testbase

Range and averages (import)

Name: _____

Class: _____

Date: _____

Time: **18 minutes**

Marks: **18 marks**

Comments:

1 **Mean and median**

(a) Look at these three numbers.

9	11	10

Show that the **mean** of the three numbers is **10**

1 mark

Explain why the **median** of the three numbers is **10**

1 mark

(b) Four numbers have a mean of 10 and a median of 10, but **none** of the numbers is 10

What could the four numbers be?

Give an example.

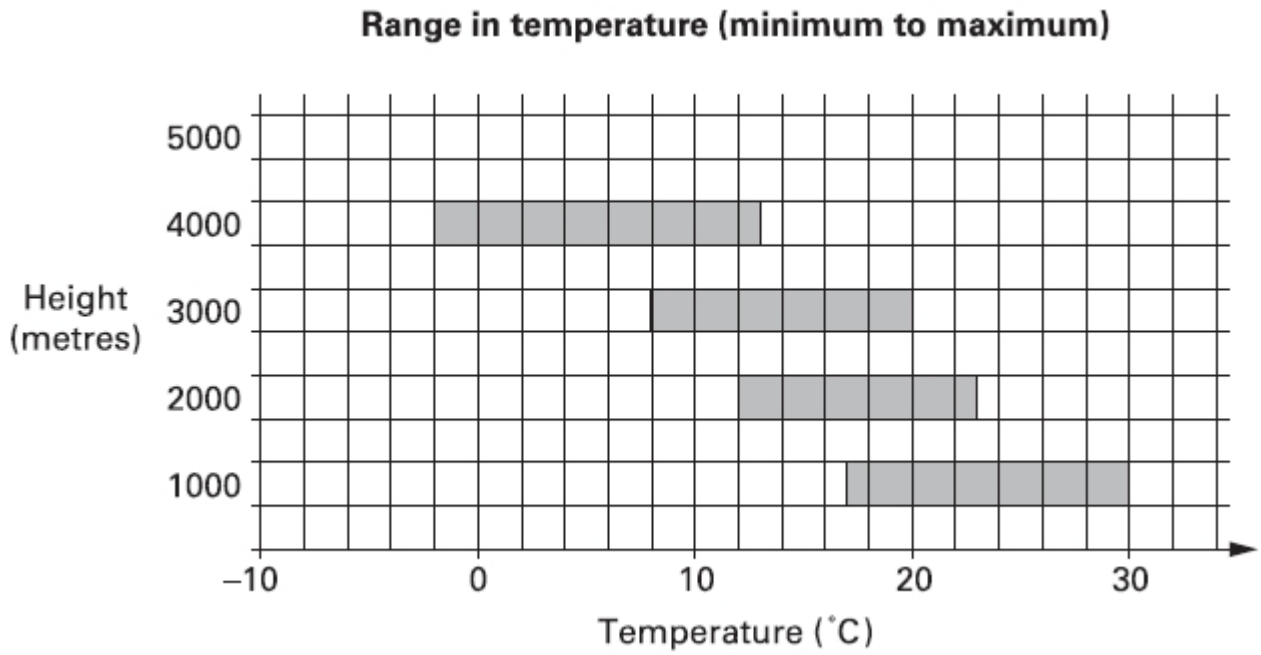
1 mark

2 **Nepal**

There are high mountains in Nepal.

At different heights, the temperature is different.

The graph shows information about temperatures in one month.



For example:

At 1000 metres, the maximum temperature is 30°C.

(a) At **3000** metres, what is the **minimum** temperature?

.....°C

1 mark

(b) At **5000** metres, the minimum temperature is **–3°C**.

The **range** in temperature is **15°C**.

On the graph above, draw a bar to show this information.

2 marks

3 **Favourite sport**

Hanif asked ten people:

'What is your favourite sport?'

Here are his results.

football	*cricket*	*football*	*hockey*	*swimming*
hockey	*swimming*	*football*	*netball*	*football*

(a) Is it possible to work out the **mean** of these results?

☐ Yes ☐ No

Explain how you know.

1 mark

(b) Is it possible to work out the **mode** of these results?

☐ Yes ☐ No

Explain how you know.

1 mark

4 **100 metres**

A pupil recorded the times of **23** people running the 100 metres.
The stem-and-leaf diagram shows the results.

13	6					
14	1	3	4			
14	7	7	8	9		
15	0	1	1	3	4	4
15	5	7	8	8	9	
16	2	2	4	4		

Key:

13 | 6 represents 13.6 seconds

(a) Two of the people ran the 100 metres in **14.7 seconds**.

How many of them ran the 100 metres **faster** than this?

..... people

1 mark

(b) What was the **range** of times?

seconds

2 marks

5 **Statistics**

Here are three number cards.
The numbers are hidden.

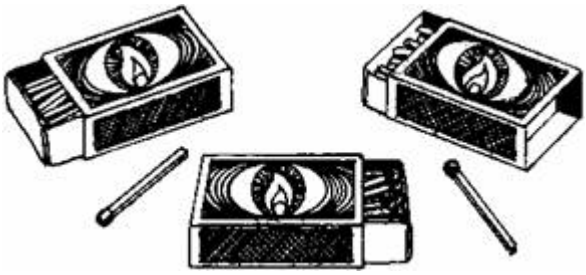
The **mode** of the three numbers is **5**
The **mean** of the three numbers is **8**

What are the three numbers?
Show your working.

..... , ... , ...

2 marks

6



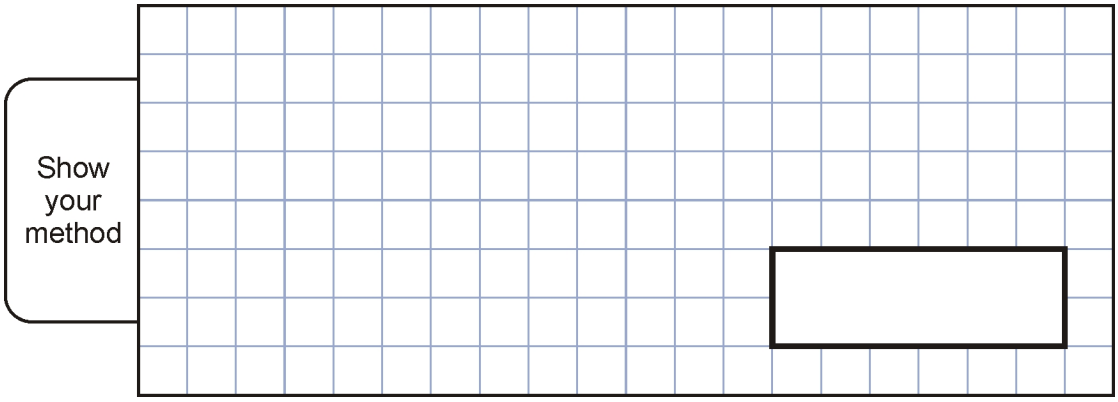
Carol counts the matches in **10** boxes.

She works out that the **mean** number of matches in a box is **51**

Here are her results for **9 boxes**.

Number of matches in a box						
48	49	50	51	52	53	54
	✓	✓	✓	✓		✓
	✓	✓				✓
	✓					

Calculate how many matches are in the **10th box**.



2 marks

7 **Speed bumps**

Bumps are built on a road to slow cars down.

The stem-and-leaf diagrams show the speed of **15 cars** before and after the bumps were built.

		Key: 2 | 3 means 23 mph	
	Before		**After**
2		2	3 4 4
2	7 8	2	6 6 7 8 8 9
3	0 2 4	3	0 0 0 1 2
3	5 6 8 9	3	5
4	1 3 4 4 4	4	
4	6	4	

(a) Use the diagrams to write the missing **numbers** in these sentences.

Before the bumps:

The maximum speed was ..... mph, and

..... cars went at more than 30 mph.

After the bumps:

The maximum speed was ..... mph, and

..... cars went at more than 30 mph.

2 marks

(b) Show that the **median** speed fell by 10mph.

1 mark

Mark schemes

1 (a) Shows that the mean is 10

eg

- 9 + 11 + 10 = 30,
  30 ÷ 3
- (9 + 11 + 10) ÷ 3
- 10 is already 10, then 9 is 1 below and 11 is 1 above

Accept minimally acceptable explanation

eg

- *30 ÷ 3*
- *30 ÷ 10 = 3*
- *9 + 11 = 20, 20 ÷ 2*
- *Add one to 9 and take one off 11*
- *10 is halfway between 9 and 11*

Accept method described

eg

- *You add them up then divide by how many there are*

Do not accept incorrect statement

eg

- *9 + 10 + 11 ÷ 3 = 10*
- *3 ÷ 30 = 10*

1

Gives a correct explanation of why the median is 10
eg

- 10 is the middle number when the numbers are in order
- The median is the middle number when the numbers go from smallest to largest

Accept minimally acceptable explanation

eg

- *It is the middle number*
- *It's the middle largest*
- *It's the second smallest*
- *9 10 11*
- *It is in between*

Do not accept incomplete or incorrect explanation

eg

- *9 10 11*
- *10 is halfway between 9 and 11*

1

(b) Gives four values that total 40 and whose middle two numbers, when ordered, add to 20, with none of the values being 10

eg

- 8 9 11 12
- 0 0 20 20
- 9 11 9 11
- 7 13 9 11

Accept fractions, decimals and negatives

1

[3]

2 (a) 8

1

(b) Draws a bar from –3 to 12, aligned with 5000 on the *y*-axis, and of the correct thickness

! *Lines not ruled or accurate*
Accept provided the pupil's intention is clear

2

or Indicates that the maximum temperature is 12
eg

- –3 + 15 = 12 seen
- Draws a bar with a right-hand end at 12

or

Indicates on the graph the correct positioning for –3

or

Draws a bar that is 15 units, ie $7\frac{1}{2}$ squares, in length

! *For 1m, bar incorrectly aligned with the 5000, or bar of incorrect thickness*
Condone

1

[3]

3 (a) Indicates No and gives a correct explanation
eg

- You can only find the mean of a set of numbers
- The data are in words not in figures so the mean cannot be found
- You can't add words up then divide by how many there are
- There are no numerical values

Accept minimally acceptable explanation
eg

- *They are words*
- *You need numbers*
- *There are no quantities (or figures)*
- *You need to add them together*
- *You can't divide them (by 10)*

Do not accept incomplete explanation
eg

- *You can't find the mean of sports*
- *You can't have fractions of a word*
- *Not enough information*

Do not accept: their explanation shows misconceptions about the mean
eg

- *You can't add them up and divide by 5*
- *You can't divide a word by a word*
- *You can't find the mean of words unless you use the frequencies*
- *It doesn't say whether Hanif asked them to give the sports marks out of ten*
- *You can't put them in order because they are words not numbers*

Do not accept: numerical values assigned
eg

- *Yes, football and swimming are 8 letters, cricket and netball are 7 and hockey is 6*

U1

(b) Indicates Yes and gives a correct explanation
eg

- The mode is the most common thing, so you can find it for numbers or words
- The mode is football as it was chosen most often, by four people
- You can see from the table what was the most popular sport

Accept minimally acceptable explanation
eg

- *Most common*
- *Most popular*
- *More like football*
- *Highest is football*
- *Football is favourite*

Do not accept mode identified but not explained
eg

- *The mode is football*
- *Four of the ten chose football so this is the mode*
- *Football appears more than once*

Do not accept incomplete or incorrect explanation
eg

- *Most*
- *You can see how many picked each sport*
- *There's more than one of some results*
- *You can find the mode from both numbers and words*
- *Football was chosen the most as five people said that*

1

[2]

4 (a) 4

1

(b) 2.8 or equivalent

2

or Identifies the values 13.6 and 16.4 or equivalent

or

Shows a complete correct method with not more than one computational error
eg
- 6 – 13 = 3, 0.6 – 0.4 = 0.2,
  3 – 0.2

! ***For 1m, key not interpreted***
Condone only if the correct range has been evaluated
eg, accept
- *2|8*

eg, do not accept
- *6|4 – 13|6*

Do not accept for 1m, conceptual error
eg
- *6 – 13 = 3, 0.6 – 0.4 = 0.2,*
  3 + 0.2 = 3.2

1

[3]

5 Identifies the three numbers as 5, 5, 14

Accept any order

2

or

Identifies two of the numbers as 5

or

Gives three numbers that sum to 24, or otherwise indicates the sum of the three is 24

1

[2]

6 Award **TWO** marks for the correct answer of 52

If the answer is incorrect award **ONE** mark for evidence of an appropriate method, eg

51 × 10 = 510

so number of matches =

510 – ((49 × 3) + (50 × 2) + (54 × 2) + 51 + 52)

The calculation need not be completed for the award of the mark.

Up to 2

[2]

7 (a) Completes both sentences correctly, with all four values in the correct positions,ie

46

12

35

3

! ***Throughout the question, key not interpreted***

eg, for the value 46

- *4|6*

Penalise only the first occurrence

2

or Gives at least two values in the correct positions
or
Shows the values 46, 12, 35 and 3, even if their positions are incorrect

1

(b) Gives a correct justification

eg

- 38 – 28 = 10
- It falls from 38 to 28

Accept minimally acceptable justification

eg

- *38 and 28 identified, with no evidence of an incorrect method*

! ***Ambiguous notation***

eg

- *28 – 38*

Condone

Do not accept incomplete or incorrect justification

eg

- *The difference between the middle numbers before and after is 10*
- *Indicates both values of 8 corresponding to the units of 38 and 28 on the diagram, but with no interpretation of the key*
- *Before the median was 39, after the median was 29, so it fell by 10*

1

[3]