

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

Wednesday 9 November 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.

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.

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Turn over ►

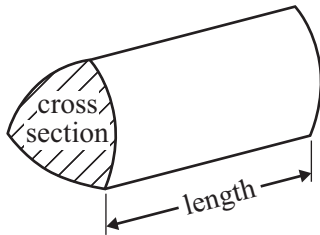
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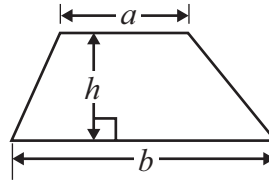
Formulae – Higher Tier

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

Volume of prism = area of cross section \times length

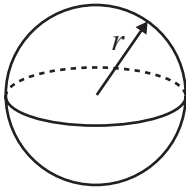


Area of trapezium = $\frac{1}{2}(a + b)h$



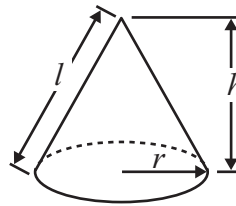
Volume of sphere = $\frac{4}{3}\pi r^3$

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

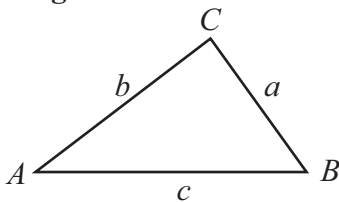


Volume of cone = $\frac{1}{3}\pi r^2 h$

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** Last week, Imran's pay was £208
This week his pay is 5% more than last week.
Work out Imran's pay this week.

£

(Total for Question 1 is 3 marks)



2 Here is a list of ingredients for making a Cheese Soufflé.

Cheese Soufflé	
3	eggs
1	oz butter
$\frac{1}{2}$	oz flour
$\frac{1}{4}$	pint milk
3	oz grated cheese

Imperial Units	=	Metric Units
1 oz	=	28 g
1 pint	=	568 ml

(a) Complete the list of ingredients using metric units.

Cheese Soufflé	
3 eggs
..... g butter
..... g flour
..... m/ milk
..... g grated cheese

(2)

Jemma wants to make 12 Cheese Soufflés.

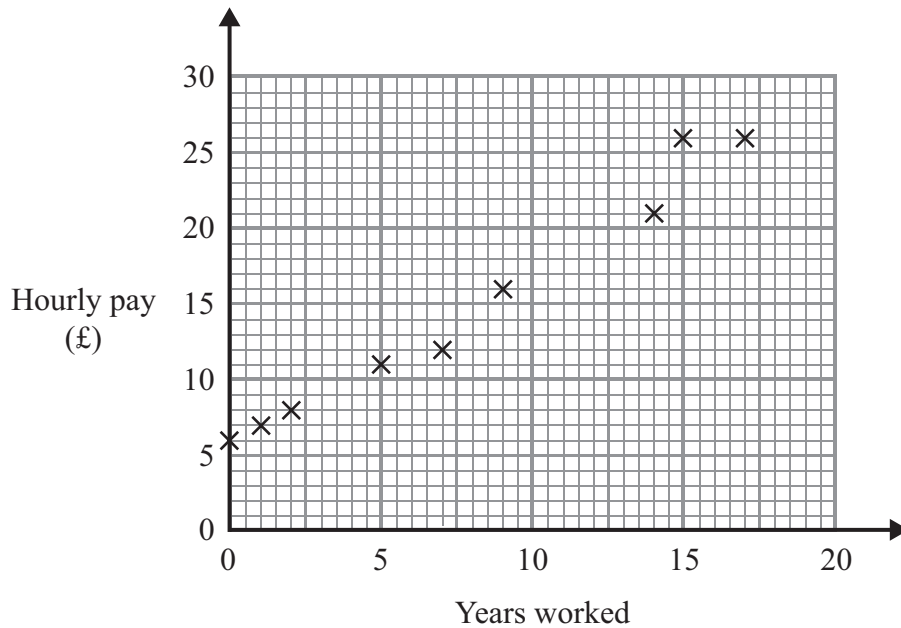
(b) Work out how much milk she will need.
Give your answer in litres.

..... litres
(2)

(Total for Question 2 is 4 marks)



- 3 The scatter graph shows some information about 9 people who work for a company. It shows the number of years each person has worked. It also shows each person's hourly pay in pounds.



Sara has worked for the company for 10 years.
Her hourly pay is £19

- (a) Show this information on the graph.

(1)

- (b) Draw a line of best fit on the graph.

(1)

- (c) Describe the relationship this scatter graph shows.

(1)

(Total for Question 3 is 3 marks)



4

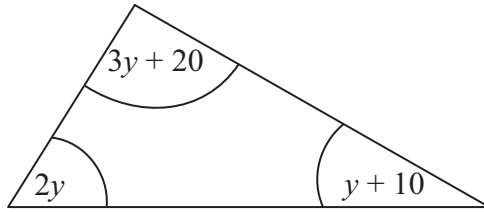


Diagram **NOT**
accurately drawn

- (i) Find an expression, in terms of y , for the sum of the three angles in the triangle.
Simplify your expression.

- (ii) Find y .

$y = \dots\dots\dots$
(4)

(Total for Question 4 is 4 marks)



- 5 The table gives information about the number of cars at a ferry port and the number of people in each car.

Number of people	Number of cars
1	33
2	140
3	109
4	165
5	41
6	12

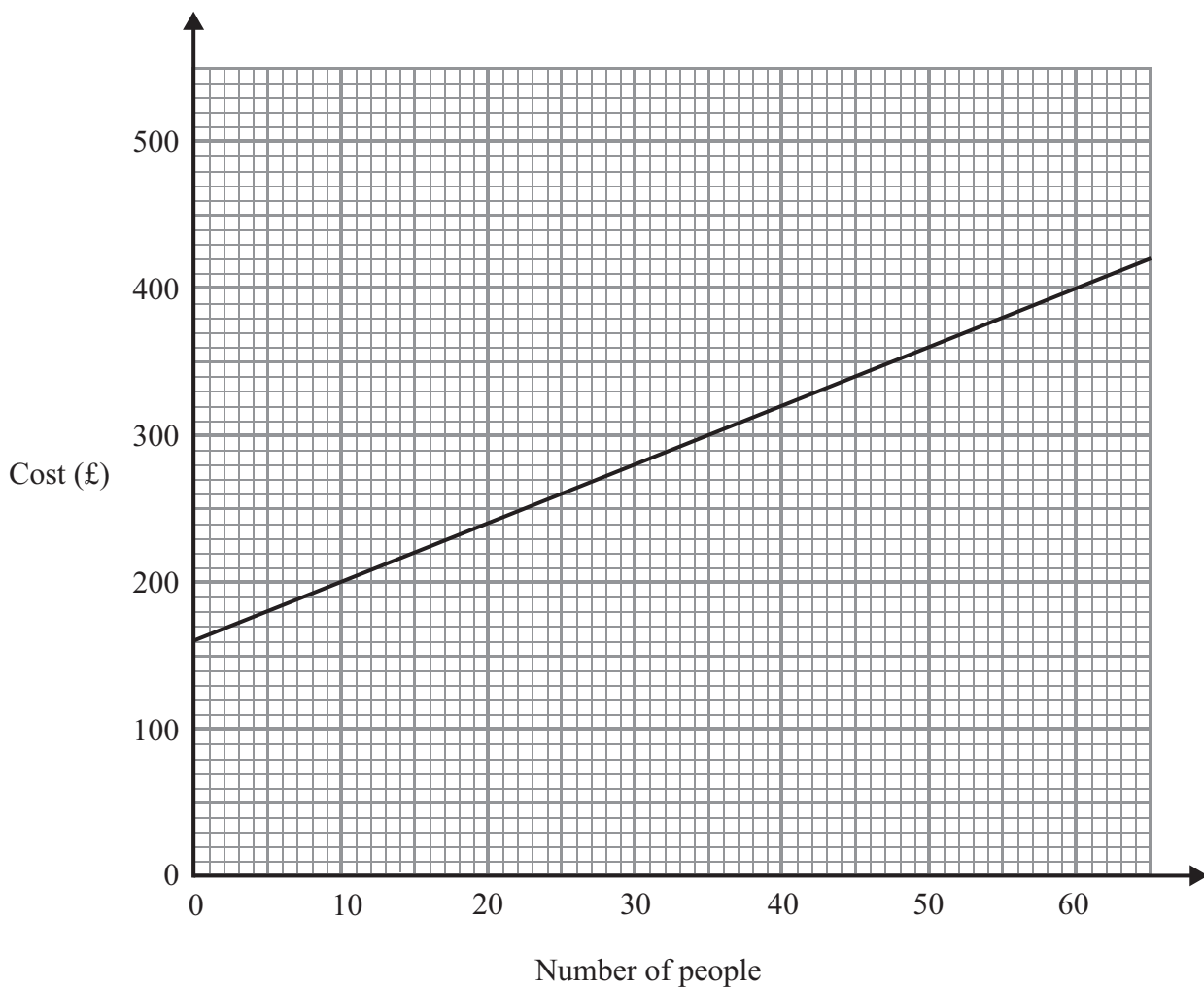
Work out the mean number of people per car.

.....
(3)

(Total for Question 5 is 3 marks)



- 6 Liam is organising a conference for a number of people. He is going to use the Grange Hotel. He can use the graph below to work out the cost, in pounds, for different numbers of people.



- (a) (i) Work out the gradient of the line on the graph.

.....

There are 20 more people at the conference than Liam had expected.

- (ii) How much does this add to the cost of the conference?

£.....

(4)



Liam is also organising a conference at the Bellevue Hotel.

The cost is £20 plus £8 per person.

The table shows information about the cost at this hotel for different numbers of people.

Number of people	10	20	30	40	50	60
Cost (£)	100	180	260	340	420	500

(b) For how many people will the cost at the Grange Hotel be the same as the cost at the Bellevue Hotel?

.....
(3)

(Total for Question 6 is 7 marks)



*7 The table shows some information about the average adult spending in 2008 as a percentage of average **total** adult spending in 2008.

Item	Percentage
food	11%
housing	11%
leisure	13%
clothes	5%
transport	14%
household goods	8%
other items	38%

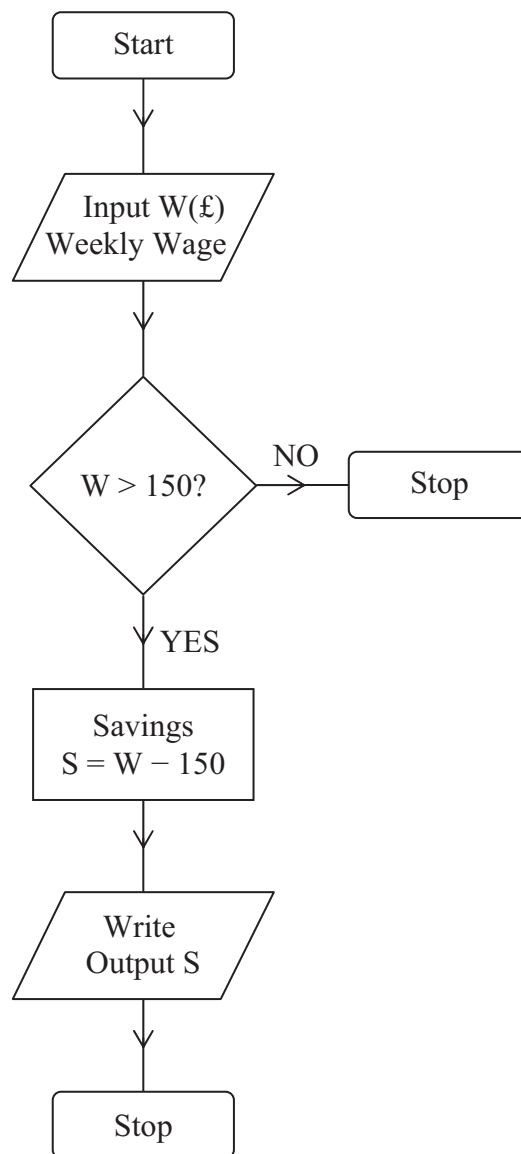
In May 2008, Katie spent a total of £425
She spent £48.45 of the £425 on food.

Compare the percentage that Katie spent on food with the average adult spending on food.

(Total for Question 7 is 3 marks)



8 Samina uses this flow chart to work out how much money she can save each week.



One week Samina's wage was £187.50

(i) Write down the Input W.

£

(ii) Work out the Output S.

£

(Total for Question 8 is 2 marks)



- 9 James is going to cover a rectangular floor with flooring.
The floor has a length of 6 m.
It has a width of 4.5 m.

Flooring is sold in packs.

One pack of flooring covers an area of 1.44 m^2 .

Each pack costs £12.87

James buys the least number of packs so that he has enough flooring to cover the floor.

Work out how much money James pays for the flooring.

£

(Total for Question 9 is 4 marks)



10 The table shows the weight in grams of some UK coins.

Coin	Weight (g)
50p	8.00
20p	5.00
10p	6.50
5p	3.25
2p	7.12
1p	3.56

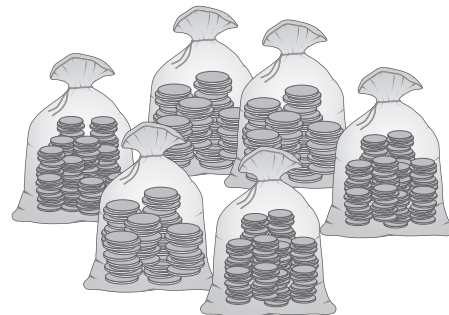
(a) Work out the value of 1 kg of 50p coins.

.....
(2)

Jeff works in a bank.

A customer gives him 5 bags of 2p coins.
Each bag weighs 356 g.

The customer also gives him 5 bags of 1p coins.
Each bag weighs 356 g.



*(b) Compare the total value of the bags of 2p coins with the total value of the bags of 1p coins.

(2)

(Total for Question 10 is 4 marks)



11 Karine wants to find out how far people travel from their home to the nearest cinema.

(a) Design a suitable question Karine can use on a questionnaire.

(2)

Karine did a survey on the distances people travelled from their home to the nearest cinema.

She gave a questionnaire to 5 of her friends.

This may **not** be a good method to do the survey.

(b) Explain why.

(1)

(Total for Question 11 is 3 marks)



12 A table top is made from a triangle and a trapezium.

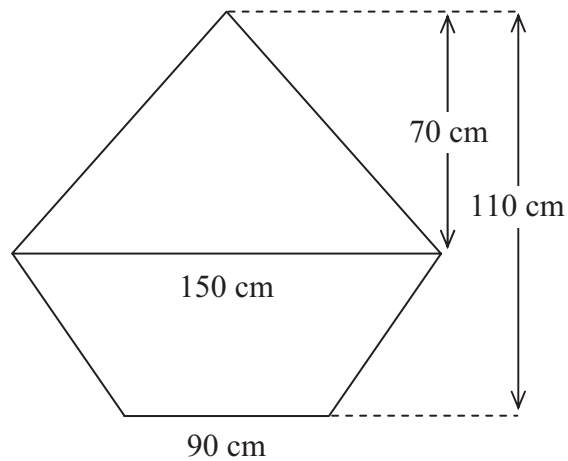


Diagram **NOT** accurately drawn

Work out the area of the table top.

..... cm²

(Total for Question 12 is 4 marks)



13 The tables show some information about the population of the United Kingdom (UK) in 2003 and in 2008

2003		
	Area (km ²)	Number of people per km ²
England	130 281	383
Northern Ireland	13 576	125
Scotland	77 925	65
Wales	20 732	142

2008	
	Percentage of total UK population
England	84%
Northern Ireland	4%
Scotland	9%
Wales	3%

In 2008, the total population of the UK was 61 million.

The population of **England** increased between 2003 and 2008

Work out this increase.

Give your answer correct to 2 significant figures.

.....
(Total for Question 13 is 5 marks)



14 A machine part is made by cutting a small square from the centre of a large square piece of steel.

The dimensions of the machine part are shown on the diagram.
All measurements are in cm.

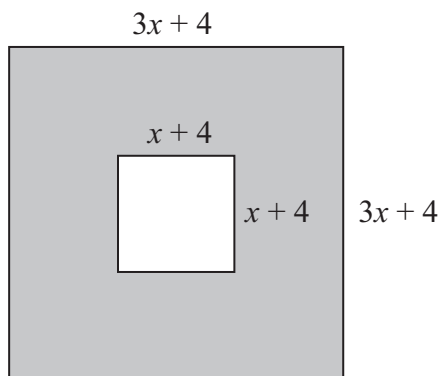


Diagram **NOT** accurately drawn

The perimeter of the small square is two thirds of the perimeter of the large square.

Work out the length of a side of the small square.

..... cm

(Total for Question 14 is 5 marks)



- 15 The table shows some information about eight planets.
It shows their distance from the Sun and their mass.

Planet	Distance from the Sun (km)	Mass (kg)
Earth	150×10^6	5.97×10^{24}
Jupiter	778.3×10^6	5.898×10^{27}
Mars	228×10^6	6.42×10^{23}
Mercury	57.91×10^6	3.302×10^{23}
Neptune	4498×10^6	1.024×10^{26}
Saturn	1427×10^6	5.68×10^{26}
Uranus	2871×10^6	8.683×10^{25}
Venus	108.21×10^6	4.869×10^{24}

- (a) Which planet has the smallest mass?

.....
(1)

- (b) Write, in standard form, the distance of Mars from the Sun.

.....
(2)

- (c) Kelly says,

“The mass of Jupiter is more than 1000 times the mass of the Earth”.

Is Kelly correct?
Explain your answer.

(2)

(Total for Question 15 is 5 marks)



16 Jenny is organising a party.

She buys some paper plates and some plastic cups.

Paper plates are sold in packs.

There are 25 plates in a pack.

Each pack costs 78p.

Plastic cups are sold in packs.

There are 35 cups in a pack.

Each pack costs £1.10

Jenny buys exactly the same number of plates and cups.

What is the least amount of money she pays?

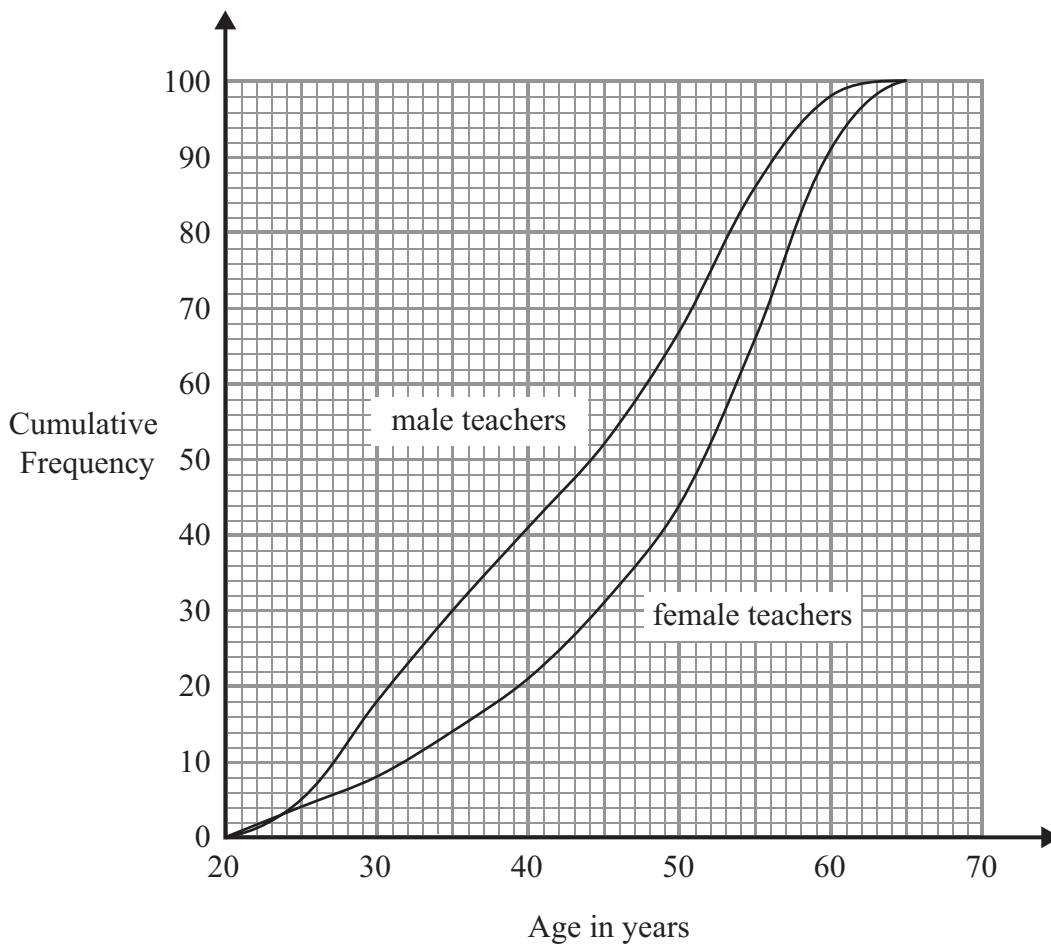
£

(Total for Question 16 is 5 marks)



17 A student did a survey of teachers' ages.

The cumulative frequency curves show information about the ages of the male teachers and the ages of the female teachers.



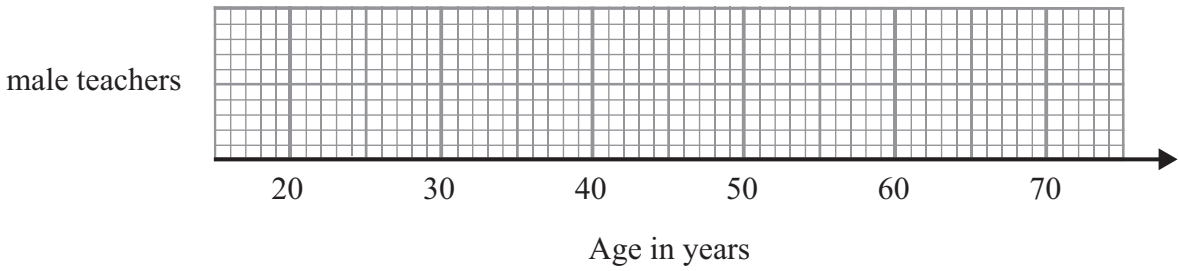
(a) Find an estimate for the number of the male teachers older than 50 years of age.

.....
(2)



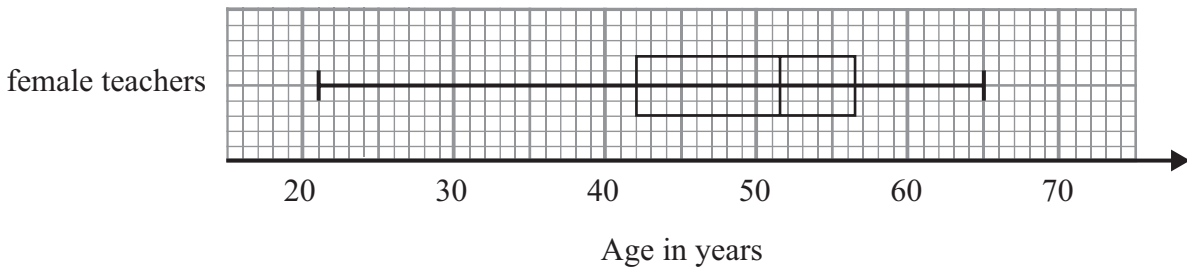
The youngest male teacher was 21 years of age.
 The oldest male teacher was 65 years of age.

(b) On the grid, draw a box plot to show the distribution of the ages of the male teachers.



(4)

The box plot below shows information about the ages of the female teachers.



(c) Make two comparisons between the distributions of the ages of male teachers and female teachers.

.....

.....

.....

.....

(2)

(Total for Question 17 is 8 marks)



18 Jeff invests £500 in a bank account for 4 years.

The bank pays compound interest at an annual rate of

3.5% for the first year

2.0% for each of the other 3 years

(a) Work out how much Jeff has in his account after 4 years.

£

(3)

(b) Work out the annual equivalent rate (AER) over these 4 years.

Give your answer to one decimal place.

You must show your working.

.....%

(3)

(Total for Question 18 is 6 marks)



19 The throwing area for a sports event is formed from the sectors of two circles with centre O .

The area of sector AOD is 0.5 m^2 .

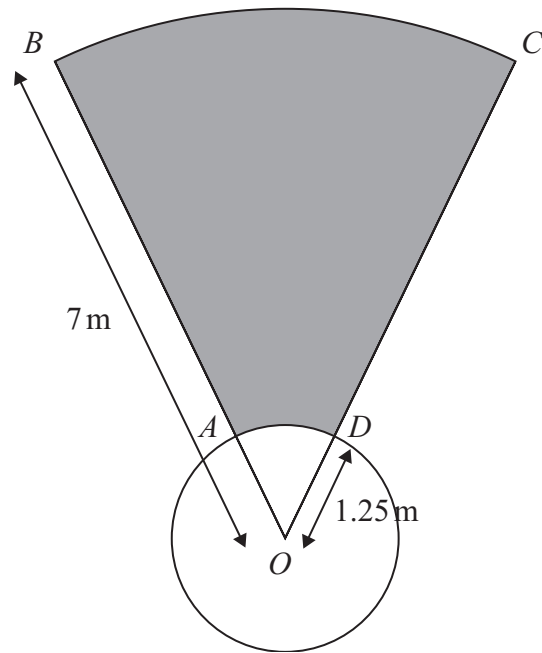


Diagram **NOT** accurately drawn

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

..... m^2

(Total for Question 19 is 5 marks)



20 The table shows some information about the population of a town.

	Population size
Male children	1650
Male adults	5346
Female children	2085
Female adults	5968

Nhabi is going to carry out a survey about the health service in this town. He wants to find out if people have been to their doctor in the last year.

Nhabi decides to take a sample.

(a) Explain why it is appropriate to take a stratified sample.

.....
.....
(1)

Nhabi takes a stratified sample of 200 people.

(b) Calculate the number of male adults that should be in his sample.

.....
(2)



Jess takes a random sample of 150 people in the town.
Sixty of these people have not been to their doctor in the last year.

- (c) Estimate the number of people in the town who have not been to their doctor in the last year.

.....
(2)

(Total for Question 20 is 5 marks)



21 Jean owns a flower shop.

Jean needs at least 60 bunches of flowers.

She buys x bunches of daffodils and y bunches of tulips to sell in her shop.

(a) Express this information as an inequality.

.....
(1)

Jean pays 40 pence for each bunch of daffodils.

She pays 80 pence for each bunch of tulips.

Jean does not want to pay a total of more than £40

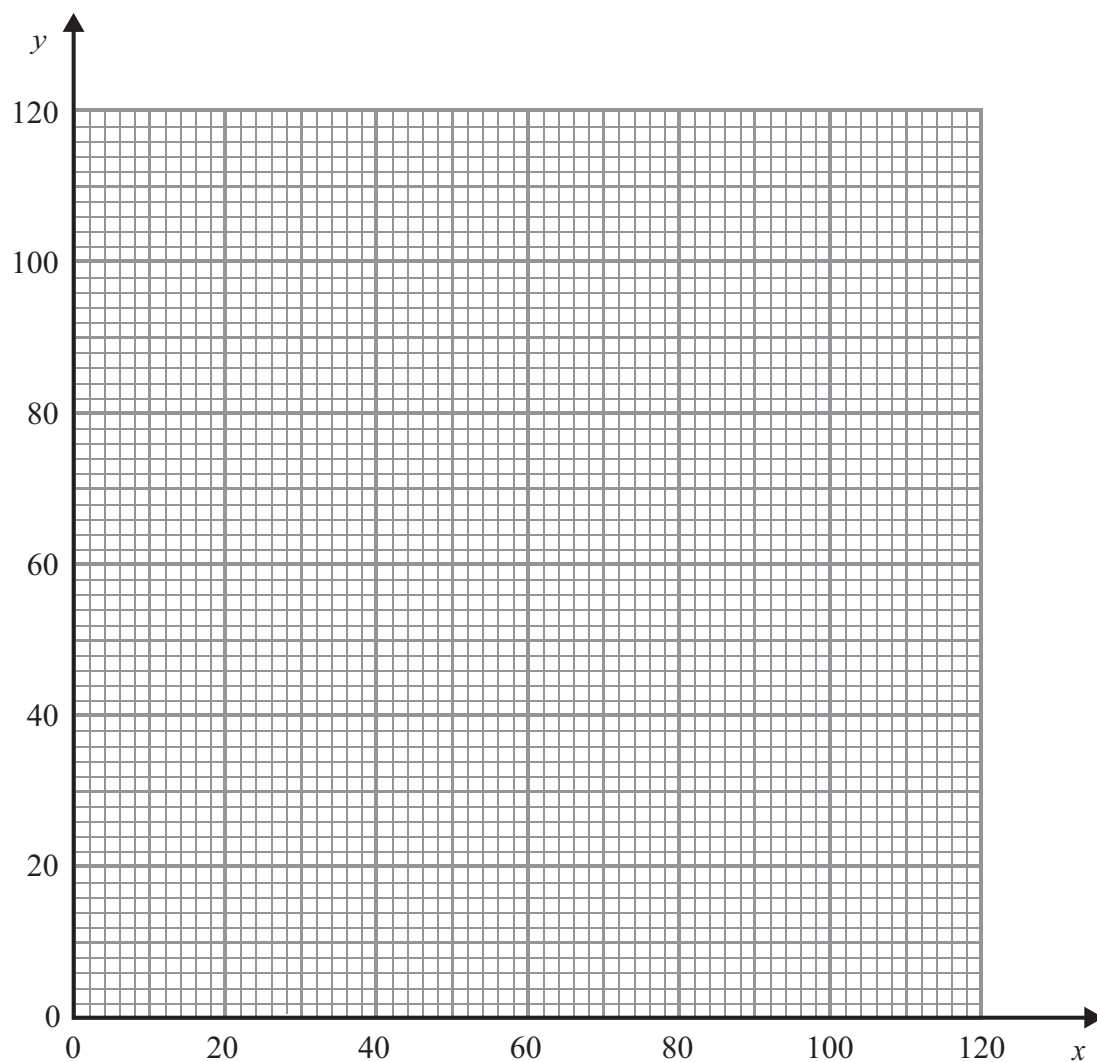
(b) Show that $x + 2y \leq 100$

(2)

Jean is going to buy at least 20 bunches of tulips.

(c) On the grid, show by shading, the region which satisfies all the above three conditions.





(3)

Jean will make a profit of 20 pence on each bunch of flowers she sells.
 She sells all the bunches of daffodils and bunches of tulips.

(d) Work out the greatest total profit that Jean will make.

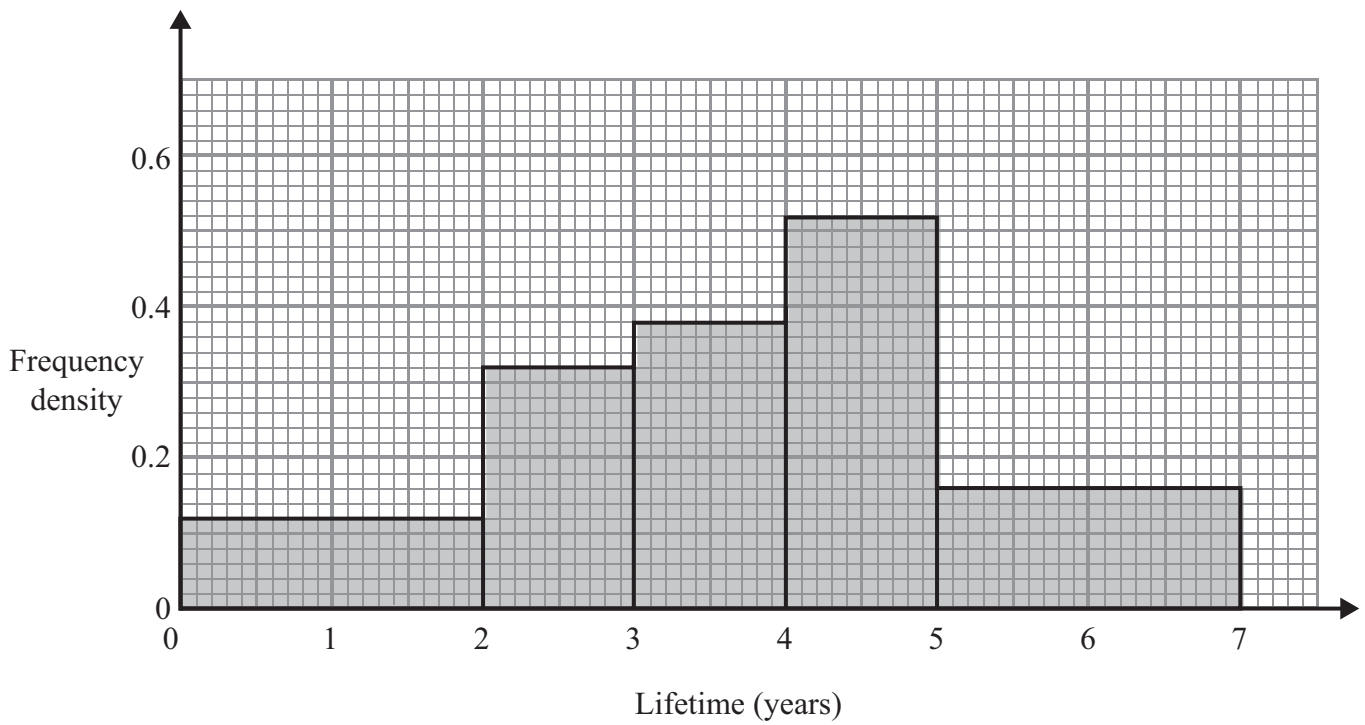
£

(2)

(Total for Question 21 is 8 marks)



22 The histogram shows information about the lifetime of some electrical components.



Work out the proportion of the components with a lifetime of between 1 and 6 years.

.....
(Total for Question 22 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

