High School Mathematics Test 2015

Year 8

Data Analysis

Non Calculator Section

Name_____

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 individual 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)

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 **not** allowed.

1. Bernard records the number of emails he receives for nine days.

The results are listed below.

17, 18, 19, 19, 22, 22, 23, 25, 25

The median of the data is

☐ 20 ☐ 20.5 ☐ 21 ☐ 22

2. The numbers of music tracks owned by 15 friends are listed below.

96, 27, 37, 48, 20, 25, 45, 37, 48, 50, 37, 50, 66, 55, 72.

Find the modal number of tracks. ☐

3. There are 9 siblings in the Smith family.

Their ages (in years) are 3, 4, 4, 6, 9, 10, 12, 15, 18.

Calculate the mean age of the siblings.

☐

4. At a "Show and Shine" event, ten cars were given points out of 100.

The points given were : 84, 64, 89, 77, 75, 26, 70, 78, 83, 64.

The range of the points was:

☐ 63 ☐ 64 ☐ 71 ☐ 76

5. Justin records the mass of every 12th sheep from the flock that goes through his shearing shed.

Which term best describes this statistical process?

- ☐ Taking a census of the weights of the flock.
- ☐ Taking observations of the weights of the flock.
- ☐ Taking a sample of the weights of the flock.
- ☐ Taking a survey of the weights of the flock.

6. Dean recorded the number of shots in each point of a tennis game.

The results were:

4, 7, 13, 1, 8, 6, 12, 3

The median was :

☐ 6 ☐ 6.5 ☐ 7 ☐ 7.5

7. Hans records the number of cars which use a carwash each hour.

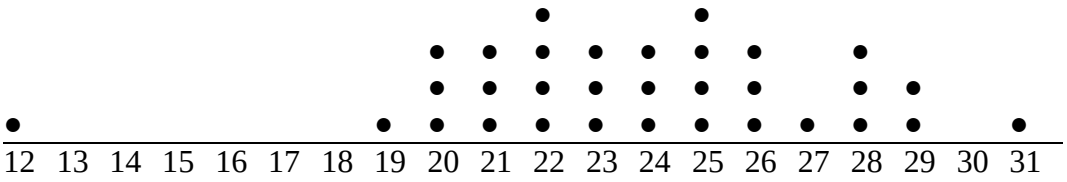
The results are listed below.

6, 5, 7, 7, 8, 5, 5, 7, 6, 6,

What is the mean of the data?

Questions 8 and 9 refer to the following.

The scores of 32 students on a quiz are shown in the plot below.



8. Which score is an outlier?

- ☐ 12
- ☐ 19
- ☐ 27
- ☐ 31

9. Which of the following scores are the mode?

- ▭ 22
- ▭ 23.5
- ▭ 24
- ▭ 22 and 25.

10. Maria and Suzie both record the maximum temperature each day.

Their results are listed below.

Maria: 37°, 32°, 28°, 20°, 48°

Suzie : 36°, 36°, 25°, 22°, 47°

What can be said about the ranges of the two sets of data?

- ▭ Both sets of data had the same range.
- ▭ Maria's data had the greater range.
- ▭ Suzie's data had the greater range.
- ▭ Suzie's data had no range.

11. Mike and Mal compare the number of kilometres they have travelled in their trips last year.

Mike 600, 850, 650, 900, 680, 880, 1 400.

Mal 1 200, 400, 390, 800, 600, 400, 340, 1 800

Which is true?

- ▭ Mike has a greater median, and Mal has a greater range.
- ▭ Mal has a greater median, and Mike has a greater range.
- ▭ Mike has a greater median and a greater range.
- ▭ Mal has a greater median and a greater range.

Questions 12 and 13 refer to the frequency distribution table.

Score (x)	Frequency (f)	fx
5	4	20
6	3	18
7	5	35
8	6	48
9	1	9
10	1	10
	Σf =	Σfx =

12. What is the mean of the scores in the table?

13. What is the median of the scores in the table?

14. Gidget played five games of *Maria Cart* on her tablet and achieved an average score of 1 230.
She then played a sixth game where she scored twice her previous average.
What is her new average for the six games?

15. The students in Year 7 have a median height of 140 centimetres.
Keisha and Freddie measure the heights of separate sample groups from Year 7.
Their results (in cm) are:

Keisha : 139, 120, 150, 135, 180, 140, 138, 145, 146

Freddie : 133, 155, 141, 146, 110, 148, 149, 152, 125

Which is true?

- ▭ Both sample medians are higher than the that of the population.
- ▭ Both sample medians are lower than the that of the population.
- ▭ Only Freddie's sample has a higher median than that of the population.
- ▭ Only Keisha's sample has a higher median than that of the population.

High School Mathematics Test 2015

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 this test paper. Calculators are allowed.

1. Bart wants to calculate statistics about the online activity of the 30 members of his class.

He hands out a form with questions on it to 12 members of the class.

How is he collecting his data?

- ☐ He is taking a sample of the class using a survey.
- ☐ He is taking a census of the class using a survey.
- ☐ He is taking a sample of the class by observation.
- ☐ He is taking a census of the class by observation.

2. Candice sells T shirts at the local markets.

She records the number of shirts she sells of each size.

Which measure would be useful to Candice to determine which size to order the most of?

☐ The mean. ☐ The median. ☐ The mode. ☐ The range.

3. Mr Jamison records the number of pages that his students write in their English essays.

The results were:

1, 2, 2, 3, 4, 8, 4, 3, 4, 5, 1, 1, 2, 2, 1, 4, 1, 4, 3, 5, 4, 6

The mode was :

☐ 1 ☐ 2 ☐ 3 ☐ 4

4. The maximum temperatures over a week at Tibuburra are shown below.

35, 36, 30, 28, 34, 37, 38

Find the mean maximum temperature for the week.

5. Nick records the number of matches in 8 boxes that he buys.

The results were:

46, 45, 43, 52, 53, 46, 47, 55

What was the range?

6. Zoe is collecting data on oxygen content in rivers.

The spreadsheet below shows some of the data she had collected.

	A	B	C	D	E	F	G
1							
2			Analysis of Oxygen Content In 1 Litre Water Samples				
3							
4		Number of Samples			30		
5		Sum of Content in Samples (mg)			285		
6		Minimum Content (mg)			6.4		
7		Maximum Content (mg)			14.5		
8		Most Common Content (mg)			10.2		
9							

What is the mean oxygen content?

☐ 8.1 ☐ 9.5 ☐ 10.2 ☐ 14.5

7. The Edwards Mining company recorded their output per day (in millions of tonnes) over a fortnight.

The amounts were: 45, 42, 45, 44, 38, 39, 42, 46, 35, 39, 45, 55, 39 and 47.

Which is true?

☐ The mode is 39 only.

☐ The mode is 45 only.

☐ The mode is both 39 and 45.

☐ There is no mode.

8. The gold content of twelve ore samples that Linus collected on a surveying trip were:

7.5%, 4.5%, 4.0%, 7.0%, 5.5%, 8.0%, 8.5%, 6.6%, 5.5%, 4.0%, 9.5% and 12.4%.

What was the median gold content?

☐ 6.8% ☐ 7.0% ☐ 8.4 % ☐ 11.7%

Questions 9 to 11 refer to the stem and leaf plot below.

	Ages in College Class
1	2 9
2	0 1 1 1 2 3 4 5 6 6 7 8 9
3	0 1 2

9. What is the median age?

☐ 21 ☐ 24 ☐ 24.5 ☐ 25

10. What is the modal age(s)?

11. Which value is an outlier?

☐ 12 ☐ 19 ☐ 20 ☐ 32

12. Which of the following could be described as a measure of spread for a set of data?

☐ The mean. ☐ The median. ☐ The mode. ☐ The range.

13. Michael has 120 music files stored on his tablet.

The average size of the files is 3.6 MB.

What is the total size of all of Michaels music files?

14. Charli compares the number of shots taken by two golfers in each of 9 holes.

Aaron 4, 2, 3, 4, 3, 2, 4, 5, 4.

Jason 3, 3, 3, 3, 4, 3, 5, 6, 5.

Which is true?

☐ Aaron has the higher median, but Jason has the higher mode.

☐ Aaron has the higher mode, but Jason has the higher median.

☐ Aaron has the higher median and mode.

☐ Jason has the higher median and mode.

15. Kevin calculates the statistics below from a full days output of 1200 doodads from a production line.

Diameter of Doodads	
Mean	44 mm
Median	46 mm
Mode	48 mm
Range	40 mm

Viktoria takes a sample of 12 doodads from the same days production.

Which of the following measures would not be possible for Viktoria's sample?

☐ Mean = 46 ☐ Median = 46 ☐ Mode = 46 ☐ Range = 46

High School Mathematics Test 2015

Year 8

Data Analysis

Calculator Allowed
Longer Answer Section

Name_____

Write all working and answers in the spaces provided on this test paper.
Marks may not be awarded if working out and/or answers are not clear.
Marks allocated are shown beside each question.
Calculators are allowed.

Marks

1. Paula drew a stem and leaf plot from the scores on a health test she gave to 40 patients.

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

(a) Find the mode of the scores. **1**

……..

……..

(b) What is the median of the scores? **1**

……..

……..

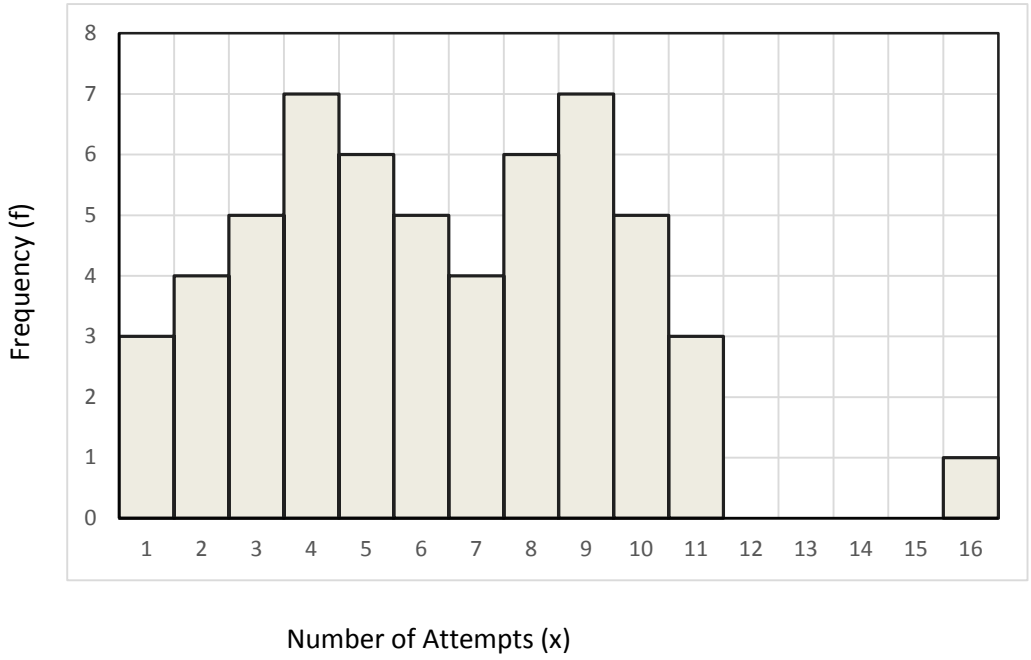
(c) What is the mean of the scores? **1**

……..

……..

Marks

2. The frequency histogram represents the number of attempts people took to solve a puzzle.



(a) What is the median number of attempts? **1**

……..

……..

(b) What is the mean number of attempts? **1**

……..

……..

(c) Describe the clusters and outliers in the data set. **2**

……..

……..

High School Mathematics Test 2015

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Data Analysis

Non Calculator Section

ANSWERS

No.	WORKING	ANSWER
1.	Median is the of 5th of 9 scores which is 22.	4th Answer
2.	37 occurs three times, so is the mode.	37
3.	$\text{Mean} = \frac{3 + 4 + 4 + 6 + 9 + 10 + 12 + 15 + 18}{9}$ $= \frac{81}{9}$ $= 9$ years	9
4.	Range = 89 – 26 = 63	1st Answer
5.	It is a sample as only some of the flock are weighed, and it is done by measuring, not observing or surveying.	3rd Answer
6.	Arranged in order scores are 1, 3, 4, 6, 7, 8, 12, 13 Median is average of 4th and 5th scores ie of 6 and 7 Median = 6.5	2nd Answer
7.	$\text{Mean} = \frac{6 + 5 + 7 + 7 + 8 + 5 + 5 + 7 + 6 + 6}{10}$ $= \frac{62}{10}$ $= 6.2$	6.2
8.	12 is separated from the bulk if the scores, so is the outlier.	1st Answer
9.	There are two modes, 22 and 25.	4th Answer
10.	Maria's range = 48 – 20 = 28 Suzie's range = 47 – 22 = 25	2nd Answer

11.	Arrange in order: Mike 600, 650, 680, 850, 880, 900, 1 400. Median = 850. Range = 1400 – 600 = 800 Mal 340, 390, 400, 400, 600, 800, 1 200, 1 800 Median = $\frac{400 + 600}{2} = \frac{1000}{2} = 500$ Range = 1800 – 340 = 1460 Mike has a greater median, and Mal has a greater range.	1st Answer
12.	Mean = 140 ÷ 20 = 7	7
13.	Median is the 10th and 11th scores which are both 7's.	7
14.	Total score on 5 games = $5 \times 1230 = 6150$ Twice her previous average = $2 \times 1230 = 2460$ Total score on 6 games = $6150 + 2460 = 8610$ New average = $8610 \div 6 = 1435$	1435
15.	In order the samples are: Keisha : 120, 135, 138, 139, 140, 145, 146, 150, 180 Freddie : 110, 125, 133, 141, 146, 148, 149, 152, 155 Freddie's sample median is higher than the population, and Keisha's is the same as the population.	3rd Answer

High School Mathematics Test 2015

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Data Analysis

Calculator Allowed
Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	Form with questions is a survey and 12 out of 30 is a sample.	1st Answer
2.	Mode tells which occurs most often	3rd Answer
3.	1, 2, 2, 3, 4, 8, 4, 3, 4, 5, 1, 1, 2, 2, 1, 4, 1, 4, 3, 5, 4, 6 Tallying the scores, 1 occurs 5 times, 2 occurs 4 times, 3 occurs 3 times, 4 occurs 6 times, the rest occur 2 or less times. Mode is 4.	4th Answer.
4.	$\text{Mean} = \frac{35+36+30+28+34+37+38}{7} = \frac{238}{7} = 34$	34
5.	Range = 55 – 43 = 12	12
6.	$\text{Mean} = \frac{\text{Sum}}{\text{Number}}$ $= \frac{285}{30}$ $= 9.5$	2nd Answer
7.	Since both 39 and 45 occur more than the other amounts, they are both the mode.	3rd Answer
8.	In order 4.0, 4.0, 4.5, 5.5, 5.5, 6.6, 7.0, 7.5, 8.0, 8.5, 9.5, 12.4 $\text{Median} = \frac{6.6+7.0}{2} = \frac{13.6}{2} = 6.8$	1st Answer
9.	From 18 scores, median is the 9th and 10th, which are 24 and 25, so median = $\frac{24+25}{2} = 24.5$	3rd Answer
10.	The mode is 21 which occurs 3 times.	21
11.	12 is the outlier	1st Answer
12.	Range is a measure of spread.	4th Answer
13.	$\text{Average} = \frac{\text{sum}}{\text{number}}$ $3.6 = \frac{\text{sum}}{120}$ $Sum = 3.6 \times 12$ $= 432\ MB$	432 MB
14.	Aaron 2, 2, 3, 3, 4, 4, 4, 4, 5 Median = 4 Mode = 4 Jason 3, 3, 3, 3, 3, 4, 5, 5, 6. Median = 3 Mode = 3	3rd Answer
15.	As we don't know how many there are of each diameter, the first three are possible. The sample range cannot be greater than the range of the whole days production however.	4th Answer

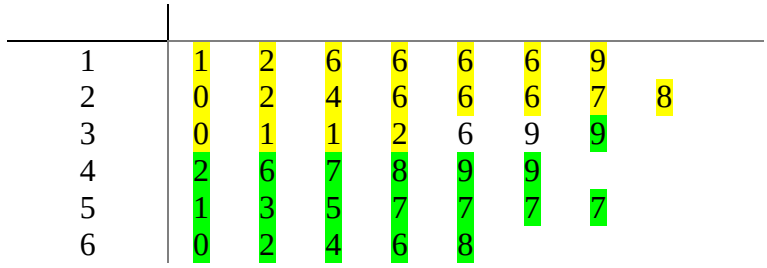
High School Mathematics Test 2015

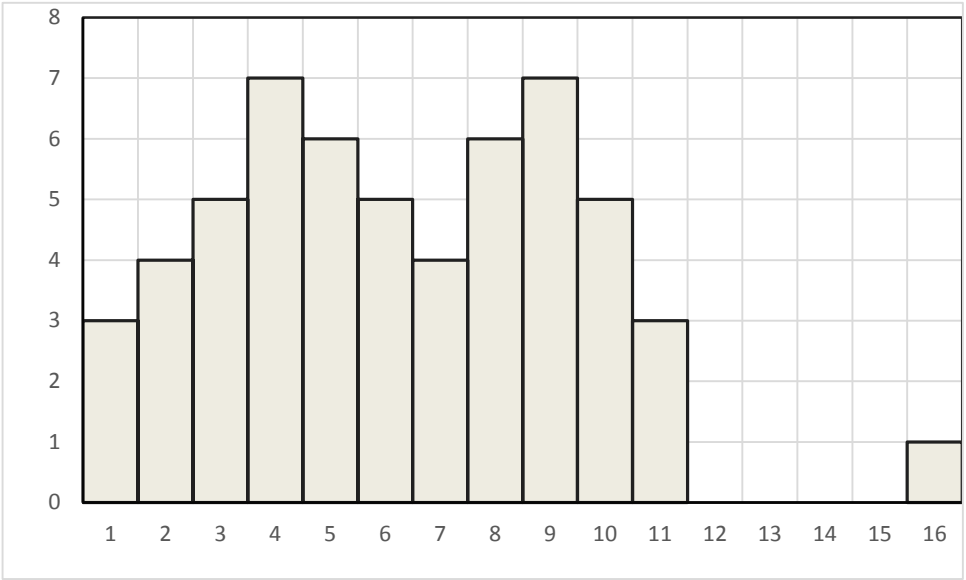
Year 8

Data Analysis

Calculator Allowed
Longer Answer Section

ANSWERS

		Marks
1.		
	(a) Modes are 16 and 57 (both occur 4 times)	**1**
	(b) Median is average of 20th and 21st scores. Median = $= \frac{36+39}{2} = \frac{75}{2} = 37.5$	**1**
	(c) $\text{mean} = \frac{1531}{40} = 38.275$	**1**

2.		
	(a) There are 56 scores, so median is 28th and 29th scores which are both 6's, so median = 6.	**1**
	(b) $\text{Sum of scores} = 3 \times 1 + 4 \times 2 + 5 \times 3 + 7 \times 4 + 6 \times 5 + 5 \times 6 + 4 \times 7 + 6 \times 8 + 7 \times 9 + 5 \times 10 + 3 \times 11 + 16$ $= 352$ $\text{Mean} = \frac{352}{56}$ $= 6.29$	**1**
	(c) There are clusters around 4 and 9 and an outlier which is 16.	**2**