The cost of materials used in the product is £40. The product requires a total of 2.5hrs machining time at a rate of £30 per hour.

A, Calculate the total cost of manufacturing the product

B, The sales price of the product is £143.75. Calculate the percentage profit that the company makes on each product.

3, A company buys in materials and machines them to make a new product. The cost of materials used in the product is £55.50. The product requires a total of 3.5hrs machining time at a rate of £30 per hour.

A, Calculate the total cost of manufacturing the product

B, The sales price of the product is £208.65. Calculate the percentage profit that the company makes on each product.

4, A company buys in materials and machines them to make a new product. The cost of materials used in the product is £65.75. The product requires a total of 4.25hrs machining time at a rate of £30 per hour.

A, Calculate the total cost of manufacturing the product

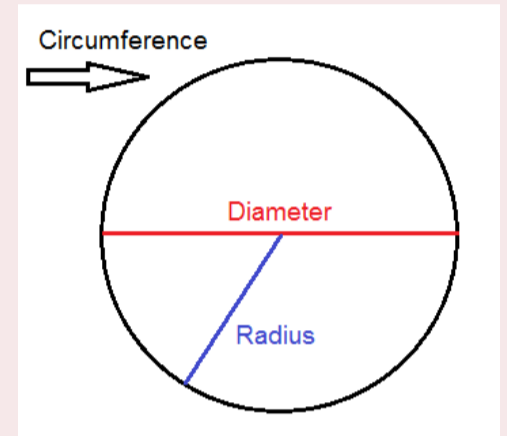
B, The sales price of the product is £278.28. Calculate the percentage profit that the company makes on each product.

Calculating Waste

To Calculate Waste you need to:

Firstly, work out the area of one circle by using the equation
 $3.142 \times (R \times R) =$

The question gives the circle size in diameter (0.4) to get the radius you have to halve the diameter.



To calculate the percentage waste you need to:

- Multiply one size by how many the questions says are needed.
- Work out the area of the material used using the equation:
 $\text{Area} = \text{length} \times \text{Width}.$
- Subtract the Area of material from the Area of circles, this will give you the waste.
- Waste divide by Area of material multiply by 100.

MATHEMATICAL UNDERSTANDING

E3: Area of a circle

Question

A company has a rectangular sheet of material that is 1 m × 1 m in size. They need to cut out four circles each of diameter 0.4 m. After the circles have been cut out, the rest of the material will be waste.

- Calculate the area of one circle, to three significant figures.
- Calculate the percentage of material that will be wasted by this operation.

Solution

- Cross-sectional area = $\pi r^2 = \pi \times 0.2^2 = 0.126 \text{ m}^2$
- Amount of material used = $0.126 \text{ m}^2 \times 4 = 0.504 \text{ m}^2$
 Amount of waste material = $1 - 0.504 = 0.496 \text{ m}^2$

$$\text{Percentage of waste} = \frac{0.496}{1} \times \frac{100}{1} = 49.6\%$$

Calculating waste

1, A rectangular sheet of material 0.8m x 1.2m is being used to cut out four circles each with a diameter of 0.5m, after the circles have been cut out the rest will be waste.

A, calculate the area of one circle, to three significant figures

B, Calculate the percentage of waste created

2, A rectangular sheet of material 2m x 4m is being used to cut out four circles each with a diameter of 0.7m, after the circles have been cut out the rest will be waste.

A, calculate the area of one circle, to three significant figures

B, Calculate the percentage of waste created

3, A rectangular sheet of material 3m x 1.5m is being used to cut out six circles each with a diameter of 0.6m, after the circles have been cut out the rest will be waste.

A, calculate the area of one circle, to three significant figures

B, Calculate the percentage of waste created

4, A rectangular sheet of material 1.2m x 0.75m is being used to cut out eight circles each with a diameter of 0.25m, after the circles have been cut out the rest will be waste.

A, calculate the area of one circle, to three significant figures

B, Calculate the percentage of waste created