St. Patrick's High School, Keady

Mathematics Department

GCSE Mathematics Practice Booklet

M2

Topic 6 – Handling Data 1

Mean, Mode, Median & Range

Data Handling Cycle

Sampling

Scatter Graphs

Statistical Diagrams

Questions taken from CCEA Past Papers

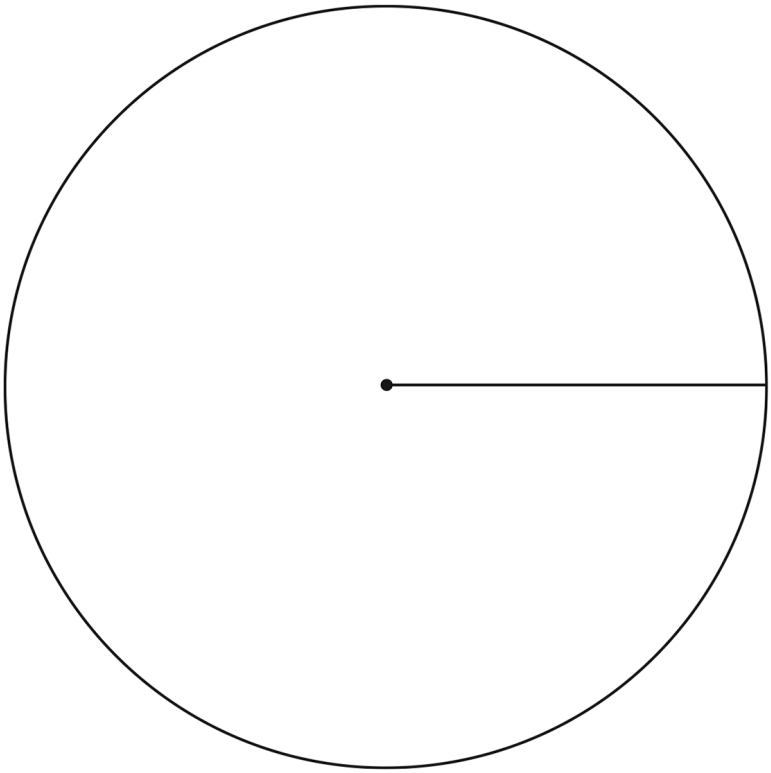
Mark Scheme included at the end of this booklet

Keady Maths

Q1 The table below gives information on the sports played by boys after school.

Sport	Football	Rugby	Hockey	Tennis
Number of boys	26	8	12	14
Angle				

Draw a clearly labelled pie chart for this information.

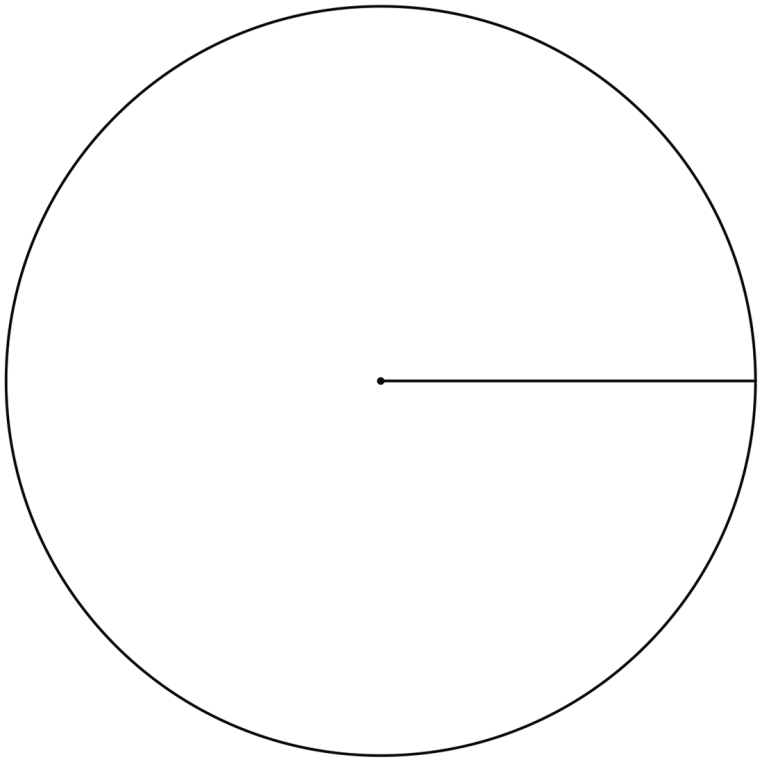


[4]

Q2 Ella recorded how many of each flavour of ice-cream were sold in her shop one day.

Ice-cream Flavour	Number	Angle
Strawberry	48	
Vanilla	31	
Chocolate	29	
Mint	12	

Draw a clearly labelled pie chart to show this information.

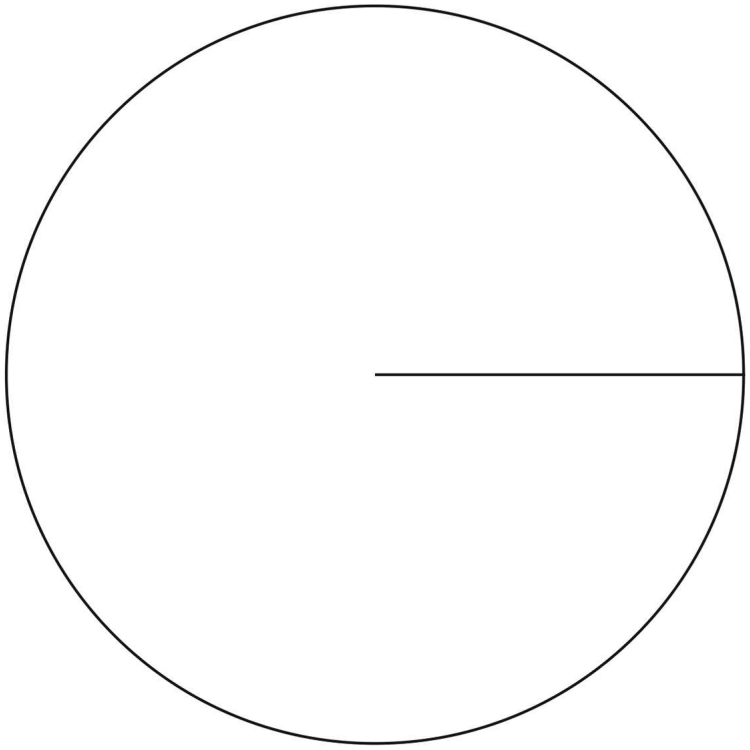


[4]

Q3 The amount of fruit sold in a canteen was recorded as follows.

Fruit	Frequency	Angle
Oranges	30	
Apples	42	
Pears	23	
Bananas	25	

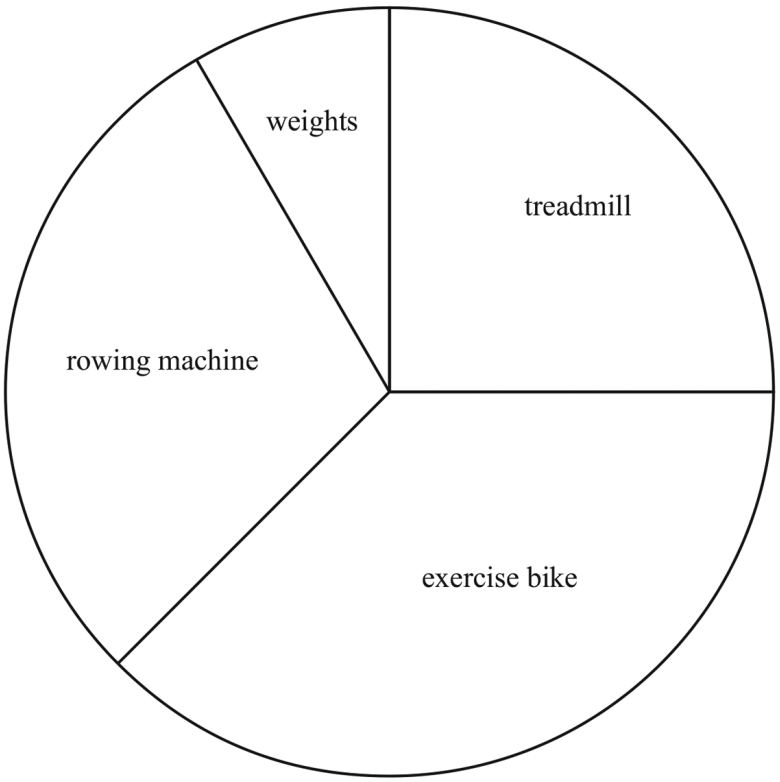
Draw a pie chart to illustrate this information.



[4]

Q4 George spent two hours at the gym one evening.

The pie chart shows how the time was spent on four activities.



(a) How much time did George spend on the treadmill?

Answer _____ [1]

(b) Roughly what amount of time was spent on the exercise bike?

Answer _____ [1]

(c) Measure the angle for rowing machine.

Answer _____° [1]

Q5 Calculate the mean of these numbers.

46 35 22 44 19 38 47 26 19 30

Answer _____ [3]

Q6 The scores in a competition were

14	11	23	17	15	13
23	29	17	14	23	16

(a) Find the mode of the scores.

Answer _____ [1]

(b) Find the median of the scores.

Answer _____ [2]

(c) Find the range of the scores.

Answer _____ [1]

Q7 The number of phone calls each hour in a health centre is shown below.

38 21 25 19 24 18 22 27 26 20

(a) What was the mean number of phone calls?

Answer _____ [3]

(b) What was the median number of phone calls?

Answer _____ [2]

Q8 Write down any three numbers with a median of 8 and a range of 6

Answer _____ [2]

Q9 The stem and leaf diagram shows the ages of people who took their driving test one day.

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

Key 1 | 7 = 17 years

(a) Find

(i) the mode,

Answer _____ [1]

(ii) the median,

Answer _____ [1]

(iii) the range.

Answer _____ [1]

(b) A quarter of these people were above a certain age.

What was that age?

Answer _____ [2]

Q10 The stem and leaf diagram shows the weights of some coins.

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

Key 3 | 4 = 3.4 g

Write down

(a) the range,

Answer _____ g [1]

(b) the mode,

Answer _____ g [1]

(c) the median.

Answer _____ g [1]

Q11 The lengths of twigs measured to the nearest tenth of a centimetre are given below.

4.3	4.7	2.9	1.0	5.8
4.2	3.6	1.9	2.7	3.0
2.6	3.7	4.3	2.7	2.8

(a) Draw a stem and leaf diagram to show this data.

[3]

(b) Find the range of the lengths.

Answer _____ cm [1]

(c) Find the median of the lengths.

Answer _____ cm [1]

Q12 The number of goals scored in each match in a football tournament are recorded in the table.

Number of Goals	Frequency	
0	2	
1	8	
2	13	
3	10	
4	9	
5	5	
6	2	
7	1	

Calculate the mean number of goals.

Answer _____ [3]

Q13 The number of goals scored in each match of a competition was recorded.

Number of goals scored in a match	Frequency
1	9
2	8
3	6
4	3
5	4

Calculate the mean number of goals per match.

Answer _____ [3]

Q14 Pupils are asked to investigate the number of electronic devices such as mobile phones, tablets, laptops etc. that people own.

(a) Joanne surveys her classmates and her results are recorded in the frequency table below.

Number of devices	Frequency
0	3
1	5
2	6
3	4
4	5
5	2
6	3

Calculate the mean number of devices for Joanne's classmates.

Answer _____ [3]

(b) Paula surveys 100 people at random coming out of the Leisure Centre one Saturday morning. She calculates the mean for her results to be 3.4

Whose value should give a better estimate for the mean for the whole population?

Give 2 reasons for your answer.

[2]

Q15 The number of days absent in a term was recorded for a class.

Number of days absent	Frequency
0	12
1	8
2	6
3	7
4	2
5	1

Calculate the mean number of days absent.

Answer _____ [3]

Q16 During a Science experiment the growth of plants was recorded.
The results are shown in the table below.

growth in cm (G)	number of plants
$0 \leqslant G < 3$	3
$3 \leqslant G < 6$	5
$6 \leqslant G < 9$	4
$9 \leqslant G < 12$	7
$12 \leqslant G < 15$	1

(a) Calculate an estimate of the mean growth of the plants.

Answer _____ cm [4]

(b) Explain why your answer is only an estimate of the mean growth.

_____

_____ [1]

Q17 The amount of pocket money (p) for each of a group of students is shown below.

Money (£)	Frequency
$0 < p \leqslant 3$	6
$3 < p \leqslant 6$	18
$6 < p \leqslant 9$	16
$9 < p \leqslant 12$	22
$12 < p \leqslant 15$	13
$15 < p \leqslant 18$	4

(a) Calculate an estimate for the mean amount of pocket money.

Answer £_____ [4]

(b) Which class interval contains the median amount of pocket money?

Answer _____ [1]

Q18 The speeds of cars on a road were recorded over a period of time.

The results are recorded in the grouped frequency table.

Speed (s miles per hour)	**Frequency**		
$20 < s \leqslant 30$	12		
$30 < s \leqslant 40$	16		
$40 < s \leqslant 50$	18		
$50 < s \leqslant 60$	2		
$60 < s \leqslant 70$	2		

(a) How many cars were travelling at more than 40 mph?

Answer _____ [1]

(b) Which class interval contains the median speed?

Answer _____ [1]

(c) Calculate an estimate for the mean speed of the cars on the road.

Answer _____ mph [4]

Q19 Data on the weights of 16 players on a sports team is recorded in the grouped frequency table.

Weight (W kg)	**Frequency**		
$60 < W \leq 70$	1		
$70 < W \leq 80$	5		
$80 < W \leq 90$	4		
$90 < W \leq 100$	6		

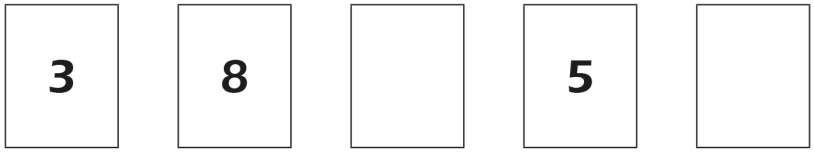
The manager states that "the estimated mean weight of the team lies within the median class".

Is his statement correct? **You must justify your answer fully.**

[4]

Q20

Alice has five cards each with a number on them. Three of the numbers are shown.



The mode of the five numbers on the cards is 5

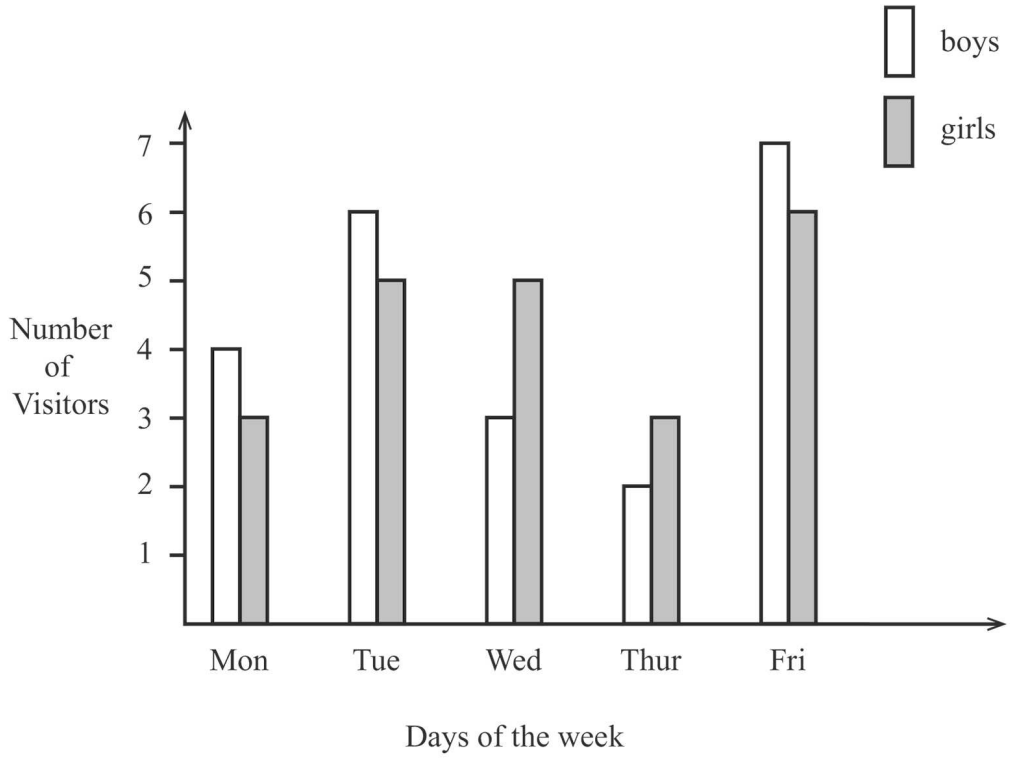
The mean of the five numbers on the cards is 6

Work out the range of the five numbers on the cards.

You must show your working.

Answer _____ [4]

Q21 The chart below shows the numbers of boys and girls who visited a library during one school week.



(a) Which day did most boys and girls visit the library?

Answer _____ [1]

(b) The librarian stated that 'more boys than girls visited the library during the week'. Was she correct? Give a reason for your answer.

Answer _____ because _____

_____ [3]

Q22 Six hundred pupils in a school completed a survey.

The survey was completed by 275 girls.

The survey found that 83 boys were left-handed and that 196 girls were right-handed.

Use this information to complete the two-way table below.

	Boys	Girls
Left-handed		
Right-handed		

[2]

Q23 Male and female care assistants work in a nursing home.

Some can work weekdays only, some can work weekends only and some can work both.

(a) Complete the two-way table below.

	Weekdays only	**Weekends only**	**Both**	**Total**
Male	1			8
Female		3		
Total	3		10	21

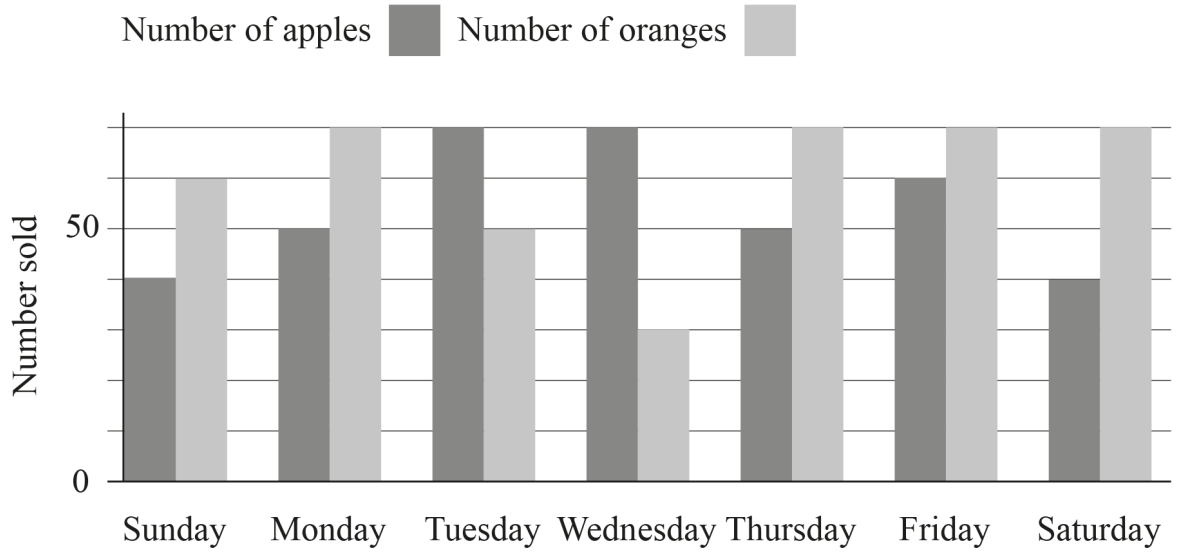
[2]

(b) How many male care assistants can work on weekends?

Answer _____ [1]

Q24

The dual bar chart shows how many apples and oranges were sold in a fruit shop last week.



The owner says

"I sold 50 more oranges than apples last week."

Is he correct?

You must explain your answer.

Answer _____ because _____ [3]

Q25 A sports team recorded information about whether players were able to play on Saturday only, Sunday only, or both.

(a) Complete the two-way table below.

	Saturday only	**Sunday only**	**Both Saturday and Sunday**	
Defenders	5	2		7
Midfielders	4		3	8
Attackers		3	1	
		6	4	21

[2]

(b) The team decides to play on Saturday.

How many midfielders are able to play?

Answer _____ [1]

Q26 In a group of students,

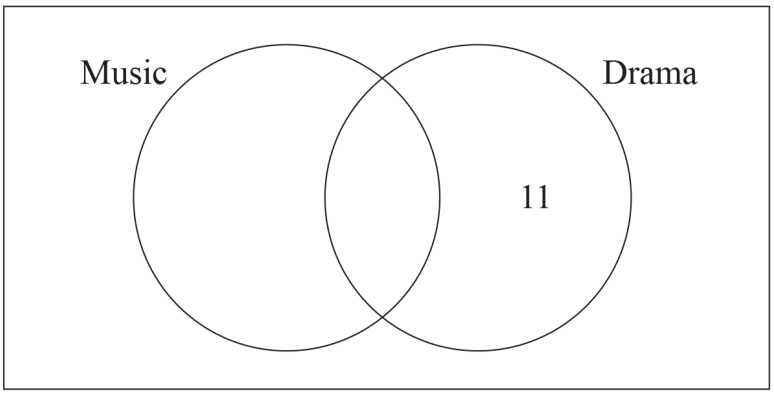
6 study Music

15 study Drama

11 students study only Drama

3 study neither subject.

Complete the Venn diagram to show this information.



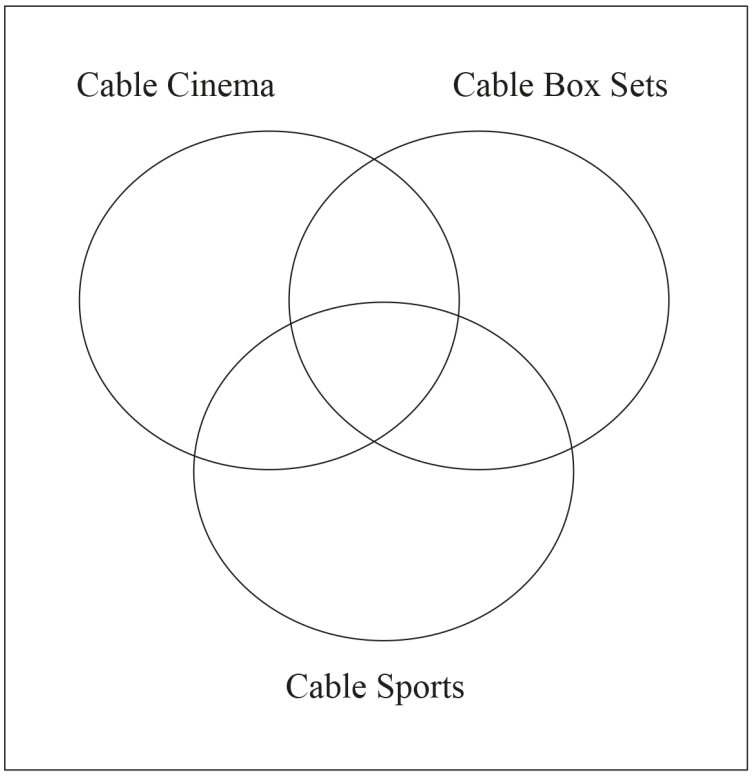
[3]

Q27

(a) 80 Cable TV customers were asked whether they had a subscription for Cable Cinema, Cable Box Sets or Cable Sports.

7 had subscriptions to all 3
11 had Cable Box Sets and Cable Sports, but not Cable Cinema
14 had Cable Box Sets and Cable Cinema, but not Cable Sports
11 had Cable Cinema and Cable Sports

Show this information on the Venn diagram. [2]



(b) 36 had a subscription for Cable Cinema
48 had a subscription for Cable Box Sets
33 had a subscription for Cable Sports

Show this information on the Venn diagram. [1]

(c) How many of the customers asked did not have any subscriptions?

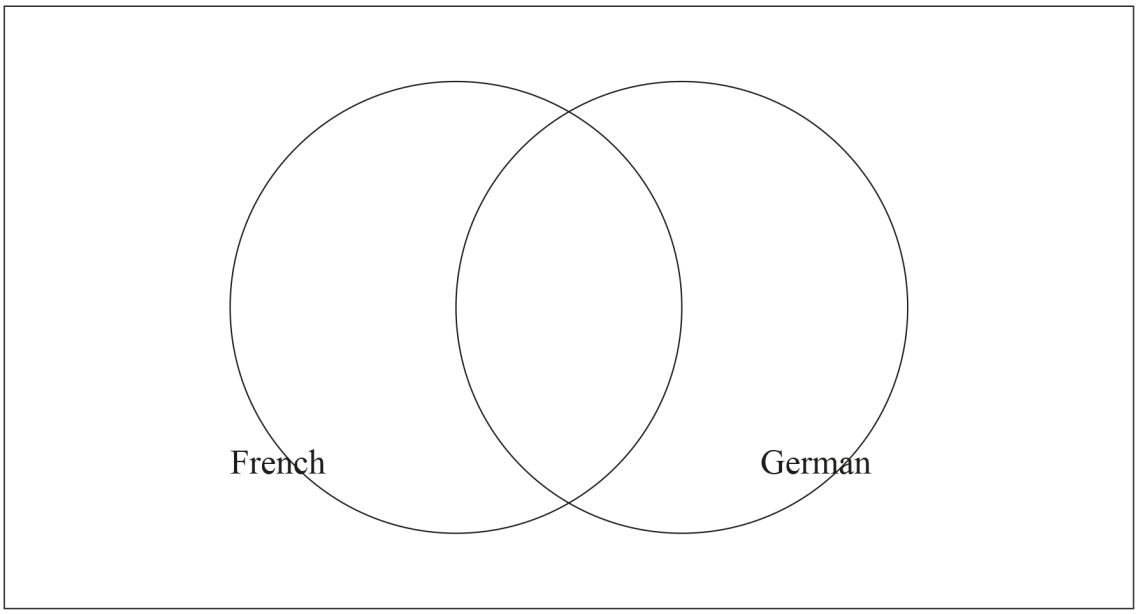
Answer _____ [2]

Q28

In Year 11 there are 200 students.
Students can choose to study French, German, both languages or no language.

95 students study French.
75 students study German.
35 students study both languages.

By completing the Venn diagram below, calculate how many students in Year 11 study no languages.



Answer _____ [4]

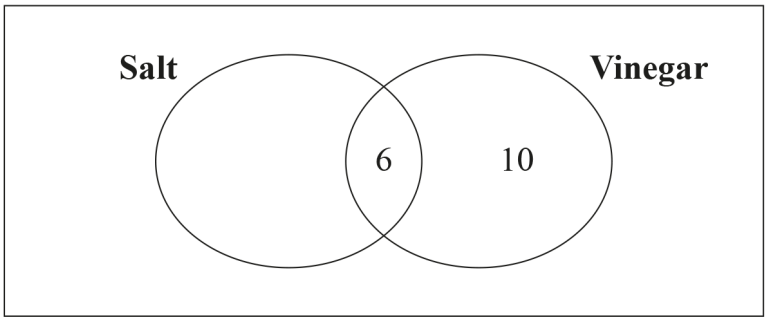
Q29

40 customers order chips in a takeaway.

6 customers take **both** salt and vinegar on their chips.

10 customers take vinegar **only**.

This information is shown on the Venn diagram.



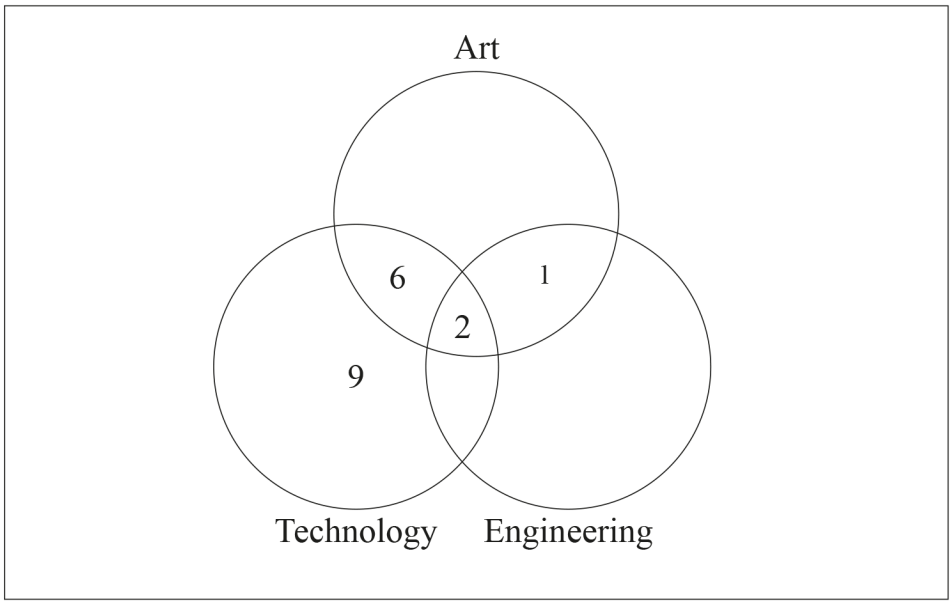
22 customers take salt on their chips.

Use the Venn diagram to work out how many customers take neither salt nor vinegar on their chips.

Answer _____ [3]

Q30 There are 35 students in a Form Class.
Some students study Art, some study Technology, some study Engineering and some study a combination of these subjects.
Some study none of these subjects.

The Venn diagram shows some information about the number of students studying the subjects.



5 students study Technology and Engineering.
14 students study Art.
8 students study Engineering.

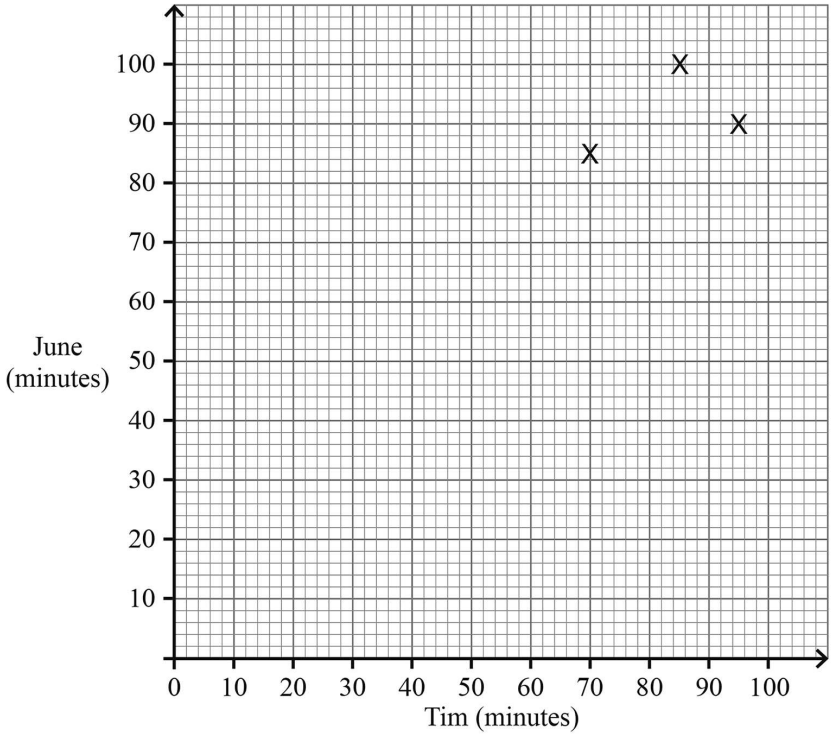
(a) Use this information to complete the Venn diagram. [4]

(b) Use the Venn diagram to calculate what percentage of Technology students also study Art but not Engineering.

Answer _____ % [2]

Q31 Tim and June recorded the amount of time in minutes they spent on different homeworks during one week. The results are shown below.

	Maths	**English**	**Art**	Geography	History	Science	Music	ICT
Tim	**70**	**85**	**95**	50	65	40	10	50
June	**85**	**100**	**90**	75	70	60	40	60



(a) Use the data to complete the scatter graph. The first three results are already plotted. [2]

(b) Draw the line of best fit. [1]

(c) Tim spent 60 minutes on a Technology homework.

Use your line of best fit to estimate the time that June spent on the Technology homework.

Answer _____ minutes [1]

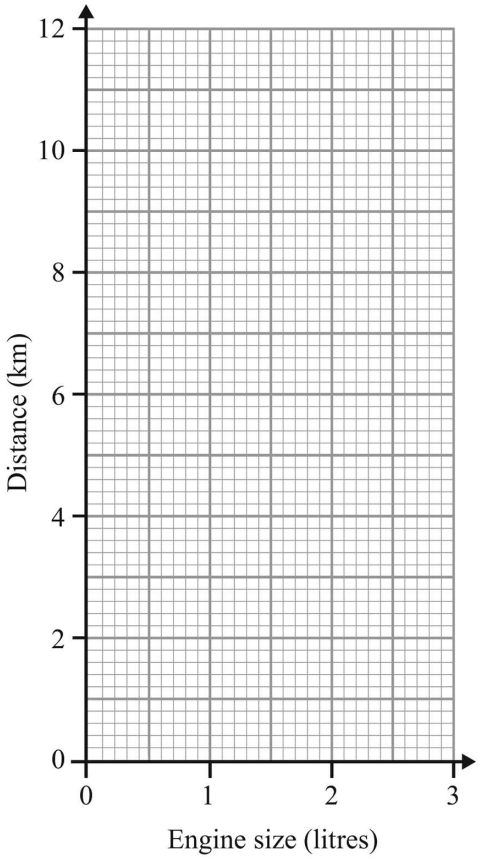
(d) What type of correlation does your graph show?

Answer _____ [1]

Q32 The table shows the engine size (litres) of different cars and the distance (km) that the cars can travel on one litre of petrol.

Engine size	1.0	1.8	2.4	1.2	2.1	1.5	2.7
Distance	12	8.6	5	9.4	5.9	10.2	3.8

(a) Draw a scatter graph. [2]



(b) Draw a line of best fit. [1]

(c) Another car travels 7 km on one litre of petrol. Use your line of best fit to estimate the engine size of this car.

Answer _____ litres [1]

(d) Describe the correlation in this scatter graph.

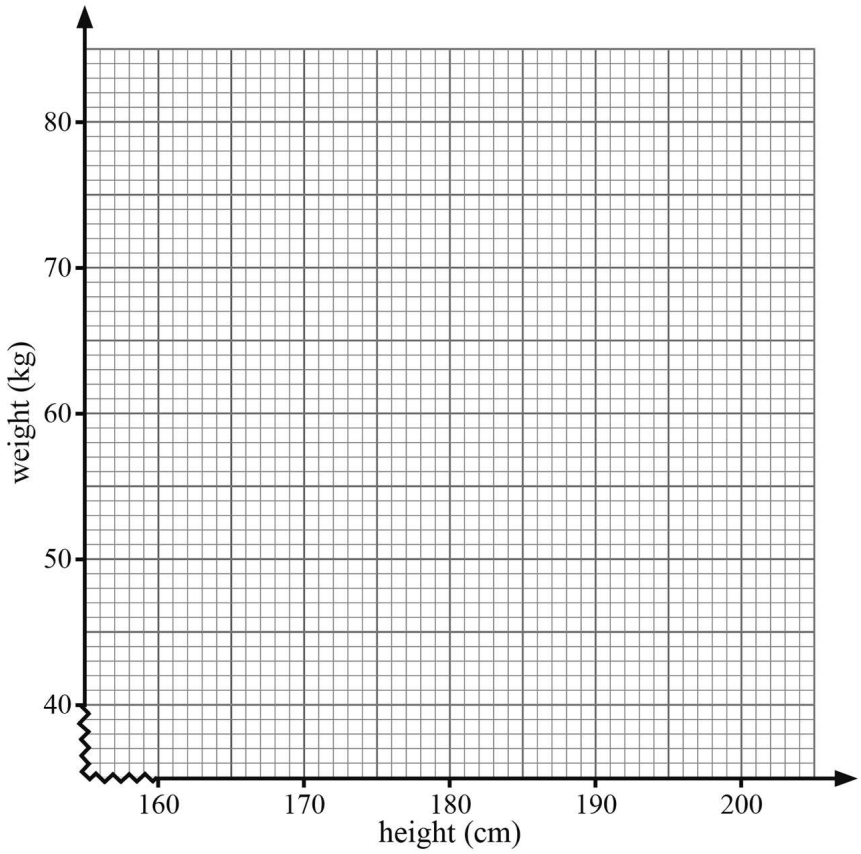
Answer _____ [1]

Q33 The heights and weights of 7 people are given.

height (cm)	165	197	178	168	180	174	190
weight (kg)	45	77	58	50	65	60	63

(a) Using the grid below show this information on a scatter diagram.

Mark your points clearly.



[2]

(b) Draw a line of best fit on the scatter diagram. [1]

(c) Use your line of best fit to estimate the weight of a person whose height is 185 cm.

Answer _____ kg [1]

Q34 A salesman recorded the average temperature (°C) and his ice-cream sales (£) during 8 weeks of the summer.

	Week 1	**Week 2**	**Week 3**	Week 4	Week 5	Week 6	Week 7	Week 8
Average Temperature (°C)	**13**	**12**	**14**	16	14	18	17	18
Sales (£)	**238**	**206**	**264**	330	272	398	364	392

(a) The first three points have already been plotted.
Use the data to complete the scatter graph. [2]

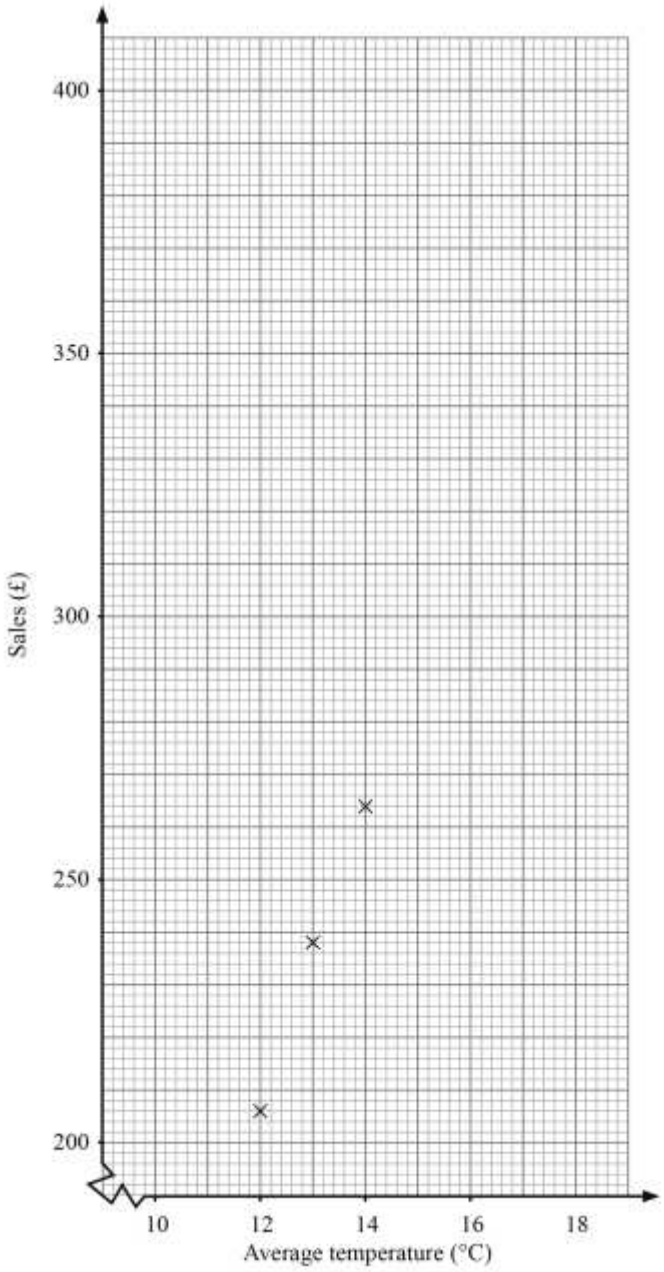
(b) Draw the line of best fit. [1]

(c) In Week 9 the average temperature was 15 °C.
Use the graph to estimate the sales for Week 9

Answer £ _____ [1]

(d) What type of correlation does your graph show?

Answer _____ [1]

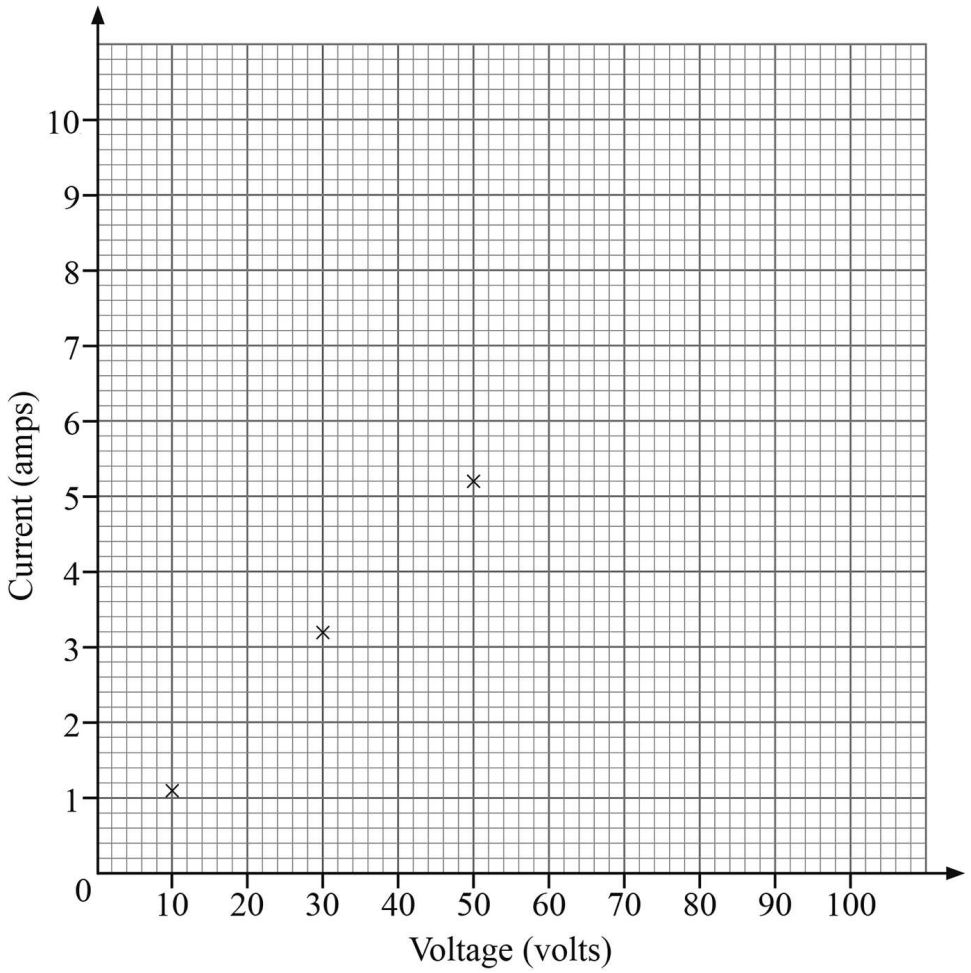

400
350
300
250
200
Sales (£)
10
12
14
16
18
Average temperature (°C)

Q35 Nine science students each measured the current (in amps) that flowed through a circuit at various voltages.

Their results are recorded below.

Student	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Voltage	10	50	30	20	80	40	60	70	90
Current	1.1	5.2	3.2	1.9	8.2	3.7	3.8	6.5	9.3

(a) Draw a scatter graph of the points. The first three points have already been plotted.



[2]

(b) Which student appears to have taken an incorrect reading?

Answer student _____ [1]

(c) Draw a line of best fit on your scatter graph. [1]

(d) Use the line of best fit to estimate the current for the incorrect reading taken by the student.

Answer current = _____ amps [1]

Q36 A questionnaire about their use of a mobile phone was given out to a sample of 20 people who left a supermarket between 10 am and 11 am on a Monday morning.

Give two reasons why this sample may not be very suitable.

Reason 1 _____

Reason 2 _____ [2]

Q37 Jean and Joyce are both pupils at Eastwood Girls High School and they want to know how many times a month, on average, the people in their town go to church.

(a) Jean asks 300 pupils in her school.

Give **two** reasons why Jean's sample may not be representative of the people in her town.

Reason 1 _____

_____ [1]

Reason 2 _____

_____ [1]

(b) Joyce stands outside her local church and asks 300 people on their way in to church.

Give **one** reason why Joyce's sample is biased.

Reason _____

_____ [1]

Q38 Jack is a pupil at Northfield Boys School. He wants to know how many times a month the people in his town go to a football match. He asks 600 pupils in his school.

Give **two** reasons why Jack's sample may not be representative of the people in his town.

Reason 1 _____

_____ [1]

Reason 2 _____

_____ [1]

Q39

(a) (i) Fiona wanted to do a survey about attendance at her school.

She designed a questionnaire for students to complete.

One of the questions was:

"How many days have you had off school?"

State **one** criticism of her question.

Answer _____

_____ [1]

(ii) She decides to give her questionnaires out to the first 20 students coming out of the Year 12 assembly one Monday.

State **two** reasons why her sample may not be representative of the whole school population.

Answer _____

_____

_____

_____ [2]

Q40

Below are listed six data sets.

A: number of pages in a book

B: temperature of a liquid

C: mass of an apple

D: colour of students' eyes

E: age of person

F: favourite food

From the list, choose one data set that represents

(a) Qualitative data Answer _____ [1]

(b) Discrete data Answer _____ [1]

(c) Continuous data Answer _____ [1]

1. Correct angles 156, 48, 72, 84 — MA2
Labels, Sectors — A1, A1

2.

Strawberry	Vanilla	Chocolate	Mint
144°	93°	87°	36°

MA2
(award [1] for evidence of 3)
Sectors correct and labelled — MA2

3.

Oranges	Apples	Pears	Bananas
90°	126°	69°	75°

MA2
(award one mark for evidence of 3)
sectors correct and labelled — MA2

4.

(a) 30 minutes or $\frac{1}{2}$ hour — A1

(b) 40–50 minutes — A1

(c) 105 ± 2 — A1

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5. Total = 326 MA1

Mean = $\frac{326}{10} = 32.6$ M1, A1

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6. **(a)** 23 A1

(b) at least 7 ordered correctly, 16.5 M1 A1

(c) 18 A1

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7. **(a)** 240 ÷ 10 M1, A1

24 A1

(b) at least 6 numbers listed in order MA1

18 19 20 21 22 24 25 26 27 38

23 MA1

---

8. 8 as middle number A1

difference of 6 between largest and smallest A1

[numbers **DO NOT** need to be listed in numerical order]

9.

(a) **(i)** 18 MA1

(ii) 26 MA1

(iii) 35 MA1

(b) $\frac{1}{4}$ of 32 = 8 MA1

38 MA1

10.

(a) 5.9 MA1

(b) 7.5 MA1

(c) 6.7 MA1

11.

(a)

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

M1A1

Key shown, e.g. 5 | 8 means 5.8 A1

(b) Range = 5.8 – 1.0 = 4.8 A1

(c) Median = 3.0 A1

12.

fx
0
8
26
30
36
25
12
7

fx products	M1
$144 \div 50$	M1
2.88	A1

13.

9, 16, 18, 12, 20 **or** 75	MA1
$75 \div 30$	MA1
2.5	A1

---

14. **(a)** $3 \times 0 + 5 \times 1 + 6 \times 2 + 4 \times 3 + 5 \times 4 + 2 \times 5 + 3 \times 6$ **or** 77 M1

$\frac{77}{28}$ MA1

$= 2.75$ A1

(b) Paula
bigger sample C1
age group/variety of sample C1

---

15. $8 + 12 + 21 + 8 + 5 = 54$ M1 A1
$54 \div 36 = 1.5$ MA1

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16. **(a)** $1.5 \times 3 + 4.5 \times 5 + 7.5 \times 4 + 10.5 \times 7 + 13.5 \times 1 \ (= 144)$ M1 A1
$= 144/20$ MA1
$= 7.2$ A1

(b) midpoints used are not exact values of growth of plant, hence mean is only an estimate of growth. A1

17.

(a)	Uses correct midpoints	A1
	Calculates correct fx (9, 81, 120, 231, 175.5, 66)	MA1
	Mean = $\frac{682.5}{79}$	MA1
	= £8.63 or £8.64	A1
(b)	(40th required) in group $6 < p \leqslant 9$	A1

18.

(a)	22	A1
(b)	$30 < s \leqslant 40$	A1
(c)	$25 \times 12 + 35 \times 16 + 45 \times 18 + 55 \times 2 + 65 \times 2 = (1910)$	M1 A1
	$\frac{1910}{50}$	M1
	= 38.2	A1

19.

Median class = $80 < W \leq 90$	A1
Mean = $\frac{1 \times 65 + 5 \times 75 + 4 \times 85 + 6 \times 95}{16}$	MA1
$= \frac{1350}{16} = 84.375$	A1
Yes his statement is correct.	A1

20.

One card must be 5 to allow mode to be 5	A1
Total of cards $5 \times 6 = 30$	MA1
Last card $= 30 - (3 + 5 + 8 + 5) = 9$	MA1
Range $= 9 - 3 = 6$	MA1

21.

(a) Friday A1

(b) Boys' total = 22 = Girls' total C2
No, totals are equal C1

22.

83	79
242	196

(A1 for 3 correct) A2

23.

(a) middle row 2, 8, 13

other rows 5, 2, 8 A2
allow [1] for any 3 correct

(b) 7 A1

24.

380 apples	MA1
420 oranges	MA1
No and 40 more were sold (or other correct statement)	A1

25.

(a)	0, 1, 2, 6, 11 (entries L to R, row by row) (award [1] for any 3 correct)	A2
(b)	7	A1

26.

3 outside circles	A1
4 in overlap	A1
2 in Music only	A1

---

27. **(a)** 7 A1

4, 14, 11 MA1

(b) 11, 16, 11 MA1

(c) The median is higher (in 2015) (or equivalent) A1

The range is smaller (in 2015) (or equivalent) A1

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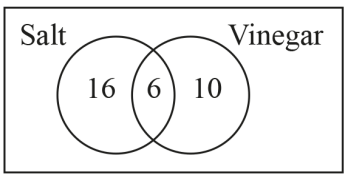
28. 35 in overlap MA1

(95 – 35 =) 60 in French only MA1

(75 – 35 =) 40 in German only MA1

200 – (35 + 60 + 40) = 65 A1

---

29. 16 marked correctly on diagram 

MA1

16 + 6 + 10 = 32 MA1

40 – 32 = 8 MA1

or

22 + 10 = 32, 40 – 32 = 8 (no 16 on diagram) M1A1 MA1

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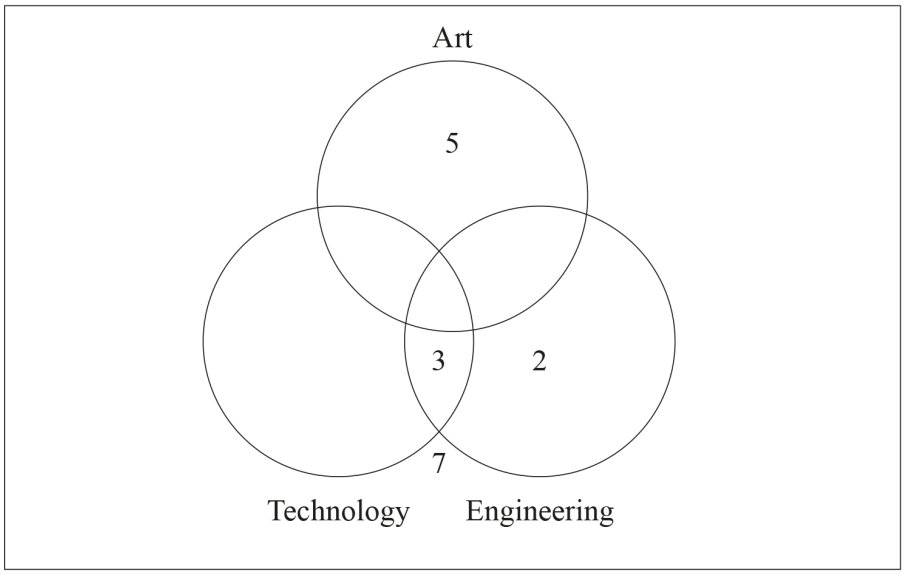
30. **(a)** 3 in T/E overlap A1

5 in single A section A1

2 in single E section A1

7 in outer box section A1



(b) $\frac{6}{20} \times 100$ MA1

$= 30\%$ A1

31.

(a)	correct points (allow A1 for 3 correct)	A2
(b)	oblique line with roughly half the points on either side	A1
(c)	follow candidate's line	A1
(d)	positive	A1

32.

(a)	7 points correct (allow A1 for 4 correct)	A2
(b)	Correct line	A1
(c)	Correct reading	A1
(d)	Negative	A1

33.

(a)	7 points correctly plotted (A1 if 5 or 6 correctly plotted)	A2
(b)	Suitable line	A1
(c)	Follow their graph	A1

34.

(a)	5 correct points (allow A1 for 3 correct)	A2
(b)	Correct line of best fit	A1
(c)	Follow candidate's line	A1
(d)	Positive	A1

35.

(a)	6 points correct (any 4 correct)	A2 (A1)
(b)	Student 7	A1
(c)	appropriate lobf	A1
(d)	appropriate reading, e.g. 5.8	MA1

36.

2 from
Older generation, very young children, too small a sample, more women than men A1 A1

37.

(a) she only asks girls **or**
she only asks one age group **or**
she doesn't ask any adults **or**
the pupils may not be from her town — C2

(b) she doesn't ask people who never go to church **or**
these people are on their way into church, so they are likely to go more often **or** similar — C1

38.

suitable answers — A2
e.g. no girls in sample
no adults in sample or only one age group
pupils may not live in his town
only children asked

39.

(a) **(i)** no time period specified — A1

(ii) she only asks Year 12s — A1

she only asks students who were in on that day — A1

40.

(a) D or F — A1

(b) A — A1

(c) B or C or E — A1
