High School Mathematics Test 2013

Year 8

Data Analysis

Non Calculator Section

Skills and Knowledge Assessed:

- Investigate techniques for collecting data, including census, sampling and observation (ACMSP284)
- Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data (ACMSP171)
- Investigate the effect of in dividual data values, including outliers, on the mean and median (ACMSP207)
- Describe and interpret data displays using median , mean and range (ACMSP172)
- Explore the variation of means and proportions of random samples drawn from the same population (ACMSP293)

Name_____

Answer all questions in the spaces provided on this test paper by:

Writing the answer in the box(es) provided.

or

Shading in the bubble for the correct answer from the four choices provided.

Show any working out on the test paper.

1. Billy and Gretel want to collect information about the audience of 500 people at a concert, Billy asks each person their postcode as they arrive.
Gretel gives out a survey form to 50 people in the audience.
Which is true?

   - ☐ Gretel is using a sample and Billy is using a census.
   - ☐ Billy is using a sample and Gretel is using a census.
   - ☐ Both Gretel and Billy are using a census.
   - ☐ Both Gretel and Billy are using a sample.

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2. Sarah collects data on the number of cars owned by a sample of 20 families. The results are listed below.

   2, 2, 1, 1, 3, 2, 1, 3, 4, 5, 1, 3, 2, 1, 2, 3, 2, 2, 1, 1

   The mode of the data is

   ☐ 1 ☐ 2 ☐ 1 and 2 ☐ 3

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3. A group of nine friends have shots at a basketball hoop.
The number of baskets that each person scores are given below.
What is the range of their scores?

   12, 36, 10, 11, 24, 12, 18, 25 and 30.

   The range of their scores is: ☐

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4. Josie and Petra compare the number of points they scored in 8 games of basketball.

Josie	11, 9, 4, 7, 7, 11, 8, 7
Petra	12, 10, 3, 3, 6, 10, 11, 3

Which is true?

- ☐ Josie has a higher mode, but Petra has a higher median.
- ☐ Petra has a higher mode, but Josie has a higher median.
- ☐ Josie has a higher mode and a higher median.
- ☐ Petra has a higher mode and a higher median.

5. The number of sightings of a numbat in a National Park, were recorded over 10 weeks. The results are listed below:

3, 5, 9, 8, 7, 2, 2, 8, 3, 6

What was the median number of sightings?

☐ 5 ☐ 5.5 ☐ 6 ☐ 6.5

6. When doing an analysis of magazines for her media studies assignment, Farrin counts the number of pages used for advertising in a magazine over 8 issues. The results were:

45, 26, 32, 44, 38, 55, 56, 40.

What was the mean number of pages used for advertising?

☐

7. Oliver is competing in a cycle race which takes 8 laps of a velodrome.
On the first four laps his mean time for each lap is 15 seconds.
He wants his mean time for each lap to be 14 seconds for the whole race.
What is the mean time per lap that he must achieve in the last 4 laps?

☐ 8 seconds ☐ 10 seconds ☐ 12 seconds ☐ 13 seconds

8. The speeds (in km/h) of 6 cars passing a police radar check are given below.

76, 79, 80, 74, 81 and 150.

Which is true?

- ☐ There is a cluster around 80 and outliers of 74 and 150.
- ☐ There is a cluster around 80 and one outlier of 150.
- ☐ There is a cluster around 76 and outliers of 70 and 150.
- ☐ There is a cluster around 76 and one outlier of 150.

Questions 9 – 12 refer to the stem and leaf plot below.
The plot shows the number of fan emails received each day by a singer in month.

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

9. The median number of emails is :

☐ 30 ☐ 31 ☐ 32 ☐ 33

10. Write down the range of the data.

☐

11. The mode of the data is :

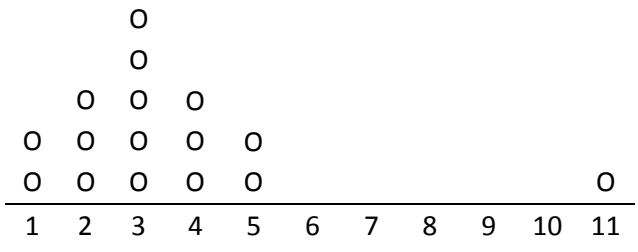
☐ 15 ☐ 19 ☐ 35 ☐ 44

12. There were one days results left out when the stem and leaf plot was drawn up.
On that day there were 19 emails.
What would be changed by adding this day to the stem and leaf plot?

☐ The mode and the range. ☐ The median and the mode.

☐ The median and the range. ☐ Only the median.

Questions 13 to 15 refer to the dot plot below.
The plot gives the number of children in 16 families.



13. The mean number of children in the families is :

☐ 2.5 ☐ 3.0 ☐ 3.5 ☐ 4.5

14. Which is true?

- ☐ There is a cluster around the median, which is 3.
- ☐ There is a cluster around the median, which is 3.5.
- ☐ There is a cluster around the mode, which is 3.5.
- ☐ There is a cluster around the mode, which is 4.

15. The researcher made two comments about the data.

Statement A : The range of the scores is 10.

Statement B : The range is be much smaller if the outlier is ignored.

Which statement is true?

- ☐ Statement A only.
- ☐ Statement B only.
- ☐ Both statements.
- ☐ Neither Statement.

16. What is the effect on the mean if the outlier is ignored?

- ☐ It decreases by 1.0.
- ☐ It decreases by 0.5.
- ☐ It is unchanged.
- ☐ It increases by 0.5.

High School Mathematics Test 2013

Year 8

Data Analysis

Calculator Allowed Short Answer Section

Name_____

Answer all questions in the spaces provided on this test paper by:
Writing the answer in the box provided.
or
Shading in the bubble for the correct answer from the four choices provided.
Show any working out on the test paper. Calculators are allowed.

1. Which of the following is an example of collecting data by observation of a sample of the population?

   ☐ Asking all players in a soccer club what they wear when training.

   ☐ Asking a group of ten players in a soccer club what they wear when training.

   ☐ Watching all players in a soccer club to see what they wear when training.

   ☐ Watching a group of ten players in a soccer club to see what they wear when training.

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2. The ages of 15 players in the Crestwell rugby league team are listed below.

   23, 17, 32, 25, 27, 25, 35, 19, 32, 25, 29, 27, 18, 25, 31

   Find the mean of the ages. ☐

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3. Kasey reads 8 articles from a magazine one rainy afternoon.
   The time she took to read each article (to the nearest tenth of a minute) is listed below.

   2.5, 4.5, 3.9, 7.5, 3.5, 8.2, 3.4, 2.5

   What was the median time that it took her to read the articles?

   ☐ 2.5 minutes ☐ 3.7 minutes ☐ 4.5 minutes ☐ 5.0 minutes

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4. The masses of 13 packages which arrive from a courier company are given below.

   1.8kg, 2.6kg, 4.2kg, 2.6kg, 1.5kg, 1.8kg, 2.5kg, 4.2kg, 2.6kg, 1.5kg, 1.8kg, 2.6kg, 4.2kg.

   What is the modal mass? ☐

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5. Tyler and Jack compare their results on five exams. Their results are shown below.

Tyler	49	56	55	72	91
Jack	72	67	52	78	94

Which is true?

- ☐ Jacks results have a higher mean, and a higher range.
- ☐ Jacks results have a higher mean, but both have the same range.
- ☐ Jacks results have a lower mean, but a higher range.
- ☐ Jacks results have a lower mean, but both have the same range.

6. George has 12 songs stored on his mobile phone.
The average playing time of the songs is 4.25 minutes.
When George adds another song, the mean playing time decreases to 4.0 minutes.
What was the playing time of the extra song?

☐ 0.25 minutes ☐ 0.5 minutes ☐ 1.0 minutes ☐ 3.0 minutes

7. There are 15 men in a bus, who have a mean age of 34.5 years and a mode of 36 years.
Another man who is 36 years old gets on the bus.
What is true?

- ☐ The mean will increase and the mode will stay the same.
- ☐ The mode will increase and the mean will stay the same.
- ☐ The mean and the mode will both stay the same.
- ☐ The mean and the mode will both increase.

Questions 8 and 9 refer to the information below.
Crestview Ave has 16 houses which have a mean value of $328 125.
One of the houses, called Crestwell Manor has a value of $1.5 million, and the remaining 15 houses have a range in their values of $20 000.

8. What word is used to describe values such as that of Crestwell Manor in this set of data?

☐ Cluster. ☐ Median. ☐ Outlier. ☐ Range

9. What is the mean value of the houses in Crestview Ave if Crestwell Manor is left out of the data?

Questions 10 – 13 refer to the frequency table below which gives the number of hours it took to complete an assignment for 28 students in a class.

Hours (x)	Frequency (f)	fx
2	7	
3	8	
4	5	
5	4	
6	2	
7	2	
	Σ f =	Σ fx =

10. Complete the frequency table. (2 marks)

11. Find the modal number of hours.

12. The range of the times is :

☐ 4 hours ☐ 5 hours ☐ 6 hours ☐ 7 hours

13. Calculate the mean of the times (correct to one decimal place).

Questions 14 – 16 refer to the information below.
The results on a test for two classes are shown on the back to back stem and leaf plot.

Ms Irwin				Stem	Ms Browne			
		7	6	2	4			
	5	4	2	3	2	6	7	8
	3	2	0	4	4	4	6	
5	4	3	1	5	3	6	6	
	7	5	2	6	7			
		4	3	7	8			

14. Which is true?

- ☐ Ms Irwin's class has 3 more students.
- ☐ Ms Browne's class has 4 more students.
- ☐ Ms Irwin's class has 4 more students.
- ☐ Both classes have the same number of students.

15. Which is true of the two classes results?

- ☐ Ms Browne's class has a higher mean and median.
- ☐ Ms Browne's class has a higher mean but a lower median.
- ☐ Ms Irwin's class has a lower mean and median.
- ☐ Ms Irwin's class has a higher mean and median.

16. Which class had better results on the test? Give reasons for your answer which include mention of the shape of the distributions, or statistical measures.

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High School Mathematics Test 2013

Year 8

Data Analysis

ANSWERS

Non Calculator Section

1.	Gretel is using a sample and Billy is using a census.
2.	1 and 2
3.	26
4.	Josie has a higher mode, but Petra has a higher median.
5.	5.5
6.	42
7.	13 seconds
8.	There is a cluster around 80 and one outlier of 150.

9.	32
10.	59
11.	15
12.	The median and the mode
13.	3.5
14.	There is a cluster around the median, which is 3.
15.	Both statements.
16.	It decreases by 0.5.

Calculator Allowed Section

1.	Watching a group of ten players in a soccer club to see what they wear when training.
2.	26
3.	3.7 minutes
4.	2.6kg
5.	Jacks results have a higher mean, but both have the same range
6.	1.0 minutes
7.	The mean will increase and the mode will stay the same.
8.	Outlier
9.	$250 000

10.

Hours (x)	Frequency (f)	fx
2	7	14
3	8	24
4	5	20
5	4	20
6	2	12
7	2	14
	Σ f = 28	Σ fx = 104

11.	3 hours
12.	5 hours
13.	3.7 hours
14.	Ms Irwin's class has 4 more students.
15.	Ms Irwin's class has a higher mean and median.
16.	Ms Irwin's class has better results, their mean, median and mode would all be higher, as their results were symmetrical while Ms Browns results were skewed toward the lower scores.