Year 11 to 12 TRANSITION
Preparation resources for Core Maths
(Level 3 Mathematical Studies)

This booklet contains GCSE topics and questions that will help you prepare for Core Maths content next year. Please find solutions/mark scheme at the end of the document.

Any questions about Core maths, email me on alb.fej@sns.hackney.sch.uk.
I look forward to teaching you Core maths next year!
Ms Fejzo.

Percentages with multipliers

Q1.

Write 0.8 as a percentage.

..... %

(Total for question = 1 mark)

Q2.

Write 0.73 as a percentage.

..... %

(Total for question = 1 mark)

Q3.

Write 15% as a decimal.

.....

(Total for question = 1 mark)

Q4.

Work out 60% of 70

.....

(Total for question = 2 marks)

Q5.

Work out 70% of £90

£ .....

(Total for question is 2 marks)

Q6.

Work out 234% of 150

.....

(Total for question = 2 marks)

Q7.

Azmol is paid £1500 per month.
He is going to get a 3% increase in the amount of money he is paid.

Work out how much money Azmol will be paid per month after the increase.

£ .....

(Total for question = 2 marks)

Money calculations and percentages

Q8.

Trevor buys a boat.
The cost of the boat is £14 200 plus VAT at 20%

Trevor pays a deposit of £5000
He pays the rest of the cost in 10 equal payments.

Work out the amount of each of the 10 payments.

£ .....

(Total for question = 4 marks)

Q9.

Irena sells ice creams.
One day she sells 80 ice creams.
The next day she sells 108 ice creams.

Work out the percentage increase in the number of ice creams she sells.

..... %

(Total for question = 3 marks)

Q10.

In a sale, the price of a jacket is reduced.

The jacket has a normal price of £52
The jacket has a sale price of £41.60

Work out the percentage reduction in the price of the jacket.

..... %

(Total for question = 3 marks)

Q11.

Emily buys a pack of 12 bottles of water.
The pack costs £5.64

Emily sells all 12 bottles for 50p each.

Work out Emily's percentage profit.
Give your answer correct to 1 decimal place.

..... %

(Total for question = 3 marks)

Q12.

In a shop, the normal price of a coat is £65
The shop has a sale.

In week 1 of the sale, the price of the coat is reduced by 20%
In week 2 of the sale, the price of the coat is reduced by a further £10

Maria has £40

Does Maria have enough money to buy the coat in week 2 of the sale?
You must show how you get your answer.

(Total for question is 3 marks)

Q13.

Sean pays £10 for 24 chocolate bars.

He sells all 24 chocolate bars for 50p each.

Work out Sean's percentage profit.

..... %

(Total for question = 3 marks)

Q14.

Last year Jo paid £245 for her car insurance.
This year she has to pay £883 for her car insurance.

Work out the percentage increase in the cost of her car insurance.

..... %

(Total for question = 3 marks)

Reverse percentages

Q15.

In a sale, the price of a TV is reduced by 25%

A week later, the sale price of the TV is reduced by 15%
The price of the TV is now £293.25

What was the price of the TV before the sale?

£ .....

(Total for question = 3 marks)

Q16.

Jules buys a washing machine.

20% VAT is added to the price of the washing machine.
Jules then has to pay a total of £600

What is the price of the washing machine with **no** VAT added?

£ .....

(Total for question = 2 marks)

Q17.

In a sale, normal prices are reduced by 20%.
The normal price of a coat is reduced by £15

Work out the normal price of the coat.

£ .....

(Total for question = 2 marks)

Q18.

In a sale, the normal price of a book is reduced by 30%.
The sale price of the book is £2.80

Work out the normal price of the book.

£ .....

(Total for question = 2 marks)

Compound interest

Q19.

Toby invested £7500 for 2 years in a savings account.
He was paid 4% per annum compound interest.

How much money did Toby have in his savings account at the end of 2 years?

£ .....

(Total for question is 2 marks)

Q20.

Katy invests £200 000 in a savings account for 4 years.
The account pays compound interest at a rate of 1.5 % per annum.

Calculate the total amount of interest Katy will get at the end of 4 years.

£ .....

(Total for question = 3 marks)

Q21.

Northern Bank has two types of account.
Both accounts pay compound interest.

Cash savings account Interest 2.5% per annum	Shares account Interest 3.5% per annum

Ali invests £2000 in the cash savings account.
Ben invests £1600 in the shares account.

(a) Work out who will get the most interest by the end of 3 years.

You must show all your working.

(4)

In the 3rd year the rate of interest for the shares account is changed to 4% per annum.

(b) Does this affect who will get the most interest by the end of 3 years?

Give a reason for your answer.

.....

.....

.....

(1)

(Total for question = 5 marks)

Q22.

Naoby invests £6000 for 5 years.
The investment gets compound interest of x% per annum.

At the end of 5 years the investment is worth £8029.35

Work out the value of x.

.....

(Total for question = 3 marks)

Q23.

Katy invests £2000 in a savings account for 3 years.

The account pays compound interest at an annual rate of

2.5% for the first year
x% for the second year
x% for the third year

There is a total amount of £2124.46 in the savings account at the end of 3 years.

(a) Work out the rate of interest in the second year.

.....

(4)

Katy goes to work by train.

The cost of her weekly train ticket increases by 12.5% to £225

(b) Work out the cost of her weekly train ticket before this increase.

£.....

(2)

(Total for question = 6 marks)

Q24.

At the beginning of 2009, Mr Veale bought a company.
The value of the company was £50 000

Each year the value of the company increased by 2%.

(a) Calculate the value of the company at the beginning of 2017

Give your answer correct to the nearest £100

£ .....

(2)

At the beginning of 2009 the value of a different company was £250 000
In 6 years the value of this company increased to £325 000

This is equivalent to an increase of x% each year.

(b) Find the value of x.

Give your answer correct to 2 significant figures.

.....

(3)

(Total for question = 5 marks)

Q25.

Jean invests £12 000 in an account paying compound interest for 2 years.

In the first year the rate of interest is x%
At the end of the first year the value of Jean's investment is £12 336

In the second year the rate of interest is $\frac{x}{2}$ %

What is the value of Jean's investment at the end of 2 years?

£ .....

(Total for question = 4 marks)

Q26.

Sakira invested £3550 in a savings account for 3 years.

She was paid 2.6% per annum compound interest for each of the first 2 years.
She was paid *R*% interest for the third year.

Sakira had £3819.21 in her savings account at the end of the 3 years.

Work out the value of *R*.
Give your answer correct to 1 decimal place.

.....

(Total for question = 3 marks)

Q27.

Ian invested an amount of money at 3% per annum compound interest.
At the end of 2 years the value of the investment was £2652.25

(a) Work out the amount of money Ian invested.

£.....

(3)

Noah has an amount of money to invest for five years.

Saver Account	Investment Account
4% per annum compound interest.	21% interest paid at the end of 5 years.

Noah wants to get the most interest possible.

(b) Which account is best?
You must show how you got your answer.

(2)
(Total for question is 5 marks)

Q28.

The population of a city increased by 5.2% for the year 2014

At the beginning of 2015 the population of the city was 1560 000

Lin assumes that the population will continue to increase at a constant rate of 5.2% each year.

(a) Use Lin's assumption to estimate the population of the city at the beginning of 2017
Give your answer correct to 3 significant figures.

.....

(3)

(b) (i) Use Lin's assumption to work out the year in which the population of the city will reach 2 000 000

.....

(ii) If Lin's assumption about the rate of increase of the population is too low, how might this affect your answer to (b)(i)?

.....

.....

.....

(3)

(Total for question = 6 marks)

Q29.

In 2016 the population of the UK was 6.5×10^7

Laura wants to calculate an estimate for the population of the UK in 2020
She assumes that the population increases by 0.6% each year.

(a) Using Laura's assumption, calculate an estimate for the population of the UK in 2020

.....

(2)

Kieran also assumes that the population of the UK increases by 0.6% each year.

He says that it will take over 80 years for the population to increase by 50% because $\frac{50}{0.6} = 83.\dot{3}$

Kieran's method is wrong.

(b) Explain what is wrong with his method.

.....

.....

(1)

Assuming that the population of the UK increases by 0.6% each year,

(c) show that the population of the UK each year forms a geometric progression.

(2)

(Total for question = 5 marks)

Exchange rates

Q30.

Three companies sell the same type of furniture.

The price of the furniture from Pooles of London is £1480
The price of the furniture from Jardins of Paris is €1980
The price of the furniture from Outways of New York is $2250

The exchange rates are

£1 = €1.34
£1 = $1.52

Which company sells this furniture at the lowest price?
You must show how you get your answer.

(Total for question is 3 marks)

Q31.

Three companies sell the same type of furniture.

The price of the furniture from Pooles of London is £1480
The price of the furniture from Jardins of Paris is €1980
The price of the furniture from Outways of New York is $2250

The exchange rates are

£1 = €1.34
£1 = $1.52

Which company sells this furniture at the lowest price?
You must show how you get your answer.

(Total for question is 3 marks)

Q32.

In London, 1 litre of petrol costs 108.9p
In New York, 1 US gallon of petrol costs $2.83

1 US gallon = 3.785 litres
£1 = $1.46

In which city is petrol better value for money, London or New York?
You must show your working.

(Total for question = 3 marks)

Q33.

Gina finds out the price of a CD box set in three different countries.

The price is

£98 in the UK
$134.99 in the USA
€139.99 in Germany

The exchange rates are

£1 = $1.43
€1 = £0.73

Gina wants to pay the cheapest price for the box set.

(a) From which country should Gina buy the box set?

You must show how you get your answer.

(3)

Gina lives in the UK.

(b) Why might your answer to (a) **not** be the best country for Gina to buy the box set from?

.....

(1)

(Total for question = 4 marks)

Q34.

Andy went on holiday to Canada.
His flights cost a total of £1500

Andy stayed for 14 nights.
His hotel room cost $196 per night.

Andy used wifi for 12 days.
Wifi cost $5 per day.

The exchange rate was $1.90 to £1

(a) Work out the total cost of the flights, the hotel room and Wi-Fi.

Give your answer in pounds.

£ .....

(5)

(b) If there were fewer dollars to £1, what effect would this have on the total cost, in pounds, of Andy's holiday?

.....

(1)

(Total for question = 6 marks)

Estimation problems

Q35.

(a) Work out an estimate for the value of $\sqrt{63.5 \times 101.7}$

.....

(2)

$(2.3)^6 = 148$ correct to 3 significant figures.

(b) Find the value of $(0.23)^6$ correct to 3 significant figures.

.....

(1)

(c) Find the value of 5^{-2}

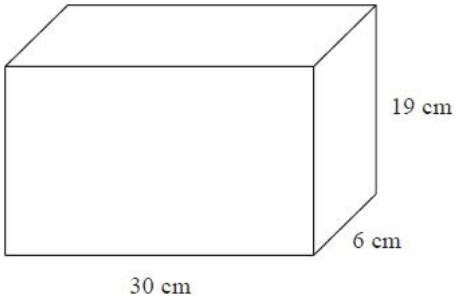
.....

(1)

(Total for question = 4 marks)

Q36.

A container is in the shape of a cuboid.



The container is $\frac{2}{3}$ full of water.

A cup holds 275 ml of water.

What is the greatest number of cups that can be completely filled with water from the container?

.....

(Total for question = 4 marks)

Q37.

(a) Write 7357 correct to 3 significant figures.

.....

(1)

(b) Work out $\frac{\sqrt{17 + 4^2}}{7.3^2}$

Write down all the figures on your calculator display.

.....

(2)

(Total for question = 3 marks)

Q38.

A person's heart beats approximately 10^5 times each day.
A person lives for approximately 81 years.

(a) Work out an estimate for the number of times a person's heart beats in their lifetime.

Give your answer in standard form correct to 2 significant figures.

.....

(2)

2×10^{12} red blood cells have a total mass of 90 grams.

(b) Work out the average mass of 1 red blood cell.

Give your answer in standard form.

..... grams

(2)

(Total for question = 4 marks)

Q39.

Paul organised an event for a charity.

Each ticket for the event cost £19.95
Paul sold 395 tickets.

Paul paid costs of £6000
He gave all money left to the charity.

(a) Work out an estimate for the amount of money Paul gave to the charity.

£.....

(3)

(b) Is your answer to (a) an underestimate or an overestimate?
Give a reason for your answer.

.....

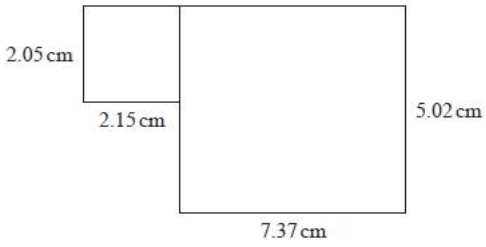
.....

(1)

(Total for question = 4 marks)

Q40.

This shape is made from two rectangles.



(a) Work out an estimate for the total area of the shape.

..... cm^2

(3)

(b) Is your answer to (a) an overestimate or an underestimate?

Give a reason for your answer.

.....

.....

(1)

(Total for question = 4 marks)

Q41.

A unit of gas costs 4.2 pence.

On average Ria uses 50.1 units of gas a week.
She pays for the gas she uses in 13 weeks.

(a) Work out an estimate for the amount Ria pays.

.....

(3)

(b) Is your estimate to part (a) an underestimate or an overestimate?
Give a reason for your answer.

.....

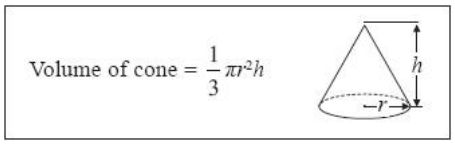
.....

(1)

(Total for question is 4 marks)

Q42.

A cone has a volume of 98 cm^3.
The radius of the cone is 5.13 cm.



(a) Work out an estimate for the height of the cone.

..... cm

(3)

John uses a calculator to work out the height of the cone to 2 decimal places.

(b) Will your estimate be more than John's answer or less than John's answer?
Give reasons for your answer.

.....

.....

.....

(1)

(Total for question = 4 marks)

Q43.

A cycle race across America is 3069.25 miles in length.

Juan knows his average speed for his previous races is 15.12 miles per hour.
For the next race across America he will cycle for 8 hours per day.

(a) Estimate how many days Juan will take to complete the race.

.....

(3)

Juan trains for the race.
The average speed he can cycle at increases.
It is now 16.27 miles per hour.

(b) How does this affect your answer to part (a)?

.....

.....

(1)

(Total for question = 4 marks)

Q44.

Work out an estimate for the value of $\frac{43.2 \times \sqrt{99.05}}{0.193}$

.....

(Total for question = 3 marks)

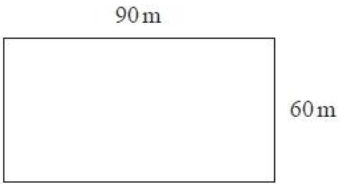
Area and surface area problems

Q45.

A garden is in the shape of a rectangle 90 m by 60 m.

Flowers are grown in 40% of the garden.
The rest of the garden is grass.

Work out the area of the garden that is grass.

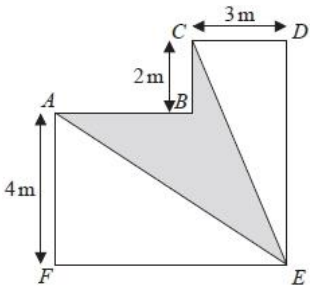


..... m^2

(Total for question = 4 marks)

Q46.

The diagram shows a shape *ABCDEF*.



All the corners of the shape are right angles.
The perimeter of the shape is 28 m.

Work out the area of *ABCE* shown shaded on the diagram.

.....

(Total for question = 5 marks)

Q47.

Maisie knows that she needs 3 kg of grass seed to make a rectangular lawn 5 m by 9 m.

Grass seed is sold in 2 kg boxes.

Maisie wants to make a rectangular lawn 10 m by 14 m.
She has 5 boxes of grass seed.

(a) Has Maisie got enough grass seed to make a lawn 10 m by 14 m?

You must show all your working.

(4)

Maisie opens the 5 boxes of grass seed.

She finds that 4 of the boxes contain 2 kg of grass seed.
The other box contains 1 kg of grass seed.

(b) Does this affect whether Maisie has enough grass seed to make her lawn?

Give a reason for your answer.

.....

.....

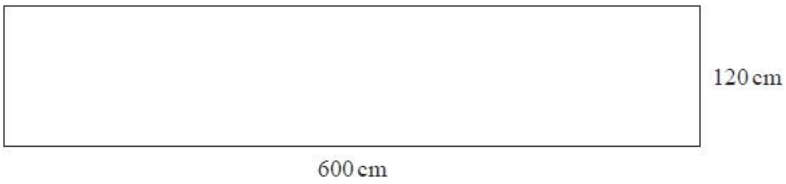
.....

(1)

(Total for question = 5 marks)

Q48.

The diagram shows a rectangular garden path.



Wasim is going to cover the path with paving stones.
Each paving stone is a square of side 30 cm.
Each paving stone costs £2.50

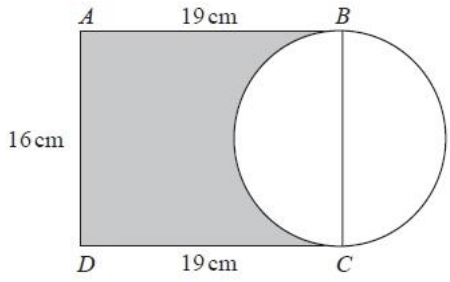
Wasim has £220 to spend on paving stones.

Show that he has enough money to buy all the paving stones he needs.

(Total for question = 4 marks)

Q49.

Here is a diagram showing a rectangle, *ABCD*, and a circle.



BC is a diameter of the circle.

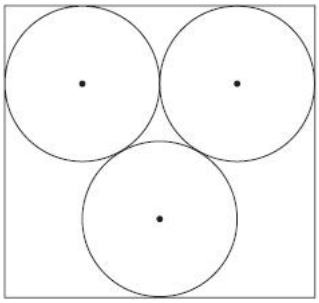
Calculate the percentage of the area of the rectangle that is shaded.
Give your answer correct to 1 decimal place.

.....%

(Total for question is 4 marks)

Q50.

The diagram shows 3 identical circles inside a rectangle.
Each circle touches the other two circles and the sides of the rectangle, as shown in the diagram.



The radius of each circle is 24 mm.

Work out the area of the rectangle.
Give your answer correct to 3 significant figures.

..... mm^2

(Total for question = 4 marks)

Q51.

Carpet tiles are going to be used to cover a floor.

The floor is a 1200mm by 1000mm rectangle.
Each carpet tile is a 40cm by 30cm rectangle.

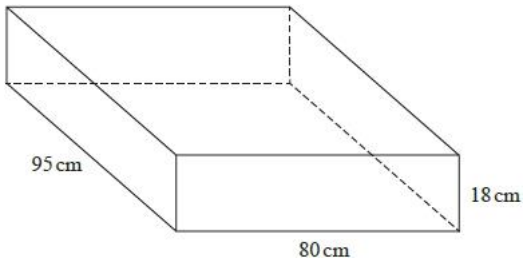
Exactly 10 carpet tiles can be used to cover the floor completely.

Show in a labelled sketch how this can be done.

(Total for question = 3 marks)

Q52.

A sofa has 6 identical cushions.
Each cushion is a cuboid 18 cm by 80 cm by 95 cm.



The cushions are covered with a protective spray.
The protective spray is in cans.

The label on each can has this information.

Spray in this can covers 4 m^2

(a) Work out how many cans are needed to cover the 6 cushions with protective spray.

.....

(5)

The information on each label is inaccurate.
The spray in each can covers 10% more than 4 m^2.

(b) How will this affect the number of cans needed for the 6 cushions?

You must show how you get your answer.

.....

.....

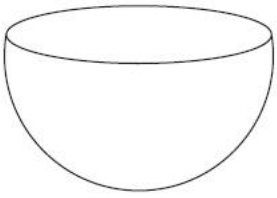
(2)

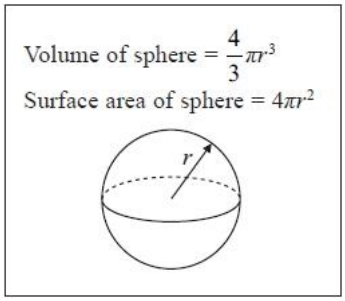
(Total for question = 7 marks)

Volume problems

Q53.

The diagram shows a solid hemisphere.





The volume of the hemisphere is $\frac{250}{3}$ π

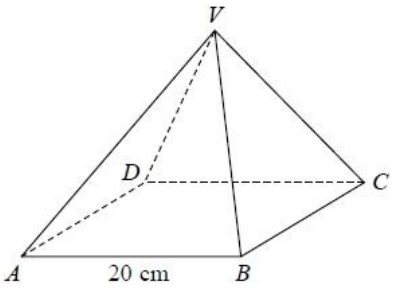
Work out the exact total surface area of the solid hemisphere.
Give your answer as a multiple of π.

..... cm^2

(Total for question is 4 marks)

Q54.

VABCD is a solid pyramid.



ABCD is a square of side 20 cm.

The angle between any sloping edge and the plane *ABCD* is 55°

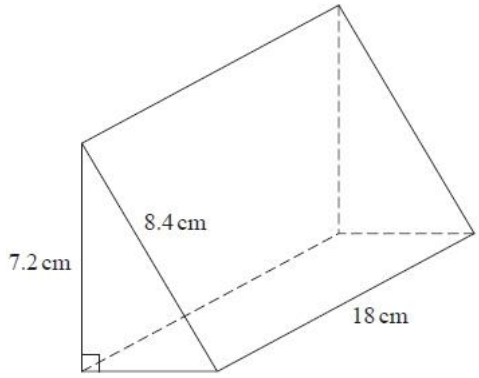
Calculate the surface area of the pyramid.
Give your answer correct to 2 significant figures.

.....cm^2

(Total for question = 5 marks)

Q55.

Here is a triangular prism.



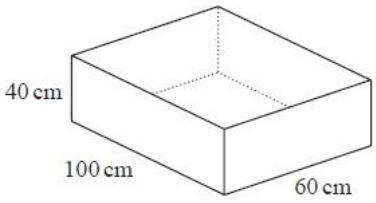
Work out the volume of the prism.
Give your answer correct to 3 significant figures.

..... cm^3

(Total for question = 5 marks)

Q56.

The diagram shows a sand pit.
The sand pit is in the shape of a cuboid.



Sally wants to fill the sand pit with sand.
A bag of sand costs £2.50
There are 8 litres of sand in each bag.

Sally

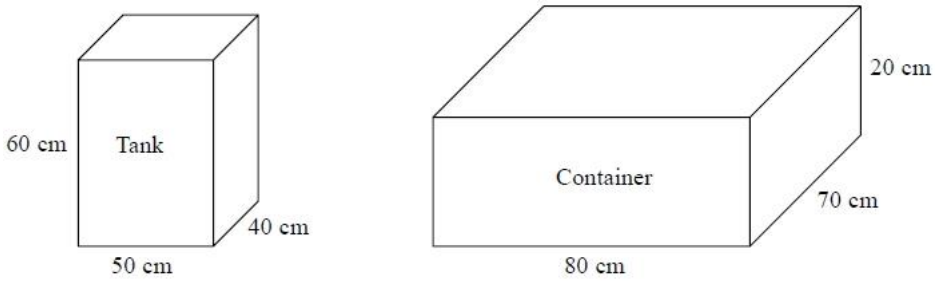
"The sand will cost less than £70"

Show that Sally is wrong.

(Total for question is 5 marks)

Q57.

The diagram shows a tank in the shape of a cuboid.
It also shows a container in the shape of a cuboid.



The tank is full of oil.
The container is empty.

35% of the oil from the tank is spilled.
The rest of the oil from the tank is put into the container.

Work out the height of the oil in the container.
Give your answer to an appropriate degree of accuracy.

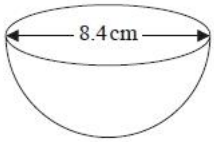
..... cm

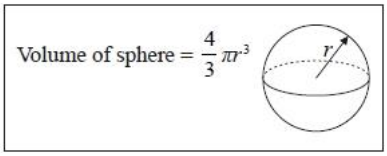
(2)

(Total for question = 5 marks)

Q58.

The diagram shows a hemisphere with diameter 8.4 cm.





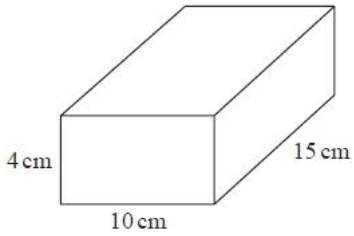
Work out the volume of the hemisphere.
Give your answer correct to 3 significant figures.

..... cm^3

(Total for question = 2 marks)

Q59.

Here is a cuboid.

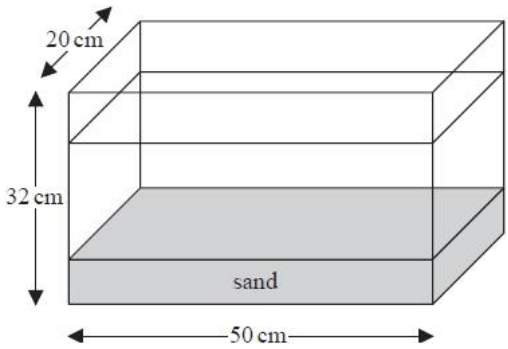


Work out the volume of the cuboid.

(Total for question = 3 marks)

Q60.

The diagram shows a fish tank in the shape of a cuboid.



The dimensions of the tank are 50 cm by 32 cm by 20 cm.

The tank is $\frac{3}{4}$ full of water and sand.

The ratio of the volume of water to the volume of sand is 5 : 1

Work out the number of litres of water in the tank.
You must show all your working.

..... litres

(Total for question = 5 marks)

Averages and spread

Q61.

Here is a list of numbers

12 19 12 15 11 15 12 13 17

Find the median.

.....

(Total for question = 2 marks)

Q62.

The table shows some information about the dress sizes of 25 women.

Dress size	Number of women
8	2
10	9
12	8
14	6

(a) Find the median dress size.

.....

(1)

3 of the 25 women have a shoe size of 7

Zoe says that if you choose at random one of the 25 women, the probability that she has either a shoe size of 7 or a dress size of 14 is $\frac{9}{25}$ because

$$\frac{3}{25} + \frac{6}{25} = \frac{9}{25}$$

(b) Is Zoe correct?

You must give a reason for your answer.

.....

.....

(1)

(Total for question = 2 marks)

Q63.

Matthew has eight cards.
There is a number on each card.

3	1	2	3	6	8	7	2

(a) Work out the range of the numbers on the cards.

.....

(1)

(b) Work out the median of the numbers on the cards.

.....

(2)

(Total for question = 3 marks)

Q64.

Ross rolled an ordinary dice 30 times.

The frequency table gives information about his results.

Score	Frequency
1	7
2	5
3	4
4	4
5	6
6	4

Ross worked out the mean score as 8

(a) Explain why it is impossible for the mean score to be 8

.....

.....

(1)

Graham also worked out the mean score.

Here is his working.

$1 \times 7 + 2 \times 5 + 3 \times 4 + 4 \times 4 + 5 \times 6 + 6 \times 4 = 99$

$99 \div 6 = 16.5$

The mean score is 16.5

(b) Describe the mistake Graham made in his method to work out the mean score.

.....

.....

(1)

(Total for question = 2 marks)

Q65.

20 men, 10 women and 10 children are in a competition.

The mean score for the women is 15.6
The mean score for the children is 9.2

Kevin says that the mean score for all 40 people is 11.2

(a) Work out the mean score for the men.

.....

(3)

Kevin was wrong.
The mean score for all 40 people was actually 11.15

(b) How does this affect the mean score for the men?

.....

.....

(1)

(Total for question = 4 marks)

Q66.

The table gives information about the times taken, in seconds, by 18 students to run a race.

Time (t seconds)	Frequency
$5 < t \leqslant 10$	1
$10 < t \leqslant 15$	2
$15 < t \leqslant 20$	7
$20 < t \leqslant 25$	8

Work out an estimate for the mean time.
Give your answer correct to 3 significant figures.

..... seconds

(Total for question = 3 marks)

Q67.

There is a total of 45 boys and girls in a choir.

The mean age of the 18 boys is 16.2 years.
The mean age of the 27 girls is 16.7 years.

Calculate the mean age of all 45 boys and girls.

..... years

(Total for question = 3 marks)

Q68.

A bus company recorded the ages, in years, of the people on coach A and the people on coach B.

Here are the ages of the 23 people on coach A.

41	42	44	48	52	53	53	53	56	57	57	59
60	61	63	64	64	66	67	69	74	77	79	

(a) Complete the table below to show information about the ages of the people on coach A.

Median	
Lower quartile	
Upper quartile	
Least age	41
Greatest age	79

(2)

Here is some information about the ages of the people on coach B.

Median	70
Lower quartile	54
Upper quartile	73
Least age	42
Greatest age	85

Richard says that the people on coach A are younger than the people on coach B.

(b) Is Richard correct?
You must give a reason for your answer.

.....

.....

.....

(1)

Richard says that the people on coach A vary more in age than the people on coach B.

(c) Is Richard correct?
You must give a reason for your answer.

.....

.....

.....

(1)

(Total for question = 4 marks)

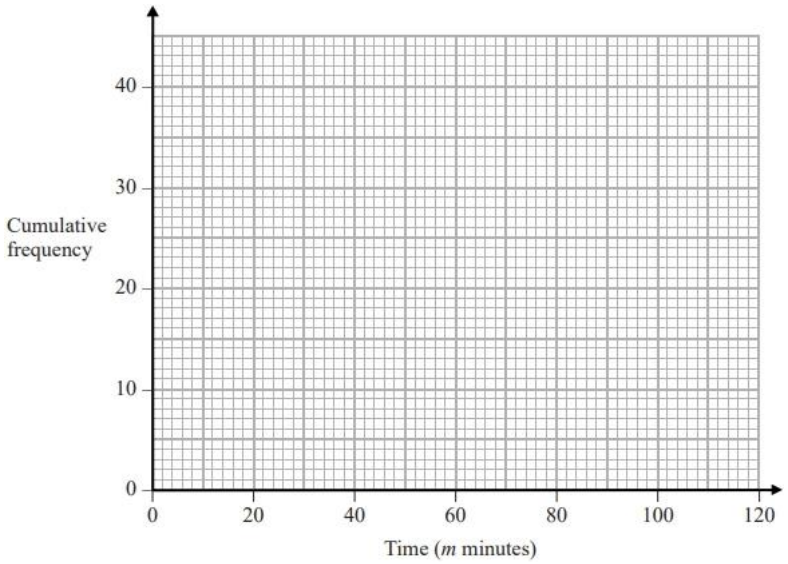
Cumulative frequency diagrams

Q69.

The cumulative frequency table shows information about the times, in minutes, taken by 40 people to complete a puzzle.

Time (m minutes)	Cumulative frequency
$20 < m \leqslant 40$	5
$20 < m \leqslant 60$	25
$20 < m \leqslant 80$	35
$20 < m \leqslant 100$	38
$20 < m \leqslant 120$	40

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



(2)

(b) Use your graph to find an estimate for the interquartile range.

..... minutes

(2)

One of the 40 people is chosen at random.

(c) Use your graph to find an estimate for the probability that this person took between 50 minutes and 90 minutes to complete the puzzle.

.....

(2)

(Total for question = 6 marks)

Q70.

The table gives information about the weekly wages of 80 people.

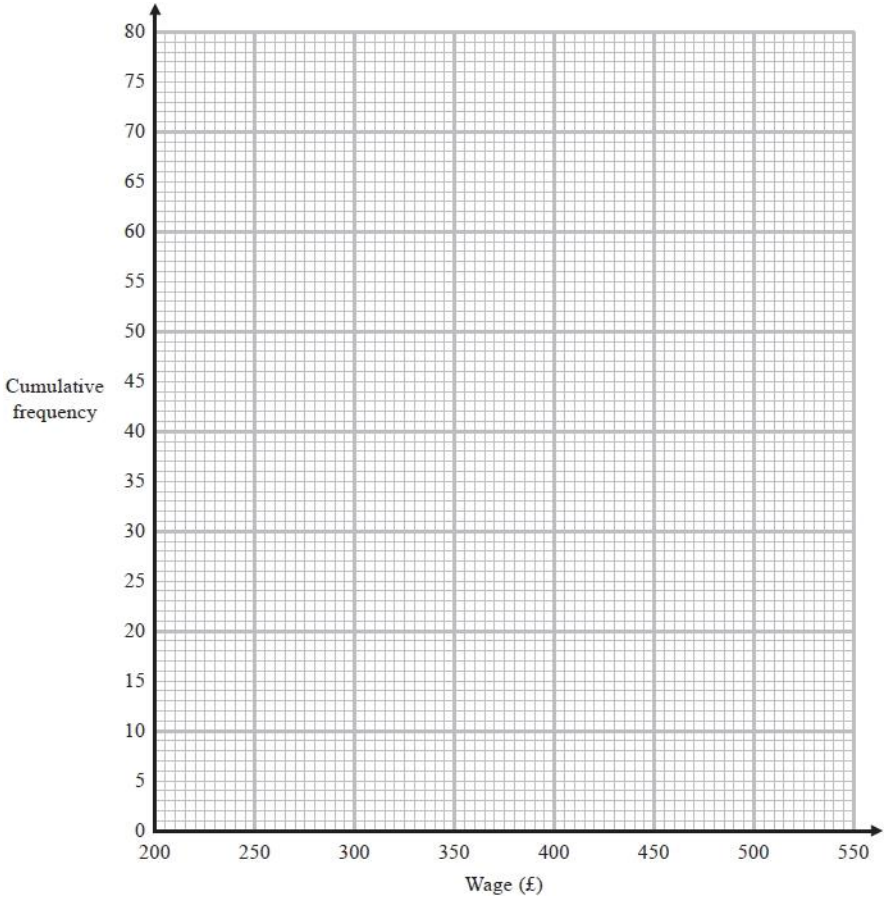
Wage (£w)	Frequency
$200 < w \leqslant 250$	5
$250 < w \leqslant 300$	10
$300 < w \leqslant 350$	20
$350 < w \leqslant 400$	20
$400 < w \leqslant 450$	15
$450 < w \leqslant 500$	10

(a) Complete the cumulative frequency table.

Wage (£w)	Cumulative frequency
$200 < w \leqslant 250$	
$200 < w \leqslant 300$	
$200 < w \leqslant 350$	
$200 < w \leqslant 400$	
$200 < w \leqslant 450$	
$200 < w \leqslant 500$	

(1)

(b) On the grid below, draw a cumulative frequency graph for your completed table. **(2)**



Juan says

"60% of this group of people have a weekly wage of £360 or less."

(c) Is Juan correct?

You must show how you get your answer.

(3)

(Total for question = 6 marks)

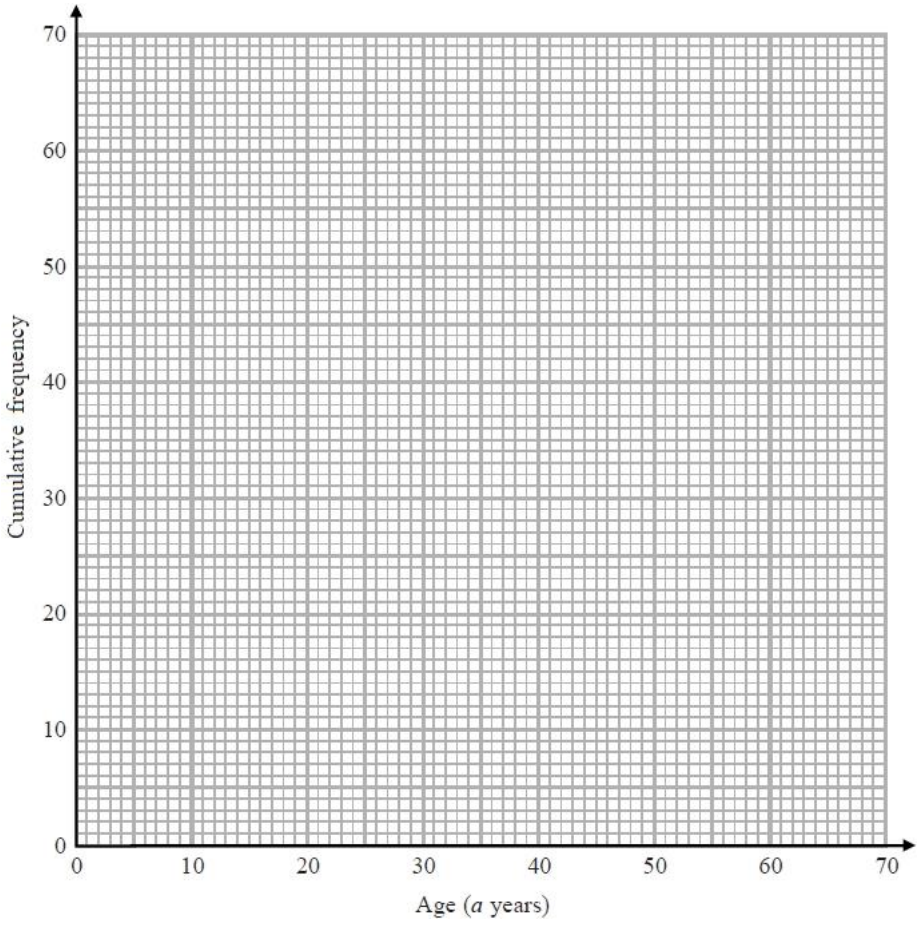
Q71.

Francesco carried out a survey about the ages of the people in his office.

The table shows information about his results.

Age (a years)	Cumulative frequency
$20 < a \leqslant 30$	10
$20 < a \leqslant 40$	26
$20 < a \leqslant 50$	58
$20 < a \leqslant 60$	66
$20 < a \leqslant 70$	70

(a) On the grid opposite, draw a cumulative frequency graph for this information. **(2)**



(b) Use your graph to find an estimate for the median age.

..... years

(1)

Francesco says,

"More than 60% of the people in the office are between 35 and 55 years old."

(c) Use your graph to determine if Francesco is correct.

.....

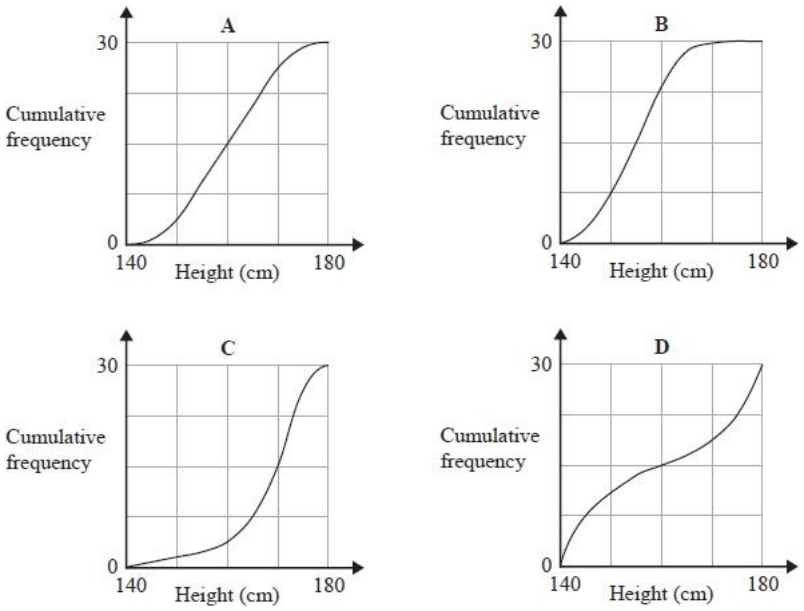
(3)

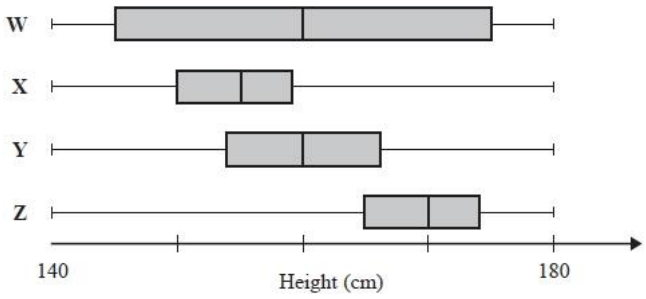
(Total for question = 6 marks)

Q72.

Joan measured the heights of students in four different classes.

She drew a cumulative frequency graph and a box plot for each class.





Match each cumulative frequency graph to its box plot.

Cumulative frequency graph	Box plot
A	
B	
C	
D	

(Total for question = 2 marks)

Box plots

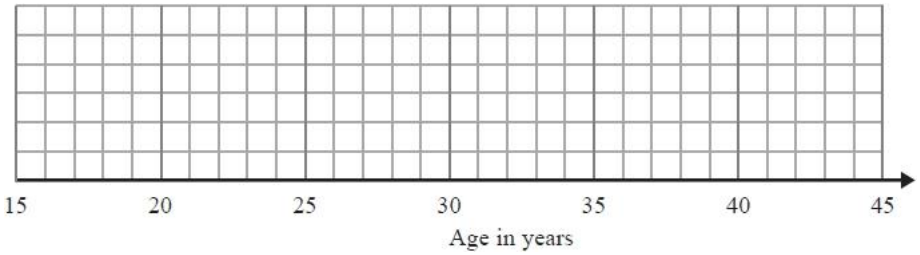
Q73.

The stem and leaf diagram shows the ages, in years, of 25 people.

1	7 7 8 9
2	1 2 4 4 5 5 6 7 8 9 9
3	0 1 2 2 3 4 5 6
4	0 1

Key: 1 | 7 represents 17 years

(a) (i) On the grid, draw a box plot for this information.



(3)

One of these people is chosen at random.

(ii) What is the probability that this person is 30 years of age or older?

.....

(2)

The grouped frequency table gives information about the ages of a different group of people.

Age (a years)	Frequency
$0 < a \leqslant 20$	7
$20 < a \leqslant 30$	12
$30 < a \leqslant 40$	5
$40 < a \leqslant 50$	1

Anne drew this cumulative frequency table for this information.

Age (a years)	Cumulative frequency
$0 < a \leqslant 20$	7
$20 < a \leqslant 30$	19
$30 < a \leqslant 40$	24
$40 < a \leqslant 50$	25

The cumulative frequency table is **not** correct.

(b) Write down one thing that is wrong with the table.

.....

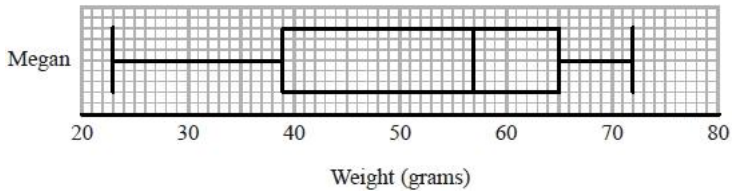
(1)

(Total for question = 6 marks)

Q74.

Megan grows potatoes.

The box plot below shows information about the weights of Megan's potatoes.



Megan says that half of her potatoes weigh less than 50 grams each.

(a) Is Megan correct?

Give a reason for your answer.

.....

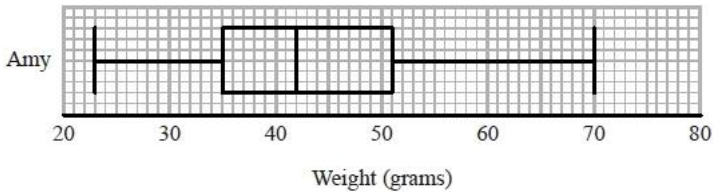
.....

.....

(1)

Amy also grows potatoes.

The box plot below shows information about the weights of Amy's potatoes.



(b) Compare the distribution of the weights of Megan's potatoes with the distribution of the weights of Amy's potatoes.

.....

.....

.....

.....

.....

(2)

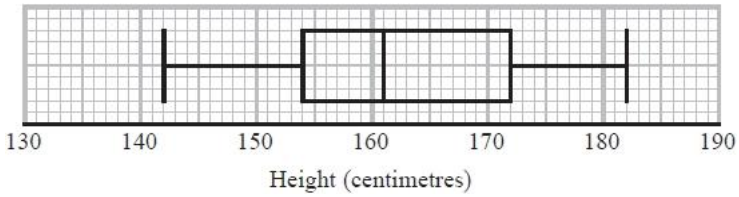
(Total for question = 3 marks)

Q75.

Aisha recorded the heights, in centimetres, of some girls.
She used her results to work out the information in this table.

Least height	142 cm
Lower quartile	154 cm
Interquartile range	17 cm
Median	162 cm
Range	40 cm

Aisha drew this box plot for the information in the table.
The box plot is **not** fully correct.



Write down the two things Aisha should do to make the box plot fully correct.

1 .....

.....

.....

2 .....

.....

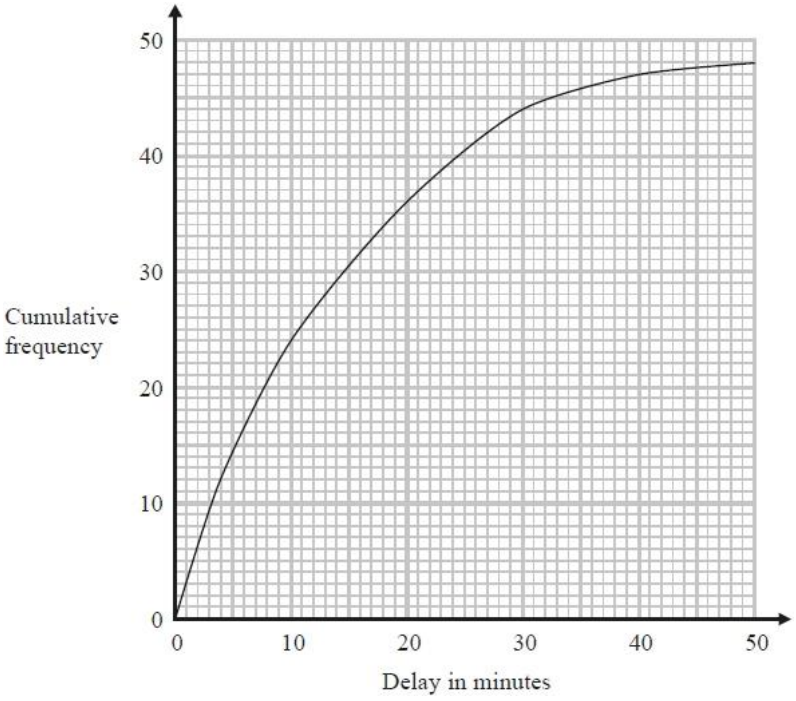
.....

(Total for question = 2 marks)

Q76.

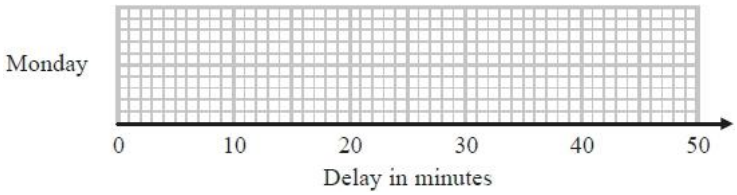
The times that 48 trains left a station on Monday were recorded.

The cumulative frequency graph gives information about the numbers of minutes the trains were delayed, correct to the nearest minute.



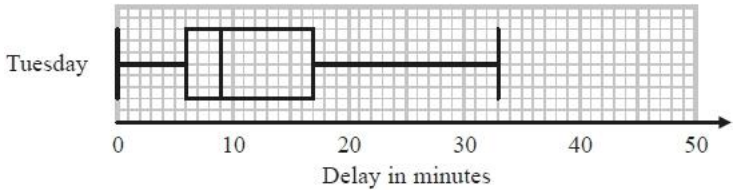
The shortest delay was 0 minutes.
The longest delay was 42 minutes.

(a) On the grid below, draw a box plot for the information about the delays on Monday.



(3)

48 trains left the station on Tuesday.
The box plot below gives information about the delays on Tuesday.



(b) Compare the distribution of the delays on Monday with the distribution of the delays on Tuesday.

.....

.....

.....

.....

(2)

Mary says,

"The longest delay on Tuesday was 33 minutes.
This means that there must be some delays of between 25 minutes and 30 minutes."

(c) Is Mary right?

You must give a reason for your answer.

.....

.....

(1)

(Total for question = 6 marks)

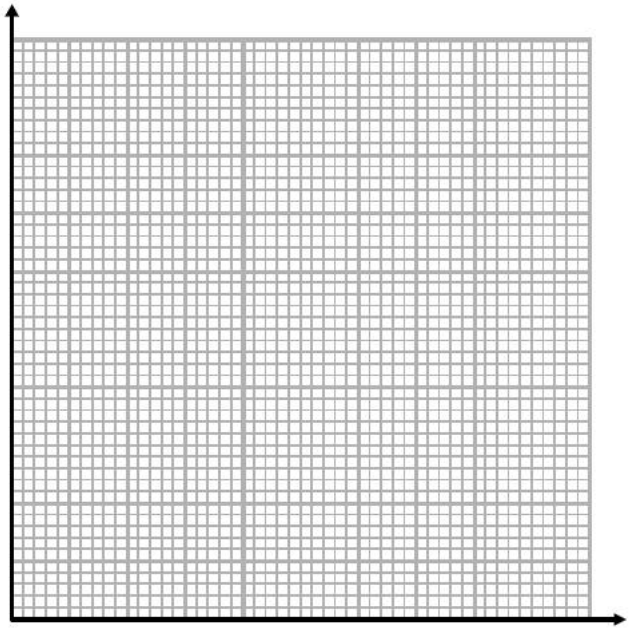
Histograms

Q77.

The table gives information about the speeds, in km/h, of 81 cars.

Speed (s km/h)	Frequency
$90 < s \leqslant 100$	13
$100 < s \leqslant 105$	16
$105 < s \leqslant 110$	18
$110 < s \leqslant 120$	22
$120 < s \leqslant 140$	12

(a) On the grid, draw a histogram for the information in the table.



(3)

(b) Find an estimate for the median.

..... km/h

(2)

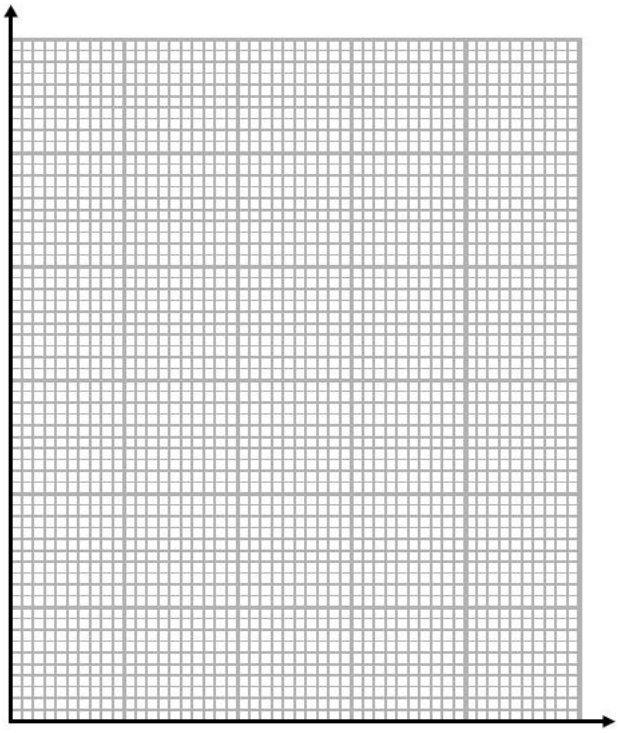
(Total for question = 5 marks)

Q78.

The table gives information about the heights of 150 students.

Height (h cm)	Frequency
$140 < h \leqslant 150$	15
$150 < h \leqslant 155$	30
$155 < h \leqslant 160$	51
$160 < h \leqslant 165$	36
$165 < h \leqslant 180$	18

(a) On the grid, draw a histogram for this information.



(3)

(b) Work out an estimate for the fraction of the students who have a height between 150 cm and 170 cm.

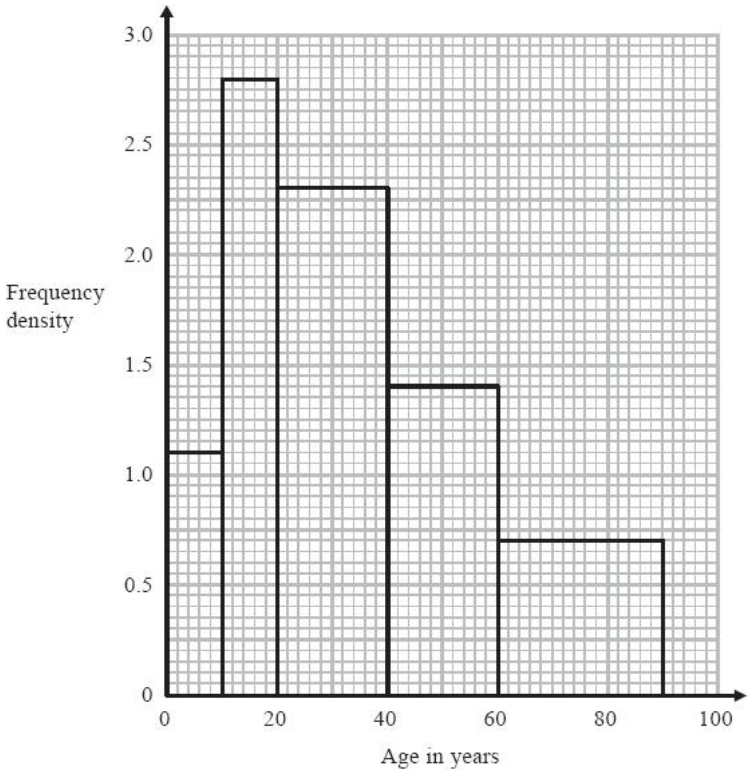
.....

(2)

(Total for question = 5 marks)

Q79.

The histogram shows some information about the ages of the 134 members of a sports club.



20% of the members of the sports club who are over 50 years of age are female.

Work out an estimate for the number of female members who are over 50 years of age.

.....

(Total for question = 3 marks)

Stem and leaf diagrams

Q80.

Here are the speeds, in kilometres per hour, of 15 cyclists.

16	22	34	18	24
22	33	28	19	41
23	25	31	40	23

Show this information in a stem and leaf diagram.

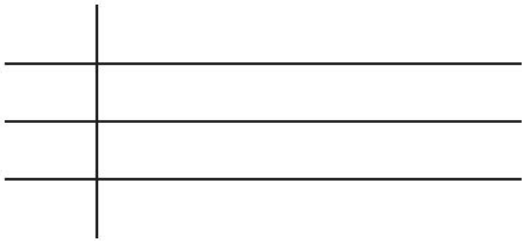
(Total for question = 3 marks)

Q81.

Here are the heights, in centimetres, of 15 children.

123	147	135	150	147
129	148	149	125	137
133	138	133	130	151

(a) Show this information in a stem and leaf diagram.



(3)

One of the children is chosen at random.

(b) What is the probability that this child has a height greater than 140 cm?

.....

(2)

(Total for question is 5 marks)

Q82.

The stem and leaf diagram shows information about the heights, in cm, of the boys in a class.

14	0	2	9			
15	1	1	3	5	7	
16	2	4	5	7	8	9
17	6	6	7	9		
18	0	0	1			

Key: 15 | 1 represents 151 cm

(a) Find the median height.

..... cm

(1)

The girls in the class have a median height of 162 cm.
Their heights have a range of 45 cm.

(b) Compare the distribution of the heights of the boys with the distribution of the heights of the girls.

.....

.....

.....

.....

(2)

(Total for question = 3 marks)

Q83.

The stem and leaf diagram gives information about the speeds of 27 cars.

3	8
4	1 3 4 6 7 8 8 9 9
5	2 2 4 6 7 7 8 8 9
6	1 1 2 2 2 2 3
7	0

Key:
3 | 8 means 38 miles per hour

(a) Find the median speed.

..... miles per hour

(1)

(b) Work out the range.

..... miles per hour

(1)

One of the cars is chosen at random.

Jack says,

"The probability that the speed of this car is more than 60 miles per hour is $\frac{1}{3}$"

(c) Jack is wrong.
Explain why.

.....

.....

(2)

(Total for question = 4 marks)

Q84.

The table shows information about the heights, in cm, of a group of Year 9 girls.

least height	150 cm
median	165 cm
greatest height	170 cm

This stem and leaf diagram shows information about the heights, in cm, of a group of 15 Year 9 boys.

15	8 9 9
16	4 5 7 7 8
17	0 3 4 4 7
18	0 2

Key: 15 | 8 represents 158 cm

Compare the distribution of the heights of the girls with the distribution of the heights of the boys.

.....

.....

.....

.....

.....

.....

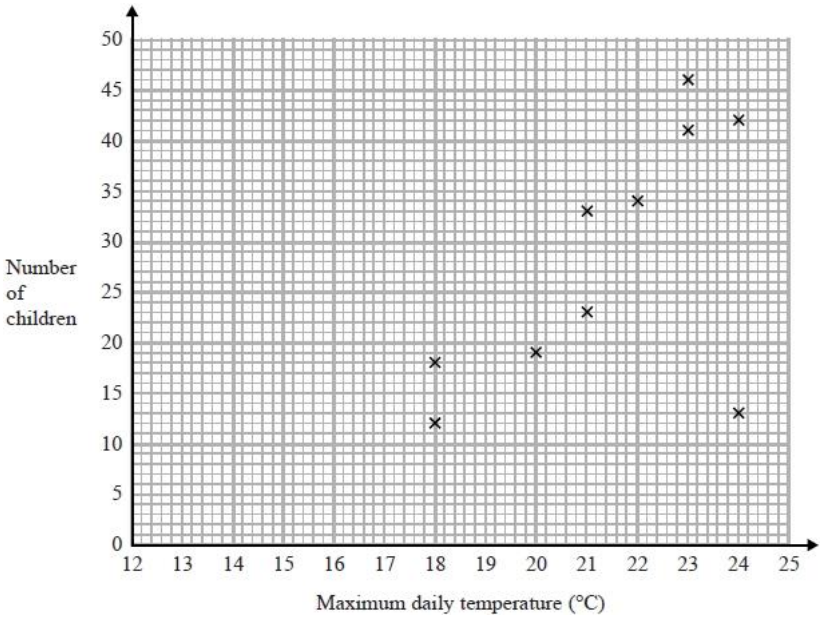
(Total for question = 3 marks)

Scatter graphs and lines of best fit

Q85.

Jean records the maximum daily temperature each day for 10 days.
She also records the number of children going to a paddling pool for each of these days.

She draws this scatter graph for her information.



Jean's information for one of these days is an outlier on the scatter graph.

(a) Give a possible reason for this.

.....

.....

(1)

(b) What type of correlation does the scatter graph show?

.....

(1)

On the 11th day, the maximum daily temperature was 19°C.

(c) Write down an estimate for the number of children going to the paddling pool on the 11th day.

.....

(1)

It would not be sensible to use the scatter graph to predict the number of children going to the paddling pool on a day when the maximum daily temperature was 13°C.

(d) Give a reason why.

.....

.....

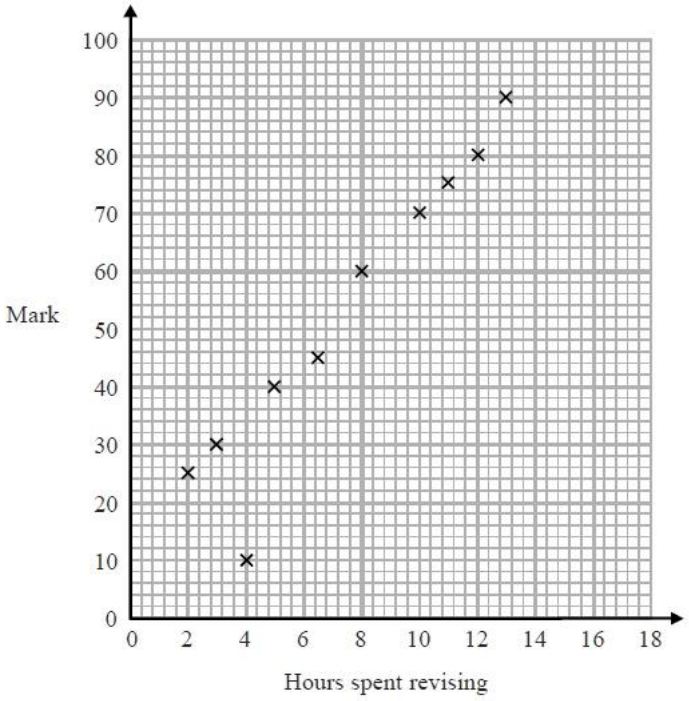
(1)

(Total for question = 4 marks)

Q86.

The scatter diagram shows information about 10 students.

For each student, it shows the number of hours spent revising and the mark the student achieved in a Spanish test.



One of the points is an outlier.

(a) Write down the coordinates of the outlier.

.....

(1)

For all the **other** points

(b) (i) draw the line of best fit,

(ii) describe the correlation.

.....

.....

(2)

A different student revised for 9 hours.

(c) Estimate the mark this student got

.....

(1)

The Spanish test was marked out of 100

Lucia says,

"I can see from the graph that had I revised for 18 hours I would have got full marks."

(d) Comment on what Lucia says.

.....

.....

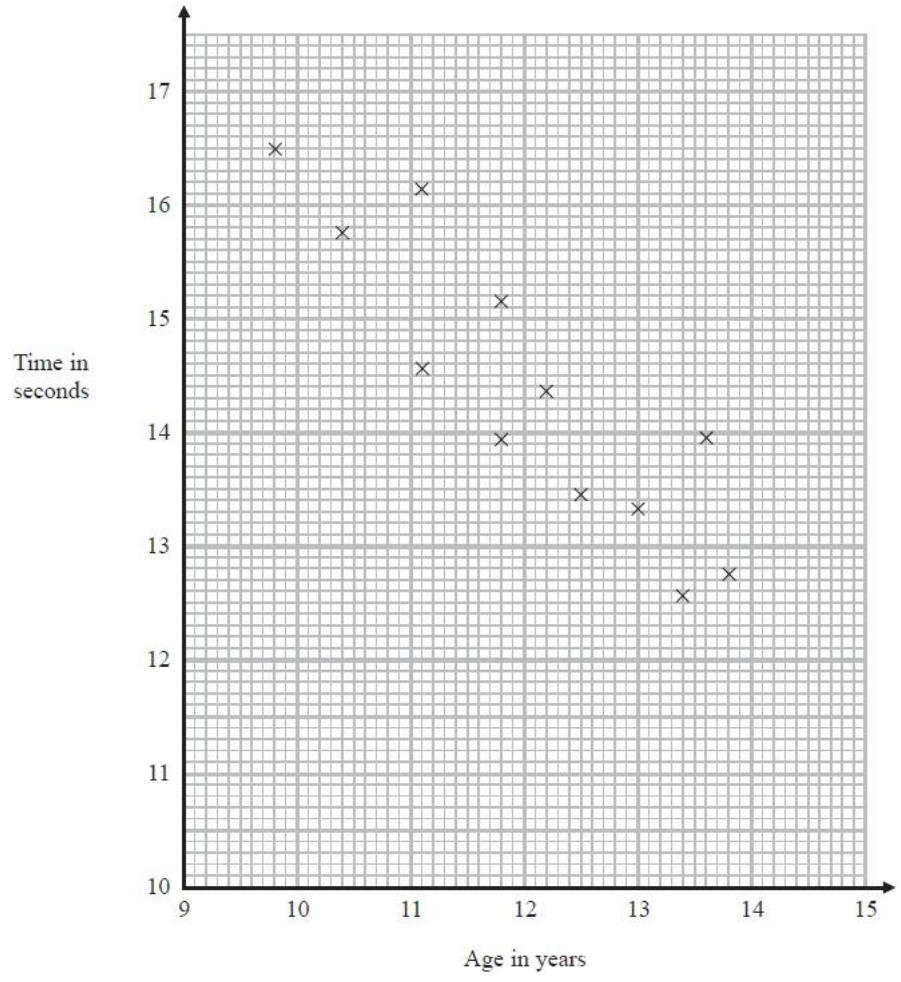
(1)

(Total for question is 5 marks)

Q87.

The scatter diagram shows information about 12 girls.

It shows the age of each girl and the best time she takes to run 100 metres.



(a) Write down the type of correlation.

.....

(1)

Kristina is 11 years old.

Her best time to run 100 metres is 12 seconds.

The point representing this information would be an outlier on the scatter diagram.

(b) Explain why.

.....

.....

(1)

Debbie is 15 years old.
Debbie says,

"The scatter diagram shows I should take less than 12 seconds to run 100 metres."

(c) Comment on what Debbie says.

.....

.....

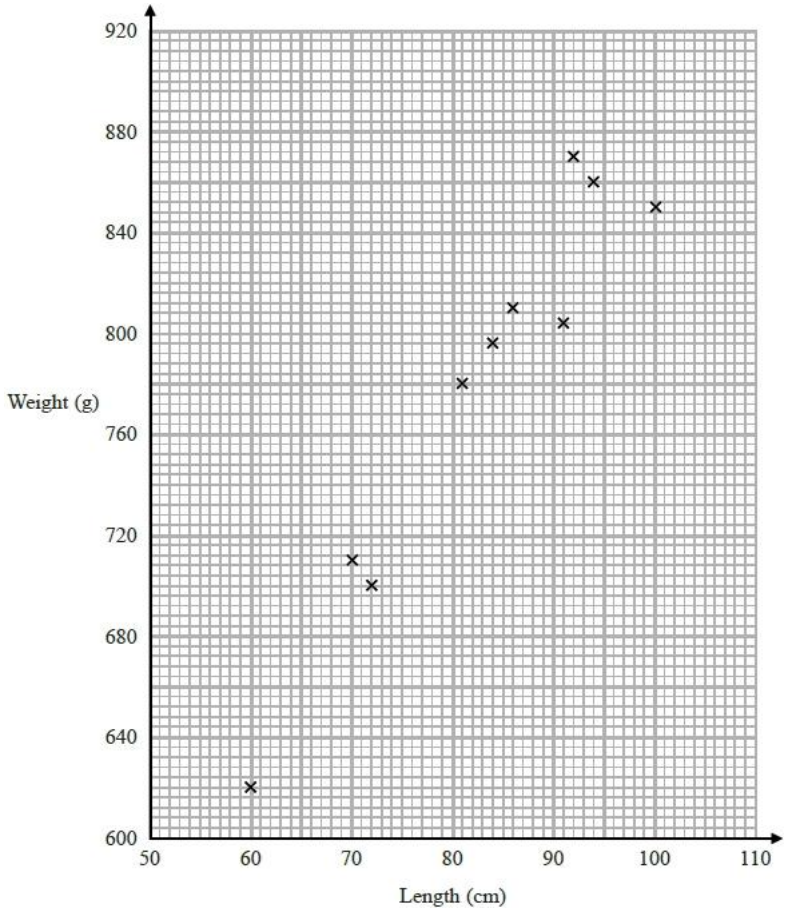
(1)

(Total for question = 3 marks)

Q88.

The scatter graph shows information about 10 adult snakes of the same type.

It shows the length and weight of each snake.



An adult snake of this type has a weight of 740 g.

(a) Use the scatter graph to estimate the length of this snake.

..... cm

(2)

Steven wants to estimate the weight of an adult snake of length 110 cm.

He says he will draw a line of best fit and read off the weight at 110 cm.

(b) Explain what is wrong with his method.

.....

.....

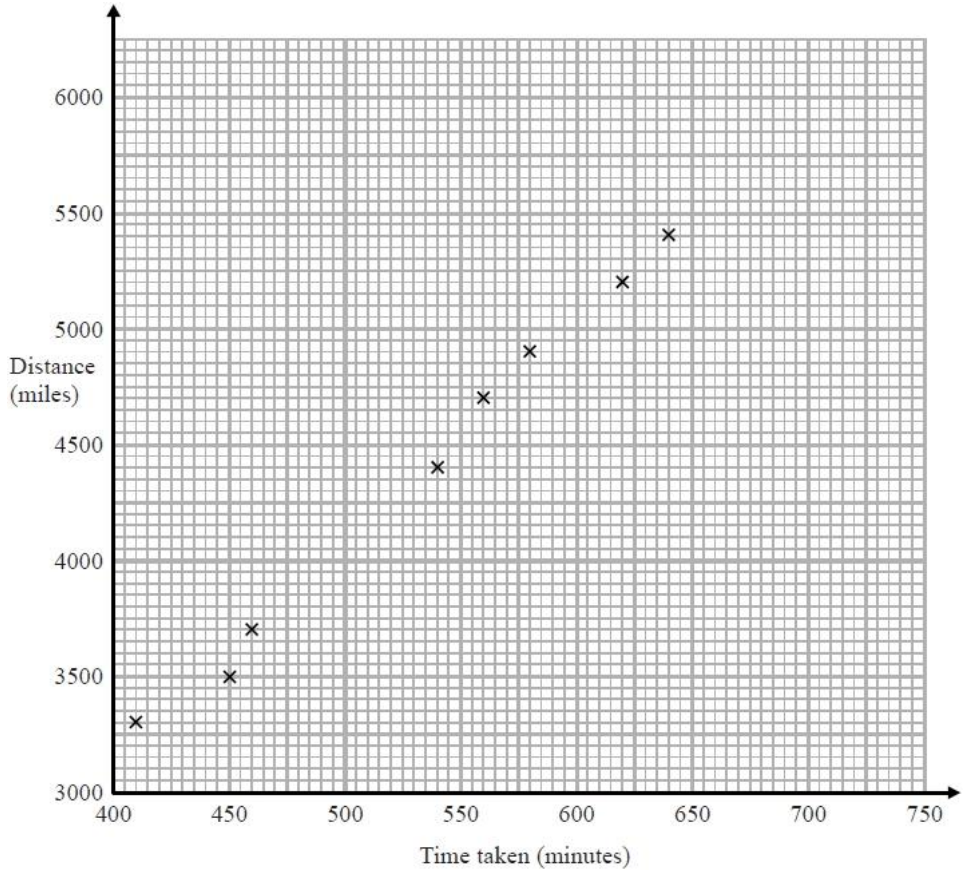
(1)

(Total for question = 3 marks)

Q89.

Oliver records the distance from London to each of eight cities in the USA.
He also records the time taken to fly from London to each of these cities.

The scatter graph shows this information.



Chicago is a city in the USA.
Chicago is 4000 miles from London.

(a) (i) By drawing a line of best fit, find an estimate for the time taken to fly from London to Chicago.

..... minutes

(2)

(ii) Why is your answer to part (i) only an estimate?

.....

.....

(1)

(b) (i) Calculate the gradient of your line of best fit.

.....

(2)

(ii) Give an interpretation of the gradient of your line of best fit.

.....

.....

(1)

(Total for question = 6 marks)

Sampling

Q90.

Hannah is planning a day trip for 195 students.

She asks a sample of 30 students where they want to go.
Each student chooses one place.

The table shows information about her results.

Place	Number of students
Theme Park	10
Theatre	5
Sports Centre	8
Seaside	7

(i) Work out how many of the 195 students you think will want to go to the Theme Park.

.....

(2)

(ii) State any assumption you made **and** explain how this may affect your answer.

.....

.....

.....

(1)

(Total for question = 3 marks)

Q91.

There are p counters in a bag.
12 of the counters are yellow.

Shafiq takes at random 30 counters from the bag.
5 of these 30 counters are yellow.

Work out an estimate for the value of p.

.....

(Total for question = 2 marks)

Q92.

Each person in a fitness club is going to get a free gift.
Stan is going to order the gifts.

Stan takes a sample of 50 people in the fitness club.
He asks each person to tell him the gift they would like.

The table shows information about his results.

Gift	Number of people
sports bag	17
gym towel	7
headphones	11
voucher	15

There are 700 people in the fitness club.

(i) Work out how many sports bags Stan should order.

.....

(2)

(ii) Write down any assumption you made **and** explain how this could affect your answer.

.....

.....

.....

.....

(1)

(Total for question = 3 marks)

Q93.

Shirley wants to find an estimate for the number of bees in her hive.

On Monday she catches 90 of the bees.
She puts a mark on each bee and returns them to her hive.

On Tuesday she catches 120 of the bees.
She finds that 20 of these bees have been marked.

(a) Work out an estimate for the total number of bees in her hive.

.....

(3)

Shirley assumes that none of the marks had rubbed off between Monday and Tuesday.

(b) If Shirley's assumption is wrong, explain what effect this would have on your answer to part (a).

.....

.....

(1)

(Total for question = 4 marks)

Q94.

There are 1200 students at a school.

Kate is helping to organise a party.
She is going to order pizza.

Kate takes a sample of 60 of the students at the school.
She asks each student to tell her **one** type of pizza they want.

The table shows information about her results.

Pizza	Number of students
ham	20
salami	15
vegetarian	8
margherita	17

Work out how much ham pizza Kate should order.
Write down any assumption you make **and** explain how this could affect your answer.

.....

.....

(Total for question = 3 marks)

Probability

Q95.

Stuart throws a biased coin 10 times.
He gets 7 Tails.

Maxine throws the same coin 50 times.
She gets 30 Tails.

Prasha is going to throw the coin once.

(i) Whose results will give the better estimate for the probability that she will get Tails, Stuart's or Maxine's?
You must give a reason for your answer.

.....

.....

.....

(1)

(ii) Use Stuart's and Maxine's results to work out an estimate for the probability that Prasha will get Tails.

.....

(1)

(Total for question = 2 marks)

Q96.

There are 300 seeds in a packet of flower seeds.
Each seed will grow into a white flower or a yellow flower or a red flower.

The probability of a seed growing into a white flower is 0.62
45 of the seeds are expected to grow into yellow flowers.

One of the seeds is chosen at random from the packet.

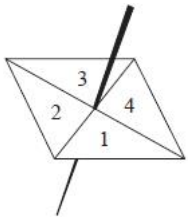
What is the probability that this seed will grow into a red flower?

.....

(Total for question = 3 marks)

Q97.

Here is a 4-sided spinner.



The table shows the probabilities that when the spinner is spun it will land on 1, on 3 and on 4

Number	1	2	3	4
Probability	0.2		0.4	0.1

The spinner is spun once.

(a) Work out the probability that the spinner will land on 2

.....

(1)

(b) Which number is the spinner least likely to land on?

.....

(1)

Jake is going to spin the spinner 60 times.

(c) Work out an estimate for the number of times the spinner will land on 1

.....

(2)

(Total for question = 4 marks)

WELL DONE FOR COMPLETING THIS BOOKLET! 😊.
NOW CHECK YOUR ANSWERS USING THE MARK SCHEME BELOW.

Mark Scheme

Q1.

Question	Working	Answer	Notes
		80	B1

Q2.

Question	Answer	Mark	Mark scheme	Additional guidance
	73	B1	cao	

Q3.

Question	Answer	Mark	Mark scheme	Additional guidance
	0.15	B1	cao	

Q4.

Question	Working	Answer	Mark	Notes
		42	M1 A1	for showing method to work out 60% of 70, eg 0.6 × 70 **or** (70 ÷ 10) × 6 (= 42) cao

Q5.

Paper 1MA1: 2F			
Question	**Working**	**Answer**	**Notes**
		63	M1 for a method to find A1 percentage of a quantity

Q6.

Paper 1MA1: 3F			
Question	Working	Answer	Notes
		351	M1 for 2.34 × 150 oe A1

Q7.

Question	Working	Answer	Mark	Notes
		1545	M1 A1	shows a method to find 3% eg 1500 × 0.03 (=45) cao

Q8.

Question	Answer	Mark	Mark scheme	Additional guidance
	1204	P2 (P1 P1 A1	for a full process to find 120% of 14200 eg. 1.2 × 14200 (=17040) **or** (0.2 × 14200) + 14200 (=17040) for process to find 20% of 14200 eg. 0.2 × 14200 (=2840) oe) for [cost] − 5000 cao SCB1 for answer of 920 if P0 scored	 [cost] must be greater than 14200

Q9.

Question	Working	Answer	Notes
		35	M1 for method to find increase 108 – 80 (= 28) M1 for method to find % increase eg $\frac{28}{80} \times 100$ A1 cao

Q10.

Question		Working	Answer	Mark	Notes
			20	3	M1 for 52 – 41.6 (= 10.4) M1 "10.4" ÷ 52 × 100 A1 for 20

Q11.

Question	Working	Answer	Mark	Notes
	£6 − £5.64 = 36p or 50p – 47p = 3p	6.4	P1	for a strategy to compare the same number of bottles e.g. £5.64 ÷ 12 (= 47 or 0.47) or 12 × 50p (= 6 or 600) or 36 or 0.36 or 3 or 0.03
			P1	for start of process to find percentage profit e.g. $\frac{"36"}{564}$ or $\frac{"3"}{"47"}$ or $\frac{"6"}{5.64}$ or $\frac{50}{"47"}$ oe with consistent units
	6.3829787…%		A1	for answer in the range 6.3 to 6.4

Q12.

Paper 1MA1: 2F			
Question	**Working**	**Answer**	**Notes**
		for 'no' with supporting evidence	P1 for correct process to find price in Week 1, P1 eg. 65 × 0.8 (= 52) for process to find the price in week 2, C1 eg. "52" – 10 (= 42) for 'no' with supporting evidence

Q13.

Question	Answer	Mark	Mark scheme	Additional guidance
	20	P1	for process to find SP of 24 chocolate bars, eg. 0.50 × 24 (= 12) oe **or** for process to find the overall profit eg (24 × 0.5) – 10 (= 2) **or** for process to find CP of one chocolate bar, eg. 1000 ÷ 24 (= 41.66…) oe	Working can be carried out in either pounds or pence.
		P1	(dep) for start to a process to find percentage profit, eg. using $\frac{"12"-10}{10}$ **or** $\frac{"12"}{10}$ **or** $\frac{50-"41.66..."}{"41.66..."}$ oe with consistent units	
		A1	cao	

Q14.

Question	Answer	Mark	Mark scheme	Additional guidance
	260 to 260.5	M1 M1 A1	for 883 – 245 (=638) **or** 883 ÷ 245 (=3.60..) **or** 883 ÷ 245 × 100 (=360(.408...)) oe for a complete method to find the percentage increase eg "638" ÷ 245 × 100 (=260(.408..)) **or** 883 ÷ 245 × 100 − 100 (=260(.408..)) oe Accept answers in the range 260 to 260.5	

Q15.

Question		Working	Answer	Mark	Notes
			460	P1 P1 A1	for a process to find the cost after the first reduction, e.g. 293.25 ÷ 0.85 (= 345) (dep) for a complete process to find the initial cost, e.g. "345" ÷ 0.75 cao

Q16.

Question	Working	Answer	Mark	Notes
		500	M1 A1	recognition of 1.2 or 120% oe eg 600 ÷ 1.2 oe or $x \times 1.2 = 600$ oe or 120%=600 cao

Q17.

Paper 1MA1: 1F			
Question	Working	Answer	Notes
		75	P1 for start to process eg. linking 20% with 15 or 100 ÷ 5 (= 20) A1

Q18.

Question	Working	Answer	Mark	Notes
		4	M1	for a complete method eg $2.80 \times 100 \div (100-30)$ oe **or** $2.80 \div 0.7$ oe **or** for build up method but must show all intermediate steps unless all figures are correct eg $2.8 \div 7 = 0.4$ and "0.40" $\times$ 10 (=4)
			A1	cao

Q19.

Paper 1MA1: 2H			
Question	Working	Answer	Notes
		8112	M1 for complete method, eg. 7500×1.04^2 A1 cao

Q20.

Question	Answer	Mark	Mark scheme	Additional guidance
	12272.70 12272.71 or 12272.72	M1	for evidence of using a correct first step eg 200000 × 0.015 (= 3000) or 200000 × 1.015 (= 203000)	
		M1	for evidence of a compound interest method eg 203000 × 0.015 (= 3045) or 203000 × 1.015 (= 206045) **or** 206045 × 0.015 (= 3090.675) or 206045 × 1.015 (= 209135.675) **or** 209135.675 × 0.015 (= 3137.035...) or 209135.675 × 1.015 (212272.710...) **or** 200000×1.015^t, $t \geq 2$	values may be rounded or truncated to 2 dp
		A1	for 12272.7(0) or 12272.71 or 12272.72 SC B2 for 212272.7(0) or 212272.71 or 212272.72	

Q21.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	Ben (supported)	P1	shows how to work interest out for one year eg 2000 × 0.025 (= 50) **or** 1600 × 0.035 (= 56) **or** 150 **or** 168 **or** 2000×1.025 (= 2050) **or** 1600 × 1.035 (= 1656)	Throughout accept figures ±1 pence which do not need to be presented in money notation (to 2dp) or with monetary symbols.
		P1	shows compound interest calculation for one account eg 2050→51.25 **or** 2101.25→52.53 **or** 1656→57.96 **or** 1713.96→59.99 eg 2000×1.025^3 (= 2153.78) **or** 1600×1.035^3 (= 1773.95)	Award mark for a correct process shown, for which these figures can be taken as implying the process.
		P1	shows complete compound interest calculation for both accounts eg 2000×1.025^3 (= 2153.78) **and** 1600×1.035^3 (= 1773.95) OR one interest stated correctly eg 153.78 **or** 173.95	As above, award mark for both correct processes shown for both accounts, which these figures can be taken as implying the process.
		C1	Ben (shares) supported by 153.78 **and** 173.95	Accept an answer of "shares".
(b)	conclusion	C1	conclusion (ft) eg no change, shares now 182.5… **Acceptable examples** no since shares/Ben now 182.5 Still Ben since 182.5 > Ali No; he only gets 8.57 more No; he gets 68.56 instead of 59.98 (3rd yr) No; Ben already gets more interest, he would just get even more **Not acceptable examples** no shares now 182.5 Still Ben since less than Ali 182.5 > 153.78 no; he needs 20.17 more	Conclusion needs to be supported. ft is from part (a); calculations carried out as part of (b) need to be correct for the comparison to be valid.

Q22.

Question	Working	Answer	Mark	Notes
		6 (%)	P1 P1 A1	for y^5 oe or 8029.35 ÷ 6000 for a process to find $1+x$ e.g. $\sqrt[5]{(8029.35 \div 6000)}$ or 1.06 or 1.0599.. 5.99 to 6

Q23.

Paper 1MA1: 2H			
Question	Working	Answer	Notes
(a)		1.8%	P1 for start to process eg. 2000 × 1.025 (= 2050) P1 for process to use all given information eg. "2050" × $m^2 = 2124.46$ or $"2050" \times \left(1+\frac{x}{100}\right)^2 = 2124.46$ P1 for process to find their unknown eg $m = \sqrt{\frac{2124.46}{2050}} (=1.01799...)$ A1 for 1.79% – 1.8 %
(b)		200	M1 225 ÷ 1.125 oe A1

Q24.

Question	Working	Answer	Mark	Notes
(a)		58600	M1	for a complete method, eg 50000 × 1.02^8 (= 58582(.969...)) or for finding the increase in value of the company after 8 years, eg 8582(.969...) or 8600
			A1	cao
(b)		4.5	P1	for a process to find multiplier for 6 year period, eg 325 ÷ 250 oe (= 1.3) or 130(%) or for 250000 × y^6 = 325000
			P1	for a process to find multiplier for one year, eg $("1.3")^{\frac{1}{6}}$ or 1.044…or 1.045
			A1	4.4 – 4.5

Q25.

Question	Answer	Mark	Mark scheme	Additional guidance
	12 508.7(0)	P1	for start of process to find interest rate for year 1 eg 12336 ÷ 12000 (=1.028) **or** (12336 – 12000) ÷ 12000 (=0.028) **OR** forms a suitable equation, eg 12000 × $(1 + \frac{x}{100})$ = 12336	
		P1	for complete process to find the interest rate for year 1 eg ("1.028" – 1) × 100 (=2.8) **or** "0.028" × 100 (=2.8) **OR** correct process to solve correct equation eg (12336 – 12000) ÷ 120 (=2.8)	Rate of interest = 2.8, or x = 2.8 implies P2
		P1	for complete process to find the value at the end of 2 years eg ("2.8" ÷ 2 + 100) ÷ 100 × 12336	
		A1	accept 12508.7 to 12508.71 **or** 12509	12509 must come from correct working

Q26.

Question	Answer	Mark	Mark scheme	Additional guidance
	2.2	P1	works out interest for one year, eg 3550 × 0.026 (= 92.3(0)) **or** 3550 × 1.026 (=3642.3(0))	
		P1	for compound interest calculation, eg 3550 × 1.026^2 (= 3736.9…) **or** for an answer given as 0.0219… or 1.0219…	
		A1	answer in range 2.19 to 2.2	If an answer in the range is seen in working and then incorrectly rounded award full marks

Q27.

Paper 1MA1: 3H			
Question	**Working**	**Answer**	**Notes**
(a)		2500	P1 for use of 1.03 P1 for a full method equivalent to $\div 1.03^2$ A1 2500
(b)		Saver account with support	P1 process to find a comparable total interest figure A1 for conclusion with supporting statement eg 21.(665..)>21

Q28.

Question	Working	Answer	Notes
(a)	$1560000 \times (1.052)^2$	1730000	P1 for process to find population in 2016 P1 for complete process to find population in 2017 A1 for 1725000 - 1730000
(b)(i)		2020	P1 for process to find when population will exceed 2 000 000 A1 for 2020
(ii)			C1 for correct comment on how assumption will affect the answer, eg if the percentage growth is higher the population may exceed 2 000 000 earlier.

Q29.

Question	Working	Answer	Mark	Notes
(a)		6.66×10^7	M1 A1	for $6.5 \times 10^7 \times 1.006^4$ for 6.66×10^7 or $6.657(\ldots) \times 10^7$
(b)		explanation	C1	for explanation, e.g. growth is compound not simple oe, increase in population changes each year oe
(c)		Correct argument	M1 C1	for method to find the common ratio, e.g. finds population in 3 successive yrs or 1.006 for convincing conclusion, e.g. terms are generated by multiplying previous term by 1.006 so a geometric progression is formed

Q30.

Paper 1MA1: 2F			
Question	**Working**	**Answer**	**Notes**
		Jardins of Paris	P1 correct process to convert one price to another currency, eg 1980 ÷ 1.34 P1 for a complete process leading to 3 prices in the same currency C1 for 3 correct and consistent results and a correct comparison made.

Q31.

Paper 1MA1: 2H			
Question	**Working**	**Answer**	**Notes**
		Jardins of Paris	P1 correct process to convert one price to another currecncy, eg 1980 ÷ 1.34 P1 for a complete process leading to 3 prices in the same currency C1 for 3 correct and consistent results and a correct comparison made.

Q32.

Question	Working	Answer	Mark	Notes
2		New York (supported)	P1	for changing between £ and $, eg 1.089×1.46 (= 1.58(9.)) or 2.83÷1.46 (= 1.93(8.)) or between litres and gallons, eg 1.089×3.785 (= 4.12(1.)) or 2.83÷3.785 (= 0.74(7.))
			P1	for a complete process to give values that can be used for comparison, eg "1.938..." ÷ 3.785 (= 0.51(2.)) **or** "1.589..."...× 3.785 (= 6.01(7.)) **or** 1.089 × 3.785 = (4.12(1.)) and 2.83 ÷ 1.46 (= 1.93(8.))
			C1	for New York and correct comparative values

Q33.

Question		Working	Answer	Mark	Notes
	(a)	UK £98, USA £94.40, Germany £102.19 UK $140.14, USA $134.99 Germany $146.14 UK €134.25, USA €129.31 Germany €139.99	USA with reasons	3	P1 process to find price to compare for USA, e.g. 134.99 ÷ 1.43 (= 94.40) P1 process to find price to compare for Germany, e.g. 139.99 × 0.73 (= 102.19) A1 correct conclusion with correct figures in consistent currencies to compare e.g. (£)94.40, (£)102.19, (£)98
	(b)		Explanation	1	C1 reason, e.g. reference to postage costs or travel

Q34.

Question	Working		Answer	Mark	Notes
(a)	$	£	2975.79	P1	for process to find total room cost eg 196 × 14 (= 2744)
	5	2.631...		P1	for process to find total wifi cost eg 5 × 12 (= 60)
	60	31.578...		P1	for using exchange rate appropriately (could be used earlier in the question), eg "2804" ÷ 1.90 (= (£)1475.789...) or 1500 × 1.90 (= ($)2850)
	196	103.157...			
	2744	1444.21...			
	2804	1475.789...		P1	for process to find the total cost in £, eg "1475.79(..)" + 1500 or in $, eg "2850" + "2804" (= 5654)
				A1	2975 to 2976
(b)			Statement	C1	Statement about the total price rising May comment that flights will not change but the rest will rise

Q35.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	75 to 81	B2	for answer in the range 75 to 81	
		(B1	for 60 **or** 100 **or** 6000 **or** 6400 **or** $\sqrt{64\times100}$)	
(b)	0.000 148	B1	for 0.000 148 oe	Can use standard form
(c)	$\frac{1}{25}$	B1	for $\frac{1}{25}$ or 0.04	

Q36.

Question	Answer	Mark	Mark scheme	Additional guidance
	8	P1	for working with volume of the cuboid, eg 30 × 6 × 19 (= 3420) **OR** for using $\frac{2}{3}$ with one dimension, eg 30 × 2 ÷ 3 (= 20)	For P marks, ignore attempts at unit conversion
		P1	for "3420" × 2 ÷ 3 (= 2280) **or** "3420" ÷ 3 (= 1140) **OR** "20" × 6 × 19 (= 2280) **OR** "3420" ÷ 275 (= 12.4… = 12 cups)	
		P1	(dep on P2) for "2280" ÷ 275 (= 8(.29...)) **or** "1140" ÷ 275 (= 4(.14...)) **OR** "12" × 2 ÷ 3 **OR** for 275 × 8 (= 2200) **or** 275 × 9 (= 2475)	
		A1	cao	

Q37.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	7360	B1	cao	
(b)	0.1077981356	B2	for 0.1077(981…)	Answer must be given to at least 4 decimal places rounded or truncated
		(B1	for 5.74(45626…) **or** 53.29 **or** 0.11 **or** 0.107 **or** 0.108)	Accept a clear indication of the decimal point. Check first four decimal places only

Q38.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	3.0×10^9	P1	for correct process, eg $10^5 \times 365 \times 81$ or for a correct answer not written in standard form, eg 2956500000 or $2.9(565) \times 10^n$ where $n \neq 9$ oe	Values may be rounded. Allow 350, 360, 366, 370, 400 and 80, 100
		A1	for an answer in the range 2.8×10^9 to 4.0×10^9	
(b)	4.5×10^{-11}	P1	for correct process, eg $\frac{90}{2\times10^{12}}$ **or** for correct answer not written in standard form, eg 45×10^{-12} or 0.45×10^{-10} **or** 4.5×10^n where $n \neq -11$	Allow $90 \div 2 \times 10^{12}$
		A1	cao	

Q39.

Paper 1MA1: 1F				
Question	Working	Answer		Notes
(a)		2000	P1	Evidence of estimate eg. 400 or 20 used in calculation
			P1	complete process to solve problem
			A1	
(b)		Overestimate with reason	C1	ft from (a) eg. overestimate as two numbers rounded up

Q40.

Question		Working	Answer	Mark	Notes
	(a)		39	3	P1 for rounding one dimension correctly P1 for $(2 \times 2) + (5 \times 7)$ with at least three of 2, 2, 5, 7 used A1 cao
	(b)		Justified answer	1	C1 ft (dep on P1) underestimate with explanation

Q41.

Paper 1MA1: 1F				
Question	Working	Answer		Notes
(a)		2000p-2600p	P1	Evidence of estimate eg. 4 or 50 used in calculation
			P1	complete process to solve problem
			A1	2000p-2600p or £20-£26
(b)		under	C1	underestimate as values have been rounded down

Q42.

Question	Working	Answer	Mark	Notes
(a)		3.5 to 4.5	M1	substitution into formula $\frac{1}{3}\pi r^2 h$ of chosen values for r and V (accept $r = 5.13$ and $V = 98$) and starts rearrangement e.g. multiplies by 3, divides by π or divides by r^2 (both sides)
			M1	uses estimates in calculation e.g. $\frac{3\times100}{3\times25}$ (or in rearranged formula) or $\frac{12}{\pi}$
			A1	arrives at a single value from estimate in the range 3.5 to 4.5
(b)		more	C1	ft e.g. more since number in numerator goes up; numbers in denominator go down.

Q43.

Question	Answer	Mark	Mark scheme	Additional guidance
	Estimated value	P1	for using a rounded value in a correct process eg 3000 ÷ 15 **or** 15 × 8 **or** 20 × 8	Their rounded value must be used in a calculation Rounding may appear after a correct process eg 15.12 × 8 = 120.96 ≈ 100 followed by eg 3069.25 ÷ 100
		P1	for a full process to find the number of days eg "3000" ÷ "15" ÷ "10" (= 20) **or** "3000" ÷ "15" ÷ 8 (= 25)	Accept 3069.25 ÷ 15.12 ÷ 8 oe
		A1	for a correct answer following through their rounded values	
(b)	Explanation	C1	eg less days required **or** it doesn't affect the answer because I would still round 16.27 down to 15 (or up to 20)	Refers to time taken

Q44.

Question		Working	Answer	Mark	Notes
			2000	3	B1 for correctly rounding two of the three values (40, 100, 0.2) M1 for partially completing the calculation, e.g. (40 × 10) ÷ 0.2, 400 ÷ 0.2 A1 cao

Q45.

Question	Answer	Mark	Mark scheme	Additional guidance
	3240	P1	for 90×60 (= 5400) **OR** $40 \div 100 \times 90$ (= 36) **OR** $40 \div 100 \times 60$ (= 24)	
		P1	for a process to work out area that is flowers eg. $40 \div 100 \times$ "5400" (= 2160) **OR** "36" × 60 (= 2160) **OR** 90 × "24" (= 2160)	
		P1	for a full process to find the area that is grass eg. "5400" – "2160" (=3240)	
		A1	cao	
			ALTERNATIVE	
		P1	for 100 – 40 (= 60)	
		P1	(indep) for 90×60 (=5400) **OR** $90 \times 60 \div 100$ (= 54) or $60 \times 60 \div 100$ (= 36)	
		P1	for a full process to find the area that is grass eg. "60" $\div 100 \times$ "5400" (=3240) **OR** "54" × 60 (= 3240) or "36" × 90 (= 3240)	
		A1	cao	

Q46.

Question		Working	Answer	Mark	Notes
			13 m^2	5	P1 process to find *FE* $(28 - 6 - 6) \div 2$ (= 8) or *AB* $(28 - 6 - 6 - 3 - 3) \div 2$ (= 5) P1 process to find area of a triangle $\frac{4 \times 8}{2}$ (= 16) or $\frac{6 \times 3}{2}$ (= 9) or $\frac{5 \times 4}{2}$ (= 10) or $\frac{2 \times 3}{2}$ (= 3) P1 complete process for shaded area e.g. $8 \times 4 + 2 \times 3 -$ ("16" + "9") or $\frac{5 \times 4}{2} + \frac{2 \times 3}{2}$ A1 cao C1 (indep) for m^2

Q47.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	Yes (supported)	P1	for start of process, eg 5×9 (= 45) **or** 10×14 (= 140) **or** 5×2 (= 10 (kg)) **or** $3 \div 2$ (= 1.5 (boxes))	Accept values rounded or truncated to 1dp in both (a) and (b). Ignore units
		P1	for process using ratio of areas, eg "140" ÷ "45" (= 3.1...) **or** for using ratio of amount of seed eg "10" ÷ 3 (= 3.3...) **or** for finding coverage for 1 kg of grass seed, eg "45" ÷ 3 (= 15 (m^2))	
		P1	for process to find amount of seed needed, eg "140" ÷ "45" × 3 (= 9.3...kg) **or** "140" ÷ "45" × "1.5" (= 4.6...(boxes)) oe **or** "15" × 2 (= 30 (m^2 per box)) **and** "140" ÷ "30" (= 4.6...(boxes)) **or** for process to find area that can be seeded, eg "10" ÷ 3 × "45" (= 150 (m^2)) **or** "140" ÷ "10" (= 14 (m^2)) oe	Accept 9.4 Accept 4.7
		C1	for "Yes" supported by correct figures eg 4.6...(and 5), **or** 9.3...and 10 **or** 150 and 140 (or 140 to 148.5) **or** 15 and 14	
(b)	Yes, (does not have enough) (supported)	C1	for reasoning supported with correct figures, eg does not have enough seed and compares 9 (kg) with 9.3…(kg) or 4.5 (boxes) with 4.6… (boxes) or 135 (m^2) with 140 (m^2) ft from (a)	Values used in (a) do not need repeating in (b) as long as intention is clear

Q48.

Question	Answer	Mark	Mark scheme	Additional guidance
	Accurate figures with supportive working	M1	for a correct first step eg 600 ÷ 30 (= 20) **or** 120 ÷ 30 (=4) **or** 600 × 120 (=72 000) **or** 30 × 30 (=900)	Could work in m or cm
		M1	for finding an appropriate cost 2.5 × "20" (=50) **or** 2.5 × "4" (=10) **OR** number of tiles required "72 000" ÷ "900" (=80) **or** "4" × "20" (=80) **OR** number they can afford 220 ÷ 2.5 (=88)	Units must be consistent
		M1	for full **method** to get figures to compare eg cost to tile whole area eg "80" × 2.5 **OR** number of tiles they need and number they can afford eg "72 000" ÷ "900" and 220 ÷ 2.5	
		A1	for 200 **OR** 80 and 88 **OR** 72 000 and 79 200 **OR** 132 (cm) **OR** 660 (cm) SC B2 for answer of 60	

Q49.

Paper 1MA1: 2F			
Question	Working	Answer	Notes
		66.9	P1 for process to find the area of one shape, eg. 19×16 (= 304) or $\pi \times 8^2$ (= 201.06...) P1 for process to find the shaded area, eg. "304" – "201.06" ÷2 (= 203.46...) P1 for a complete process to find required percentage, eg. $\frac{"203.46"}{304} \times 100$ A1 for answer in range 66 to 68

Q50.

Question	Working	Answer	Mark	Notes
		8600	P1	for process to find the length of the rectangle, e.g. 24 × 4 (= 96)
			P1	for process to find the perpendicular height of an equilateral triangle of side (24 × 2) cm, e.g. 48sin60 (= 41.5(69..)) or $\sqrt{48^2 - 24^2}$ (= $24\sqrt{3}$ oe)
			P1	for complete process to find the width of rectangle, e.g. "41.5(69..)" + 24 + 24 (= 89.5(69..))
			A1	for answer in the range 8592 to 8602

Q51.

Paper 1MA1: 1F			
Question	Working	Answer	Notes
		Correct diagram with layout and lengths	M1 for changing to consistent units eg. 1000 ÷ 10 or 40 × 10 M1 for interpreting information and a process to fit tiles in floor area eg. may be seen in a sketch or a calculation C1 for a diagram to communicate a correct layout with lengths clearly identified

Q52.

Question	Working	Answer	Mark	Notes
(a)		4	P1	for process to find area of at least 2 different faces, e.g. 95 × 18 and 80 × 18
			P1	for a complete process to find the surface area of one cushion, e.g. (95 × 18 + 80 × 18 + 95 × 80) × 2
			P1	for process to convert units, e.g. 80 ÷ 100 (= 0.8)
			P1	(dep on P2) for their area multiplied by 6 and divided by 4
			A1	cao
(b)		Reduces requirement	P1	for showing 4.4 is now covered or 2.93 tins or 3 tins
			C1	(dep) Statement that the number required of tins will be reduced

Q53.

Paper 1MA1: 1H			
Question	Working	Answer	Notes
		75π	P1 starts process by using $\frac{250}{3}\pi$ and $\frac{1}{2}\times\frac{4}{3}\pi r^3$ to find radius as 5 P1 starts process using ½ curved surface area eg $(4 \times \pi \times 5^2) \div 2$ P1 complete process shown eg $(4 \times \pi \times 5^2) \div 2 + (\pi \times 5^2)$ A1 for 75π

Q54.

Paper 1MA1: 3H			
Question	Working	Answer	Notes
	$AC^2 = 20^2 + 20^2 = 800$ $AX^2 = 10^2 + 10^2 = 200$ $\sqrt{200} \times \tan 55 = VX \quad (= 20.19...)$ $VM^2 = \sqrt{"20.19"^2 + 10^2} \quad (= 22.54...)$ $4 \times \frac{1}{2} \times "22.54" \times 20 + 20^2$	1300	Let X be centre of base, M be midpoint of AB P1 process to find AC or AX P1 process to find VX or VA P1 process to find height of sloping face or angle of sloping face. P1 process to find surface area of one triangular face. A1 For 1300 – 1302

Q55.

Question	Answer	Mark	Mark scheme	Additional guidance
	280	P1	for starting to use Pythagoras to find the missing side eg $8.4^2 - 7.2^2$ (= 18.72)	Award P1 for a correct Pythagorean statement eg $x^2+7.2^2=8.4^2$
		P1	for a complete process to find the missing side eg $\sqrt{70.56-51.84}$ **or** $\sqrt{18.72}$ (=4.32....)	4.3 truncated or rounded can imply P2
		P1	(dep P1) for a process to find the area of the triangular face eg [length of base] × 7.2) ÷ 2 (=15.57..) **OR** the volume of the cuboid eg [length of base] × 7.2 ×18 (=560.7..)	Uses a figure they show as the length of the base of the right angled triangle but dep on P1 Allow 15.57.. truncated or rounded if unsupported
		P1	for a complete process to find the volume of the prism eg "15.5.." × 18 **or** "560.7.." ÷ 2	
		A1	answer in the range 278 – 281	If an answer is given in the range 278 to 281 but then incorrectly given to 3 sig fig this mark can still be awarded.

Q56.

Paper 1MA1: 1F				
Question	**Working**	**Answer**	**Notes**	
		explanation	M1 works with volume eg 240000	begins working back eg 70÷2.50
			M1 uses conversion 1 litre = 1000 cm^3	uses conversion 1 litre = 1000 cm^3
			M1 uses 8000 eg vol ÷ 8000 (=30)	uses 8000 eg "28"× 8000 (=224000)
			M1 uses "30" eg "30" × 2.50	works with vol. eg 224000
			C1 for explanation and 75 stated	for explanation with 240000 and 224000

Q57.

Paper 1MA1: 2F			
Question	**Working**	**Answer**	**Notes**
		13.9	P1 finds the volume of a cuboid eg. 50×40×60 (= 120000) P1 finds 35% of the oil from the cuboid eg. 120000 × 0.35 oe (=42000) P1 removes 35% of oil from cuboid eg. 120000 – 42000 (= 78000) P1 division to find missing side length eg. 78000 ÷ (80 × 70) or 13.928... A1 for answer to an appropriate degree of accuracy eg. (13.9 or 14 or 10)

Q58.

Question	Answer	Mark	Mark scheme	Additional guidance
	155	M1	for a complete method to find the volume of the hemisphere, eg $\frac{1}{2}\times\frac{4}{3}\times\pi\times4.2^3$ oe	
		A1	answer in range 155 to 155.2	If an answer in the range is seen in working and then incorrectly rounded award full marks

Q59.

Question	Answer	Mark	Mark scheme	Additional guidance
	600 cm^3	M1	for a complete method to find the volume eg $4 \times 10 \times 15$	If extra steps are shown do not award this mark
		A1	for 600	Ignore incorrect or absent units for this mark
		B1	(indep) cm^3	Ignore incorrect or absent numerical answer for this mark

Q60.

Question	Working	Answer	Mark	Notes
		20	P1	for process to find the height of the surface of water, e.g. $32 \times \frac{3}{4}$ (= 24) or to find the volume of the tank, e.g. $50 \times 32 \times 20$ (= 32 000)
			P1	for process to find volume of water and sand, e.g. $50 \times$ "24" $\times 20$ (= 24 000) or "32 000" $\times \frac{3}{4}$ (= 24 000) or for process to divide their height in the ratio 5 : 1 e.g. "24" $\div (5 + 1) \times 5$ (= $4 \times 5 = 20$)
			P1	(dep P1) for process to divide volume in ratio 5:1, e.g. "24 000" $\div (5 + 1) \times 5$ (= $4000 \times 5 = 20\,000$) or process to find volume of water, e.g. "20" $\times 50 \times 20$ (= 20 000)
			P1	for process to convert to litres, e.g. "20 000" $\div$ 1000
			A1	cao

Q61.

Paper 1MA1: 2F			
Question	Working	Answer	Notes
		13	M1 Puts numbers in order or clear attempt to find 5th number **or** (9 + 1)/2 **or** selects 11 A1

Q62.

Question	Working	Answer	Mark	Notes
(a)		12	B1	cao
(b)		Explanation	C1	No with statement about not being mutually exclusive events eg a person could be in both categories

Q63.

Question		Working	Answer	Mark	Notes
	(a)		7	1	B1 cao
	(b)		3	2	M1 for listing the numbers in order and identifying the middle two numbers as 3 or answer of 4.5 A1 cao

Q64.

Question	Working	Answer	Notes
(a)		No and reason	C1 No and reason eg the mean must be less than 6
(b)		explanation	C1 Should have divided by 30, not by 6

Q65.

Question	Working	Answer	Mark	Notes
(a)		10	P1	for process to find total scores of either women, 15.6×10 (= 156) or children 9.2×10 (= 92) or all 11.2×40 (= 448)
			P1	for complete process to find average score of men, e.g. ("448" – "156" – "92") ÷ 20
			A1	cao
(b)		Mean is reduced	C1	The mean is reduced (since the total is reduced)

Q66.

Question	Answer	Mark	Mark scheme	Additional guidance
	18.6	M1	for finding 4 products within intervals (including end points)	Min *fx* / Max *fx*: 5 / 10; 20 / 30; 105 / 140; 160 / 200
		M1	for Σ"*fx*" ÷ (1+ 2 + 7 + 8) **or** (7.5×1 +12.5×2 + 17.5×7 +22.5×8) ÷ (1+ 2 + 7 + 8) **or** ("7.5" + "25" + "122.5" + "180") ÷ "18" **or** "335" ÷ "18"	Σ"*fx*" **must** come from 4 products *fx* within intervals (including end points)
		A1	for 18.6(111…)	

Q67.

Question	Answer	Mark	Mark scheme	Additional guidance
	16.5	M1	for method to find total of ages of boys, eg 18×16.2 (= 291.6) or total of ages of girls, eg 27×16.7 (= 450.9) or total of ages of boys and girls, eg 742.5	May use an equivalent method with number of boys and girls used in the ratio 2 : 3 $\frac{16.2+16.7}{2}$ scores 0 marks
		M1	for complete method, eg $\frac{"291.6"+"450.9"}{45}$ ($=\frac{742.5}{45}$)	
		A1	cao	

Q68.

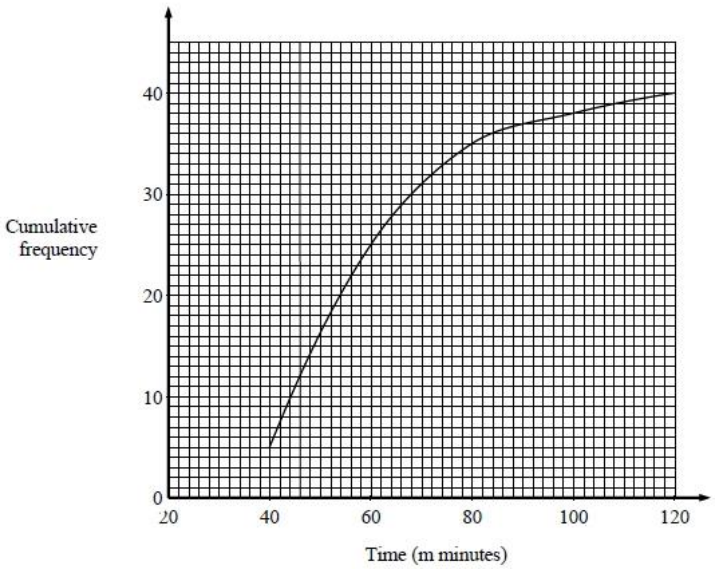
Question	Answer	Mark	Mark scheme	Additional guidance
(a)	59, 53, 66	B2 (B1	for Median = 59, LQ = 53, UQ = 66, may be seen in working for one correct)	
(b)	Yes, with reason	C1	for Yes and comment comparing median ages, ft from (a) **Acceptable examples** "59" < 70 All statistics/values are lower for coach A (so they are younger) Median is lower The middle age is lower on coach A **Not acceptable examples** Median is higher Median for coach A is "59" and coach B is 70 The oldest on coach A is 79 and the oldest on coach B is 85 There are people on coach B that are older than on coach A	

(c)	No, with reason	C1	for No and comment comparing spreads of ages from ranges or IQRs, ft from (a) **Acceptable examples** 38 < 43 **or** "13" < 19 Greater difference between greatest and least age for coach B Range for coach B is larger than coach A The range of ages is wider on coach B than on coach A The range is 5 greater on coach B There is a smaller difference between the lower and upper quantiles on coach A than on coach B The IQR is shorter for coach A **Not acceptable examples** Quartiles are less for coach A 53 < 54 **or** 79 < 85 (oe) Range for coach A is 38 and range for coach B is 43 Coach A ranges from 41-79 but coach B ranges from 42-85	Working A: Range = 38, IQR = "13" B: Range = 43, IQR = 19

Q69.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	cf graph through (40, 5), (60, 25), (80, 35), (100, 38) and (120, 40)	C2 (C1 SC: B1 for 4 or 5 points plotted not at end but consistently within each interval and joined provided no gradient is negative	for a complete and accurate cf graph for at least 4 or 5 cf values plotted correctly)	May be a cumulative frequency curve or a cumulative frequency polygon Ignore any graph drawn to the left of the first point If histograms drawn, plots must be identified
(b)	answer in range 21 to 28	M1 A1	for UQ in the range 66 to 70 or LQ in the range 42 to 46 or ft their cf graph for answer in range 21 to 28 or ft their cf graph	
(c)	answer in the range $\frac{19}{40}$ to $\frac{24}{40}$	M1 A1	for finding the difference between readings taken from the cf axis at points from a mark of 50 and a mark of 90 or ft their graph (if possible) for an answer in the range $\frac{19}{40}$ to $\frac{24}{40}$ or ft their cf graph	Their graph must be a cf graph Accept any equivalent fraction, decimal from 0.475 to 0.6 or percentage from 47.5% – 60%

(a)



Q70.

Question	Answer	Mark	Mark scheme		Additional guidance
(a)	5,15,35,55,70,80	B1	cao		
(b)	Graph drawn	M1	for 5 or 6 of their points plotted correctly from a cf table		Ignore to the left of the first point and right of the last point If histograms drawn, points must be identified Accept a smooth curve or line segments ft from a cum freq graph
		A1	for a fully correct graph SC B1 if 5 or 6 of their points plotted not at end but consistent within each interval and joined by a curve or line segments providing no gradient is negative		
(c)	Correct decision and correct figures	M1	for 60 ÷ 100 × 80 (=48) oe	reading value from graph at wage = 360 (=40) **or** for $35 + \frac{1}{5} \times 20$ (=39)	
		M1	reading value from graph at cf = 48 (=380)	for "40" ÷ 80 × 100 (=50(%)) **or** for 60 ÷ 100 × 80 (=48)	
		C1	ft for correct decision and correct figures, eg No with 48 and "380" **or** with "40" and "50"(%) **or** with "40" and 48		

Q71.

Question		Working	Answer	Mark	Notes
	(a)		Correct graph	B1 B1	for 5 or 6 points plotted correctly for their points joined by a curve or line segments provided no gradient is negative.
	(b)		43	B1	Answer in the range 41 to 45
	(c)		Yes with justification	M1 M1 C1	for taking readings from graph at 35 **and** 55 years for a correct calculation from their readings eg "44"÷70 (= 63%) or 60% of 70 = 42 for a correct conclusion and calculation from their readings, e.g. "44"÷70 (= 63%) or 60% of 70 = 42% (< "44")

Q72.

Question		Working	Answer	Mark	Notes
			A & Y B & X C & Z D & W	2	B2 for all correct (B1) for two or three correct

Q73.

Question	Working	Answer	Mark	Notes
(a)(i)		Box plot drawn	B1 B1 B1	for a box drawn with at least two correct values from: LQ = 23, Median = 28, UQ = 32.5 for lowest value = 17 and highest value = 41 clearly shown on the grid for a fully correct diagram
(a)(ii)		$\frac{10}{25}$	M1 A1	for $\frac{a}{25}$ where $a < 25$ or $\frac{10}{b}$ where $10 < b \leq 25$ for $\frac{10}{25}$ oe
(b)		Incorrect classes	C1	for identifying that the class intervals are incorrect, e.g. should be $0 < a \leq 30, 40, 50$

Q74.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	Explanation	C1	eg 'No' the median is 57	
(b)	Comparison	C1	(ft) a correct comparison of medians eg the median weight for Megan was greater than the median weight for Amy	Simply quoting values for median, range and IQR is insufficient, they must be compared Median Range IQR Megan 57 49 26 Amy 42 47 16 Figures given must be correct. Comparisons can relate to the range or the IQR
		C1	a correct comparison of a measure of spread eg the interquartile range of weights for Megan was greater than the interquartile range of weights for Amy For the award of both marks at least one of the comparisons must be in the context of the question	

Q75.

Question	Answer	Mark	Mark scheme	Additional guidance
	Two changes	C1	plot the median at 162, not 161 oe	
		C1	plot the upper quartile at 171, not 172 oe **Acceptable examples** the median has been plotted at 161 / upper quartile at 172 the upper quartile should be 171 (not 172) UQ is wrong as IQR is 17 not 18 **Not acceptable examples** the median / upper quartile have been plotted / drawn wrong the upper quartile has been worked out incorrectly She needs to work out the UQ	

Q76.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	box plot drawn	B1	ends of whiskers at 0 and 42 with a box	The box can be of any height. Accept ends that are marked (eg line, cross, dot) or defined by the end of the whiskers if clear.
		B1	median at 10 inside a box	Has to be inside a box; whiskers not required
		B1	for ends of box at 4 and 20	An independent mark that can be awarded for just a box; do not need whiskers for this mark.
(b)	Comparison	C1	for a correct comparison of medians, eg. the median delay time on Mon was greater than the median delay time on Tues. or ft (a)	Simply quoting values for median, range and IQR is insufficient, they must be compared
		C1	for a correct comparison of a measure of spread, eg. the interquartile range (range) of delay times on Mon was greater than the interquartile range (range) of delay times on Tues. or ft (a) For the award of both marks at least one of the comparisons must be in context	Comparisons can relate to the median, and then either the range or the IQR.
(c)	statement	C1	'No' with statement explaining that there might not be any delays between 25 minutes and 30 minutes as in the upper 25% (12 trains) the delays may all be between 17 and 25 or 30 and 33	The 'No' may be implied from their wording, and could be written next to the "?" The statement must mention (or imply) values above the UQ of 17

Q77.

Question	Working	Answer	Notes
(a)		histogram	C1 for 2 correct bars of different widths or at least 3 correct frequency densities C1 all bars in correct proportions or 4 correct bars with axes scaled and labelled C1 fully correct histogram with axes scaled and labelled
(b)	81 ÷ 2 = 40.5 90 to 105 is 29	108.2	C1 for 81 ÷ 2 = 40.5 and 11.5 ÷ 18 × 5 (= 3.19..) C1 For answer in range 108 to 109

Q78.

Question	Working	Answer	Mark	Notes
(a)	1.5, 6, 10.2, 7.2, 1.2	Histogram drawn	C1	for 2 correct bars of different widths or at least 3 correct frequency densities.
			C1	for all bars in correct proportions or 4 correct bars with axes scaled and labelled.
			C1	for fully correct histogram with axes scaled and labelled.
(b)		$\frac{123}{150}$	M1	for a method to find number of students in interval, eg $30 + 51 + 36 + \frac{1}{3} \times 18$ (= 123) or $150 - 15 - \frac{2}{3} \times 18$ (= 123)
			A1	for $\frac{123}{150}$ oe or 0.82 or 82%

Q79.

Question	Working	Answer	Mark	Notes
		7	P1	for correct process to find any frequency, eg. "1.1" × 10 (= 11) or "2.8" × 10 (= 28) or "2.3" × 20 (= 46) or "1.4" × 20 (= 28) or "1.4" × 10 (= 14) or "0.7" × 30 (= 21)
				or for a correct process to find the total area and an area of any block, eg. using 1 cm^2 = 1 unit of area to get 53.6 and one of 4.4, 11.2, 18.4, 11.2, 5.6, 8.4
			P1	(dep P1) for complete process to find 20% of ("1.4" × 10 + "0.7" × 30), eg. $\frac{20}{100} \times$ "35" or $\frac{\text{"5.6"+"8.4"}}{\text{"53.6"}} \times 134 \times \frac{20}{100}$
			A1	cao

Q80.

Question	Working	Answer	Mark	Notes
	1 | 6 8 9 2 | 2 2 3 3 4 5 8 3 | 1 3 4 4 | 0 1 key 4|1 is 41	Diagram	B2	for a fully correct diagram
			(B1)	for an ordered diagram with one error or omission or for an unordered diagram)
			B1	for an appropriate key

Q81.

Paper 1MA1: 2F			
Question	Working	Answer	Notes
(a)		12| 3 5 9 13| 0 3 3 5 7 8 14| 7 7 8 9 15| 0 1 Key: 12|3 represents 123	C1 for an unordered diagram with just one error or for an ordered diagram with no more than two errors C1 for a fully correct diagram
(b)		$\frac{6}{15}$ oe	C1 for a correct key (units may be omitted but must be correct if included) M1 for correct interpretation from their diagram (or from original information) of the number (6) out of 15 over 140 A1 for $\frac{6}{15}$ oe or ft their diagram

Q82.

Question	Working	Answer	Mark	Notes
(a)		165	1	B1 cao
(b)		Correct conclusion	2	C1 for correct statement on median (can ft) C1 for 41 with correct statement on range NB to get both marks at least one must be interpreted in the context of the question

Q83.

Question	Working	Answer	Notes
(a)		56	B1 cao
(b)		32	B1 cao
(c)		Reason	C1 starts argument eg 8 cars or 8/27 C1 completes argument eg with 1/3 = 9/27

Q84.

Question	Answer	Mark	Mark scheme	Additional guidance
	20 or 24 or 168	B1	for identification of the range of the girls (20) **or** the range (24) **or** the median (168) of the boys	
	Comparison	C2	for a correct comparison of medians **and** a correct comparison of ranges supported by correct figures eg the median height for girls (165) is less than the median height for boys (168) and the range for girls (20) is less than the range for boys (24) At least one comparison must be in context referring to height or quoting cm.	Simply quoting values for median, range is insufficient; they must be compared.
		(C1	for a correct comparison of medians **or** a correct comparison of ranges that could ft their incorrect figure(s))	Context not necessary for C1

Q85.

Question	Working	Answer	Mark	Notes
(a)		Reason	1	C1 reason for low attendance in hot weather, e.g. rain, school day, measurement error
(b)		Positive	1	B1 positive (correlation)
(c)		15-25	1	B1 answer in range 15-25
(d)		Data out of range	1	C1 explanation, e.g. extrapolation, data out of range, number of children will be negative

Q86.

Paper 1MA1:3F			
Question	**Working**	**Answer**	**Notes**
(a)		(4,10)	B1 cao
(b)(i)		Line drawn	B1 Straight line drawn passing between (2,20) and (2,30) AND (13,86) and (13,94)
(ii)		Positive	C1 positive
(c)		Value between 60 and 70	C1 a correct value given
(d)		Statement	C1 for referring to the danger of extrapolation outside the given range or for a given point Eg line of best fit may not continue or full marks are hard to achieve no matter how much revision is done

Q87.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	negative	B1	cao	Ignore any description of a relationship and any reference to strength of correlation
(b)	Explanation	C1	for a correct explanation, eg "not in line with the trend of the other points" "does not fit in with the correlation" "is far away from the other points or line of best fit"	
(c)	Comment	C1	for an explanation eg "point would be outside of the range of the scatter diagram"	

Q88.

Question	Working	Answer	Mark	Notes
(a)		72 – 80	M1	for a single line segment with a positive gradient that could be used as a line of best fit or a horizontal line from 740 or a point plotted at $(x, 740)$ where x is in the range 72 – 80
			A1	answer in range 72 – 80
(b)		Explanation	B1	explanation, e.g. 110 cm is outside of the range of the data, the line of best fit cannot be extended that far

Q89.

Question	Working	Answer	Mark	Notes
(a)(i)		480 – 500	B1	for line of best that can be used to estimate time of flight
			B1	for 480 – 500 or ft lobf
(a)(ii)		reason	C1	for reason, e.g. lobf can vary, data is only a sample, scale cannot be read exactly
(b)(i)		9.4 – 9.8	M1	for method to find gradient, e.g. triangle drawn with "change in distance ÷ change in time"
			A1	for 9.4 – 9.8 or ft lobf
(b)(ii)		speed	C1	for speed (in miles per minute) oe

Q90.

Question	Answer	Mark	Mark scheme	Additional guidance
(i)	65	M1	for working with proportion eg. 10 ÷ 30 × 195 (= 65)	Condone use of 200 for 195
		A1	cao	
(ii)	statement	C1	for statement **Acceptable examples** sample is representative (otherwise answer wrong) random sample (otherwise answer will be different) the 30 students are from the 195 (otherwise not accurate) 10 out of every 30 want to go to the Theme Park (otherwise answer will be different/wrong) there is no bias **Not acceptable examples** There would be more than 10 people who want to go to the Theme Park I rounded my answer	

Q91.

Question	Answer	Mark	Mark scheme	Additional guidance
	72	M1	for $\frac{5}{30}=\frac{12}{p}$ oe, eg $\frac{12}{p}\times 30 = 5$ or $12 \div \frac{5}{30}$ **or** $5 : 30 = 12 : p$ **or** 1 in 6 (30 ÷ 5) counters are yellow, so 12 × "6" **or** using equivalent ratios to 5 : 30, eg. 2 : 12 and 10 : 60 and adding to give 2 + 10 : 12 + 60	
		A1	cao	

Q92.

Question	Answer	Mark	Mark scheme	Additional guidance
(i)	238	P1	for working with proportion eg $\frac{17}{50}\times 700$ oe	
		A1	cao	
(ii)	statement	C1	for statement **Acceptable** Sample is representative (otherwise answer wrong) Random sample (otherwise answer will be different) The 50 people are from the 700 (otherwise not accurate) 17 out of every 50 want a sports bag (otherwise answer will be different / wrong) There is no bias That the other 650 will want the same gifts as the 50 **Not acceptable** There would be more than 17 people who want the sports bag I rounded my answer 17 out of 50 want a sports bag A repeat of the calculation done in (i) Most of the people would want a sports bag References as what might change in the future (eg a change in membership) That all 700 people wanted a type of gift rather than no gift (otherwise would have changed my answer)	

Q93.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	540	P1	for $\frac{120}{20}$ (=6) **or** $\frac{20}{120}$ (=0.16..) **or** $\frac{90}{20}$ (=4.5) **or** $\frac{20}{90}$ (=0.22..)	Decimal values truncated or rounded to 2 dp or more
		P1	for $\frac{20}{120}=\frac{90}{n}$ **or** $\frac{20}{90}=\frac{120}{n}$ **or** $\frac{90\times120}{20}$ oe	
		A1	cao	
(b)	Explanation	C1	for explanation **Acceptable examples** If marks fall off Shirley will have over-estimated the number of bees There will be fewer bees Her amount will go down **Not acceptable examples** My answer will be wrong It will increase the answer	

Q94.

Paper 1MA1: 1F			
Question	**Working**	**Answer**	**Notes**
		400	P1 Start to process eg. 1200 ÷ 60 A1 400 oe (accept number of whole pizzas eg. 400÷4 = 100 with 4 people per pizza) C1 Eg. Assumption that sample is representative of population – it may not be all 1200 people are going to the party – need less pizza if they don't, assume 4 people per pizza – if different may need more/fewer pizzas

Q95.

Question	Answer	Mark	Mark scheme	Additional guidance
(i)	Maxine with bigger number of trials	C1	for Maxine with reason **Acceptable examples** She throws the coin more times than Stuart **Not acceptable examples** Maxine throws it 50 times She gets more Tails Stuart (he) ……	
(ii)	$\frac{37}{60}$	B1	for $\frac{37}{60}$ oe	

Q96.

Question	Working	Answer	Mark	Notes	
		0.23	P1	for 45 ÷ 300 (= 0.15)	for 0.62 × 300 (= 186)
			P1	(dep P1) for 1 – (0.62 + "0.15")	(dep P1) for 300 – ("186" + 45)
			A1	oe	oe

Q97.

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	0.3	B1	for 0.3 oe	Acceptable equivalents are 3/10 or 30% Answer on answer line takes precedence
(b)	4	B1	4 or ft their (a)	Do not accept a statement of probability (eg 0.1)
(c)	12	M1	for 0.2 × 60 oe	Do not accept the use of any other probability
		A1	cao	