School Name
Mathematics 2017

Year 9

Basic Statistics

Non Calculator

Skills and Knowledge Assessed:

- Construct and compare a range of data displays including stem-and-leaf plots and dot plots (ACMSP170)
- Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data (ACMSP171)
- Describe and interpret data displays using median, mean and range (ACMSP172)
- Investigate techniques for collecting data, including census, sampling and observation (ACMSP284)
- Investigate the effect of individual data values, including outliers, on the mean and median

Name_____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.
A ruler and protractor will be needed for this test.

1. Find the mode of the heights of these eleven teenagers.

   162 cm, 175 cm, 180 cm, 172 cm, 188 cm, 165 cm, 180 cm, 142 cm, 168 cm, 176 cm, 182 cm.

   ……

   ……

2. What is the range of these masses?

   12 kg, 11 kg, 8 kg, 22 kg, 24 kg, 12 kg, 16 kg, 15 kg, 11 kg.

   ……....

   ……

3. The number of storeys of the 12 tallest Brisbane buildings are given below.

   32, 34, 34, 38, 40, 44, 46, 53, 54, 69, 74, 81

   Find the median.

   ……

   ……

4. What is the mean of these ages (in years)?

15, 12, 16, 11, 18, 13, 15, 14. 16, 17

……....

……

5. Are there any clusters in the data below, and if so around which number(s) do they occur?

19, 4, 16, 15, 7, 16, 9, 14, 14, 15, 25, 15, 22

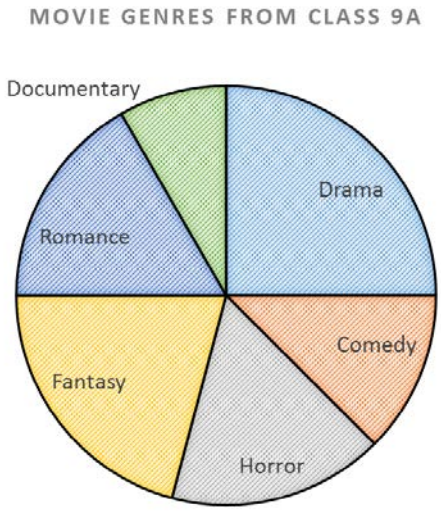
……....

……

6. Name a type of graph that would be suitable to represent the monthly rainfall measurements for a town over a period of a year.

……

Questions 7 – 9 refer to the sector graph below. (A protractor will be needed.)



All 24 students in Class 9A wrote down their favourite movie genre.

The results were used to draw the sector graph.

7. Which genre was chosen by $\frac{1}{8}$ of the students?

……....

……

8. Two genres were chosen by the same number of students.
What fraction of the students chose each of these genres?

……....

……

9. How many students wrote down Drama as their favourite genre?

……....

……

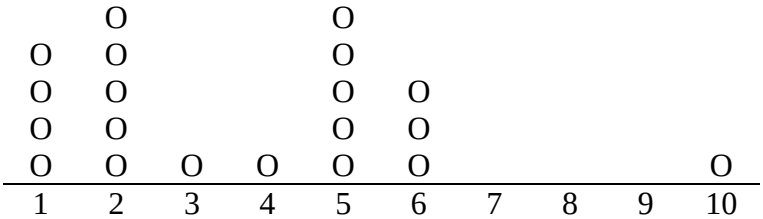
10. The bags shown hold the following numbers of items.
3, 4, 4, 4, 5, 5, 6, 7, 7, 15.
Explain the effect that an outlier has on the mean of this data?

……

……

Questions 11 – 13 refer to the dot plot below.

The plot shows the number of occupants in each vehicle which passed a survey point in an hour.



11. What was the median number of occupants?

……....

……

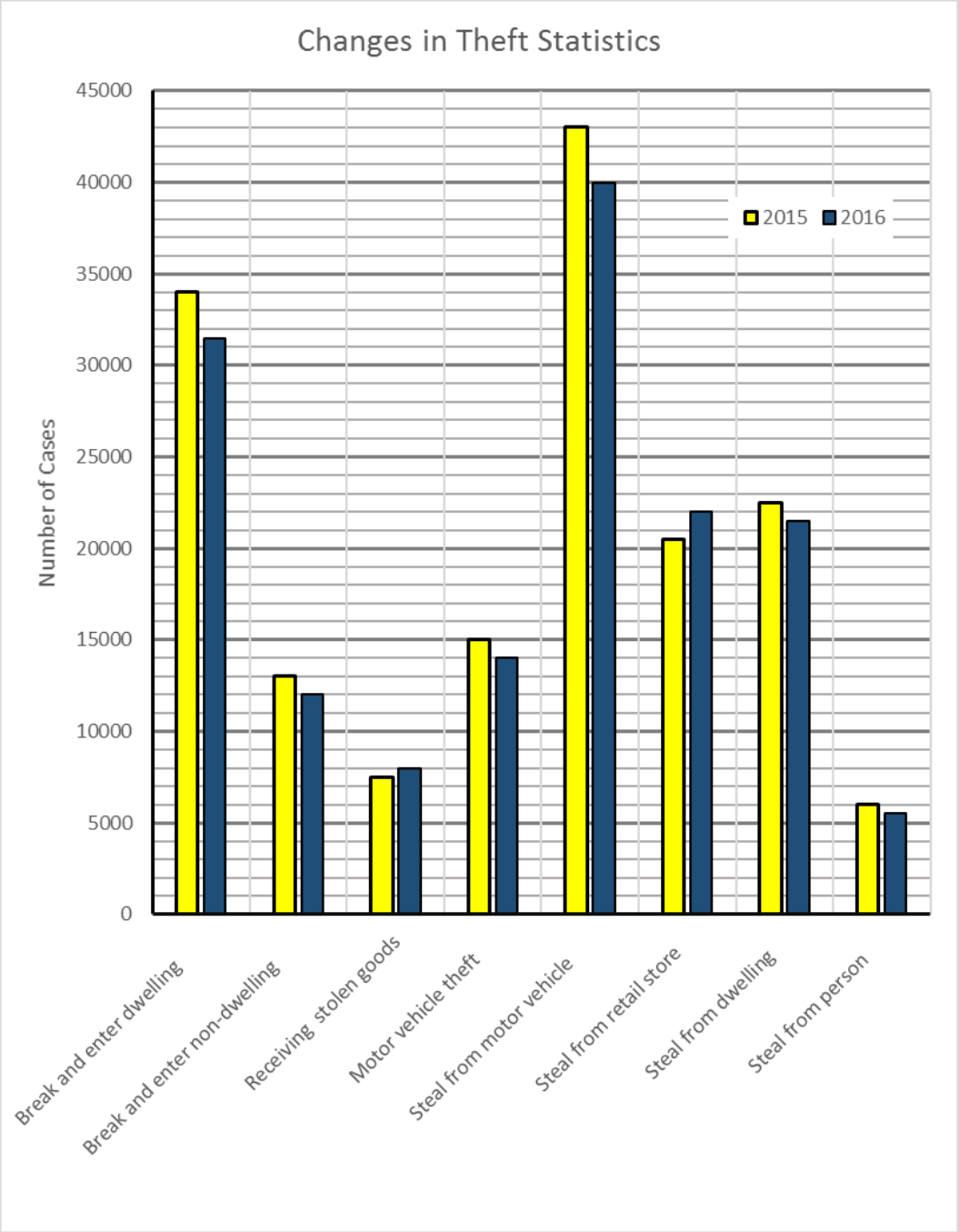
12. What was the mean number of occupants?

……....

……

13.	Describe any clusters and outliers in the data. …….... …….
14.	Two teams of 8 players played a game of netball. The mean score for all the players in the game was 8 points. The mean score for the players in the winning team was 9 points. What was the mean score for the players in the losing team? …….... …….

Questions 15 – 18 refer to the column graph below.



The column graph compares the crime statistics for theft for two years.

15. Which categories showed an increase in the number of reports from 2015 to 2016?

……....

……

16.	What was the change in the category “Steal from Motor Vehicle” between 2015 and 2016? …….... …….
17.	Which category saw a decrease of 2500 reports between 2015 and 2016? …….... …….
18.	Which category had the larger percentage decrease, “Steal from Dwelling” or “Steal from Person”? (Explain your answer with calculations, however you do not need to calculate exact percentages.) …….... …….

School Name
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Calculator Allowed

Year 9

Basic Statistics

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Section 2 Multiple Choice Section

Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

1. Maria has a collection of 45 old Australian coins

The total value of her collection is $10 170.

What is the mean value of the coins?

A. $226 B. $339

C. $2 034 D. $5 085

2. Justin is asked to find the median of 16 numbers, which are arranged in order.

Which of the scores should he locate?

A. The 7^{th} and 8^{th} scores.

B. The 8^{th} score.

C. The 8^{th} and 9^{th} scores.

D. The 9^{th} score.

Questions 3 – 5 refer to the following.

The ages (in weeks) of the dogs at a puppy pre-school are given below.

12 14 12 16 15 14 10 16 14 12

3. What age is the mode?

A. 12 weeks B. 12 weeks and 14 weeks

C. 14 weeks D. 14 weeks and 16 weeks

4. What is the range of their ages?

A. 5 weeks B. 6 weeks C. 7 weeks D. 14 weeks

5. What is the mean age of the group?

A. 13 weeks B. 13.5 weeks C. 14 weeks D. 14.5 weeks

6. Jonas records the colours of the balloons at a party.

What type of data is this?

A. Categorical data.

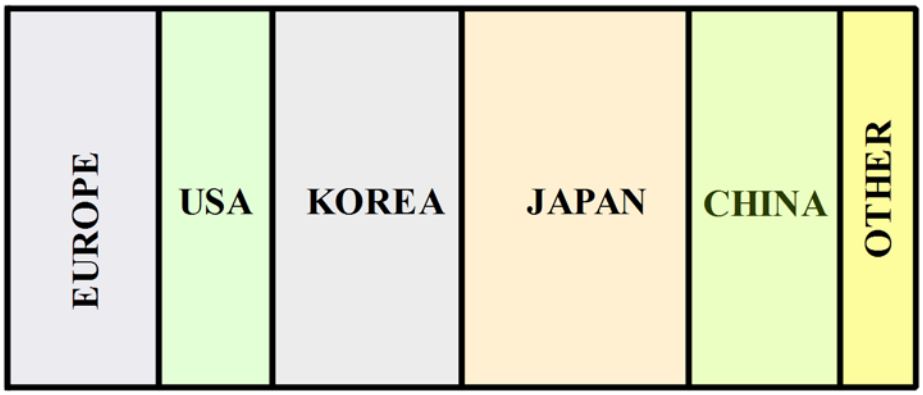
B. Continuous Numerical Data

C. Discrete Numerical Data

D. Random Data

Questions 7 – 9 refer to the following:

Imported Car – Country of Manufacture



The graph shows the country of manufacture for cars sold through a dealership which sells imported cars.

7. What fraction of the cars were from the China?

A. $\frac{1}{12}$ B. $\frac{1}{6}$ C. $\frac{1}{4}$ D. $\frac{1}{3}$

8. What percentage of cars sold came from Japan?

A. 15% B. 20% C. 25% D. 30%

9. In the period of the survey, there were 240 cars sold.
How many of them were from Korea?

A. 30 B. 40 C. 45 D. 50

Questions 10 – 12 refer to the following:

20	2	4	6			
21	0	5	6	8	9	
22	1	4	4	7		
23	1	5	6	6		
24	1	3	7			
25	0	4	4	4	5	5

The stem-and-leaf plot shows the audience numbers at a band's concerts during July.

10. If they played no more than one concert per day, how many days did they have off in July?

A. 3 B. 4 C. 5 D. 6

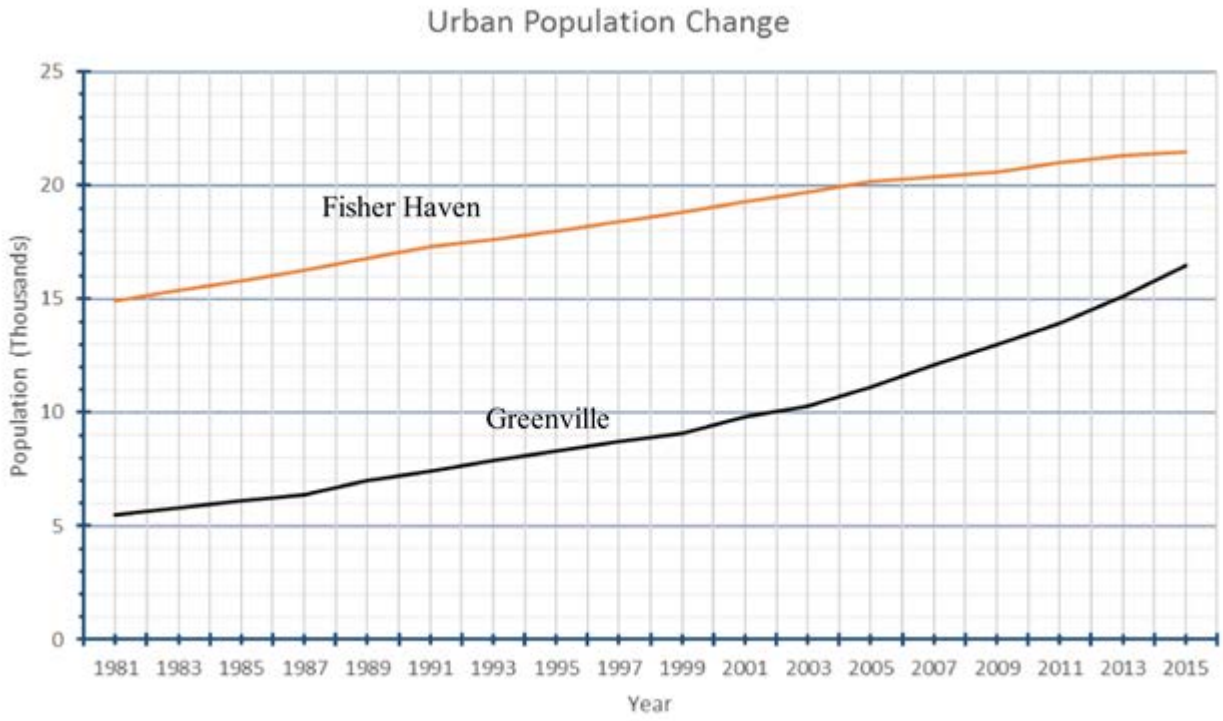
11. What was the median audience size?

A. 224 B. 229 C. 231 D. 233

12. Which statement is true about the audience size?

A. The range is 50.
B. The median is greater than the mode.
C. The mean is 254.
D. The mode is greater than the mean.

Questions 13 – 14 refer to the line graph below.



The graph shows the population of two cities over a number of years.

13. What was the approximate difference in the populations of the two towns in 2011?

A. 7 000 B. 7 500 C. 8 000 D. 8 500

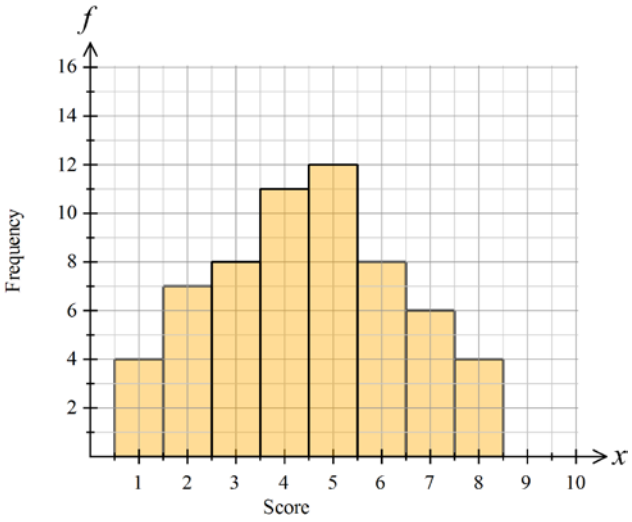
14. How did the difference in the populations of the two towns change between 1981 and 2015?

A. The difference has increased by 4 500.
B. The difference has increased by 6 500.
C. The difference has decreased by 4 500.
D. The difference has increased by 6 500.

15. The mean mass of 19 men is 72 kg.
An additional man is added to the group, which changes the mean to 73 kg.
What was the mass of the 20th man?

A. 89 kg B. 90 kg C. 91 kg D. 92 kg

Questions 16 – 18 refer to the following:



The frequency histogram shows the results for the number of errors made in a typing exercise by sixty applicants for a clerical job.

16. What is the mean number of errors (correct to 2 decimal places)?

A. 4.47 B. 4.62 C. 4.94 D. 5.24

17. What is the median number of errors?

A. 3.5 B. 4 C. 4.5 D. 5

18. What percentage of the applicants made more than five errors?

A. 25% B. 30% C. 36% D. 40%

School Name
Mathematics 2017

Year 9

Basic Statistics

Calculator Allowed

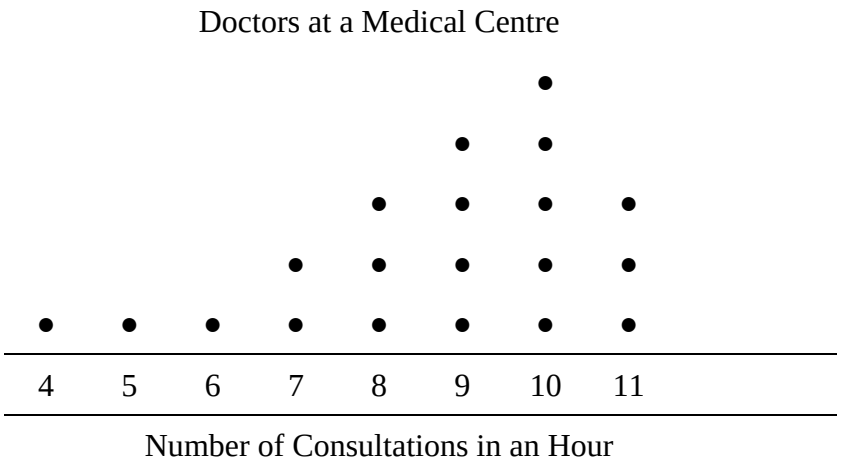
Name_____

Section 3 Longer Answer Section

Write all working and answers in the spaces provided on this test paper.

Marks

1. Twenty doctors work at a medical centre.
The dot plot below shows the number of consultations that each of the doctors complete in an hour.



(a) Find the median and the mode and compare their values. **3**

……....

……....

……

Marks

(b) Find the mean number of consultations. **1**

……....

……

(c) Describe the shape of the distribution. **2**

……....

……

2.

Score (x)	Frequency (f)	fx	Cumulative Frequency
6	8		
7	15		
8	18		
9	7		
10	2		
	$\Sigma f =$	$\Sigma f x =$	

(a) Complete the frequency distribution table above. **3**

(b) Calculate the mean from the table. (Correct to 1 decimal place) **1**

……....

……

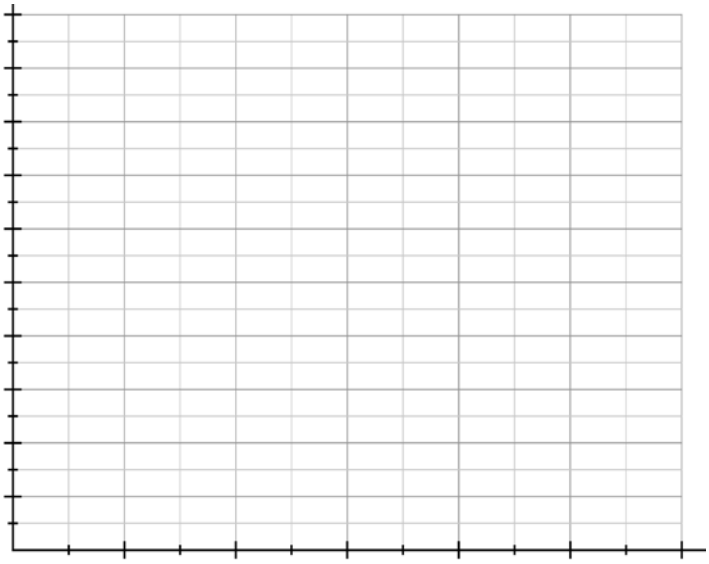
(c) Find the median from the table. **1**

……....

……

Marks

(d) Use the grid below to draw a frequency histogram from the table. **2**



(e) Describe the shape of the distribution. **2**

……....

……

School Name

Mathematics 2017

Multiple Choice Answer Sheet

Basic Statistics

Name _____

Completely fill the response oval representing the most correct answer.

1. A ⬭ B ⬭ C ⬭ D ⬭
2. A ⬭ B ⬭ C ⬭ D ⬭
3. A ⬭ B ⬭ C ⬭ D ⬭
4. A ⬭ B ⬭ C ⬭ D ⬭
5. A ⬭ B ⬭ C ⬭ D ⬭
6. A ⬭ B ⬭ C ⬭ D ⬭
7. A ⬭ B ⬭ C ⬭ D ⬭
8. A ⬭ B ⬭ C ⬭ D ⬭
9. A ⬭ B ⬭ C ⬭ D ⬭
10. A ⬭ B ⬭ C ⬭ D ⬭
11. A ⬭ B ⬭ C ⬭ D ⬭
12. A ⬭ B ⬭ C ⬭ D ⬭
13. A ⬭ B ⬭ C ⬭ D ⬭
14. A ⬭ B ⬭ C ⬭ D ⬭
15. A ⬭ B ⬭ C ⬭ D ⬭
16. A ⬭ B ⬭ C ⬭ D ⬭
17. A ⬭ B ⬭ C ⬭ D ⬭
18. A ⬭ B ⬭ C ⬭ D ⬭

School Name
Mathematics Test 2017

Year 9 — *Basic Statistics* — Non Calculator Section

ANSWERS

Question	Working and Answer
1.	142 cm, 162 cm, 165 cm, 168 cm, 172 cm, 175 cm, 176 cm, 180 cm, 180 cm, 182 cm, 188 cm. **180 cm** occurs twice so it is the mode.
2.	Range = 24 kg - 8 kg = **16 kg**
3.	32, 34, 34, 38, 40, 44, 46, 53, 54, 69, 74, 81 Median is between 44 and 46, so **median = 45**
4.	15, 12, 16, 11, 18, 13, 15, 14. 16, 17 Mean = $= \frac{15 + 12 + 16 + 11 + 18 + 13 + 15 + 14 + 16 + 17}{10}$ $= \frac{147}{10}$ $= 14.7$
5.	In order we have 4, 7, 9, 14, 14, 15, 15, 15, 16, 16, 19, 22, 25. **There is one cluster and it is centred around 15.**
6.	**A line graph** is the most suitable,
7.	$\frac{1}{8}$ of $360° = 45°$ The sector which measures 45° is **Comedy.**
8.	Horror and Romance both had $60°$ sectors. The fraction was $\frac{60}{360} = \frac{1}{6}$ **of the students**

Question	Working and Answer
9.	Drama is 90° angle, so it is $\frac{90}{360} = \frac{1}{4}$ of the students. $\frac{1}{4}$ of 24 = **6 students**
10.	3, 4, 4, 4, 5, 5, 6, 7, 7. 15 15 is the outlier and if it is included in the data, the mean = $\frac{60}{10} = 6$ When it is not included in the data, the mean = $\frac{45}{9} = 5$ **So the outlier has the effect of increasing the mean by 1.**
11.	There are 20 vehicles, so median is between the 10th and 11th. The 10th is a 3 and the 11th a 4, so **median = 3.5**
12.	$\text{Mean} = \frac{1 \times 4 + 2 \times 5 + 3 + 4 + 5 \times 5 + 6 \times 3 + 10}{20}$ $= \frac{4 + 10 + 3 + 4 + 25 + 18 + 10}{20}$ $= \frac{74}{20}$ $= 3\frac{14}{20}$ $= 3.7$
13.	**There are clusters around 2 and 5 and an outlier at 10.**
14.	The mean score for all the players in the game was 8 points so the total points scored by the players was $16 \times 8 = 128$ The mean score for the players in the winning team was 9 points so the total points scored by the winning players was $8 \times 9 = 72$. Points scored by losing team = 128 – 72 = 56 Mean for losing team = $\frac{56}{8} = 7$
15.	"**Receiving stolen goods**" and "**Steal from retail store**" both increased.
16.	Change in "Steal from Motor Vehicle" = 43 000 – 40 000 = 3 000 **Decrease of 3 000**
17.	**Break and enter dwelling** decreased by 2500 from 34000 to 31500

Question	Working and Answer
18.	"Steal from Dwelling" went from 22 500 to 21 500 a decrease of 1000 $\text{Percentage} = \frac{1000}{22500} \times 100 = \frac{1000}{225} \approx 4\%$ "Steal from Person" went from 6 000 to 5 500 a decrease of 500 $\text{Percentage} = \frac{500}{6000} \times 100 = \frac{500}{60} \approx 8\%$ **"Steal from Person" had the larger percentage decrease**

School Name
Mathematics Test 2017

Year 9

Basic Statistics

Calculator Allowed
Multiple Choice
Section

ANSWERS

Question	Working	Answer
1.	$\text{Mean} = \frac{10170}{45} = 226$	**A**
2.	From 16 numbers there are two middle numbers, the 8^{th} and 9^{th}.	**C**
3.	12 weeks and 14 weeks both occur 3 times which is more than any other age.	**B**
4.	$\text{Range} = \text{highest} - \text{lowest} = 16 - 10 = 6 \text{ weeks}$	**B**
5.	$\text{Mean} = \frac{12+14+12+16+15+14+10+16+14+12}{10}$ $= \frac{135}{10}$ $= 13.5 \text{ weeks}$	**B**
6.	As the data he collects will be colours (words) the data is categorical	**A**
7.	The graph is 12 cm long and the section for China is 2 cm, so the fraction is $\frac{2}{12} = \frac{1}{6}$	**B**
8.	The section for Japan is 3 cm, so the fraction is $\frac{3}{12} = \frac{1}{4}$ Percentage = 25%	**C**
9.	The section for Korea is 2.5 cm, so the fraction is $\frac{2.5}{12} = \frac{5}{24}$ $\text{Number} = \frac{5}{24} \times 240 = 50 \text{ cars}$	**D**

10.	There are 25 entries, so they played for 25 out of 31 days in July. They had 6 days off.	**D**
11.	Median from 25 scores is the 13th score. 20 | 2 4 6 21 | 0 5 6 8 9 22 | 1 4 4 7 23 | 1 5 6 6 24 | 1 3 7 25 | 0 4 4 4 5 5 Median = 231	**C**
12.	Range = 255 – 202 = 53 so A is false. The mode is 254 and median = 231 (from above) so B is false. The mean would be closer to the middle, so C is false. The mode is 254 and the mean would be closer to the middle, so D is true.	**D**
13.	in 2011 Fisher Haven has about 21 000 people. in 2011 Greenville has about 14 000 people. Difference = 21 000 – 14 000 = 7 000	**A**
14.	In 1981 Fisher Haven has about 15 000 people and Greenville has about 5 500 people. Difference in 1981 = 15 000 – 5 500 = 9 500 In 2015 Fisher Haven has about 21 500 people and Greenville has about 16 500 people. Difference = 21 500 – 16 500 = 5 000 Change = 9 500 – 5 000 = 4 500 The difference has decreased by 4 500	**C**
15.	Total mass of the 19 men = 19 × 72 = 1368 Total mass of the 20 men = 20 × 73 = 1460 Mass of twentieth man = 1460 – 1368 = 192 kg	**D**
16.	$\text{Mean} = \frac{1\times4+2\times7+3\times8+4\times11+5\times12+6\times8+7\times6+8\times4}{60}$ $= \frac{4+14+24+44+60+48+42+32}{60}$ $= \frac{268}{60}$ $= 4.4666666..$ $= 4.47$ (2 dec places)	**A**

<table>
<tr>
<td>17.</td>
<td>From 60 the median is between the 30th and 31st scores
Taking cumulative frequencies:
<table>
<tr><td>Score</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>CF</td><td>4</td><td>11</td><td>19</td><td>30</td><td>42</td><td>50</td><td>56</td><td>60</td></tr>
</table>
So 30th score is a 4 and 31st is a 5
Median = 4.5</td>
<td>C</td>
</tr>
<tr>
<td>18.</td>
<td>From CF above, 42 applicants made up to 5 errors, so 60 – 42 = 18 made more than 5 errors.
$\text{Percentage} = \frac{18}{60} \times 100$
$= 30\%$</td>
<td>B</td>
</tr>
</table>

School Name

Mathematics 2017

Multiple Choice Answer Sheet

Basic Statistics

Name _____

Completely fill the response oval representing the most correct answer.

1.	A ●	B ○	C ○	D ○
2.	A ○	B ○	C ●	D ○
3.	A ○	B ●	C ○	D ○
4.	A ○	B ●	C ○	D ○
5.	A ○	B ●	C ○	D ○
6.	A ●	B ○	C ○	D ○
7.	A ○	B ●	C ○	D ○
8.	A ○	B ○	C ●	D ○
9.	A ○	B ○	C ○	D ●
10.	A ○	B ○	C ○	D ●
11.	A ○	B ○	C ●	D ○
12.	A ○	B ○	C ○	D ●
13.	A ●	B ○	C ○	D ○
14.	A ○	B ○	C ●	D ○
15.	A ○	B ○	C ○	D ●
16.	A ●	B ○	C ○	D ○
17.	A ○	B ○	C ●	D ○
18.	A ○	B ●	C ○	D ○

School Name
Mathematics Test 2017

Year 9

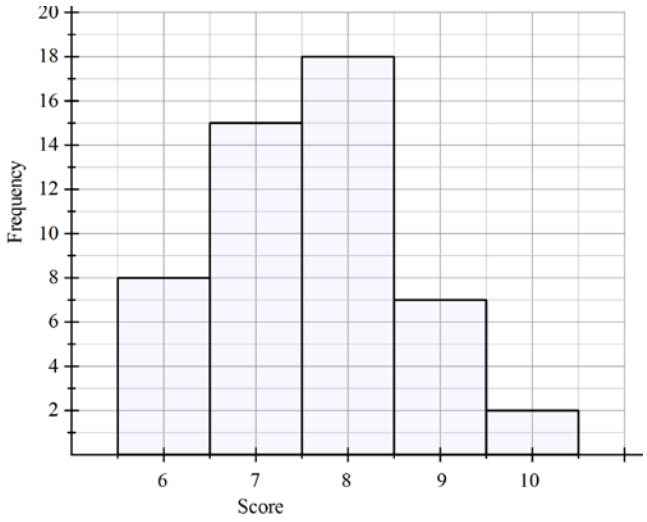
Basic Statistics

Calculator Allowed
Longer Answer Section

ANSWERS

Question	Working and Answer	Marks
1.	(a) From 20, the median is between the 10th and 11th scores which are both 9's so the median is 9. The mode is 10. The mode is 1 greater than the median.	3 marks for correct median and mode, and a comparison which says which is greater. 2 marks if either is incorrect, but a comparison still made, or both correct but no comparison is made. 1 mark if both are incorrect, but a comparison is still made, or only one correct but no comparison is made.
	(b) $\text{Mean} = \frac{4+5+6+14+24+36+50+33}{20}$ $= \frac{172}{20}$ $= 8.6$	1 mark for correct answer
	(c) The data has a cluster toward the upper values and a long tail at the lower end. It is negatively skewed	2 marks for negatively skewed 1 mark for skewed

<table>
<tr><th>Question</th><th>Working and Answer</th><th>Marks</th></tr>
<tr><td>2.</td><td>(a)
<table>
<tr><th>Score (x)</th><th>Frequency (f)</th><th>fx</th><th>CF</th></tr>
<tr><td>6</td><td>8</td><td>48</td><td>8</td></tr>
<tr><td>7</td><td>15</td><td>105</td><td>23</td></tr>
<tr><td>8</td><td>18</td><td>144</td><td>41</td></tr>
<tr><td>9</td><td>7</td><td>63</td><td>48</td></tr>
<tr><td>10</td><td>2</td><td>20</td><td>50</td></tr>
<tr><td></td><td>Σf = 50</td><td>Σfx = 380</td><td></td></tr>
</table></td><td>3 marks for completed columns and sums of columns

2 marks if one column has a mistake or an error is made in sums.
1 mark if basically correct method with multiple errors or if one column is completely correct.</td></tr>
<tr><td></td><td>(b) $\text{mean} = \bar{x} = \dfrac{\Sigma fx}{\Sigma f}$
$= \dfrac{380}{50}$
$= 7.6$</td><td>1 mark for correct answer</td></tr>
<tr><td></td><td>(c) From 50 scores median is 25th and 26th which are both 8’s from CF column.
Median = 8</td><td>1 mark for correct answer</td></tr>
<tr><td></td><td>(d)
 
</td><td>2 marks for correctly drawn histogram.

1 marks if graph has minor errors or is untidily drawn</td></tr>
<tr><td></td><td>(e) The data is positively skewed</td><td>2 marks for both terms in description.

1 mark for skewed</td></tr>
</table>