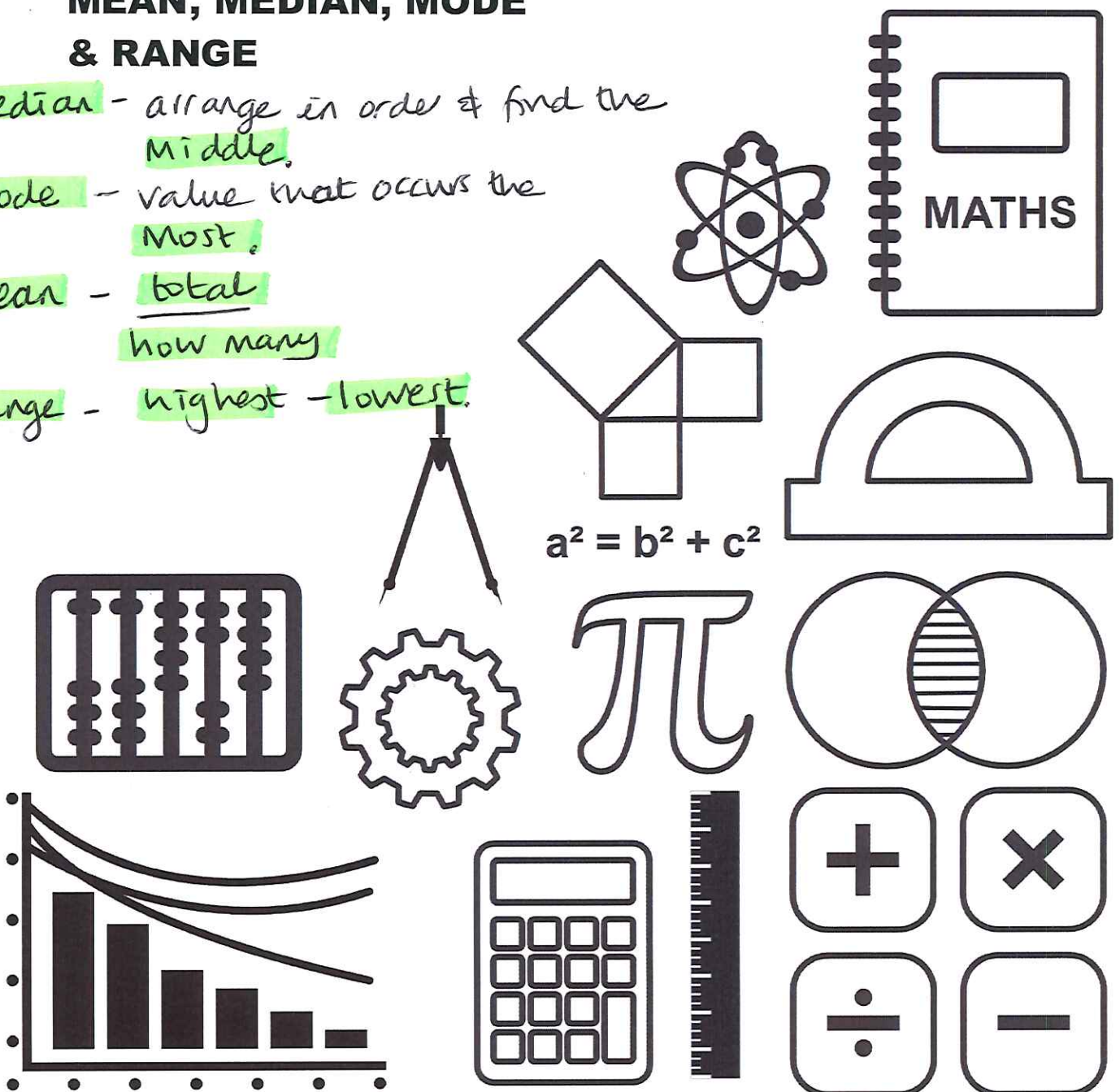


SOLUTIONS

GCSE TOPIC BOOKLET MEAN, MEDIAN, MODE & RANGE

- **Median** - arrange in order & find the **Middle**.
- **Mode** - value that occurs the **Most**.
- **Mean** - **total**
how many
- **range** - **highest - lowest**.



1.

Last summer, Mr Williams had 10 tomato plants like the one shown below.



The number of tomatoes that grew on each plant is given below.

~~42~~ ~~37~~ 48 ~~34~~ 44 ~~41~~ ~~39~~ ~~42~~ ~~38~~ 45

(a) Calculate the mean number of tomatoes per plant.

[3]

$$= \frac{42 + 37 + 48 + 34 + 44 + 41 + 39 + 42 + 38 + 45}{10}$$

$$= \frac{410}{10} = 41 \text{ tomatoes}$$

(b) Find the median number of tomatoes per plant.

[2]

34, 37, 38, 39, 41, 42, 42, 44, 45, 48

median = 41.5 tomatoes

(c) What is the modal number of tomatoes per plant?

[1]

= most often = 42 tomatoes

(d) Next summer, Mr Williams plans to buy more tomato plants like the one above.

He says:

"On average, I should get about 41 tomatoes from each plant."

Give a reason why his data shows he is correct.

[1]

Yes he is correct because the mean is an average and that is 41.

2.

Jim and Andy play for their local cricket team.
They scored the following runs in their last six matches.

Jim	42	71	39	62	70	40
Andy	115	6	84	36	10	85

(a) Calculate the mean of Andy's scores.

$$\text{Mean} = \frac{(115 + 6 + 84 + 36 + 10 + 85)}{6}$$

6

$$= \frac{336}{6} = 56$$

Mean is

56

[3]

(b) Find the median of Jim's scores.

39, 40, 42, 62, 70, 71

$$\text{Median} = \frac{42 + 62}{2} = \frac{104}{2} = 52$$

[2]

3.

The number of points scored by the Welsh rugby team in their 9 games during the 2014-2015 season were as follows:

28 17 16 12 16 26 20 23 61

(a) Find the mode of the number of points scored.

16

[1]

(b) Find the median number of points scored.

12, 16, 16, 17, 20, 23, 26, 28, 61

20

[2]

(c) Find the mean number of points scored.

$$\text{Mean} = \frac{(28 + 17 + 16 + 12 + 16 + 26 + 20 + 23 + 61)}{9}$$

9

$$= \frac{219}{9} = 24.3 = 24 \text{ points}$$

[3]

4.

The ages, in years, of 8 members of a fitness club were:

55 37 34 42 46 29 31 62

(a) Find the median of their ages.

[2]

29, 31, 34, 37, 42, 46, 55, 62

$$\text{Median} = \frac{37 + 42}{2} = \frac{79}{2} = 39.5$$

(b) Find the range of their ages.

[1]

= highest - lowest

$$= 62 - 29 = 33$$

(c) Find the mean of their ages.

[3]

$$= \frac{55 + 37 + 34 + 42 + 46 + 29 + 31 + 62}{8}$$

$$= \frac{336}{8} = 42$$

(d) Assuming that the membership has not changed in the last four years, what were the mean and range of their ages four years ago?

[2]

mean = 38 range = 33

(e)

Paige's revision homework is always marked out of 10. Her last 3 marks for her homework have a median of 7, a range of 4 and a mode of 7. Complete the boxes below to show the last 3 marks that Paige had for her revision homework.

7 in the middle do this one first

Working:

Range = 4

Either the highest or lowest = 7

because of the mode.

but cannot be 7, 7, 11 because it is only marked out of 10.

Must have two 7

3 7 7



A newsagent sold the following numbers of copies of *The Evening Post* on each evening from Monday to Saturday.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
50	30	49	54	57	54

- (a) Find the mean, median, mode and range for the number of copies of *The Evening Post* sold per day by the newsagent. [7]

$$\text{mean} = (50 + 30 + 49 + 54 + 57 + 54) \div 6$$

$$= 294 \div 6 = 49$$

$$\text{median} = 30, 49, 50, 54, 54, 57$$

$$\text{Median} = \frac{50 + 54}{2} = 52$$

$$\text{Mode} = 54$$

$$\text{range} = 57 - 30 = 27$$

Mean	Median	Mode	Range
49	52	54	27

- (b) The newsagent says:

"The mean is the best average to use for the number of copies of *The Evening Post* sold per day over the 6 days!"

Do you agree with the newsagent?
Give a reason for your answer.

Either Yes, because it uses all the data

or No, because it uses the 30 which is very different to the other values

6. (a) The table shows the minimum temperature recorded on 1st December in seven cities around the world.

City	Berlin	Calgary	Cardiff	Delhi	Milan	Moscow	New York
Temperature (°C)	0	-39	11	42	11	1	-5

- (i) What is the difference in temperature between the warmest and coldest cities? [2]

$$42 - (-39) = 81^{\circ}\text{C}$$

- (ii) What is the median temperature recorded? [2]

-39, -5, 0, 11, 11, 42

median

$$= 1^{\circ}\text{C}$$

- (b) The table shows the midday temperature readings that were recorded in Cardiff on the first day of each month.

Month	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Temperature (°C)	1	4	2	7	11	16	17	21	19	10	7	11

- (i) Find the mean and range of these temperature readings and complete the table below. [4]

$$\text{Mean} = \frac{1 + 4 + 2 + 7 + 11 + 16 + 17 + 21 + 19 + 10 + 7 + 11}{12}$$

$$= \frac{126}{12} = 10.5^{\circ}\text{C}$$

$$\text{Range} = 21 - 1 = 20^{\circ}\text{C}$$

	Cardiff	Paris
Mean midday temperature (°C)	10.5	15.8
Range of midday temperatures (°C)	20	29

- (ii) Midday temperature readings were also recorded on the first day of each month in Paris.

The mean was found to be 15.8°C and the range was 29°C.

Use the mean and range to compare the temperatures recorded in Cardiff and Paris. [2]

The mean tells us that on average Paris is a warmer city.

The range tells us that the temperatures in Paris are more spread out than the temperatures in Cardiff.

Leah has received many detentions in school for not completing her homework. The reason why she is receiving detentions is because she spends too much time playing games on her games console. She decides to investigate the amount of time she spends playing games. She records the number of minutes that she spends each day playing games. The following are her results.

Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Minutes	68	80	30	68	120	240	185

- (a) On which day did Leah spend exactly half an hour playing on her games console?

Wednesday

[1]

- (b) Find the mean, median, mode and range of the number of minutes spent per day playing games on her games console.

Mean

$$= \frac{68 + 80 + 30 + 68 + 120 + 240 + 185}{7}$$

$$= \frac{791}{7} = 113$$

Median

30, 68, 68, 80, 120, 185, 240

80

Mode

68

Range

$$= 240 - 30 = 210$$

[7]

8.

To encourage people to visit their new shop, the owners placed the following advert in the local newspaper.

WILL YOU BE A LUCKY CUSTOMER?

The first 500 customers who spend more than £50 will receive a sealed envelope containing a voucher worth £100 or £5 or £1.

The number of each type of voucher that the owners put in the envelopes is shown below.

Value of voucher x	Number of vouchers f
£1	400
£5	90
£100	10

$$400 \times 1 = 400$$

$$90 \times 5 = 450$$

$$10 \times 100 = 1000$$

$$\sum f = 500$$

$$\sum fx = 1850$$

[3]

(a) Calculate the mean value of the vouchers.

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{1850}{500}$$

$$= \underline{\underline{£3.70}}$$

(b) All the vouchers were given out, as planned.

Complete the table below by writing 'TRUE' or 'FALSE' in the second column and giving a reason for your decision in the third column. [4]

Statement	TRUE or FALSE	Reason
At least one customer received a voucher equal in value to the mean value.	False	No. None of the vouchers were worth £3.70
At least one customer received a voucher equal in value to the modal value.	True	Yes. Because the mode is £1 and there are £1 vouchers
At least one customer received a voucher equal in value to the median value.	True	Yes, because the median voucher value is £1

9.

Jimmy recorded the following 7 waiting times, in minutes, for meals at a local restaurant.

17 24 19 30 19 25 20

- (a) Find the mean, median, mode and range of the 7 waiting times.

[7]

Mean = $\frac{(17 + 24 + 19 + 30 + 19 + 25 + 20)}{7}$

$= \frac{154}{7} = 22$

Median

17, 19, 19, 20, 24, 25, 30
median = 20

Mode

19

Range

$30 - 17 = 13$

- (b) Jimmy recorded an extra waiting time at the restaurant.

This made the range of the 8 waiting times equal to the mode of the 8 waiting times. Find a possible value for this extra waiting time.

[2]

Mode = 19 so Range = 19

let extra waiting time be x

$30 - x = 19$

or

$x - 17 = 19$

$30 - 19 = x$

$x = 19 + 17$

$x = 11$

$x = 36$

you only need to give one possibility
so you can say either 11 minutes
or, 36 minutes

10.

The ages (in years) of the 8 members of an evening class are as follows:

36 28 45 24 31 34 27 47

lowest

highest

- (a) (i) Find the range of the ages of the members of the class.

[1]

$$47 - 24 = 23$$

- (ii) What was the range of their ages one year ago?
Give a reason for your answer.

[2]

23

Because one year ago they were all one year younger, so range would be
 $46 - 23 = 23$

- (b) Find the mean age of the members of the class.

[3]

$$= \frac{(36 + 28 + 45 + 24 + 31 + 34 + 27 + 47)}{8}$$

$$= \frac{272}{8} = 34$$

11.

The ages of the members of a netball team were

42 17 20 27 23 33 20

highest

lowest

- (a) Find the range of these ages.

[1]

$$= 42 - 17 = 25$$

- (b) Find the median of these ages.

[2]

17, 20, 20, 23, 27, 33, 42

Median

= 23

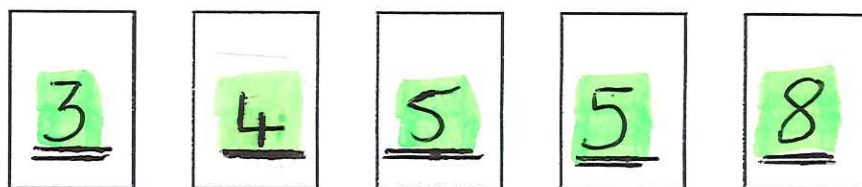
- (c) Find the mean of these ages.

[3]

$$= \frac{(42 + 17 + 20 + 27 + 23 + 33 + 20)}{7}$$

$$= \frac{182}{7} = 26$$

12.



one possible solution there are others

Five single digit numbers need to be written on the cards above.
The median, mode, mean and range of the numbers must all be 5.
Write a possible set of single digit numbers on the cards, in ascending order.

[4]

Median = 5 so write on middle card

Mode = 5 so need at least 2 5s

Mean = 5 so total = $5 \times 5 = 25$

Range = 5 so one possibility is $8 - 3 = 5$

another solution 2, 5, 5, 6, 7

13.

- (a) Jamal has five bags of carrots.
Each bag weighs a whole number of kilograms.
The median weight of these bags is 3 kg, the range of the weights is 4 kg and the modal weight is 5 kg.
What are the weights of the five bags of carrots?

[3]

Put median = 3 kg in middle straight away.

If mode = 5, that must be the two weights above 3 kg.

Realise, least = 1 kg because $5 - 1 = \text{range of } 4$

The weights of the bags of carrots are: Last one must be 2 kg because

1 kg 2 kg 3 kg 5 kg 5 kg mode = 5 kg

- (b) Jamal has a number of 3 kg bags of potatoes and a different number of 8 kg bags of potatoes.
The mean weight of the bags of potatoes is 6 kg.
What is the least number of 3 kg and 8 kg bags of potatoes that Jamal has?

[2]

Multiples of 3 3, 6, 9, 12, 15, ...

Multiples of 8 8, 16, 24, 32, 40

Use total and improved & realise that
($2 \times 3 \text{ kg}$) and ($3 \times 8 \text{ kg}$) = 30 kg in 5 bags, $\frac{30}{5} = 6 \text{ kg}$

Jamal has 2 3 kg bags and 3 8 kg bags

required mean

14.

Susan checks her water-meter reading every Monday morning.
Five readings taken during August 2015 are shown below.

Date	3 rd August	10 th August	17 th August	24 th August	31 st August
Meter reading (m ³)	76.5	80.7	84.6	94.8	98.9

- (a) How much water was used between the 3rd of August and the 31st of August? [1]

$$\begin{array}{r} 98.9 \\ - 76.5 \\ \hline 22.4 \end{array} \quad \text{Water used} = \underline{22.4} \text{ m}^3$$

- (b) How many weeks are there between the 3rd of August and the 31st of August? [1]

4 weeks

- (c) Calculate the mean amount of water that was used per week over this period of time. [2]

$$\frac{22.4}{4} = \underline{5.6 \text{ m}^3}$$

- (d) On one day during this month, Susan left a garden sprinkler on all day which used 4.5 m³ of water.
Write down a possible date on which this could have happened. [1]

Date

any date between
17th August and 23rd August
inclusive.

(allows 24th)