

High School Mathematics Test 2013

Year
10

Further Measures of Spread

Calculator Allowed

Skills and Knowledge Assessed:

- Determine quartiles and interquartile range (ACMSP248)
- Construct and interpret box plots and use them to compare data sets (ACMSP249)
- Compare shapes of box plots to corresponding histograms and dot plots (ACMSP250)
- Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data (ACMSP253)
- 10A Calculate and interpret the mean and standard deviation of data and use these to compare data sets (ACMSP278)

Name _____

Section 1 Short Answer Section

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

1. The marks of 9 students on a test out of 100 are given below. Find the upper and lower quartiles of the set of marks.

45, 55, 57, 60, 65, 80, 88, 90, 92

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2. The response times, in seconds, for 11 calls for taxis in the CBD are given below. What is the interquartile range of the times?

60, 65, 87, 90, 95, 100, 128, 150, 220, 250, 300

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3. Jack records the number of hours he spends playing an online game each day over two weeks.

2, 3, 4, 2, 3, 4, 6, 2, 3, 2, 8, 3, 4, 3

What was the interquartile range of his times?

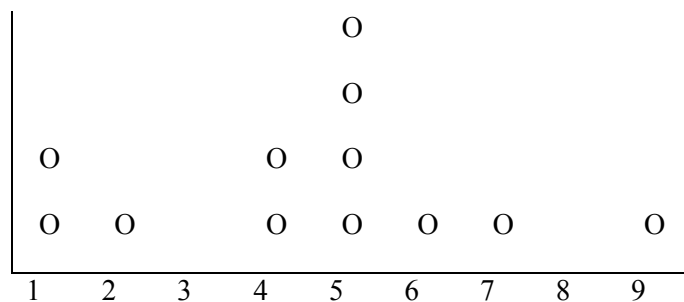
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4. Hannah records the number of hours each week she spends at dancing practice, for 16 weeks. The five number summary from her records is : 3, 5, 6, 8, 12. What is the interquartile range of her data?

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Questions 5 – 6 refer to the following.

The dot plot shows the number of days it took a sample of 12 people, to read a particular book.



5. Find the upper and lower quartiles of the data.

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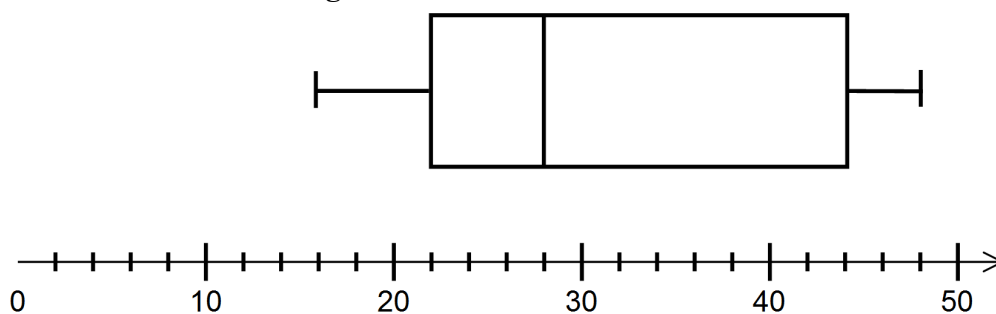
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6. Write a five number summary for the data.

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Questions 7 – 8 refer to the following.



The box plot summarises the percentage of the vote in the polls that a political party had each week over a year.

7. What was the range of the results?

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8. What was the interquartile range of the results?

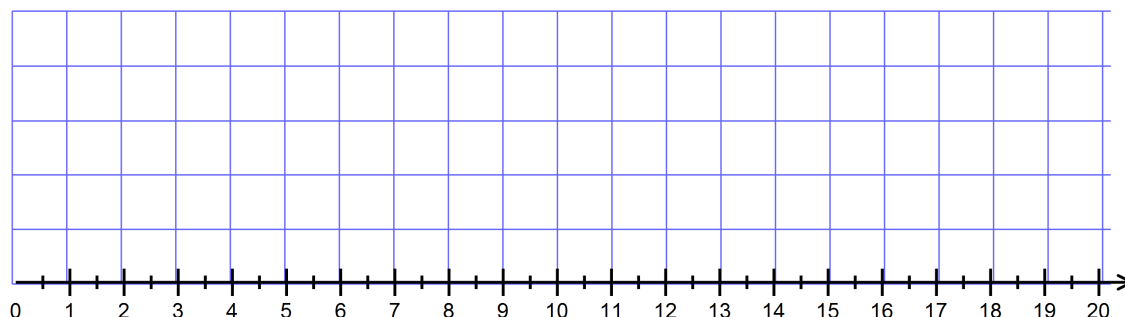
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Questions 9 – 10 refer to the five number summary of test results.

2, 12, 16, 18, 19

9. Use the five number summary to draw a box plot.



10. Describe the distribution of the data in question in terms of spread and

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11. Find the population standard deviation of the scores below (correct to one decimal place):

15, 18, 20, 22, 25, 26, 27, 28, 30, 32, 36, 40

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12. Two basketball players Keegan and Marcus both play 16 games during a season. The table below records the mean and standard deviation of the number of points they scored in each game.

Player	Mean	Standard Deviation
Keegan	18.0	8.5
Marcus	18.0	2.5

Compare the two player's performances in terms of total points scored and consistency.

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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. What is the interquartile range of the scores below?

2, 3, 5, 7, 9, 10, 12, 15

A. 4 B. 5 C. 7 D. 13

2. What is the interquartile range of the scores below?

12, 16, 13, 17, 12, 19, 14, 20, 15

A. 5.5 B. 7.5 C. 8 D. 18

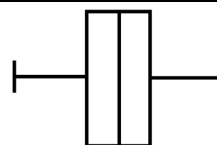
3. George made the following withdrawals from his account recently.

\$20, \$45, \$24, \$40, \$30, \$36, \$32, \$34, \$33.

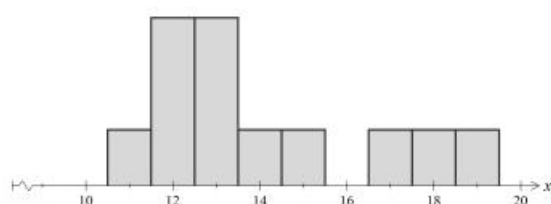
Which is a correct five number summary of these withdrawals?

A. 20, 27, 33, 36, 45
B. 20, 27, 33, 38, 45
C. 20, 30, 33, 36, 45
D. 20, 30, 33, 38, 45

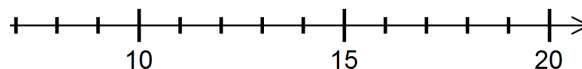
4. Which histogram could represent the same data as this box plot?



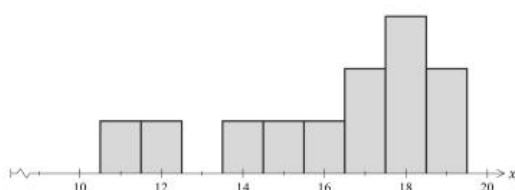
A.



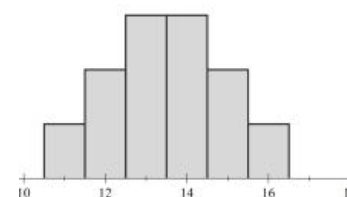
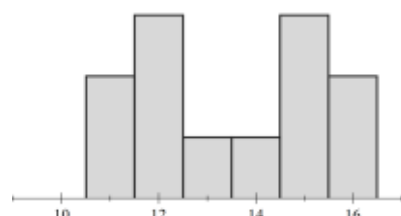
B.



C.



D.



5. Jason worked out the interquartile range of his times for a 100 m sprint to be 1.2 seconds. His lower quartile was 10.2 seconds. What was his upper quartile?

A. 9.0

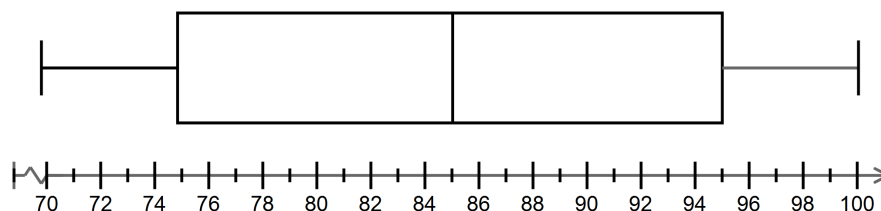
B. 10.2

C. 11.4

D. 12.6

Questions 6 – 7 refer to the following:

Collette collects information on the age of residents in a retirement home. The box plot below is drawn from the data.



6. What is the interquartile range of the data?

A. 5

B. 10

C. 15

D. 20

7. Which statement is true?

A. 25% of residents were aged between 70 and 85.

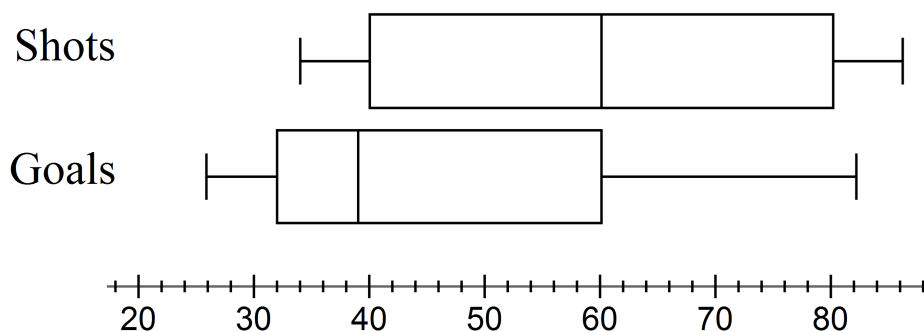
B. 25% of residents were aged between 75 and 85.

C. 25% of residents were aged between 75 and 95.

D. 25% of residents were aged between 85 and 100.

Questions 8 – 10 refer to the following.

The two box plots below were compiled by the coach of the Phoenix netball team. They show the number of shots at goal in each game and the number of goals scored respectively.



8. Which statement is true?
- A. The distribution of shots is symmetrical and of goals is skewed.
 - B. The distribution of goals is symmetrical and of shots is skewed.
 - C. Both distributions are skewed.
 - D. Both distributions are symmetrical.
9. Which two measures have the same value?
- A. The lower quartile of the shots and the upper quartile of the goals.
 - B. The lower quartile of the shots and the median of the goals.
 - C. The median of the shots and the median of the goals.
 - D. The median of the shots and the upper quartile of the goals.
10. In one particular game they scored the median number of goals from the median number of shots. What percentage of their shots were successful in that game?
- A. 39% B. 60% C. 65% D. 75%
11. Maxine recorded the number of Potoroo sightings per week on 12 randomly selected weeks of the year. The number of sightings were : 12, 15, 16, 9, 7, 8, 9, 12, 11, 9, 8, 5. What was the mean and (sample) standard deviation for the number of sightings? (Correct to two decimal places.)
- A. Mean = 10.08 and standard deviation = 3.09
 - B. Mean = 10.08 and standard deviation = 3.23
 - C. Mean = 12.10 and standard deviation = 3.09
 - D. Mean = 12.10 and standard deviation = 3.23

12. Two footballers wish to compare their records for tackling. The mean and standard deviation for their numbers of tackles per game are provided by the team statistician.

Andy has a mean of 40.5 with a standard deviation of 8.1.

Jacko has a mean of 38.2 with a standard deviation of 18.2

Which statement is correct?

- A. Andy has a better average and is more consistent.
 - B. Andy has a better average but is less consistent.
 - C. Jacko has a better average and is more consistent.
 - D. Jacko has a better average but is less consistent.
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Further Measures of Spread

Calculator Allowed

Name

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

1. The stem and leaf plot shows the number of questions answered correctly by the 20 contestants in a trivia quiz.

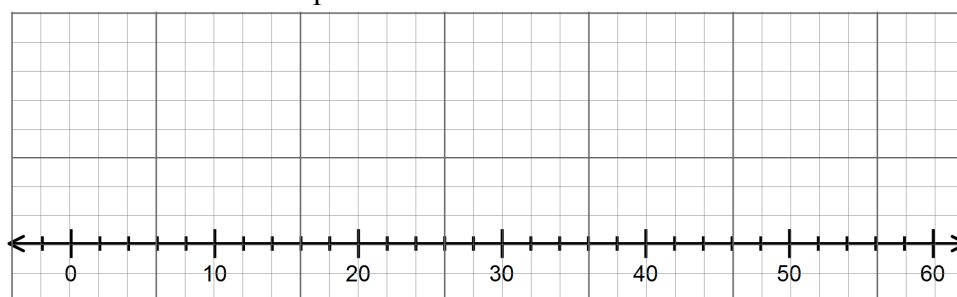
0	9					
1	4	9				
2	3	4	6	8	9	
3	0	2	4	5	8	9
4	1	3	3	4		
5	3	5				

- 2

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- 2

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High School Mathematics Test 2013

Multiple Choice Answer Sheet

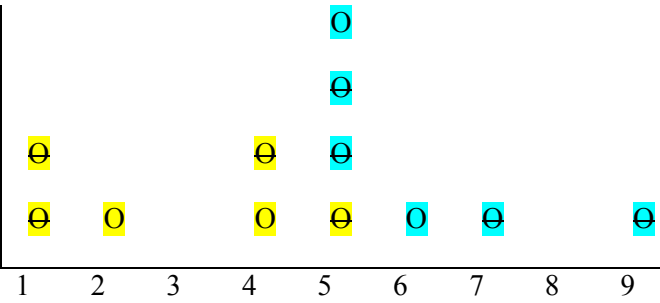
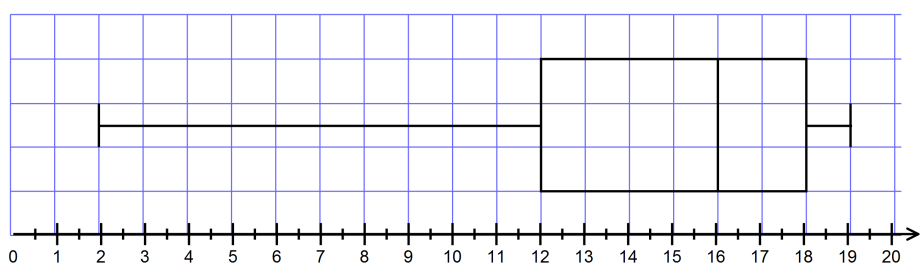
Name _____

Completely fill the response oval representing the most correct answer.

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|-----|---|-----------------------|---|-----------------------|---|-----------------------|---|-----------------------|
| 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"/> |
| 8. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 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"/> |

High School Mathematics Test 2013 Further Measures of Spread

ANSWERS

Section 1	
1.	45, 55, 57, 60, 65, 80, 88, 90, 92 Median is 65, leaving 4 above and 4 below. Lower Quartile from 45, 55, 57, 60 is 56. Upper Quartile from 80, 88, 90, 92 is 89.
2.	60, 65, 87, 90, 95, 100, 128, 150, 220, 250, 300 Median is 100, leaving 5 above and 5 below. Lower Quartile from 60, 65, 87, 90, 95 is 87. Upper Quartile from 128, 150, 220, 250, 300 is 220. Interquartile range = $220 - 87 = 133$
3.	Arrange in order 2, 2, 2, 2, 3, 3, 3, 3, 3, 4, 4, 4, 6, 8 Interquartile range = $4 - 2 = 2$
4.	Upper and lower quartiles are 8 and 5, so interquartile range = $8 - 5 = 3$.
5.	<div style="text-align: center;">  </div> <p>Lower Q = 3 Upper Q = 5.5</p>
6.	1, 3, 5, 5.5, 9
7.	Range = $48 - 16 = 32$
8.	Interquartile range = $44 - 22 = 22$
9.	
10.	$\frac{1}{2}$ mark for any mention of the highlighted terms : The data has a large range of 17, but a relatively small interquartile range of 6. The upper values are closer together meaning the data is skewed. There are clusters toward the higher values

11.	$\sigma_n = 7.0$ (correct to 1 dec place)
12.	As the two players have the same mean, they scored the same total number of points, however Marcus was more consistent, with his scores being closer to the mean. Keegans results would have varied between much higher and lower results.

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

Section 3	
1.	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> 0 9 1 4 9 2 3 4 6 8 9 3 0 2 4 5 8 9 4 1 3 3 4 5 3 5 </div> <div> <p>a) Five number summary 9, 25, 33, 42, 55</p> </div> </div>
	<p>b)</p>
	<p>d) Mean $\bar{x} = 32.95$ Population Standard Deviation = $\sigma_n = 11.72$</p>

High School Mathematics Test 2013

Multiple Choice Answer Sheet

Name _____ Marking Sheet

Completely fill the response oval representing the most correct answer.

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|-----|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|
| 1. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input checked="" type="radio"/> | D | <input type="radio"/> |
| 2. | A | <input checked="" type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 3. | A | <input type="radio"/> | B | <input checked="" 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 checked="" type="radio"/> |
| 5. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input checked="" type="radio"/> | D | <input type="radio"/> |
| 6. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input checked="" type="radio"/> |
| 7. | A | <input type="radio"/> | B | <input checked="" type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 8. | A | <input checked="" type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 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 checked="" type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |