

Design & Technology

Mathematics for D&T – Number, percentages and percentiles

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary

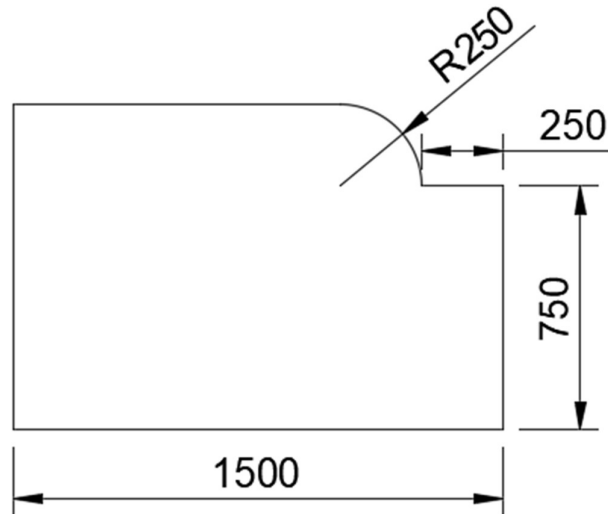
Advice

- Marks for each question are in brackets
- Read each question fully
- Try to answer every question
- Don't spend too much time on one question

Good luck!

Q1. A person needs to print 400 labels for a product. Each label covers 0.04cm^2 . A roll of labels covers 7cm^2 and cost £4.99. What is the cost to label all the products? **(3 marks)**

Q2. Some sheet metal is being cut for a car door. If the density of the metal is 2.8g/cm^3 and the metal is 6mm thick. What is the mass of the sheet metal? All measurements are in mm. **(5 marks)**



Q3. A concrete manufacturer is to provide concrete for a new high speed railway within the UK.

- A construction company requires 2000 bags of cement a day for construction
- The cement manufacturer can create 800 tonnes of cement a day
- 1 bag of cement weighs 450kg

Calculate whether the cement manufacturer can meet the construction companies cement demand **(3 marks)**

Q4a. A wallpaper company prints rolls of wallpaper 100m long by 1.2m wide. A manufacturer wants to wrap is product, the wrapping needed is 3.5m x 0.5m. Calculate the number of products he can wrap with one roll. **(3 marks)**

Q4b. Calculate the waste material in one roll as a percentage **(2 marks)**

Q5. A business owner has two options when it comes to packaging his product. He can use manual labour, or he can invest in a new vacuum forming machine. The unit cost of the product when he uses manual labour is 40p. When he uses a vacuum forming machine it is 5p. The cost of the vacuum forming machine is £15,000. How many products are needed before the vacuum forming machine is the most cost effective method of manufacture **(6 marks)**

Q6. A new high speed railway will decrease the time taken to travel between London and York by 13 minutes. The journey takes 2.10 hours currently. Calculate the percentage reduction in travel time **(3 marks)**

Answers

Q1.

3 rolls – £14.97

Q2.

Shape area = 14240.87cm^2

Volume = 8544.52cm^3

Mass = 23.92kg

Q3.

$2000 \times 450 = 900,000\text{kg} = 900 \text{ tonne}$, demand is too high (i.e. No)

Q4a.

56

Q4b.

Total area = 120m^2

Useful = 98m^2

Waste = 18.33%

Q5.

42,858

Q6.

10.3% reduction