High School Mathematics Test 2013

Year 9

Data Comparison and Sampling

Calculator Allowed

Skills and Knowledge Assessed:

- Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly from secondary sources (ACMSP228)
- Construct back to back stem and leaf plots and histograms and describe data, using terms including 'skewed', 'symmetric' and 'bi modal' (ACMSP282)
- Compare data displays using mean, median and range to describe and interpret numerical data sets in terms of location (centre) and spread (ACMSP283)

Name_____

Section 1 Short Answer Section

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

1. Tim compares the number of viewers (in millions) on two television stations at 8:30 pm over a week.

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
NBC	1.2	1.5	2.1	1.2	1.4	1.3	2.4
STS	0.8	1.1	1.4	1.6	1.3	1.8	1.1

Which station had the greater median, and by how much was it greater?

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2. Hannah does morning and afternoon exercise. She compares the number of repetitions she is able to do on the Peclifter machine in each session for five days.

Morning	45	56	52	60	55
Afternoon	50	40	45	50	52

By how much was the mean morning number of reps greater than the mean afternoon number?

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3. Markie and Ethan play the game Halo over four nights. Their scores are given below.

Markie	3755	1285	2648	3260
Ethan	2750	1560	3245	2750

Compare the ranges of their scores? Whose was greater and by how much?

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4. Everitt is a mechanic and records the number of cars that he works on each day during two months.

January				
4	5	3	2	5
2	4	3	2	2
3	4	4	5	4
4	5	3	3	4
3	4	2		

February				
2	3	4	4	3
3	6	4	3	3
4	2	4	2	1
2	3	5	3	4

What was the mode of each month's data, and which was greater?

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5. The results of a test for two classes are shown in the tables.
Find the median for each class and use this to compare the two class's performances on the test.

Mr Polygon

Score	Frequency
20	1
21	3
22	7
23	8
24	6
25	3

Ms D'Arc

Score	Frequency
20	1
21	3
22	9
23	7
24	4
25	2

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Questions 6 and 7 refer to the back to back stem and leaf plot below that compares the mass of 15 females and 15 males.

Female					Stem	Male				
			3	2	5					
		4	3	1	6	5				
8	5	3	3	1	7	2	3	3		
		5	3	2	8	3	4	5	5	8
			6	1	9	1	3	4	7	
						5	7			

6. By how much was the male's median mass greater than the females?

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7. Is the data for either gender skewed, symmetrical or bimodal?

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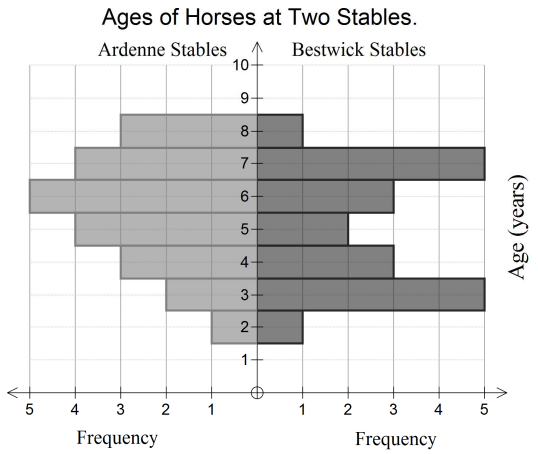
Questions 8 – 10 refer to the back to back histogram which shows the age in years of the horses which belong to two riding stables.



8. How many horses were there at each set of stables?

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9. What is the mean mass for each group (correct to 1 decimal place)?

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10. Write a comparison of the distribution of ages at the two stables. Use statistical terms and measures in your answer.

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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. Hanna collects information by observation of 200 cars in Melbourne. Which measure could be used in analysing this data?

   A. Mean B. Median

   C. Mode D. Range

Colour of Car	Frequency
Blue	18
Red	52
Silver	36
Green	24
Yellow	29
White	41

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2. Tyler compares the number of advertisements on television in each hour of the afternoon and the evening.

Afternoon	16	14	12	14	17	20
Evening	22	24	24	21	18	12

What were the modal number of advertisements in the afternoon and evening, respectively?

A. 14 and 24 B. 14 and 21.5 C. 15 and 21.5 D. 15.5 and 20

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3. Henry and Louise roll a pair of dice 10 times as part of a board game. The total of the dice for each throw is shown below.

Henry	11	9	5	8	12	8	4	9	12	7
Louise	2	6	7	8	6	7	9	2	7	10

Which is correct?

A. Henry has the higher mean score by 1.

B. Henry has the higher mean score by 2.1.

C. Louise has the higher mean score by 1.

D. Louise has the higher mean score by 2.1.

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4. Pete and Bev both work as DJ's at parties. The last 6 times they have worked, the number of tracks each has played is given in the table.

Pete	25	28	20	35	18	24
Bev	30	32	28	32	24	22

Which statement is correct?

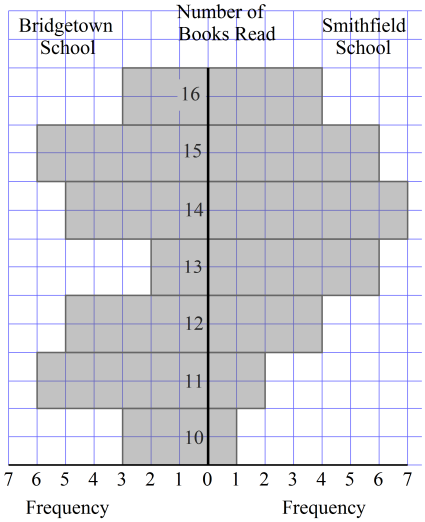
A. Bev's mean number of tracks was more than Pete's by 3.5.

B. Bev's median number of tracks was more than Pete's by 4.5.

C. Bev's modal number of tracks was more than Pete's by 2.

D. The range of Bev's number of tracks was less than Pete's by 7.5.

Questions 5 – 7 refer to the back to back histogram which shows the distribution of the number of books read by two schools in the MS readathon.



5. Which statement is correct about the distributions for the two schools?

A. Both schools had the same number of students participate.

B. Both schools had bimodal distributions.

C. Both schools had skewed distributions.

D. Both schools had the same modal number of books read.

6. Which school had the higher median number of books read?

A. They were the same.

B. Bridgetown's was higher by 1.

C. Bridgetown's was higher by 2.

D. Smithfield's was higher by 1.

7. Martha did the calculation : $\dfrac{16 \times 4 + 15 \times 6 + 14 \times 7 + 13 \times 6 + 12 \times 4 + 11 \times 2 + 10 \times 1}{30}$

What was she finding?

A. The mean for Bridgetown.

B. The mean for Smithfield

C. The range for Bridgetown.

D. The mode for Smithfield.

Questions 8 – 10 refer to the back to back stem and leaf plot showing the results of the 15 years high jump at an athletics carnival involving two regions.

Heights Jumped in the 15 years High Jump (cm)

Western Region								Eastern Region						
					7	4	15	3	5	6	6	8	9	
		9	9	9	9	5	16	0	2	5	9	9	9	9
9	8	7	7	7	5	3	17	1	3	5	5	7		
	9	7	5	4	3	0	18	2	6					

8. What was the highest jump by any participant in the 15 years high jump?

A. 180 B. 186 C. 189 D. 190

9. Which region had the highest median jump and by how much?

A. Eastern Region by 8.
B. Eastern Region by 18.
C. Western Region by 8
D. Western Region by 18

10. Which statement is **incorrect** about the distributions for the two Regions?

A. Both Regions had the same number of participants.
B. Both Regions had skewed distributions.
C. Both Regions had the same modal height jumped.
D. Both Regions had the same range of heights jumped.

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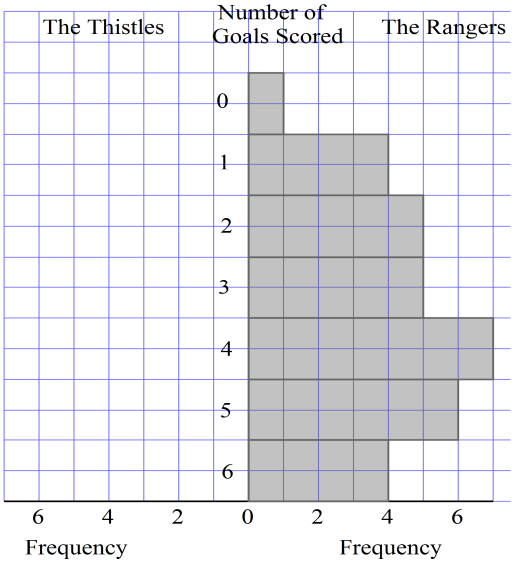
Section 3 Longer Answer Section

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

Marks

1. The table and partially completed back to back histogram below show the number of goals scored by players in two football teams, the Thistles and the Rangers.

Thistles	
Number of Goals Scored	Frequency
0	0
1	4
2	7
3	6
4	6
5	3
6	2



a) Complete the back to back histogram, using the data from the table. **2**

b) Find the median number of goals for each team. **1**

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c) Find the mean number of goals for each team. **1**

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Multiple Choice Answer Sheet

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 ⬭

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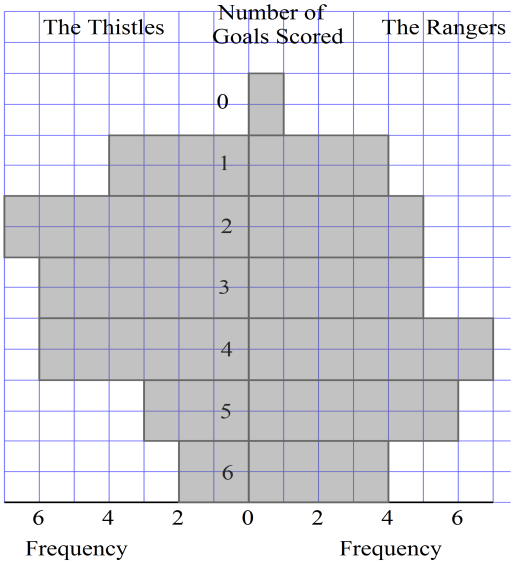
ANSWERS

Section 1	
1.	NBC ~~1.2, 1.2, 1.3~~, 1.4, ~~1.5, 2.1, 2.4~~ STS ~~0.8, 1.1, 1.1~~, 1.3, ~~1.4, 1.6, 1.8~~ NBC has the higher median by 0.1 million (100 000).
2.	Morning = $\frac{268}{5} = 53.6$ Afternoon = $\frac{237}{5} = 47.4$ Morning is greater by 6.2 reps.
3.	Markie's range = 3755 – 1285 = 2470 Ethan's range = 3245 – 1560 = 1685 Ethan's is larger by 785.
4.	January mode = 4 February mode = 3 January is greater.
5.	Mr Polygon 28 students, so medians are 14th and 15th, which are both 23. Ms D'Arc 26 students, so medians are 13th and 14th, which are 22 and 23 so median = 22.5. Mr Polygon's class has the higher median by 0.5, and this indicates the class's results are skewed more to higher results.
6.	Female | Stem | Male ~~3~~ ~~2~ | 5 | 4 ~~3~~ ~~1~ | 6 | ~~5~~ ~~8~~ ~~5~~ 3 ~~3~~ ~~1~ | 7 | ~~2~~ ~~3~~ ~~3~~ ~~5~~ ~~3~~ ~~2~ | 8 | ~~3~~ ~~4~~ ~~5~~ 5 ~~8~~ ~~6~~ ~~1~ | 9 | ~~1~~ ~~3~~ ~~4~~ ~~7~~ ~~5~~ ~~7~~ Female median = 73 Male median = 85 Male is higher by 12.
7.	The female data is symmetrical, and the male is skewed.
8.	Ardenne has 22 horses and Bestwick has 20.
9.	The mean for Ardenne = $\frac{122}{22} = 5.5$ The mean for Bestwick = $\frac{100}{20} = 5$
10.	The Ardenne data was skewed while the Bestwick data was symmetrical and bimodal. The Ardenne data has a greater mean and median, with the same range for both. The Ardenne data has one mode while the Bestwick data has two modes. (1 mark if at least two features are mentioned.)

Section 2

1.	C
2.	A
3.	B
4.	B
5.	A
6.	D
7.	B
8.	C
9.	C
10.	D

Section 3	
1.	
	b) Thistles Median = 3 (14th and 15th scores) Rangers Median = 4 (16th and 17th scores)
	c) Thistles Mean = $\frac{87}{28}$ = 3.1 (1 dec place) Rangers Mean = $\frac{111}{32}$ = 3.5 (1 dec place)

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Multiple Choice Answer Sheet

Name Marking Sheet

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 ●