

High School Mathematics Test 2015

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 WOULD BE USEFUL.

1. Oprah signed autographs at 11 public appearances last week.
The number that she signed at each appearance were 74, 56, 60, 45, 120, 72, 75, 66, 94, 64 and 88.
What was the median number of signatures?

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.....

2. Josiah caught some fish each day for a fortnight.
The number that he caught each day were 6, 5, 4, 2, 4, 1, 5, 6, 5, 4, 2, 4, 5 and 5.
What was the mode of this data?

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3. Kevin has read eight short stories. Their length (in pages) were:
6, 12, 9, 10, 15, 11, 15 and 10.
Find the mean (average) number of pages.

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4. Taylah keeps a roll of the number of girls who attend her guides group each week. For the last 10 weeks the numbers were 15, 22, 16, 18, 33, 18, 16, 9, 22 and 27. What was the range of the attendance numbers?

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5. Brodie records the score of each archer in the first round of the local archery competition. Is this a census or a sample of the archers in the competition?

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Questions 6 – 9 refer to the divided bar graph below.

The graph shows the results of an election for school captain.



A ruler would be useful.

6. Which two candidates received the same number of votes?

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7. What fraction of the total votes did Amelia receive?

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8. India had less than half of the total vote. If she combined her votes with Bill, would they have more than half of the votes together? Explain your answer.

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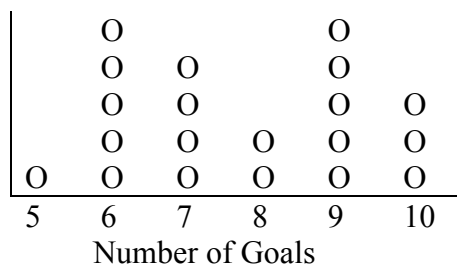
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9. If Bill received 20 votes, how many did Amelia receive?

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.....

Questions 10 – 12 refer to the dot plot below.

The plot shows the number of goals that Reece scored in 20 games of basketball.



10. What was the modal number of goals?

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11. What was the median number of goals?

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12. What was the mean number of goals?

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13. There are 19 students in Miss King's class and they have a mean mark of 40 on a test.
Another student joins the class and scores 80 on the test.
What is the new mean mark for the class on the test?

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.....

Questions 14 – 16 refer to the stem and leaf below.

The dot plot shows the attendance at 26 rehearsals of the Milkwood Theatre Company.

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

14. What was the median attendance?

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.....

15. A full rehearsal had 26 in attendance. What fraction of the rehearsals were full rehearsals?

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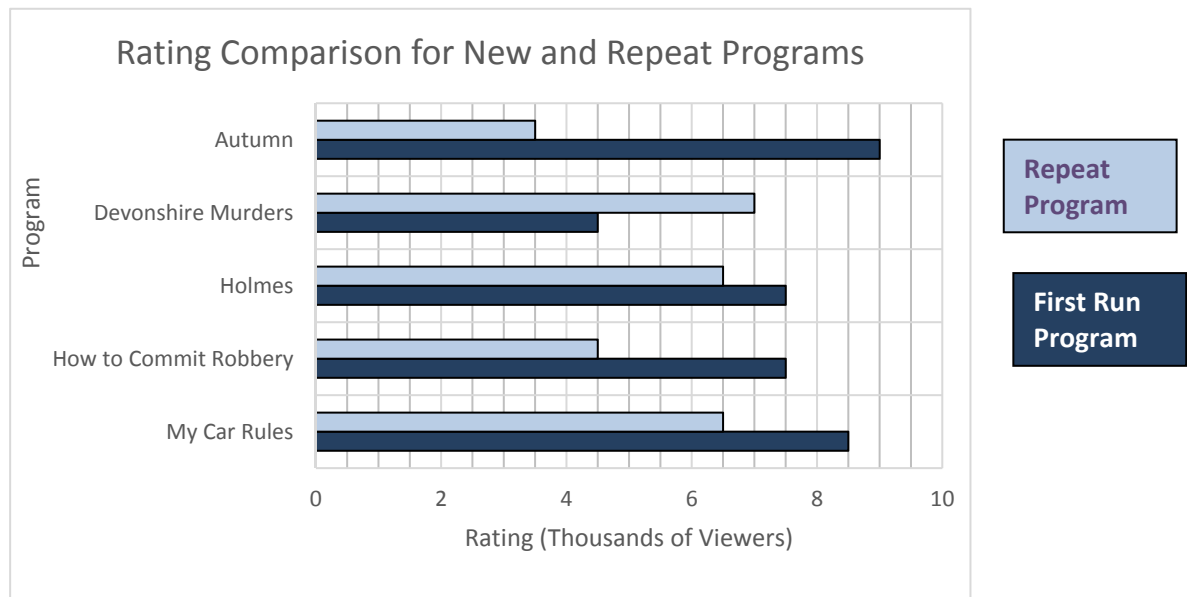
16. What was the modal attendance?

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Question 17 and 18 refer to the graph below.

A TV guide prints the graph which shows a comparison of ratings for first run and repeat programs



17. Which program had the highest overall ratings including both first run and repeats and what was its' total?

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18. What fraction of the ratings for “How to Commit Robbery” were from repeats?

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Basic Statistics

Calculator Allowed

Name _____

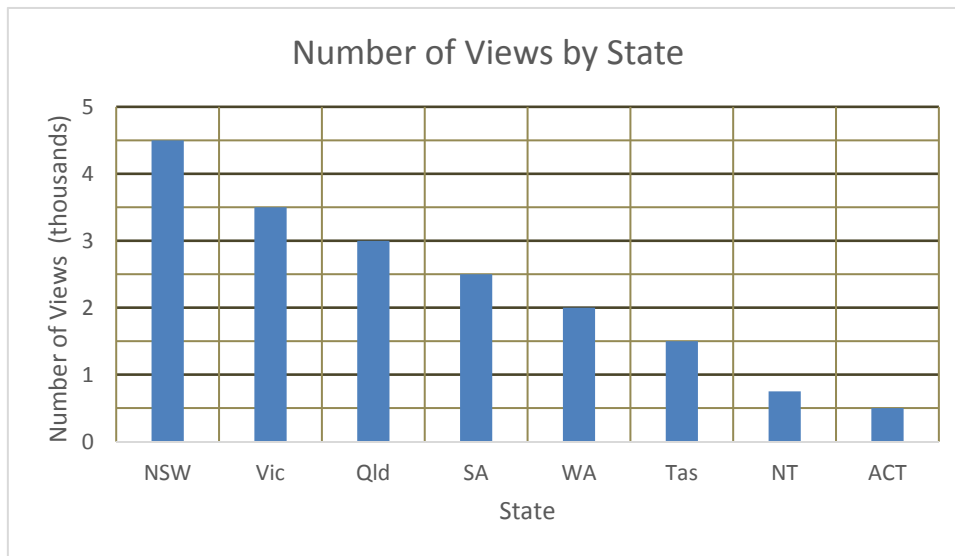
Section 2 Multiple Choice Section

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. Twelve rivals in a baking contest get the following scores out of a possible 10.
6.5, 6.8, 6.9, 6.9, 7.2, 7.6, 7.8, 7.8, 7.9, 8.4, 9.2 and 9.5.
What is the median score?
A. 7.2 B. 7.6 C. 7.7 D. 7.8
2. The members of the Hartesville athletics club record the following times (in sec) for 100 m.
13.6, 14.8, 12.9, 12.4, 13.2, 15.6, 13.7, 12.8, and 12.5.
What is their mean time?
A. 13.2 B. 13.5 C. 13.6 D. 13.8
3. Jessie watches 8 of the 20 members of her gym class and writes down the number of repetitions of an exercise that they can do.
Which is true?
A. She is collecting categorical data by observation.
B. She is collecting categorical data by measurement.
C. She is collecting numerical data by observation.
D. She is collecting numerical data by measurement.

Questions 4 - 5 refer to the graph below.

The graph shows the number of views of an online video.



4. How many views were recorded in South Australia (SA)?

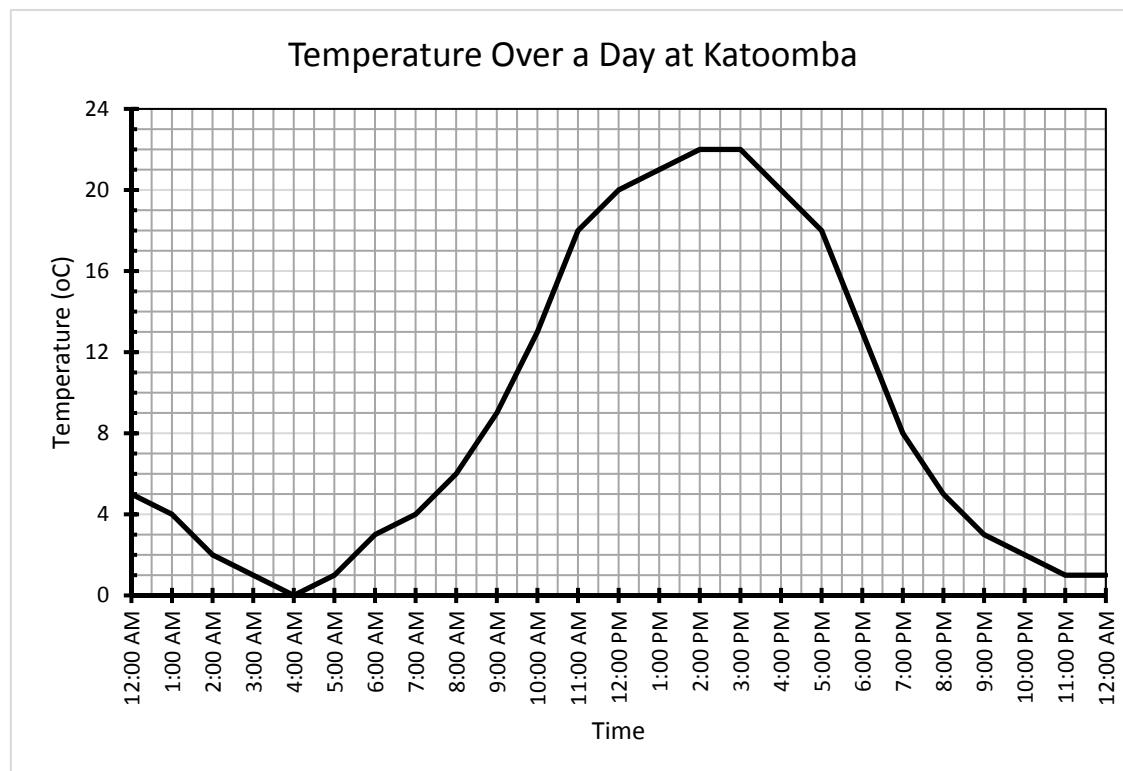
- A. 2.5 B. 25 C. 250 D. 2 500

5. Which state had twice as many views as Tasmania (Tas).

- A. Qld. B. SA C. WA D. NT

Questions 6 - 7 refer to the graph below.

Suzie drew the graph below of the temperatures on a day at Katoomba.



6. At what times was the temperature 18°C ?
- A. 10am and 5 pm B. 11am and 5 pm
C. 11am and 6 pm D. 12pm and 6 pm

7. For how long was the temperature above 13°C ?
- A. 5 hours B. 6 hours C. 7 hours D. 8 hours

Questions 8 – 10 refer to the frequency distribution table below.

The table records how many calls each of 50 students made during a day.

Number of Calls (x)	Frequency (f)	fx	Cumulative Frequency
9	8	72	8
10	12	120	20
11	15	165	35
12	10	120	45
13	5	65	50

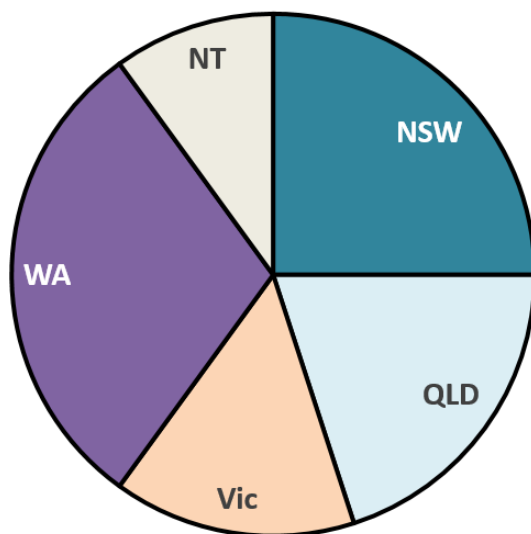
$$\Sigma f = 50 \quad \Sigma fx = 542$$

8. What percentage of the students made more than 11 calls?
 A. 30% B. 35% C. 40% D. 45%
9. What was the median number of calls?
 A. 9.5 B. 10 C. 10.5 D. 11
10. What was the mean number of calls (correct to 1 decimal place) ?
 A. 9.8 B. 10.3 C. 10.8 D. 11.3
11. Lydia has played the game of Battlefield 20 times and has an average score of 25 400.
 What average score would she need to get on her next five games of Battlefield to increase her average to 30 000?
 A. 4 600 B. 48 400 C. 121 000 D. 242 000

Questions 12 and 13 refer to the graph below.

The Grommett company records their sales according to states on the graph shown.

Proportion of Sales .



12. Which state accounted for 30% of the sales?
 A. NSW. B. QLD. C. Vic. D. WA.
13. What percentage of sales did NT account for?
 A. 10% B. 15% C. 30% D. 36%

Questions 14 and 15 refer to the stem and leaf plot below.

The Grommett company records their production each day on the stem and leaf plot.

8	2	3	5	7				
9	0	2	4	4	6	8	9	
10	0	0	2	2	2	4	6	7
11	2	5	7	9				
12	0	2	2					

Key

8 | 5 = 8.5 thousand units

14. What is the median daily production?
 A. 10 000 B. 10 100 C. 10 200 D. 10 400
15. The company has a strategy to produce at least 9 000 units each day.
 On what percentage of the days was this strategy achieved ?
 A. 15% B. 24% C. 85% D. 96%

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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.

Score (x)	Frequency (f)	fx
4	3	
5	5	
6	8	
7	6	
8	2	

$$\Sigma f = \qquad \Sigma f x =$$

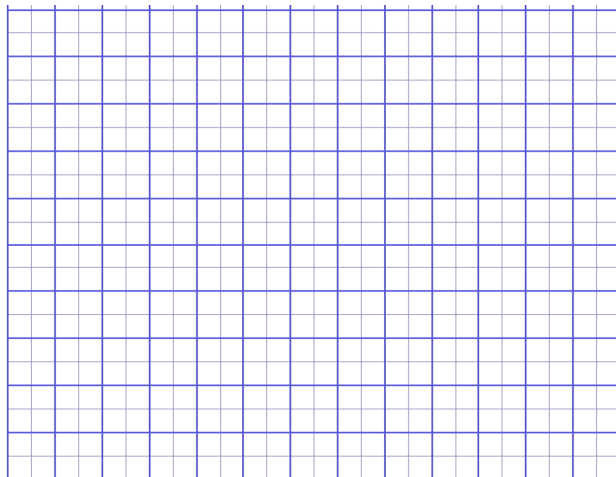
(a) Complete the frequency distribution table above. 2

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

.....

.....

(c) Use the grid below to draw a frequency histogram and polygon from the table. 2



Marks

2. The stem and leaf plot shows the percentage mark achieved by 15 people who took a welding competency test.

7	5	7	8				
8	0	0	2	2	4	6	7
9	2	5	9				
10	0	0					

- (a) To achieve competency, they needed to get as mark of 80 or better. **1**
What percentage of the group achieved competency?

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- (b) Calculate the mean mark on the test. (Correct to 1 decimal place) **1**

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High School Mathematics Test 2015

Multiple Choice Answer Sheet

Basic Statistics

Name _____

Completely fill the response oval representing the most correct answer.

- | | | | | | | | | |
|-----|---|-----------------------|---|-----------------------|---|-----------------------|---|-----------------------|
| 1. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 2. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 3. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 4. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 5. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 6. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 7. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
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| 9. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 10. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 11. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 12. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 13. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 14. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 15. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |

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Year 9

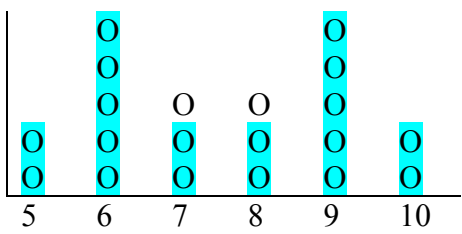
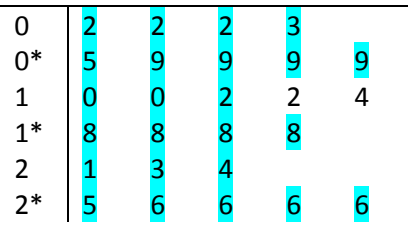
Basic Statistics

Non Calculator

Section 1 Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	In order 45, 56, 60, 64, 66, 72, 74, 75, 88, 94, 120. Median is the 6 th of 11 scores. Median is 72.	72
2.	In order they are 1, 2, 2, 4, 4, 4, 4, 5, 5, 5, 5, 5, 6, 6 5 occurs five times so it is the mode.	5
3.	Mean = $\frac{6 + 12 + 9 + 10 + 15 + 11 + 15 + 10}{8}$ = $\frac{88}{8}$ = 11	11
4.	15, 22, 16, 18, 33, 18, 16, 9, 22 and 27 Range = highest – lowest = 33 – 9 = 24	24
5.	As he recorded every score, it is a census.	Census.
6.	Bill and Emil both have 2 cm divisions.	Bill and Emil
7.	Amelia's division is 4 cm out of a total of 14 cm. Fraction = $\frac{4}{14} = \frac{2}{7}$	$\frac{2}{7}$
8.	India has a 6 cm division, and Bill has a 2 cm division. Together this is 8 cm, which is more than half of the 14 cm.	Yes as together they have 8 cm out of 14cm which is more than half.
9.	Bill received 20 votes and his division is 2 cm, so 1 cm : 10 votes Amelia is 4 cm, so hers is 40 votes. OR Amelia is twice Bills division so her votes are twice his $2 \times 20 = 40$	40 votes

		
10.	6 and 9 both occur 5 times so both are the mode.	6 and 9
11.	Taking the 10 th and 11 th scores which are 7 and 8. Median = $\frac{7+8}{2} = 7.5$	7.5
12.	Mean = $\frac{5 \times 1 + 6 \times 5 + 7 \times 4 + 8 \times 2 + 9 \times 5 + 10 \times 3}{20}$ = $\frac{5 + 30 + 28 + 16 + 45 + 30}{20}$ = $\frac{154}{20}$ = 7.7	7.7
13.	Total mark of 19 students = $19 \times 40 = 760$ New total with extra student = $760 + 80 = 840$ New mean = $\frac{840}{20} = 42$	42
		
14.	Median is 13 th and 14 th scores which are 12 and 14. Median = $\frac{12+14}{2} = 13$	13
15.	There were 4 which had 26. Fraction with 26 = $\frac{4}{26} = \frac{2}{13}$	$\frac{2}{13}$
16.	Mode is 9 and 18 and 26 as all occur 4 times.	9, 18 and 26
17.	“My Car Rules” had 8.5 and 6.5, a total of 15 thousand viewers	“My Car Rules” with 15 thousand viewers
18.	Repeats were 4.5 out of 12 altogether. Fraction = $\frac{4.5}{12} = \frac{9}{24} = \frac{3}{8}$	$\frac{3}{8}$

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Basic Statistics

Calculator Allowed

Section 2 Multiple Choice Section

ANSWERS

No.	WORKING	ANSWER																								
1.	<p>They are in order, so find the middle, the 6th and 7th. 6.5, 6.8, 6.9, 6.9, 7.2, 7.6, 7.8, 7.8, 7.9, 8.4, 9.2, 9.5.</p> <p>Median = $\frac{7.6 + 7.8}{2} = 7.7$</p>	C.																								
2.	<p>Mean = $\frac{13.6 + 14.8 + 12.9 + 12.4 + 13.2 + 15.6 + 13.7 + \dots}{9}$ = 13.5</p>	B.																								
3.	<p>The data is numbers so it is numerical. She watches and counts, so it is by observation.</p>	C.																								
4.	<p>2.5 on the scale corresponds to 2 500 views.</p>	D.																								
5.	<p>Tas had 1.5 thousand views, so twice this is 3 thousand. Qld had 3 000.</p>	A.																								
6.	<p>11 am and 5 pm from graph.</p>	B.																								
7.	<p>13° C at 10 am and 6 pm, so above for a total of 8 hours.</p>	D.																								
	<table><tr><th>Score (x)</th><th>Frequency (f)</th><th>fx</th><th>Cumulative Frequency</th></tr><tr><td>9</td><td>8</td><td>72</td><td>8</td></tr><tr><td>10</td><td>12</td><td>120</td><td>20</td></tr><tr><td>11</td><td>15</td><td>165</td><td>35</td></tr><tr><td>12</td><td>10</td><td>120</td><td>45</td></tr><tr><td>13</td><td>5</td><td>65</td><td>50</td></tr></table> <p>$\Sigma f = 50 \quad \Sigma fx = 542$</p>	Score (x)	Frequency (f)	fx	Cumulative Frequency	9	8	72	8	10	12	120	20	11	15	165	35	12	10	120	45	13	5	65	50	
Score (x)	Frequency (f)	fx	Cumulative Frequency																							
9	8	72	8																							
10	12	120	20																							
11	15	165	35																							
12	10	120	45																							
13	5	65	50																							
8.	<p>There were $10 + 5 = 15$ students who made more than 11 calls.</p> <p>Percentage = $\frac{15}{50} \times 100 = 30\%$</p>	A.																								
9.	<p>Median = 25th and 26th scores, which are both 11's so median = 11.</p>	D.																								

10.	Mean = $\frac{542}{50} = 10.84 = 10.8$ (1 dec place)	C.																																																		
11.	Total score on 20 games = $20 \times 25\,400 = 508\,000$. To have an average of 30 000 on 25 games total score = $25 \times 30\,000 = 750\,000$. Score on next 5 games = $750\,000 - 508\,000 = 242\,000$ Average on next 5 games = $242\,000 \div 5 = 48\,400$.	B.																																																		
12.	30% of $360^\circ = 108^\circ$ WA has an angle of 108°	D.																																																		
13.	Angle for NT is 36° Percentage = $\frac{36}{360} \times 100 = 10\%$	A.																																																		
	<table><tr><td>8</td><td>2</td><td>3</td><td>5</td><td>7</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td>0</td><td>2</td><td>4</td><td>4</td><td>6</td><td>8</td><td>9</td><td></td><td></td></tr><tr><td>10</td><td>0</td><td>0</td><td>2</td><td>2</td><td>2</td><td>4</td><td>6</td><td>7</td><td></td></tr><tr><td>11</td><td>2</td><td>5</td><td>7</td><td>9</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>12</td><td>0</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>	8	2	3	5	7						9	0	2	4	4	6	8	9			10	0	0	2	2	2	4	6	7		11	2	5	7	9						12	0	2	2							
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10	0	0	2	2	2	4	6	7																																												
11	2	5	7	9																																																
12	0	2	2																																																	
14.	For 26 scores the median is the 13 th and 14 th which are 10.0 and 10.2, so median = 10.1 thousand i.e. 10 100.	B.																																																		
15.	On 4 days it was not achieved, so it was achieved on 22 days out of 26. Percentage of days achieved = $\frac{22}{26} \times 100 = 84.615 = 85\%$ (nearest %)	C.																																																		

High School Mathematics Test 2015

Multiple Choice Answer Sheet

Basic Statistics

Name ANSWERS

Completely fill the response oval representing the most correct answer.

- | | | | | | | | | |
|-----|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|
| 1. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input checked="" type="radio"/> | D | <input type="radio"/> |
| 2. | A | <input type="radio"/> | B | <input checked="" type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
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| 5. | A | <input checked="" type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 6. | A | <input type="radio"/> | B | <input checked="" type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
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| 9. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input checked="" type="radio"/> |
| 10. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input checked="" type="radio"/> | D | <input type="radio"/> |
| 11. | A | <input type="radio"/> | B | <input checked="" type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 12. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input checked="" type="radio"/> |
| 13. | A | <input checked="" type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 14. | A | <input type="radio"/> | B | <input checked="" type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 15. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input checked="" type="radio"/> | D | <input type="radio"/> |

High School Mathematics Test 2015

Section 3 Longer Answer Section

1. (a)

Score (x)	Frequency (f)	fx
4	3	12
5	5	25
6	8	48
7	6	42
8	2	16

$$\Sigma f = 24$$

$$\Sigma fx = 143$$

2 marks for correct table.

1 mark for table with one or two minor errors.

(b)

$$\text{Mean} = \frac{143}{24} = 5.958333 = 6.0 \text{ (correct to 1 decimal place)}$$

1 mark for correct answer

(c)



2 marks for graph with histogram and polygon done correctly

1 mark if only one completed or if both with minor errors.

2.	<table><tr><td>7</td><td>5</td><td>7</td><td>8</td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td>0</td><td>0</td><td>2</td><td>2</td><td>4</td><td>6</td><td>7</td></tr><tr><td>9</td><td>2</td><td>5</td><td>9</td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td>0</td><td>0</td><td></td><td></td><td></td><td></td><td></td></tr></table>	7	5	7	8					8	0	0	2	2	4	6	7	9	2	5	9					10	0	0						
7	5	7	8																															
8	0	0	2	2	4	6	7																											
9	2	5	9																															
10	0	0																																
(a)	<p>3 did not achieve a mark of 80 or better. 12 out of 15 did achieve competency. Percentage = $\frac{12}{15} \times 100 = 80\%$</p>	1 mark for correct answer.																																
(b)	<p>Sum of scores = $= 75 + 77 + 78 + 80 \times 2 + 82 \times 2 + 84 + 86 + 87 + 92 + 95 + 99 + 100 \times 2$ $= 1297$ Mean = $\frac{1297}{15} = 86.466$ $= 86.5$</p>	1 mark for correct answer.																																