High School Mathematics Test 2014

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 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. Joe wants to find the average mass of the pets owned by his family.
He weighs each pet owned by family members.
How is he collecting his data?

☐ A census by measurement.

☐ A census by observation.

☐ A sample by measurement.

☐ A sample by observation.

2. Andy asks 200 people the name of their favourite movie.
Which measure should he use to analyse his results?

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

3. The ages of the 14 players on the Menindee footy team are listed below.

16, 17, 18, 20, 21, 21, 23, 25, 26, 26, 28, 29, 30, 32

Find the median of the ages. ☐

4. Noor records the number of drawing pins that land with the point upright when she drops 20 pins on 8 occasions. The results were:

6, 5, 3, 7, 3, 6, 7, 3

The mode was :

☐ 3 ☐ 5 ☐ 6 ☐ 7

5. James records the number of shots that it takes him to hit the middle of a target during a practice session.
The results were:

5, 7, 2, 11, 4, 9, 13, 3, 8, 15, 11.

The range was :

☐ 10 ☐ 11 ☐ 12 ☐ 13

6. Cathy and Noel want to collect information about the crowd of 2 000 people at a footy match.
Cathy records the colours worn by each crowd member as they arrive.
Noel asks 100 members of the crowd which team they support.
Which is true?

☐ Cathy is using a sample and Noel is using a census.

☐ Noel is using a sample and Cathy is using a census.

☐ Both Noel and Cathy are using a census.

☐ Both Noel and Cathy are using a sample.

7. When working in a jeans shop, Kayla recorded the number of jeans sold in each size.
Which measure calculated from Kayla's data would be the most useful to the retailer when ordering new stock?

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

8. Alex collects data on the number of hits per minute on two websites.
The results are listed below:

Site A 5, 3, 4, 3, 4, 7, 4, 8, 3, 4, 2, 9
Site B 8, 6, 5, 6, 3, 6, 5, 3, 5, 6, 4, 8

The respective modes of the two sets of data are:

☐ 3 and 4 ☐ 3 and 6 ☐ 4 and 6 ☐ 4 and 8

9. Sophie reads 10 chapters from her English novel one evening.
The time she took to read each chapter (to the nearest half minute) is listed below.

7.5, 4.5, 4.0, 7.0, 5.5, 8.0, 8.5, 6.5, 5.5, 4.0

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

☐ 5.5 minutes ☐ 6.0 minutes ☐ 6.5 minutes ☐ 7.0 minutes

10. The masses of 12 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, 2.6kg, 4.2kg.

What is the range of the masses?

☐

11. Each month Trang records the selling prices of the houses in her local region to help her father who is a real estate agent.
Which measure calculated from Trang's data would be the most useful to her father when looking for changing trends in housing prices?

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

12. Ali has 10 movies stored on his laptop.
The average playing time of the movies is 94 minutes.
When Ali adds another movie, the mean playing time increases to 100 minutes.
What was the playing time of the extra movie?

☐ 100 minutes ☐ 120 minutes ☐ 140 minutes ☐ 160 minutes

13. Kimia compares the number of points scored by two football teams over 8 rounds.

Eagles 1, 2, 2, 1, 1, 2, 2, 5
Hawks 3, 2, 3, 2, 3, 5, 3, 3

Which is true?

☐ The Eagles have a greater mean, but the Hawks have a greater range.

☐ The Hawks have a greater mean, but the Eagles have a greater range.

☐ The Eagles have a greater mean and a greater range.

☐ The Hawks have a greater mean and a greater range.

14. There are 16 girls on a bus, who have a mean age of 16.5 years and a median of 15 years.
Another girl who is 12 years old gets on the bus.
What is true?

- ☐ The mean will decrease and the median may also decrease.
- ☐ The mean will decrease and the median may increase.
- ☐ The mean will increase and the median may also increase.
- ☐ The mean will increase and the median may decrease.

15. Mason, Luke and Hannah each select a different sample of 8 people from a group of 60.
They each calculate the mean and range of the ages of the people in their sample.
Which is **not** possible?

- ☐ Some of the sample means were greater than the mean of the group of 60.
- ☐ Some of the sample means were less than the mean of the group of 60.
- ☐ Some of the sample ranges were greater than the range of the group of 60.
- ☐ Some of the sample ranges were less than the range of the group of 60.

High School Mathematics Test 2014

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. The numbers of games owned by 12 friends are listed below.

16, 17, 17, 18, 20, 25, 25, 26, 28, 30, 32, 33.

Find the median number of games. ☐

2. Imran collects data on the number of birthday presents received by 14 friends. The results are listed below.

6, 7, 8, 9, 9, 10, 10, 11,11, 13, 15, 15, 15, 16

The mode of the data is

☐ 9 ☐ 10 ☐ 11 ☐ 15

3. Jacob buys 12 packets of lollies for a party. The number of lollies in each packet are given below:

12, 14, 14, 15, 16, 18, 20, 25, 28, 30, 32, 35.

Calculate the mean number of lollies per packet (to 1 decimal place).

☐

4. A game in an arcade shows the five highest scores on the screen.

Highest Scores	**25400**	**23450**
18480	**18300**	**17540**

The range of the high scores is: ☐

5. The playing times (in minutes) of 12 movies are given below.

92, 88, 120, 90, 85, 91, 75, 60, 94, 101, 89, and 90.

Which is true?

- ☐ There is a cluster around 60.
- ☐ There is a cluster around 90.
- ☐ There is a cluster around 100.
- ☐ There is a cluster around 120.

6. Usman asks his classmates the number of times they travelled by bus in the last week. The results are listed below.

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

The mode of the data is

☐ 5 ☐ 6 ☐ 5 and 6 ☐ 7

7. Veronica counts the number of ducks in the local pond each day for two weeks.
The results are shown below.

12, 15, 18, 6, 12, 9, 8, 14, 16, 20, 22, 16, 18, 11.

What is the median of the data? ☐

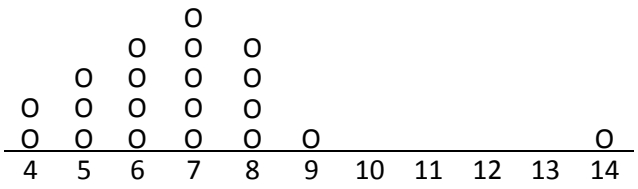
8. Josh records the distance (in km) travelled each day while on a 5 day road trip. The results are listed below.

86.5, 62.9, 58.7, 103.2, 79.7

The mean distance travelled is

☐ 44.5 ☐ 62.9 ☐ 78.2 ☐ 79.7

Questions 9 to 11 refer to the dot plot below.
The plot gives the number of hours worked by 20 workers on a certain day.



9. What is the median number of hours worked?

☐ 6 ☐ 6.5 ☐ 7 ☐ 7.5

10. Calculate the mean number of hours worked.

11. The researcher made two comments about the data.

Statement A : The mean will be smaller if the outlier is ignored

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

Which statement is true?

☐ Statement A only. ☐ Statement B only.

☐ Both statements. ☐ Neither Statement.

12. Ben and Leo compare the number of points they scored in 10 games of basketball.

Ben 12, 8, 14, 9, 6, 8, 14, 12, 9, 14
Leo 12, 4, 13, 7, 13, 13, 4, 8, 10, 13

Which is true?

☐ Ben has a greater mode, and Leo has a greater range.

☐ Leo has a greater mode, and Ben has a greater range.

☐ Ben has a greater mode and a greater range.

☐ Leo has a greater mode and a greater range.

13. Nine members of a surf team have an average time of 10.6 seconds for the beach sprint. The tenth member arrives late and when his time is added, the mean is reduced to 10.5 seconds.
What was his time?

14. Calculate the mean of the scores shown in the frequency distribution table.

Score (x)	Frequency (f)	fx
7	14	98
8	16	128
9	13	117
10	7	70
	$\Sigma f =$	$\Sigma fx =$

Questions 15 to 17 refer to the stem and leaf plot below.
The plot shows the scores on a trivia quiz by 20 contestants.

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

15. What is the mean score?

16. The median of the data is :

☐ 61 ☐ 61.5 ☐ 62 ☐ 62.5

17. An extra contestant's score of 55 was added later.

Which will not be changed by adding the extra score?

☐ The mean.

☐ The median.

☐ The mode.

☐ The range.

High School Mathematics Test 2014

Year 7

Data Collection and Representation

Calculator Allowed Longer Answer Section

Name_____

Write all working and answers in the spaces provided on this test paper.
Answers should be supported by relevant mathematical reasoning and/or calculations.
Marks allocated are shown beside each question.
Calculators are allowed.

Marks

1. Pete compiled the frequency table below for his Science class.

Marks on an Exam

Score *(x)*	Tally	Frequency *(f)*	*fx*
0	𝍸		
1	𝍸 |||		
2	𝍸 ||		
3	𝍸 |		
4	||||		

Σf = Σfx =

(a) Complete the table. **3**

(b) Find the mean of the marks. **2**

……

……

Marks

2. Sharon compiled her scores from throwing 3 darts at a dartboard into a stem and leaf plot.

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

(b) Find the median of the scores. **2**

……..

……..

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

……..

……..

(c) What is the mean of the scores? **2**

……..

……..

High School
Mathematics Test 2014

Data Analysis
ANSWERS

Non Calculator Section (1 mark each)

1. Joe wants to find the average mass of the pets owned by his family.
He weighs each pet owned by family members.
How is he collecting his data?

- [x] A census by measurement.
- [ ] A census by observation.
- [ ] A sample by measurement.
- [ ] A sample by observation.

2. Andy asks 200 people the name of their favourite movie.
Which measure should he use to analyse his results?

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

3. The ages of the 14 players on the Menindee footy team are listed below.

16, 17, 18, 20, 21, 21, 23, 25, 26, 26, 28, 29, 30, 32

Find the median of the ages. **24**

4. Noor records the number of drawing pins that land with the point upright when she drops 20 pins on 8 occasions. The results were:

6, 5, 3, 7, 3, 6, 7, 3

The mode was :

■ 3 ☐ 5 ☐ 6 ☐ 7

5. James records the number of shots that it takes him to hit the middle of a target during a practice session.
The results were:

5, 7, 2, 11, 4, 9, 13, 3, 8, 15, 11.

The range was :

☐ 10 ☐ 11 ☐ 12 ■ 13

6. Cathy and Noel want to collect information about the crowd of 2 000 people at a footy match.
Cathy records the colours worn by each crowd member as they arrive.
Noel asks 100 members of the crowd which team they support.
Which is true?

☐ Cathy is using a sample and Noel is using a census.

■ Noel is using a sample and Cathy is using a census.

☐ Both Noel and Cathy are using a census.

☐ Both Noel and Cathy are using a sample.

7. When working in a jeans shop, Kayla recorded the number of jeans sold in each size.
Which measure calculated from Kayla's data would be the most useful to the retailer when ordering new stock?

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

8. Alex collects data on the number of hits per minute on two websites.
The results are listed below:

Site A 5, 3, 4, 3, 4, 7, 4, 8, 3, 4, 2, 9
Site B 8, 6, 5, 6, 3, 6, 5, 3, 5, 6, 4, 8

The respective modes of the two sets of data are:

☐ 3 and 4 ☐ 3 and 6 ■ 4 and 6 ☐ 4 and 8

9. Sophie reads 10 chapters from her English novel one evening.
The time she took to read each chapter (to the nearest half minute) is listed below.

7.5, 4.5, 4.0, 7.0, 5.5, 8.0, 8.5, 6.5, 5.5, 4.0

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

☐ 5.5 minutes ■ 6.0 minutes ☐ 6.5 minutes ☐ 7.0 minutes

10. The masses of 12 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, 2.6kg, 4.2kg.

What is the range of the masses?

2.7

11. Each month Trang records the selling prices of the houses in her local region to help her father who is a real estate agent.
Which measure calculated from Trang's data would be the most useful to her father when looking for changing trends in housing prices?

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

12. Ali has 10 movies stored on his laptop.
The average playing time of the movies is 94 minutes.
When Ali adds another movie, the mean playing time increases to 100 minutes.
What was the playing time of the extra movie?

☐ 100 minutes ☐ 120 minutes ☐ 140 minutes ■ 160 minutes

13. Kimia compares the number of points scored by two football teams over 8 rounds.

Eagles 1, 2, 2, 1, 1, 2, 2, 5
Hawks 3, 2, 3, 2, 3, 5, 3, 3

Which is true?

☐ The Eagles have a greater mean, but the Hawks have a greater range.
■ The Hawks have a greater mean, but the Eagles have a greater range.
☐ The Eagles have a greater mean and a greater range.
☐ The Hawks have a greater mean and a greater range.

14. There are 16 girls on a bus, who have a mean age of 16.5 years and a median of 15 years.
Another girl who is 12 years old gets on the bus.
What is true?

- [x] The mean will decrease and the median may also decrease.
- [ ] The mean will decrease and the median may increase.
- [ ] The mean will increase and the median may also increase.
- [ ] The mean will increase and the median may decrease.

15. Mason, Luke and Hannah each select a different sample of 8 people from a group of 60.
They each calculate the mean and range of the ages of the people in their sample.
Which is **not** possible?

- [ ] Some of the sample means were greater than the mean of the group of 60.
- [ ] Some of the sample means were less than the mean of the group of 60.
- [x] Some of the sample ranges were greater than the range of the group of 60.
- [ ] Some of the sample ranges were less than the range of the group of 60.

High School
Mathematics Test 2014

Calculator Allowed Section (1 mark each)

1. The numbers of games owned by 12 friends are listed below.

16, 17, 17, 18, 20, 25, 25, 26, 28, 30, 32, 33.

Find the median number of games. **25**

2. Imran collects data on the number of birthday presents received by 14 friends. The results are listed below.

6, 7, 8, 9, 9, 10, 10, 11,11, 13, 15, 15, 15, 16

The mode of the data is

☐ 9 ☐ 10 ☐ 11 ■ 15

3. Jacob buys 12 packets of lollies for a party. The number of lollies in each packet are given below:

12, 14, 14, 15, 16, 18, 20, 25, 28, 30, 32, 35.

Calculate the mean number of lollies per packet (to 1 decimal place).

21.6

4. A game in an arcade shows the five highest scores on the screen.

Highest Scores	**25400**	**23450**
18480	**18300**	**17540**

The range of the high scores is: 7 860

5. The playing times (in minutes) of 12 movies are given below.

92, 88, 120, 90, 85, 91, 75, 60, 94, 101, 89, and 90.

Which is true?

- ☐ There is a cluster around 60.
- ■ There is a cluster around 90.
- ☐ There is a cluster around 100.
- ☐ There is a cluster around 120.

6. Usman asks his classmates the number of times they travelled by bus in the last week. The results are listed below.

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

The mode of the data is

■ 5 ☐ 6 ☐ 5 and 6 ☐ 7

7. Veronica counts the number of ducks in the local pond each day for two weeks.
The results are shown below.

12, 15, 18, 6, 12, 9, 8, 14, 16, 20, 22, 16, 18, 11.

What is the median of the data? 14.5

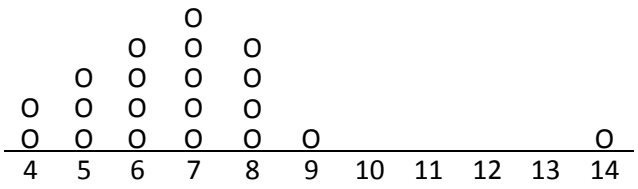
8. Josh records the distance (in km) travelled each day while on a 5 day road trip. The results are listed below.

86.5, 62.9, 58.7, 103.2, 79.7

The mean distance travelled is

☐ 44.5 ☐ 62.9 ■ 78.2 ☐ 79.7

Questions 9 to 11 refer to the dot plot below.
The plot gives the number of hours worked by 20 workers on a certain day.



9. What is the median number of hours worked?

☐ 6 ☐ 6.5 ■ 7 ☐ 7.5

10. Calculate the mean number of hours worked.

6.85

11. The researcher made two comments about the data.

Statement A : The mean will be smaller if the outlier is ignored

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

Which statement is true?

☐ Statement A only. ☐ Statement B only.

■ Both statements. ☐ Neither Statement.

12. Ben and Leo compare the number of points they scored in 10 games of basketball.

Ben 12, 8, 14, 9, 6, 8, 14, 12, 9, 14
Leo 12, 4, 13, 7, 13, 13, 4, 8, 10, 13

Which is true?

■ Ben has a greater mode, and Leo has a greater range.

☐ Leo has a greater mode, and Ben has a greater range.

☐ Ben has a greater mode and a greater range.

☐ Leo has a greater mode and a greater range.

13. Nine members of a surf team have an average time of 10.6 seconds for the beach sprint. The tenth member arrives late and when his time is added, the mean is reduced to 10.5 seconds.
What was his time?

9.6

14. Calculate the mean of the scores shown in the frequency distribution table.

Score (x)	Frequency (f)	fx
7	14	98
8	16	128
9	13	117
10	7	70
	$\Sigma f = 50$	$\Sigma fx = 413$

8.26

Questions 15 to 17 refer to the stem and leaf plot below.
The plot shows the scores on a trivia quiz by 20 contestants.

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

15. What is the mean score?

61.6

16. The median of the data is :

■ 61 ☐ 61.5 ☐ 62 ☐ 62.5

17. An extra contestant's score of 55 was added later.

Which will not be changed by adding the extra score?

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

Calculator Allowed Section (marks as indicated)

Longer Answer Section

Marks

1. Pete compiled the frequency table below for his Science class.

Marks on an Exam

Score (x)	Tally	Frequency (f)	fx
0	𝍸	5	0
1	𝍸 |||	8	8
2	𝍸 ||	7	14
3	𝍸 |	6	18
4	||||	4	16
		$\Sigma f = 30$	$\Sigma fx = 56$

(a) Complete the table. (AS ABOVE) 1 mark for each column and 1 for totals. **3**

(b) Find the mean of the marks. **2**

$$\text{Mean} = \bar{x} = \frac{\Sigma fx}{\Sigma f}$$

$$= \frac{56}{30}$$

$$= 1.9 \text{ (1 dec } pl)$$

2. Sharon compiled her scores from throwing 3 darts at a dartboard into a stem and leaf plot.

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

Marks

(b) Find the median of the scores. **2**

Median (Middle Score) = 30

(See strike through above)

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

Range = 68 – 3

= 65

(c) What is the mean of the scores? **2**

Mean = sum scores ÷ number of scores

$= \frac{1579}{47}$

= 33.6 (1 dp)