Mean Median Mode Range

Paper 1

16. The mean (average) of five numbers is 28. The mean of a different set of twelve numbers is 11. Calculate the mean of all of the numbers together.

Total 5 = 28 × 5 = 140

Total 12 = 11 × 12 = 132 => Mean = $\frac{272}{17}$ = 16

Total 17 = 140 + 132

= 272

Answer: 16 [3]

17. The mean (average) of seven numbers is 9. One number is removed and the mean increases to 10. Find the number which was removed.

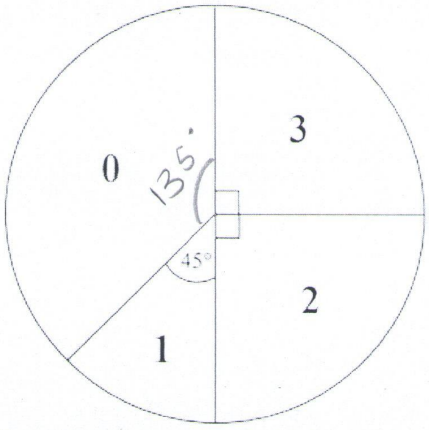
Total 7 = 9 × 7 = 63

Total 6 = 10 × 6 = 60

=> 63 − 60 = 3

Answer: 3 [3]

8. In a survey a group of children were asked how many siblings (i.e. brothers and sisters) they have. No-one in the group had more than three siblings, and the results are shown in the pie chart below.



180 − 45 = 135°

(a) Write down the percentage of children who have two siblings.

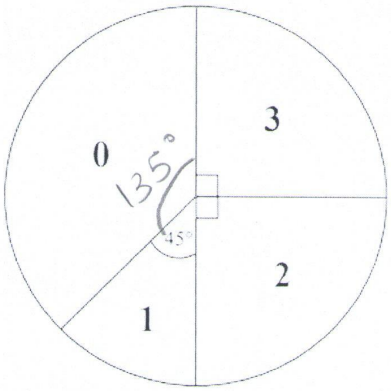
$\frac{90}{360} \times 100 = 25\%$ Answer: 25 % [1]

(b) Work out the fraction of children who have no siblings, giving your answer in its lowest terms.

$\frac{135}{360} = \frac{3}{8}$

Answer: 3/8 [2]

8. In a survey a group of children were asked how many siblings (i.e. brothers and sisters) they have. No-one in the group had more than three siblings, and the results are shown in the pie chart below.



180 − 45
= 135°

8 of the children who were surveyed had one sibling.

(c) Fill in the table below to show the number of children who have 0, 2 and 3 siblings.

Number of siblings	0	1	2	3
Number of children surveyed	24	8	16	16

[3]

(d) Write down the mode of the number of siblings.

More repeated

Answer: 0 [1]

35. A, B and C are numbers.

The mean of A and B is 40

The mean of B and C is 35

All three numbers add up to 100

What are A, B and C?

$\frac{A+B}{2} = 40 \Rightarrow A+B = 80$

$\frac{B+C}{2} = 35 \Rightarrow B+C = 70$

$A+B+C = 100 \Rightarrow A+B+C = 100$

$\Rightarrow C = 100-80 = 20$

$A = 100-70 = 30$

$B = 50$

A ..30.. B ..50.. C ..20..

A16	Here are the ages of some dogs waiting at a vet clinic: 1, 3, 4, 4, 5, 6, 6, 6, 10 a) How many dogs were there? Answer: 9 b) Find the mode of the ages of the dogs. Answer: 6 c) Find the total of the ages of all the dogs. Answer: 45 d) Find the mean of the ages of the dogs. Explain how you did it. Mean = Total / no of dogs $= \frac{45}{9} = 5$ Answer: 5	[1] [1] [1] [2]

13 Tim has three apples. The mean (average) weight of the three apples is 90 grams. When Tim eats the largest apple, the mean weight of the remaining two apples is just 70 grams. What was the weight of the largest apple?

13	130	grams

$\frac{a+b+c}{3} = 90 \Rightarrow a+b+c = 270$ ①

$\frac{a+b}{2} = 70 \Rightarrow b+c = 140$ → ②

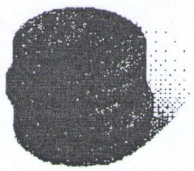
① − ②

$\Rightarrow a = 270 - 140$

$= 130\,g$

18 The Archer family has 4 children who receive £2, £5, £3 and £2 pocket money each week.

(a) Calculate the average pocket money (use the "mean" average).



Mean $= \frac{2+5+3+2}{4} = \frac{12}{4} = £3$

(b) Calculate the range of pocket money.

$5 - 2 = 3 \quad \therefore$ Range $= £3$

(c) The Jones family have 5 children who each receive an average of £3.50 a week and the range of amounts is £1.
Compare the amounts given to the children in these two families.

Total $= 5 \times 3.50 = £18$ £1 Range $= £1$

Jones give more pocket money on average and they are not much varied compared to Archers

5 marks

13. There are four unknown positive whole numbers.
The mean of the two smallest numbers is 3.
The mean of the three smallest numbers is 5.
The mean of all four numbers is 7.
All the numbers are different and odd.
What are the four numbers?

Answer 1, 5, 9, 13 [5]

$\frac{a+b}{2} = 3 \Rightarrow a+b = 6$ $a = 1$ (odd)

$b = 5$

$\frac{a+b+c}{3} = 5 \Rightarrow a+b+c = 15 \Rightarrow c = 15-6 = 9$

$\frac{a+b+c+d}{4} = 7 \Rightarrow a+b+c+d = 28 \Rightarrow d = 18-15 = 13$

22. Sujatha's marks in 4 tests were 16, 15, 16 and 10.

What was her mean score?

$$\text{Mean} = \frac{16+15+16+10}{4} = \frac{57}{4} = 14.25$$

Answer 14.25 (1 mark)

13. The mean length of a crocodile is 7.5 m and the mean length of an alligator is 4 m. If I have 4 crocodiles and 6 alligators what would be the mean length of all 10 creatures together?

13	5.4	m

$$\text{Mean} = \frac{4\times 7.5 + 6\times 4}{10} = \frac{30+24}{10} = \frac{54}{10} = 5.4\text{m}$$

15. On a wet week in Rusholme the mean (or average) rainfall over the five days from Monday to Friday was 12 mm. On Monday, when the rain was heaviest there was 22 mm, but on Friday there was only 5 mm of rain. What was the mean rainfall on the other three days?

15	11	mm

$12\times 5 = 60$

$60 - 22 - 5 = 33\text{mm} \Rightarrow \text{Mean} = \frac{33}{3} = 11\text{mm}$

15. In six of her end of term tests, each out of 50 marks, Madiha scores 48 in Mathematics, 37 in Physics, 40 in English, 48 in Chemistry, 36 in Biology and 31 in Geography.

a) What is the mode of Madiha's six scores?

A	48	B	37	C	30	D	31	E	40

15 b) Calculate her mean average score.

A	36	B	37	C	38	D	39	E	40

$$\frac{48+37+40+48+36+31}{6} = 40$$

24. The mean of three positive whole numbers is 6. The mode is 5. Find the three numbers. 5, 5, x

$\Rightarrow \frac{5+5+x}{3} = 6 \Rightarrow 10 + x = 18 \Rightarrow x = 8$

∴ 5, 5, 8 are the no

15. For the first 12 months after I bought my new phone I downloaded 4 apps to it each month. Over the next 7 months I only downloaded 1 app each month, but this month I downloaded 5 new apps. What is the average number of apps I have downloaded each month while I have had the phone?

15	3

Total apps = $12 \times 4 + 7 \times 1 + 1 \times 5 = 48 + 12 = 60$

Total months = $12 + 7 + 1 = 20 \Rightarrow$ Average = $\frac{60}{20} = 3$

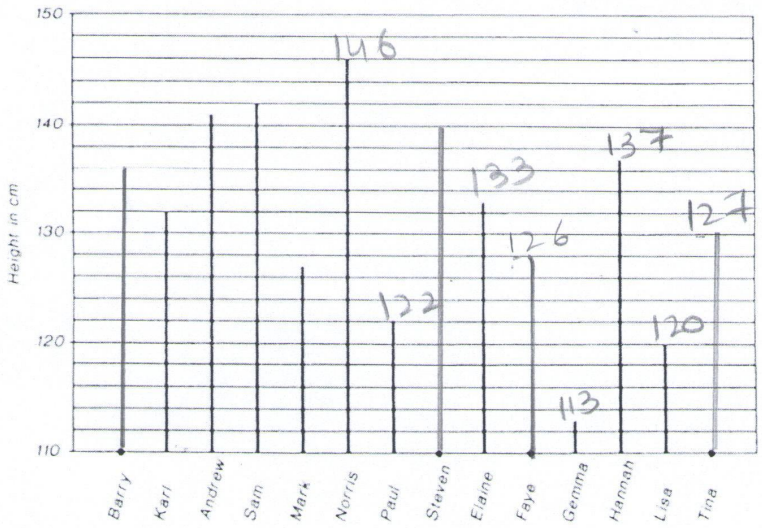
19. Four boys have an average mass of 50 kg and six girls have an average mass of 40 kg. What is the average mass of the ten children?

19	44	kg

$\frac{(50 \times 4) + (40 \times 6)}{10} = \frac{440}{10} = 44\text{kg}$

19. Pembury Youth centre held a Judo club on Tuesday evenings. At the beginning of the year the children's heights were recorded on a chart. (The last 6 names are the girls names.) Complete the chart for the four missing children using the information below.

1. Tina is the same height as Mark.
2. Faye is 20cm shorter than the tallest boy.
3. If Barry grew another 1 cm he would be the same height as the tallest girl.
4. Steven is 20cm taller than the shortest boy.



Now answer the following questions.

(a) What is the difference in height between the shortest member of the club and the tallest member?

$146 - 113 = 33\text{cm}$

Answer ..33cm.. [1]

(b) Calculate the average height of the girls.

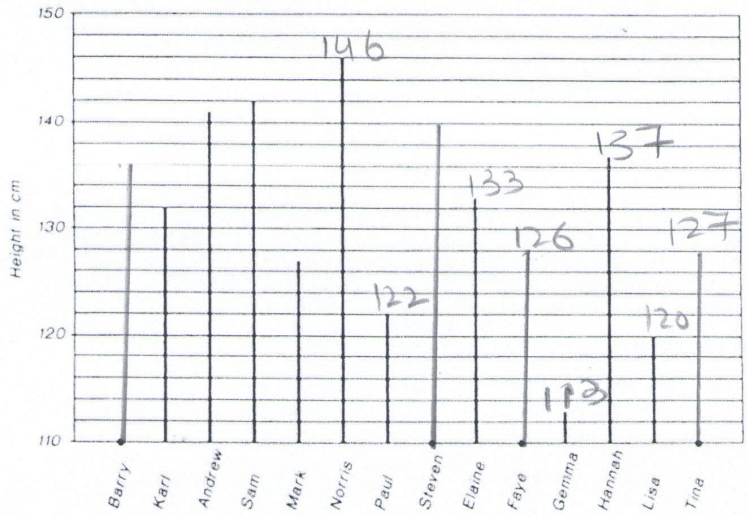
$133 + 126 + 113 + 137 + 120 + 127$ Answer ..126 cm.. [1]

$= 756$

$\Rightarrow \frac{756}{6} = 126\text{ cm}$

19. Pembury Youth centre held a Judo club on Tuesday evenings. At the beginning of the year the children's heights were recorded on a chart. (The last 6 names are the girls names.) Complete the chart for the four missing children using the information below.

1. Tina is the same height as Mark.
2. Faye is 20cm shorter than the tallest boy.
3. If Barry grew another 1 cm he would be the same height as the tallest girl.
4. Steven is 20cm taller than the shortest boy.



Now answer the following questions.

(c) Which girl is closest to the girls' average height?

Answer ... Faye [1]

(d) How tall is the shortest boy?

122 cm

12. Jon looks at the Year 7 test results in Maths and lists the marks:

20, 5, 10, 12, 0, 1, 14, 2, 15, 14, 3, 5, 14, 4 0,1,2,3,4,5,5,10,12,14,14,14,15,20

a. What is the range?

$20 - 0 = 20$

Answer: 20 [1]

b. What is the median score?

$\frac{5+10}{2} = 7.5$

Answer: 7.5 [2]

c. What is the mean score?

$\frac{119}{14} = 8.5$

Answer: 8.5 [2]

d. What is the mode?

Answer: 14 [1]

e. Jon realises that the student with a score of 0, did in fact answer one question correctly and therefore got 1 mark.
Explain why this affects the mean score but not the median.

Answer: Mean changes because the sum of the numbers change. Median is the same because the order of numbers is not changed [2]

11. In a list of numbers:

the **mode** is the number which occurs the most often;

the **median** is the number which is in the middle of the list when the numbers have been put in order;

the **mean** is the sum of all the numbers divided by how many numbers there are in the list.

For example, for the list 1, 4, 7, 1, 2,

mode = 1, median = 2, mean = $\frac{15}{5}$ = 3.

2,5,5,6,7,8,16

(a) Find the mode, the median, and the mean for the list 8, 5, 2, 16, 6, 5, 7.

mode = 5

median = 6

mean = 7 $\frac{49}{7} = 7$

(b) Write down a list of three whole numbers for which the mode is 4 and the mean is 6.

4,4,x => $\frac{x+8}{3} = 6$

=> x+8 = 18 => x = 10 4,4,10

(c) Write down a list of five whole numbers for which the mode is 9, the median is 4, and the mean is 5.

1,2,4,9,9

(d) Write down three different lists, each containing five whole numbers, so that for each list the mode is 1 and the mean is 2.

1,1,1,1,6

1,1,1,2,5

1,1,1,3,4