

Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel GCSE

Applications of Mathematics

Unit 1: Applications 1

For Approved Pilot Centres ONLY

Higher Tier

Monday 6 June 2011 – Afternoon

Time: 1 hour 45 minutes

Paper Reference

5AM1H/01

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

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.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.



Information

- The total mark for this paper is 100
- 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.

Turn over ►

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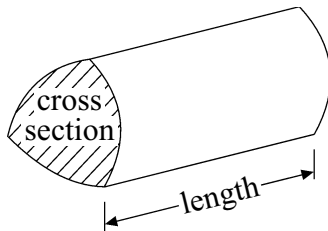
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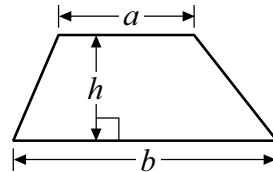
Formulae – Higher Tier

**You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.**

Volume of a prism = area of cross section \times length

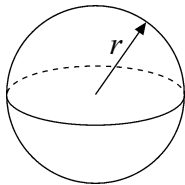


Area of trapezium = $\frac{1}{2}(a + b)h$



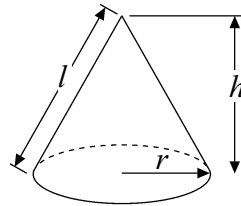
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$

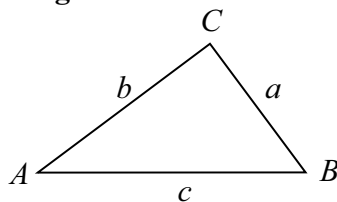


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle ABC



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2}ab \sin C$



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

- 1** Brian wants to go on holiday.
He is going to take out a loan of £500 to help pay for the holiday.
Brian will have to pay back the £500 plus 20% interest over 12 months.
He will pay back the same amount of money each month.
How much money will he need to pay back each month?

£

(Total for Question 1 is 4 marks)



- 2 Joe uses a spreadsheet to record details of the wages paid to four workers. One week he will enter their wages in columns A, B, C and D in the spreadsheet.

	A	B	C	D	E	F
1	Ali	Ben	Charlie	Dave	total wage	mean wage
2						

Joe also wants the spreadsheet to record

in cell E2 the total wage of these 4 workers
in cell F2 the mean wage of these 4 workers

Write down,

- (i) a formula for cell E2,

E2

- (ii) a formula for cell F2.

F2

(Total for Question 2 is 3 marks)



- 3 The table gives information about the number of boxes of strawberries filled by each of 100 farm workers.

Number of boxes	Frequency
$160 < x \leq 180$	5
$180 < x \leq 200$	25
$200 < x \leq 220$	48
$220 < x \leq 240$	22

- (a) Write down the modal class interval.

.....
(1)

- (b) Work out an estimate for the mean.

.....
(4)

(Total for Question 3 is 5 marks)



4 Ralph posts 40 letters.
Some of the letters are 1st class.
Some of the letters are 2nd class.

The number of 2nd class letters is 4 times the number of 1st class letters.

(a) (i) Work out the number of 1st class letters.

.....

It costs 41p to post a 1st class letter.
The total cost of posting all 40 letters is £13.52

(ii) Work out the cost of posting one 2nd class letter.

..... p

(5)

Jake is a postal worker.
He has to deliver some parcels.
Each parcel has a weight of 900 g.
The total weight of the parcels he carries must not be more than 16 kg.

(b) What is the greatest number of parcels that Jake can carry?

..... parcels

(3)

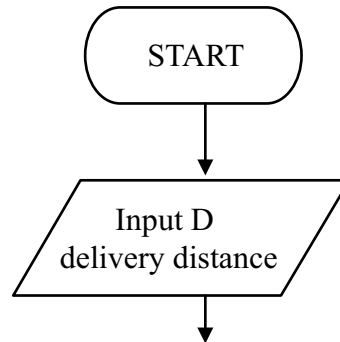
(Total for Question 4 is 8 marks)



- 5 A shop sells carpets.
There is a delivery charge for delivering carpets to customers' homes.
For up to 5 miles the delivery charge is £20
For more than 5 miles the delivery charge is £30

A flowchart is used to work out the delivery charge.

Complete the flowchart.



(Total for Question 5 is 5 marks)



- 6 Martin's house has a meter to measure the amount of water he uses. Martin pays on Tariff A for the number of water units he uses.

The graph opposite can be used to find out how much he pays.

- (a) (i) Find the gradient of this line.

.....

Martin reduces the amount of water he uses by 15 units.

- (ii) How much money does he save?

£

(4)

Instead of Tariff A, Martin could pay for his water on Tariff B.

The table shows how much Martin would pay for his water on Tariff B.

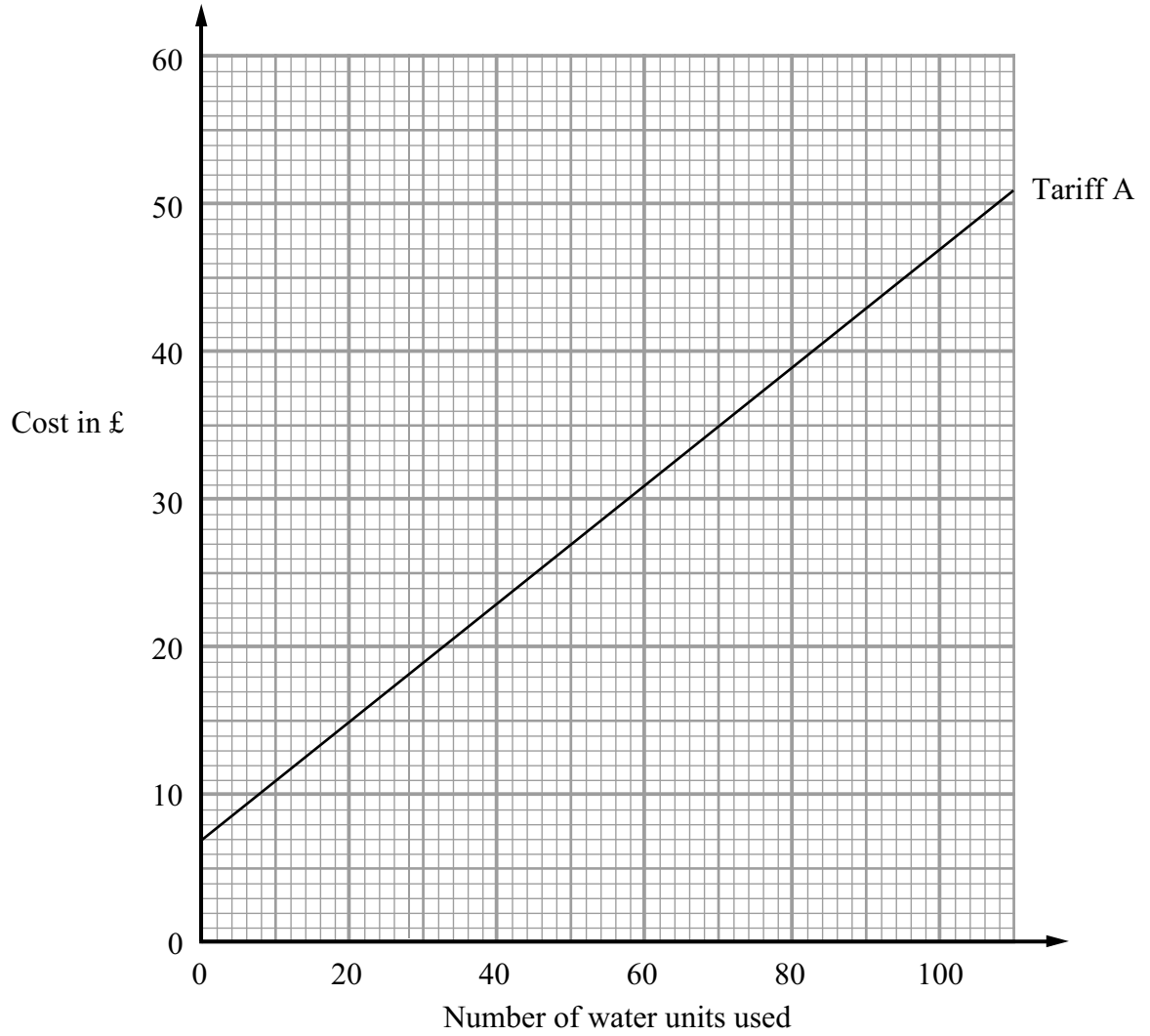
Number of water units used	0	20	40	60	80	100
Cost in £	12	18	24	30	36	42

- (b) (i) On the grid opposite, draw a line for Tariff B.
- (ii) Write down the number of water units used when the cost of Tariff A is the same as the cost of Tariff B.

..... units

(3)





(Total for Question 6 is 7 marks)



- 7 A machine drills holes into blocks.
The position of each hole is given as a 3D coordinate.
The diagram shows a rectangular block on a 3D grid.

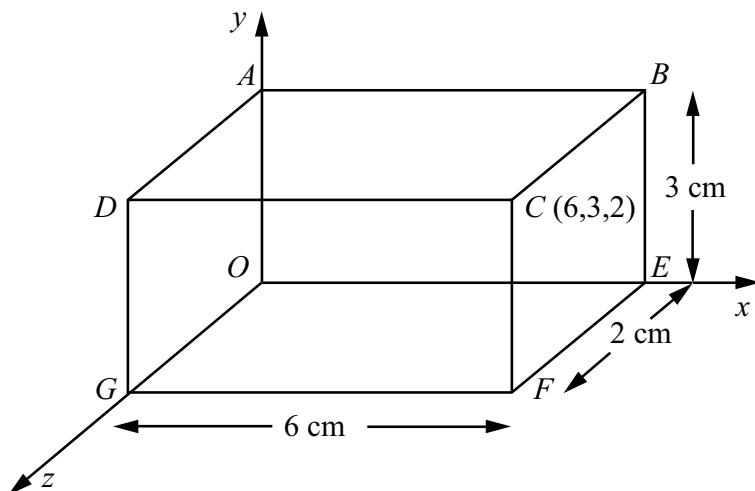


Diagram **NOT**
accurately drawn

Point C is $(6,3,2)$.

The machine has to drill a hole in the middle of face $CBEF$.

Work out the 3D coordinates of the middle of face $CBEF$.

(.....,,)

(Total for Question 7 is 2 marks)



*8 These two photographs are similar rectangles.

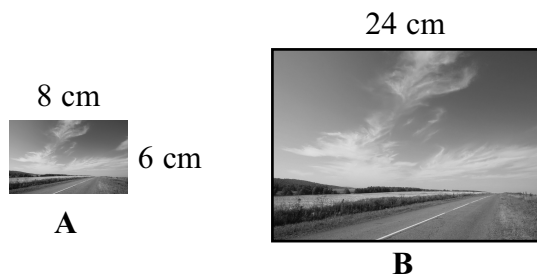


Diagram **NOT**
accurately drawn

Photograph **A** has a length of 8 cm and a width of 6 cm.
Photograph **B** has a length of 24 cm.

The two photographs are similar rectangles.

Work out the width of photograph B.

(Total for Question 8 is 4 marks)

9 Saleem invests £2000 at 4% per annum compound interest for 3 years.

Work out the total amount of money he has at the end of 3 years.

£

(Total for Question 9 is 3 marks)



10 Derek wants to make a patio using paving stones.

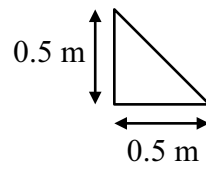
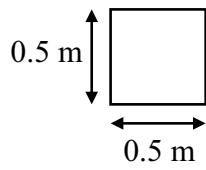


Diagram **NOT** accurately drawn

He will use square paving stones and triangular paving stones as shown in the diagram above.

The patio will be in the shape of an octagon as shown below.

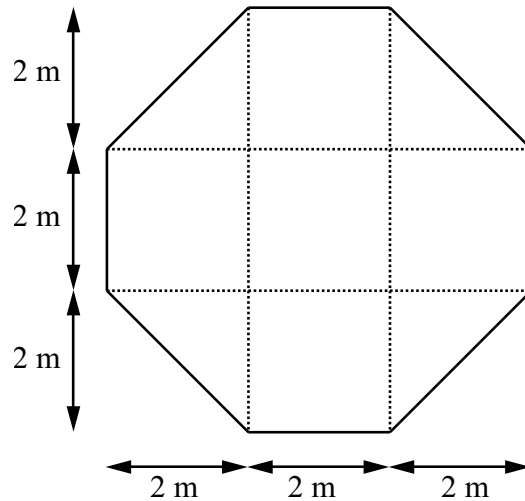


Diagram **NOT** accurately drawn

(a) Work out the number of each type of paving stone Derek needs.

square paving stones

triangular paving stones

(4)



Derek needs to paint his patio with sealant.
He needs 1 litre of sealant for every 5.6 m² of patio.

(b) Work out how many litres of sealant Derek needs.

..... litres
(4)

(Total for Question 10 is 8 marks)



11 The price of a cooker is £720 including VAT at 20%.

What is the price without the VAT?

£

(Total for Question 11 is 3 marks)



12 Harry is putting together bolt fixtures.
They are made from bolts, washers and nuts.
Each bolt fixture has

- 1 bolt
- 1 washer
- 1 nut.



Bolt Fixture

Bolts are sold in packs of 20
Washers are sold in packs of 24
Nuts are sold in packs of 25

Harry must use all the bolts, washers and nuts he buys.

(i) What is the smallest number of packs of bolts, packs of nuts and packs of washers he needs to buy?

..... packs of bolts

..... packs of washers

..... packs of nuts

(ii) How many bolt fixtures will he be able to make from these packs?

..... bolt fixtures

(Total for Question 12 is 4 marks)



13 Diane bought a printer.
It cost £69.99 plus VAT at 20%.

(a) Work out the cost of the printer.



£69.99
plus
VAT

£
(3)

The printer uses black cartridges and colour cartridges.

In April, Diane bought 3 black cartridges and 2 colour cartridges and paid a total of £95.40

In May, Diane bought 5 black cartridges and 3 colour cartridges and paid a total of £151.50

The cost of each black cartridge did not change.

The cost of each colour cartridge did not change.

(b) Find the cost of each black cartridge and the cost of each colour cartridge.

Black cartridge £

Colour cartridge £

(5)

(Total for Question 13 is 8 marks)



- 14 $ABCD$ is a rectangle.
 $EFGH$ is a trapezium.

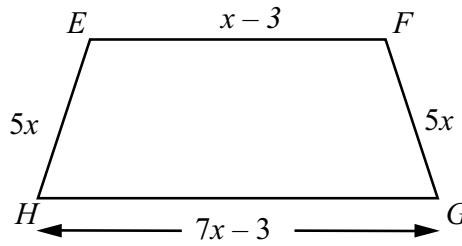
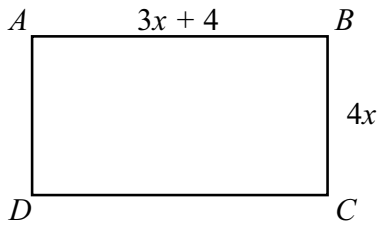


Diagram **NOT**
accurately drawn

The perimeters of these two shapes are the same.
All measurements are in centimetres.

- (i) Work out the value of x .

$x = \dots\dots\dots$

- (ii) Write down the length and the width of the rectangle.

length $\dots\dots\dots$ cm

width $\dots\dots\dots$ cm

(Total for Question 14 is 6 marks)



15 When a person exercises, their pulse rate increases.

The time it takes for their pulse rate to return to normal after exercise is called the recovery time.

A group of people did some exercise.

The table below shows some information about their recovery times.

Recovery time (t seconds)	Cumulative frequency
$0 < t \leq 20$	0
$0 < t \leq 40$	7
$0 < t \leq 60$	16
$0 < t \leq 80$	34
$0 < t \leq 90$	47
$0 < t \leq 100$	59
$0 < t \leq 120$	68
$0 < t \leq 140$	74

(a) On the grid opposite, draw a cumulative frequency graph for this information.

(2)

A different group of people did the same exercise.

Their recovery times had a median of 61 seconds and an interquartile range of 22 seconds.

*(b) Compare the recovery times of these two groups of people.

.....

.....

.....

.....

.....

.....

.....

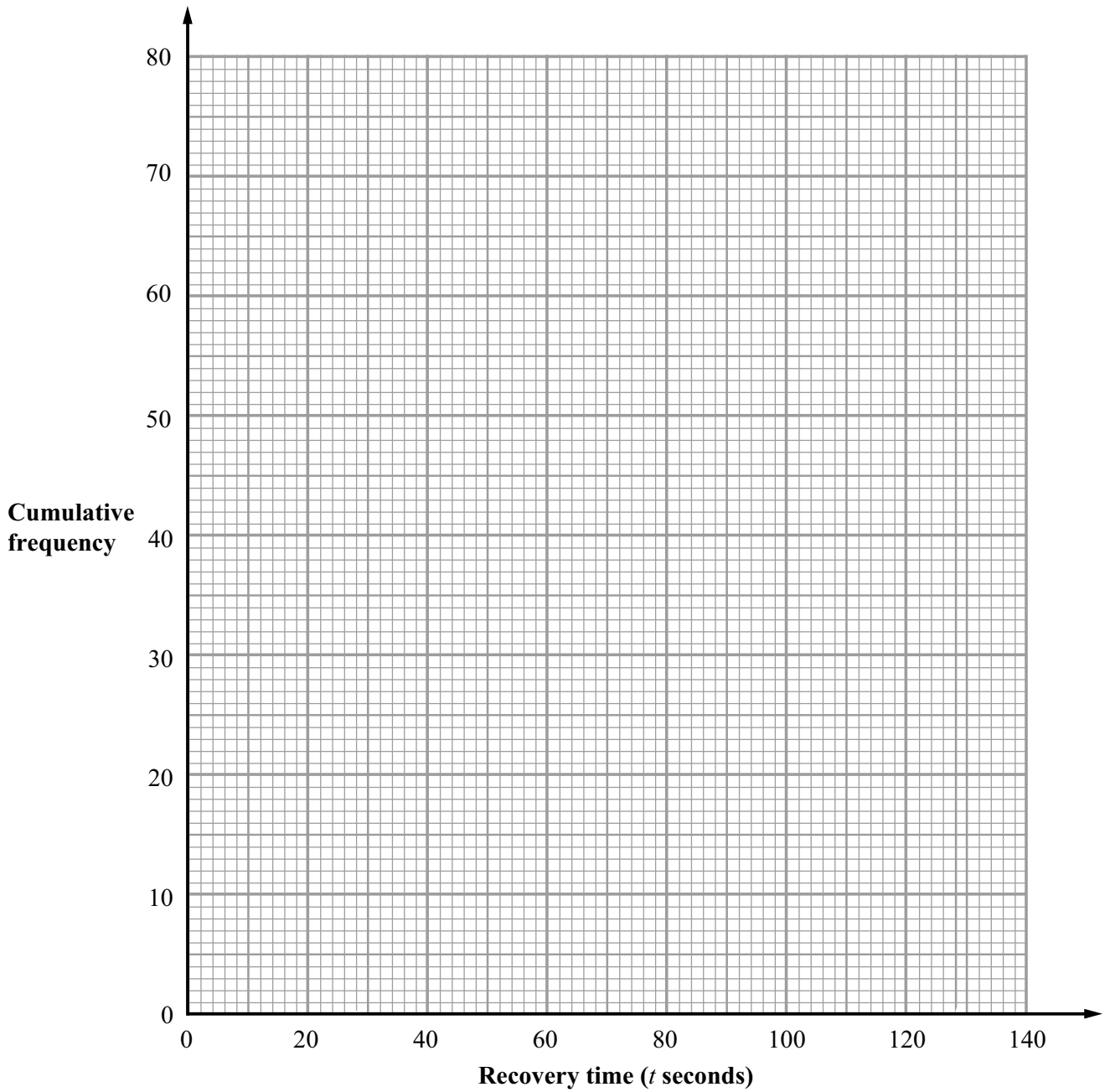
.....

.....

.....

(5)





(Total for Question 15 is 7 marks)



16 Maryanne is going to take a survey of students in her school.

The table below shows the number of students in each year group.

Year Group	Boys	Girls	Total
7	85	65	150
8	72	75	147
9	74	78	152
10	77	72	149
11	93	107	200
			798

Maryanne wants to take a sample of 80 students.

(a) Explain if she should sample the same number of students from year group 8 and from year group 11

.....

.....

.....

(1)

Maryanne wants to take a sample of 80 students, stratified by year group and by gender.

(b) Work out the number of year group 8 boys she should have in her sample.

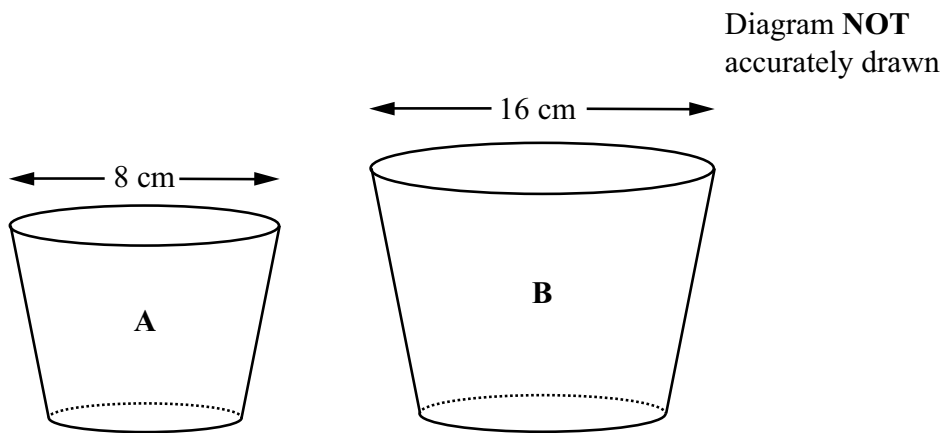
.....

(3)

(Total for Question 16 is 4 marks)



17 Martin has two solid shapes.



The two solid shapes are mathematically similar.
The top of shape **A** is a circle with diameter 8 cm.
The top of shape **B** is a circle with diameter 16 cm.

Martin uses one tin of paint to paint shape **A**.

(a) Work out how many tins of paint he will need to paint shape **B**.

..... tins
(2)

Martin made these solid shapes from metal.
The metal to make shape **A** cost £1.50

(b) How much did the metal cost to make shape **B**?

£
(3)

(Total for Question 17 is 5 marks)



18 Hassan is making some toys to sell at a school fair.
Hassan takes 40 minutes to make Toy A.
Hassan takes 20 minutes to make Toy B.

He has a total of 20 hours available to make toys.

He makes x of toy A.
He makes y of toy B.

(a) Show that $2x + y \leq 60$

(2)

His constraints are $2x + y \leq 60$, $x \geq 6$, $y \geq 2x$

(b) On the grid, draw straight lines and use shading to represent these constraints.

(4)

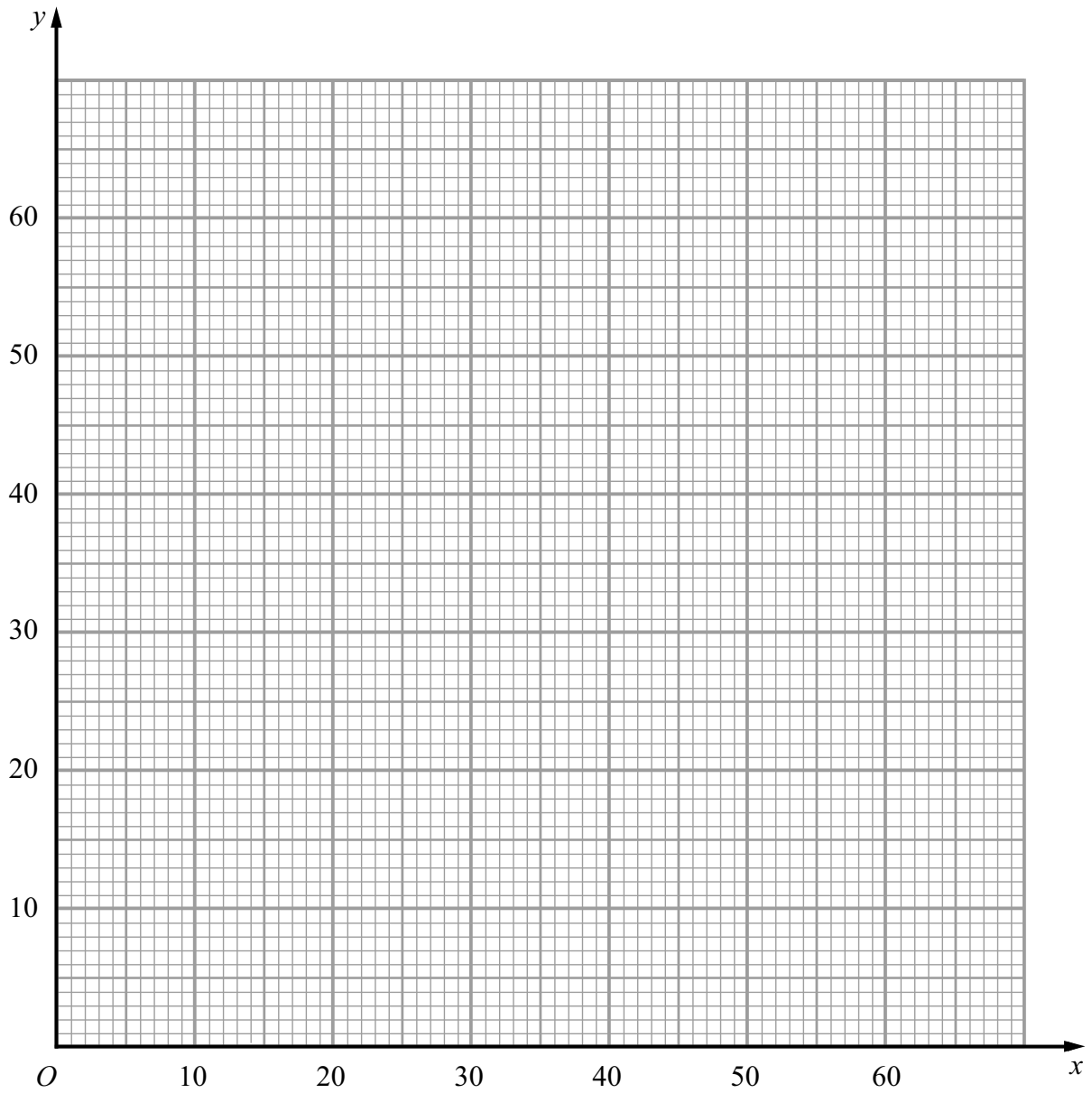
Hassan is going to sell toy A for £3
He is going to sell toy B for £2

(c) Work out the greatest amount of money Hassan could get.

£

(4)





(Total for Question 18 is 10 marks)

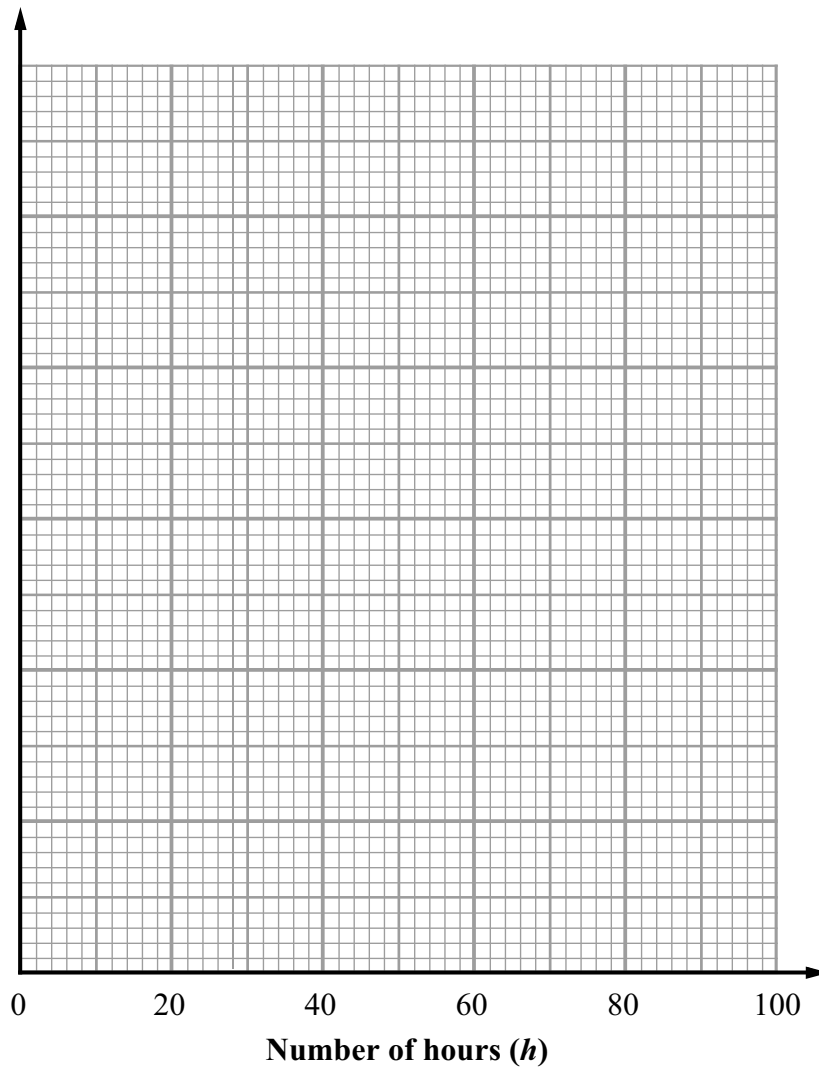


P 3 8 9 5 2 A 0 2 3 2 4

19 The table below shows some information about the number of hours projector bulb lasted before they had to be replaced.

Number of hours (h)	Frequency
$0 < h \leq 20$	10
$20 < h \leq 30$	20
$30 < h \leq 40$	50
$40 < h \leq 60$	30
$60 < h \leq 100$	10

Draw a histogram to show the information in the table.



(Total for Question 19 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

