

Write your name here

Surname

Other names

**Pearson**  
**Edexcel Award**

Centre Number

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Candidate Number

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## Statistical Methods

Level 2

Calculator allowed

Monday 15 January 2018 – Morning

**Time: 1 hour 30 minutes**

Paper Reference

**AST20/01**

**You must have:**

Pen, HB pencil, eraser, calculator, ruler.

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  $\pi$  button, take the value of  $\pi$  to be 3.142 unless the question instructs otherwise.



### Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 The two-way table shows some information about the numbers of students who attended revision classes after school.  
Each student only attended one of the revision classes.

	Monday	Wednesday	Friday	Total
Year 11		16		32
Year 12	17	21		43
Year 13		14	12	
Total			23	120

- (a) Complete the two-way table.

(3)

One of these students is chosen at random.

- (b) Write down the probability that this student is a Year 12 student.

.....  
(1)

(Total for Question 1 is 4 marks)

- 2 The table shows some statements about data.

Place a tick (✓) in the appropriate column for each statement to show whether the statement refers to **categorical** data or **continuous** data or **discrete** data.

Statement	categorical	continuous	discrete
The number of books			
The colour of a contact lens			
The height of a tower			

(Total for Question 2 is 2 marks)

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3 Sandra recorded how long each patient had to wait before seeing the nurse one afternoon at a hospital.

Here are the waiting times in minutes.

6 11 4 22 6 12 13 5 27 21 14 63 19 24 18

One of the waiting times is an outlier.

(a) Write down this waiting time.

..... minutes  
(1)

(b) Work out the median of the waiting times.

..... minutes  
(2)

(c) Work out the interquartile range of the waiting times.

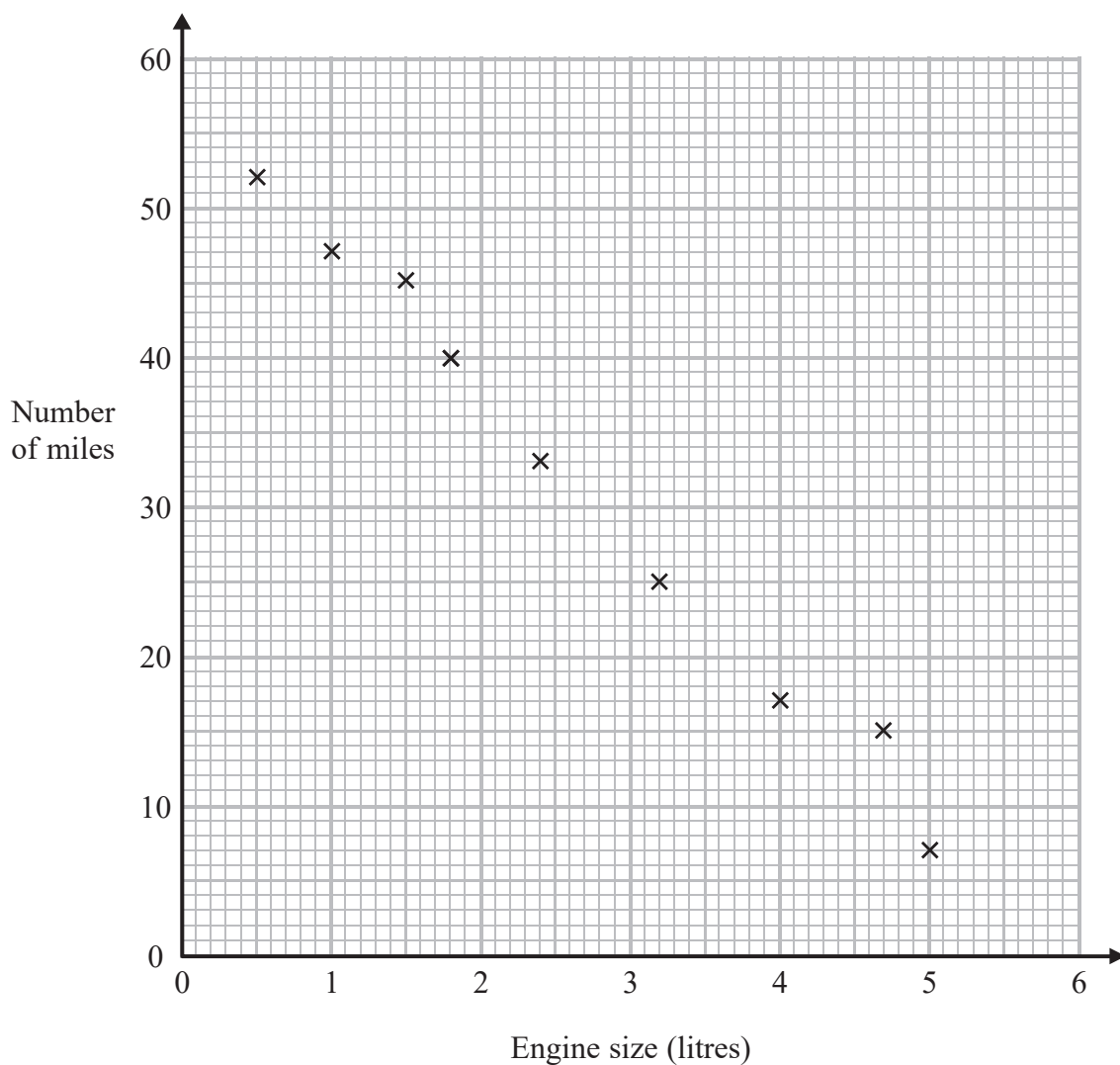
..... minutes  
(2)

**(Total for Question 3 is 5 marks)**



4 A car rental company records the number of miles cars of different engine sizes, in litres, travel using one gallon of petrol.

The scatter graph shows this information.



(a) Describe the relationship between the engine size and the number of miles.

(1)

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

(1)

A car has an engine size of 3.5 litres.

(c) Find an estimate for the number of miles this car travels using one gallon of petrol.

..... miles  
(1)

(Total for Question 4 is 3 marks)



- 5 In a box there are only purple marbles, grey marbles, yellow marbles and red marbles.

The table shows each of the probabilities that a marble taken at random from the box will be purple or will be red.

Colour	purple	grey	yellow	red
Probability	0.29			0.15

A marble is to be taken at random from the box.

- (a) Work out the probability that the marble will be purple or red.

.....  
(2)

The probability that the marble will be grey is the **same** as the probability that the marble will be yellow.

- (b) Work out the probability that the marble will be yellow.

.....  
(3)

(Total for Question 5 is 5 marks)



6 Thomas wants to find out for how many hours each student at his college works in a part-time job. He will use a questionnaire.

- (a) Design a suitable question for Thomas to use in his questionnaire. You must include some response boxes.

(2)

Thomas decides to use a sample of students from his college rather than all the students.

- (b) Write down one advantage of taking a sample.

(1)

Thomas is going to give the questionnaire to the first 8 students who enter the college library on Monday morning.

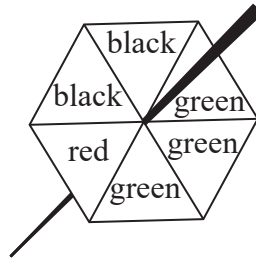
- (c) Write down one reason why this may not be a good sample.

(1)

**(Total for Question 6 is 4 marks)**



7 Here is a fair 6-sided spinner.



The spinner has 2 black sides, 3 green sides and 1 red side.

Nav spins the spinner 30 times.

(a) Explain why the spinner might not land on red exactly 5 times.

.....

.....

.....

(1)

Sarah is going to spin the spinner 210 times.

(b) Work out an estimate for the number of times the spinner will land on black.

.....

(2)

**(Total for Question 7 is 3 marks)**



8 Anjali weighed 130 pebbles.

The table gives information about the weights.

Weight ( $w$ grams)	Frequency
$20 < w \leq 30$	6
$30 < w \leq 40$	22
$40 < w \leq 50$	29
$50 < w \leq 60$	41
$60 < w \leq 70$	23
$70 < w \leq 80$	9

(a) Write down the modal class interval.

.....  
(1)

(b) Complete the cumulative frequency table.

Weight ( $w$ grams)	Cumulative frequency
$20 < w \leq 30$	
$20 < w \leq 40$	
$20 < w \leq 50$	
$20 < w \leq 60$	
$20 < w \leq 70$	
$20 < w \leq 80$	130

(1)



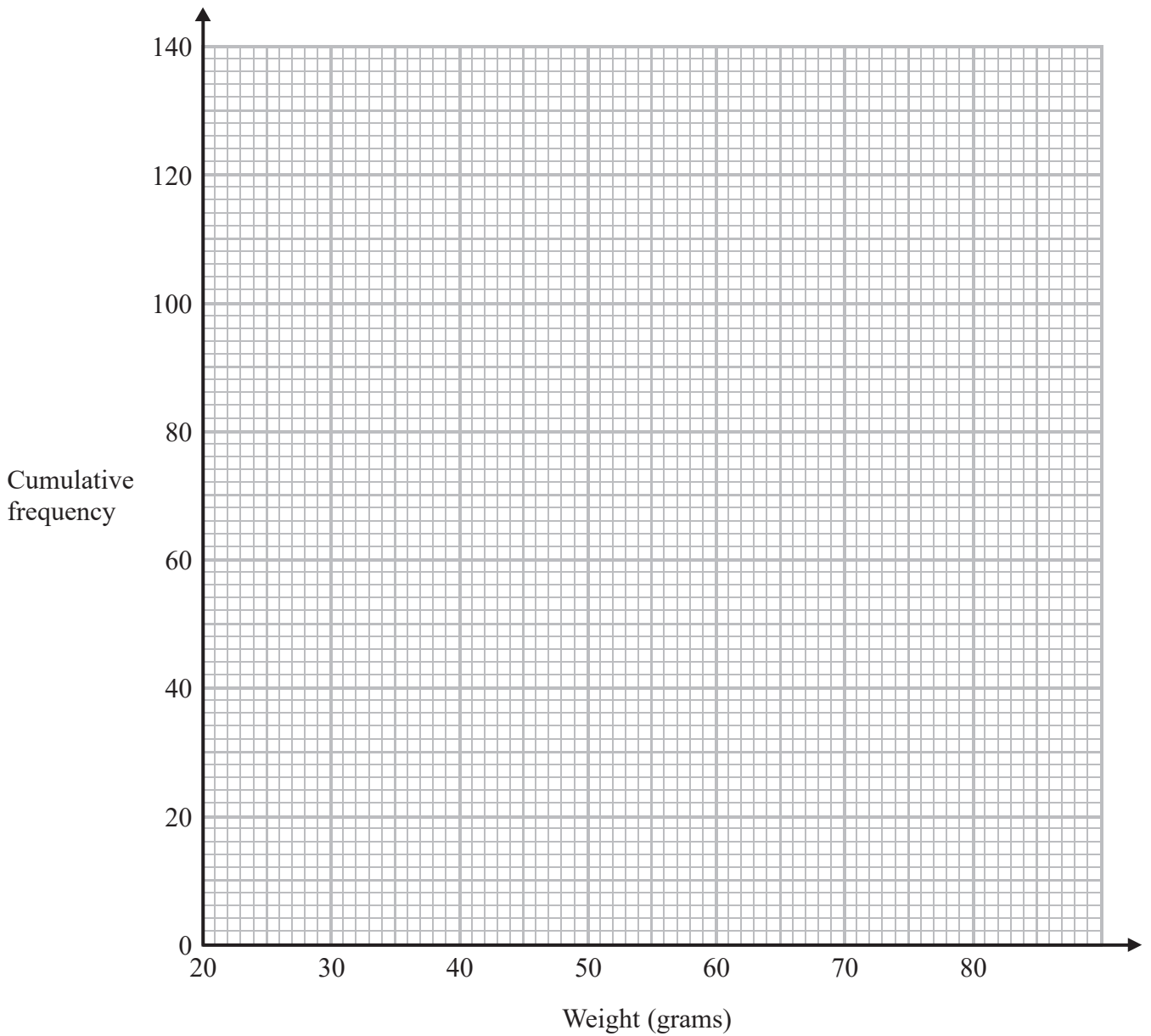


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(c) On the grid, draw a cumulative frequency graph for your table.



(2)

(d) Use your cumulative frequency graph to find an estimate for the median weight.

..... grams  
(1)

(e) Use your cumulative frequency graph to find an estimate for the number of pebbles that weigh more than 65 grams.

.....  
(2)

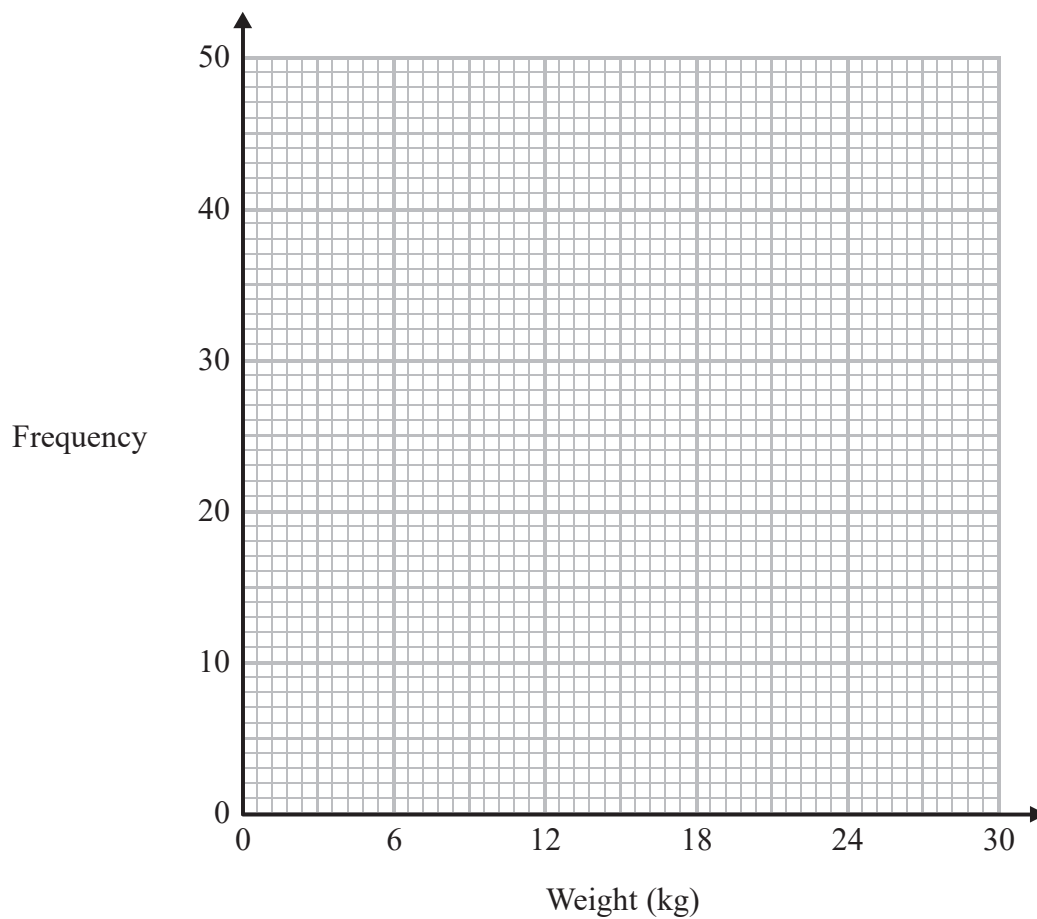
**(Total for Question 8 is 7 marks)**



- 9 David recorded the weights, in kg, of 80 parcels.  
The table gives information about his results.

Weight ( $w$ kg)	Frequency
$0 < w \leq 6$	30
$6 < w \leq 12$	11
$12 < w \leq 18$	23
$18 < w \leq 24$	12
$24 < w \leq 30$	4

- (a) On the grid, draw a frequency polygon for this information.



(2)



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(b) Find the class interval which contains the median.

.....  
(1)

(c) Work out an estimate for the mean weight of the parcels.  
Give your answer correct to one decimal place.

..... kg  
(4)

**(Total for Question 9 is 7 marks)**



10 The following table shows the personal tax allowances, in £, for two tax years.

Tax year	2015 – 2016	2016 – 2017
Personal tax allowance (in £)	10 600	11 000

- (a) Using the tax year 2015 – 2016 as the base year, work out the index number for the personal tax allowance for 2016 – 2017.  
Give your answer correct to one decimal place.

.....  
(2)

The following table shows the index number for the amount of tax paid by a large company for two tax years.

Tax year	2015 – 2016	2016 – 2017
Index number	100	63.7

- (b) Interpret the index number for the tax year 2016 – 2017.

.....  
.....  
(2)

**(Total for Question 10 is 4 marks)**

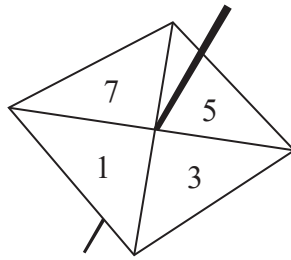


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11 The diagram shows a 4-sided spinner.



The sides of the spinner are labelled 1, 3, 5 and 7  
Sandeep spins the spinner 60 times.

For each spin, he records the number the spinner lands on as the score for that spin.

The table shows information about his results.

Score	Frequency
1	16
3	14
5	17
7	13

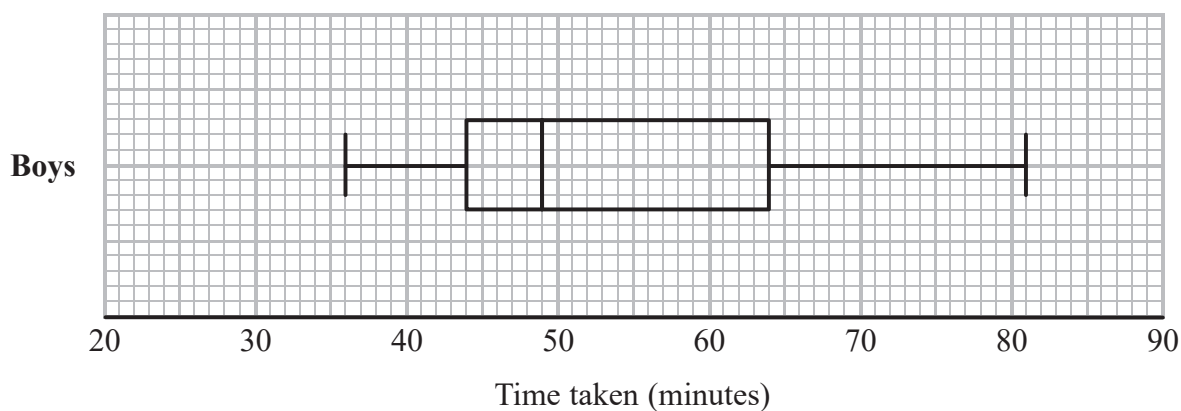
Work out Sandeep's mean score for the 60 spins.

(Total for Question 11 is 3 marks)



- 12 Alan recorded the times, in minutes, taken by some boys and by some girls to complete a charity race.

The box plot shows information about the times taken by the boys.



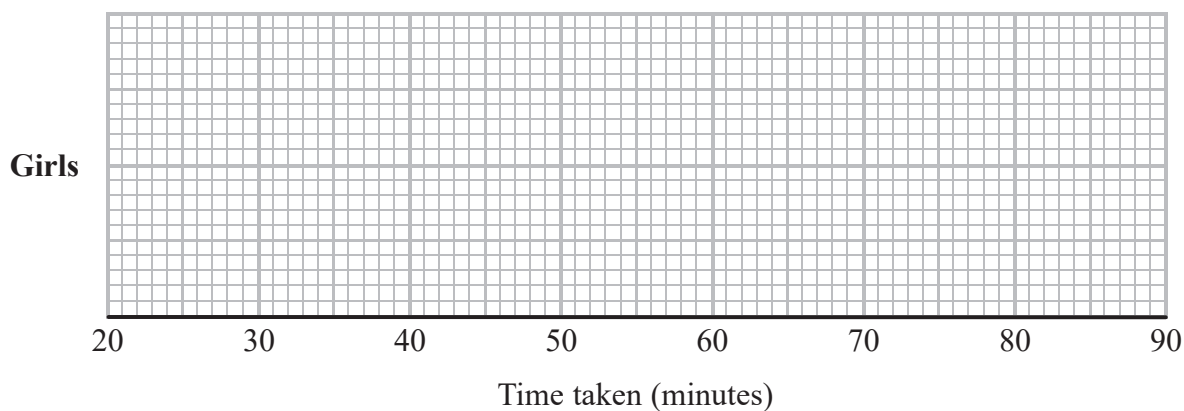
- (a) Describe the skew of the distribution of the times taken by the boys.

(1)

The table gives some information about the times taken by the girls.

Least	Lower quartile	Median	Upper quartile	Greatest
37	42	53	57	69

- (b) On the grid, draw a box plot for the information in the table.



(2)



(c) Compare the distributions of the times taken by the boys and the times taken by the girls.

.....

.....

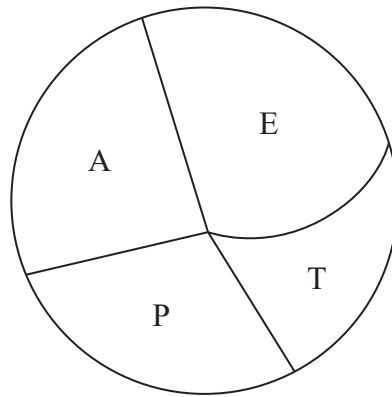
.....

.....

(2)

**(Total for Question 12 is 5 marks)**

**13** Here is a pie chart.



Write down two things that are wrong or could be misleading with the pie chart.

1.....

.....

2.....

.....

**(Total for Question 13 is 2 marks)**



14 The table gives information about the number of watches sold in a shop for each of six months.

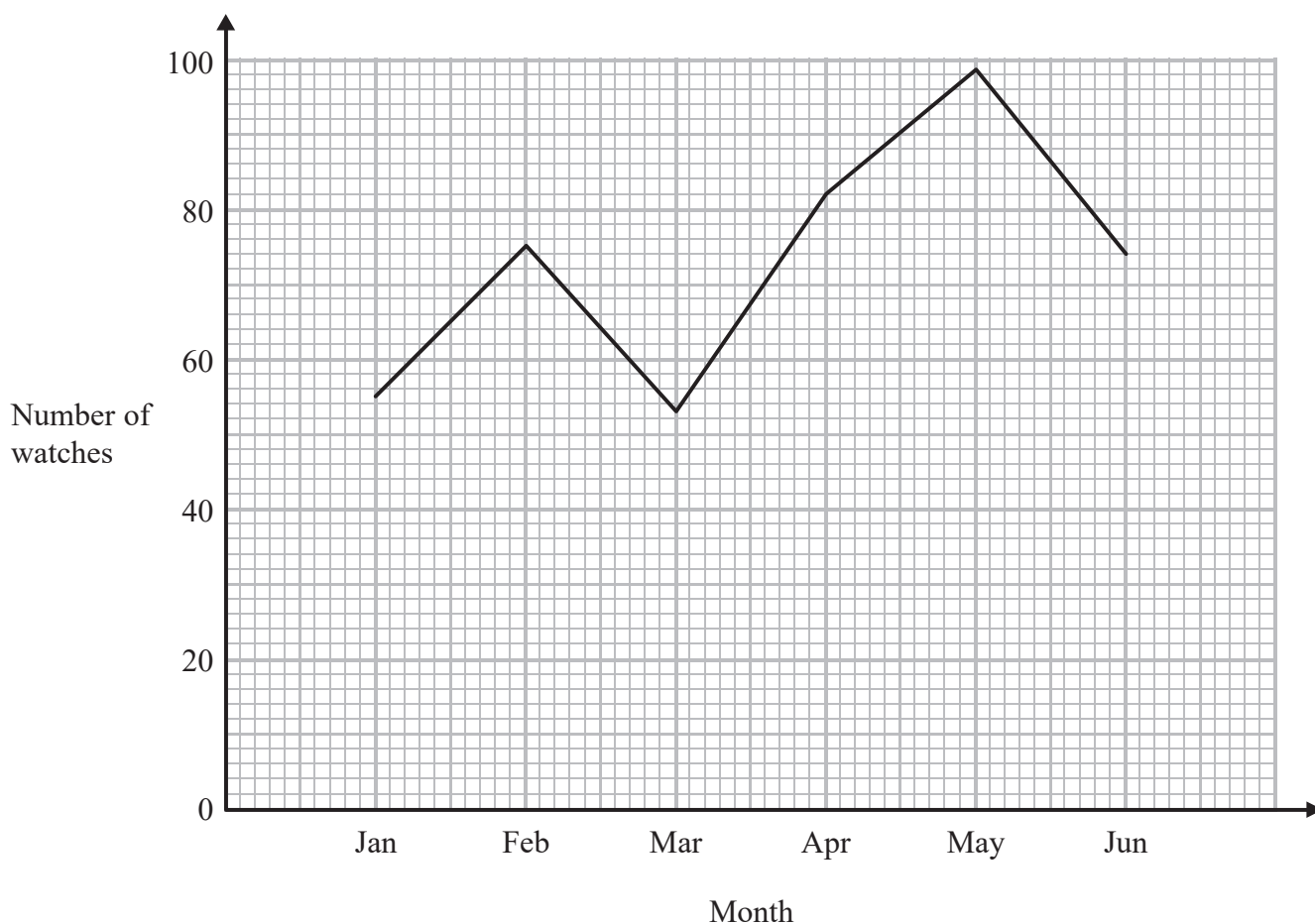
Month	Jan	Feb	Mar	Apr	May	Jun
Number of watches	55	75	53	82	99	74

- (a) Work out the 3-point moving averages for this information.  
The first two have been done for you.

61, 70, ..... , ..... (2)

The information in the table is shown as a time-series graph on the grid below.

- (b) (i) On the grid, plot the 3-point moving averages.





(ii) Describe what the moving averages show about the trend in the number of watches sold in the shop over these six months.

.....  
(3)

**(Total for Question 14 is 5 marks)**

**15** A bag contains a blue card, a pink card and a yellow card.  
A second bag contains a blue card, a green card, a red card and a yellow card.

Ray is going to take at random a card from the first bag and a card from the second bag.

(a) Complete the sample space diagram to show all possible outcomes.

		Second bag			
		blue (b)	green (g)	red (r)	yellow (y)
First bag	blue (b)	(b, b)	.....	.....	.....
	pink (p)	(p, b)	(p, g)	.....	.....
	yellow (y)	(y, b)	(y, g)	.....	.....

(2)

(b) Find the probability that both cards are the same colour.

.....  
(2)

**(Total for Question 15 is 4 marks)**

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16 Anna asked the students in her year how much pocket money they received each week.

She asked 27 boys and 33 girls.

The mean amount of pocket money received by the boys was £14.75

The mean amount of pocket money received by the girls was £15.65

Work out the mean amount of pocket money received by the 60 students.

£ .....

(Total for Question 16 is 3 marks)



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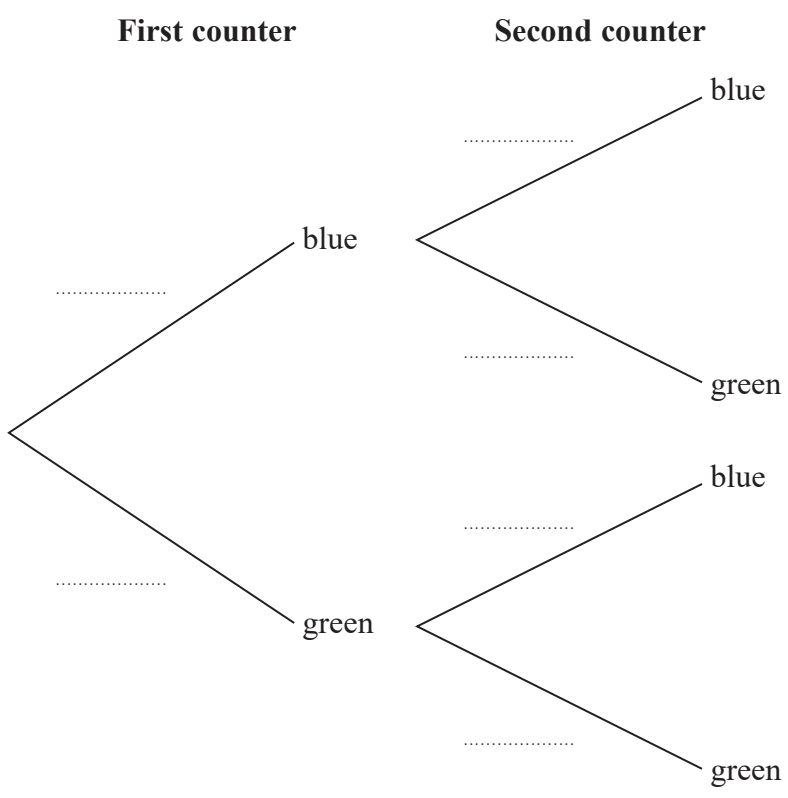
17 Ravina has a bag that contains only 7 blue counters and 3 green counters.

She takes at random a counter from the bag.

She writes down the colour of the counter and puts it back into the bag.

She then takes at random a second counter from the bag and writes down the colour of the counter.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that one counter is blue and one counter is green.

(3)

(Total for Question 17 is 5 marks)



18 In a competition there are four age groups.

The table gives information about the number of competitors in each age group.

Age group (years)	Number of competitors
16 – 19	49
20 – 39	38
40 – 59	29
60 and over	44

Rachel takes a sample of 55 of these competitors stratified by age group.

Find the number of competitors in her sample who are in the 20 – 39 age group.

.....  
(Total for Question 18 is 2 marks)



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19 The time,  $t$  seconds, that each of 60 athletes took to run 200 metres was recorded.

Here are the summarised results.

$$\sum t = 1590 \qquad \sum t^2 = 42748$$

Calculate the standard deviation of the times taken to run 200 metres.  
Give your answer correct to 3 significant figures.

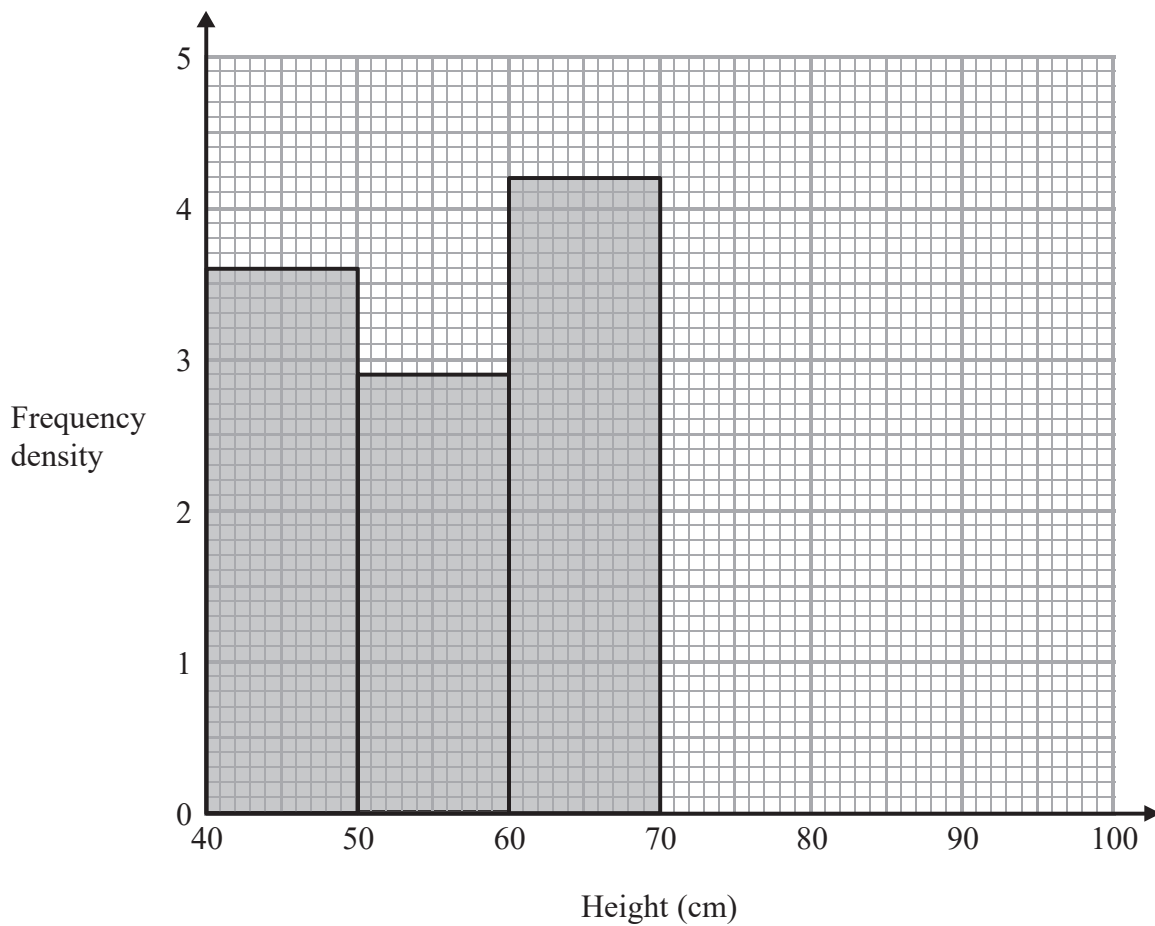
..... seconds

**(Total for Question 19 is 3 marks)**



20 The incomplete table and histogram give some information about the heights, in cm, of some dogs.

Height ( $h$ cm)	Frequency
$40 < h \leq 50$	
$50 < h \leq 60$	
$60 < h \leq 70$	42
$70 < h \leq 80$	25
$80 < h \leq 90$	14



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(a) Use the information in the histogram to complete the table.

(2)

(b) Use the information in the table to complete the histogram.

(2)

(Total for Question 20 is 4 marks)

**TOTAL FOR PAPER IS 80 MARKS**



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