

Edexcel GCSE

Mathematics (Linear) – 1MA0

FUNCTIONAL MATHS

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers

Nil

**Instructions**

Use black ink or ball-point pen.

Fill in the boxes at the top of this page with your name, centre number and candidate number.

Answer all questions.

Answer the questions in the spaces provided – there may be more space than you need.

Calculators may be used.

Information

The marks for each question are shown in brackets – use this as a guide as to how much time to spend on **each** question.

Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

Advice

Read each question carefully before you start to answer it.

Keep an eye on the time.

Try to answer every question.

Check your answers if you have time at the end.

1. The diagram shows a patio in the shape of a rectangle.

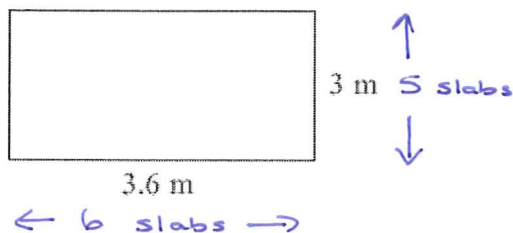


Diagram NOT
accurately drawn

The patio is 3.6 m long and 3 m wide.

Matthew is going to cover the patio with paving slabs.
Each paving slab is a square of side 60 cm.

Matthew buys 32 of the paving slabs.

- (a) Does Matthew buy enough paving slabs to cover the patio?
You must show all your working.

$$\begin{array}{lcl} 3.6\text{ m} & = & 360\text{ cm} \\ 3\text{ m} & = & 300\text{ cm} \end{array} \quad \begin{array}{lcl} 360 \div 60 & = & 6 \\ 300 \div 60 & = & 5 \end{array}$$

$$5 \times 6 = 30 \text{ slabs required}$$

So he has enough slabs.

He will have 2 slabs left

Yes.....
(3)

The paving slabs cost £8.63 each.

- (b) Work out the total cost of the 32 paving slabs.

Non-Calc

| | | | |
|----|-------|------|----|
| | 800 | 60 | 3 |
| 30 | 24000 | 1800 | 90 |
| 2 | 1600 | 120 | 6 |

$$= £276.16$$

$$\begin{array}{r} 24000 \\ 1800 \\ 90 \\ 1600 \\ 120 \\ 6 \\ \hline 27616 \end{array}$$

Calc

$$32 \times 8.63 = £276.16$$

£ 276.16.....
(3)

(6 marks)

- *2. Mr Weaver's garden is in the shape of a rectangle.

In the garden

there is a patio in the shape of a rectangle
and two ponds in the shape of circles with diameter 3.8 m.

The rest of the garden is grass.

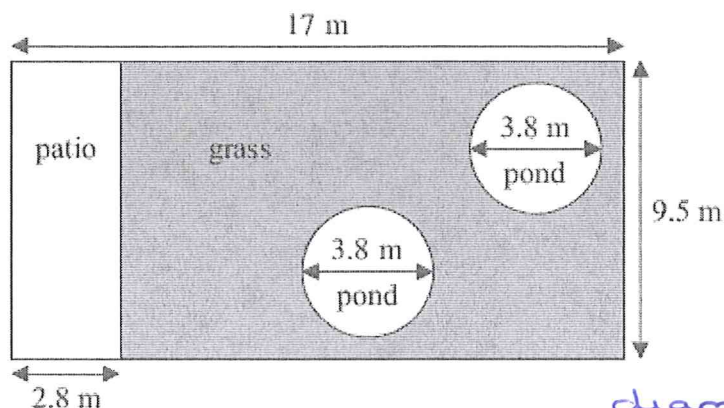


Diagram NOT
accurately drawn

diameter pond = 3.8
so radius = 1.9 m

Mr Weaver is going to spread fertiliser over all the grass.
One box of fertiliser will cover 25 m² of grass.

How many boxes of fertiliser does Mr Weaver need?
You must show your working.

$$\text{Whole Garden Area} = 17 \times 9.5 = 161.5 \text{ m}^2$$

$$\text{Patio Area} = 2.8 \times 9.5 = 26.6 \text{ m}^2$$

$$\text{Area Pond} = \pi r^2 = \pi \times 1.9^2 = 11.341149 \text{ m}^2$$

$$\begin{aligned} \text{Grass Area} &= 161.5 - \text{Patio} - \text{pond} - \text{pond} \\ &= 161.5 - 26.6 - 11.341149 - 11.341149 \\ &= 112.217701 \end{aligned}$$

$$112.217701 \div 25 = 4.48870$$

so he will need to buy 5 boxes.

(5 marks)

- *3. Henry is thinking about having a water meter.

These are the two ways he can pay for the water he uses.

Water Meter

A charge of £28.20 per year

plus

91.22p for every cubic metre of water used

1 cubic metre = 1000 litres

No Water Meter

A charge of £107 per year

Henry uses an average of 180 litres of water each day.

Henry wants to pay as little as possible for the water he uses.
Should Henry have a water meter?

Water Meter

Water used in one year

$$= 365 \times 180$$

$$= 65700 \text{ litres}$$

$$= 65.7 \text{ cubic metres.}$$

Cost of water

$$91.22 \times 65.7$$

$$= 5993.154 \text{ pence}$$

$$= \text{£}59.93 \text{ (nearest penny)}$$

Total Charge

$$\text{£}28.20 + \text{£}59.93$$

$$= \text{£}88.13$$

No Water Meter

Total Charge £107

He should have a water meter as it costs £18.87 less.

(5 marks)

- *4. Here is part of Gary's electricity bill.

| Electricity bill | |
|--------------------|------------|
| New reading | 7155 units |
| Old reading | 7095 units |
| Price per unit 15p | |

Work out how much Gary has to pay for the units of electricity he used.

$$\begin{array}{r} 7155 \\ - 7095 \\ \hline 60 \end{array}$$

He has used 60 units

$$\begin{aligned} 60 \times 15 &= 900 \text{ pence} \\ &= \text{£}9.00 \end{aligned}$$

(4 marks)

5. Peter works out the cost of the gas he used last year.
At the start of the year, the gas meter reading was 12967 units.
At the end of the year, the gas meter reading was 14059 units.
Each unit of gas he used cost 44p.

Work out the mean cost per month of the gas he used last year.

$$\begin{array}{r} 14059 \\ - 12967 \\ \hline 1092 \end{array} \text{ units used.}$$

$$\begin{aligned} 1092 \times 44 &= 48048 \text{ pence} \\ &= \text{£}480.48 \text{ in one year.} \end{aligned}$$

$$\begin{aligned} \text{Mean cost per month} \\ &= 480.48 \div 12 \\ &= \text{£}40.04 \end{aligned}$$

£ 40.04
(5 marks)

6. Here is a diagram of Jim's garden.

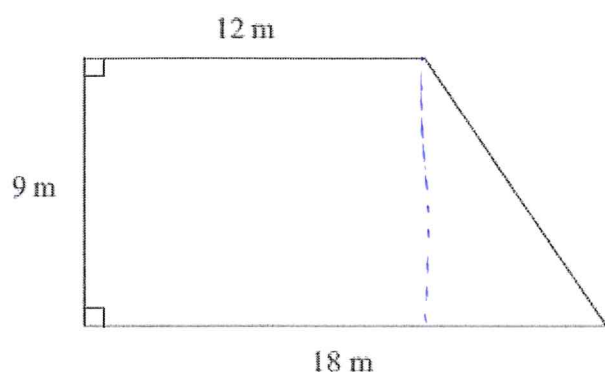


Diagram NOT
accurately drawn

Jim wants to cover his garden with grass seed to make a lawn.

Grass seed is sold in bags.

There is enough grass seed in each bag to cover 20 m^2 of garden.

Each bag of grass seed costs £4.99

Work out the least cost of putting grass seed on Jim's garden.

Area of Garden

Area of Trapezium

$$= \frac{1}{2}(a+b)h$$

$$= \frac{1}{2}(12+18) \times 9$$

$$= \frac{1}{2}(30) \times 9$$

$$= 15 \times 9$$

$$= 135 \text{ m}^2$$

or Split in to rectangle + triangle

$$\text{Rectangle} = 9 \times 12 = 108$$

$$\text{Triangle} = \frac{6 \times 9}{2} = 27$$

$$\begin{aligned} \text{Total Area} &= 108 + 27 \\ &= 135 \text{ m}^2 \end{aligned}$$

7 bags of grass will cover 140 m^2

So he needs to buy 7 bags.

$$7 \times 4.99 = £34.93$$

£ 34.93

(5 marks)

7. Jon has a flower garden in the shape of a circle.
The diameter of the garden is 5 metres.

Jon wants to put fencing around the edge of the garden.
The fencing costs £1.80 per metre.

Work out the total cost of the fencing.

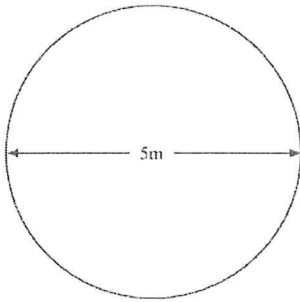


Diagram NOT
accurately drawn

$$\text{Circumference} = \pi d$$

$$= \pi \times 5$$

$$= 15.70796327$$

$$\text{Cost} = 15.70796327 \times 1.80$$

$$= 28.27433388$$

$$= \pounds 28.27$$

£ 28.27

(5 marks)

8. The diagram shows a CD.
The CD is a circle of radius 6 cm.

CDs of this size are cut from rectangular sheets of plastic.
Each sheet is 1 metre long and 50 cm wide.

Work out the greatest number of CDs that can be cut from one rectangular sheet.

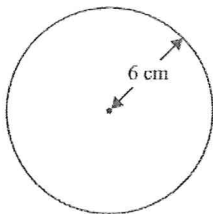


Diagram NOT
accurately drawn

$$1 \text{ m} = 100 \text{ cm}$$

$$100 \text{ cm} \div 12 = 8.333333$$

$$50 \text{ cm} \div 12 = 4.166666$$

So will fit 8 circles one way
and 4 circles the other way.

$$8 \times 4 = 32$$

32

(4 marks)

- *9. Jenny fills some empty flowerpots completely with compost.

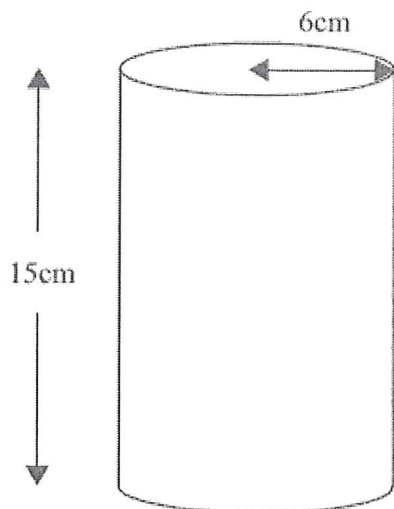


Diagram NOT
accurately drawn

Each flowerpot is in the shape of a cylinder of height 15 cm and radius 6 cm.
She has a 15 litre bag of compost.

She fills up each flowerpot completely.
How many flowerpots can she fill completely?
You must show your working.

$$\begin{aligned}\text{Volume cylinder} &= \pi r^2 h \\ &= \pi (6)^2 (15) \\ &= \pi (36)(15) \\ &= 540\pi \\ &= 1696.460033 \text{ cm}^3 \\ 15 \text{ litre bag holds } 15 \times 1000 \text{ cm}^3 &\text{ of compost} \\ &= 15000 \text{ cm}^3\end{aligned}$$

$$15000 \div 1696.460033 = 8.841941$$

So she can only fill 8 flower pots
completely. There is not enough for the
9th pot.

8

(6 marks)