High School
Mathematics Test 2013

Year 10

Bivariate Data

Calculator Allowed

Skills and Knowledge Assessed:

- Use scatter plots to investigate and comment on relationships between two numerical variables (ACMSP251)
- Investigate and describe bivariate numerical data where the independent variable is time (ACMSP252)
- 10A Use information technologies to investigate bivariate numerical data sets. Where appropriate use a straight line to describe the relationship allowing for variation (ACMSP279)

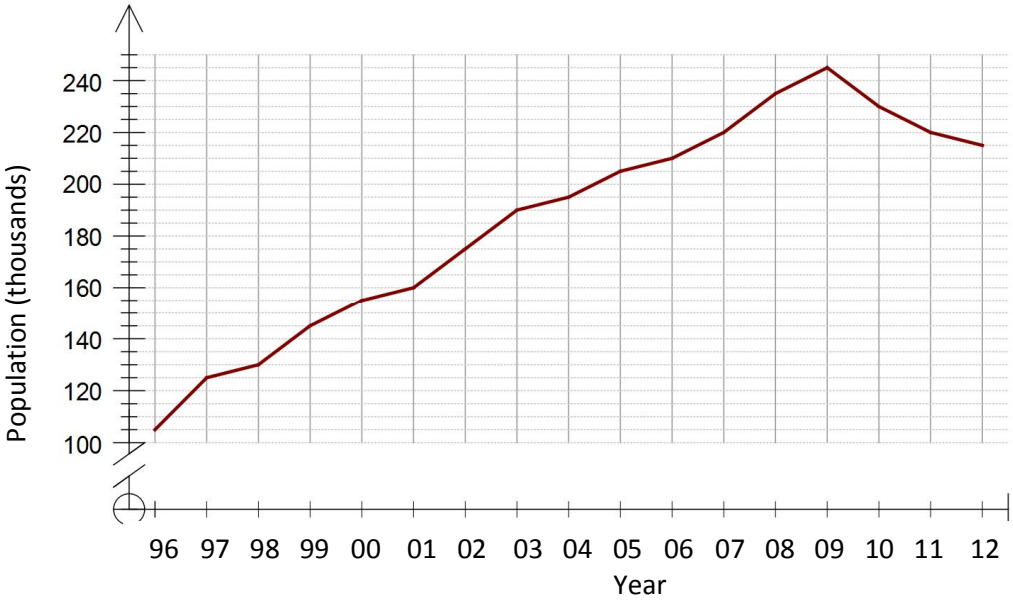
Name_____

Section 1 Short Answer Section

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

Questions 1 – 3 refer to the following.

The graph below shows the population of a Pacific Island between 1996 and 2012.



1. What was the population in 2005?

   .....

2. In which year did the population reach 190 000?

   .....

3. Compare the rate of change in population before and after 2009.

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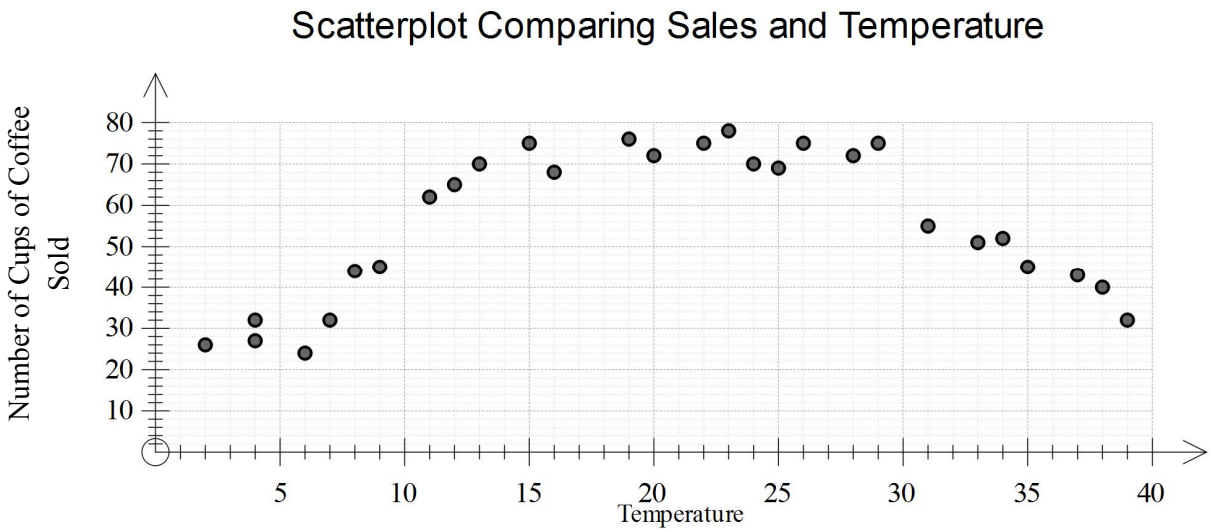
Questions 4 – 6 refer to the scatterplot shown below, which compares the outside temperature and the sales of coffee at an outdoor café over 28 days.



4. Is there a straight line relationship between the two quantities, and if not is there any other relationship between them?

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5. What percentage of the days had sales of over 60 cups?

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6. Of the days which had a temperature greater than 10°C, what percentage had sales of over 60 cups?

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7. What description could be given to the relationship between the variables *a* and *b* shown on the scatterplot?

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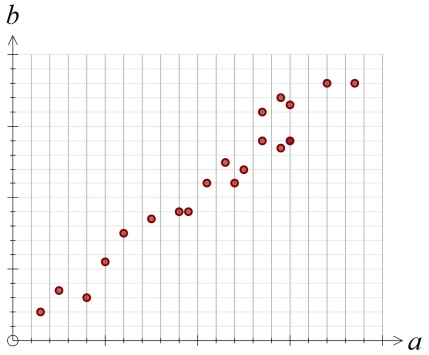
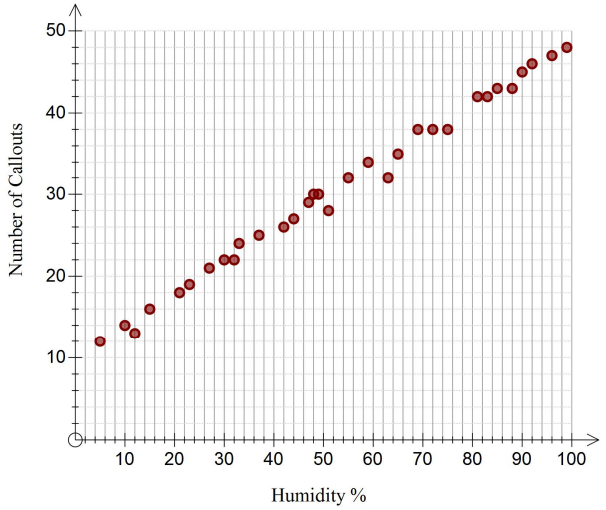


Questions 8 – 10 refer to the scatter plot shown below which compares the number of callouts by police on a day with the level of humidity on that day.



8. What percentage of days had humidity above 80%?

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9. What percentage of the days had less than 20 callouts?

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10. Of the days which had a humidity above 50%, what percentage had more than 40 callouts?

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……

11. Draw a line of best fit on the scatterplot, to represent the data.

12. Use the graph to estimate the humidity if there were 40 callouts on a day.

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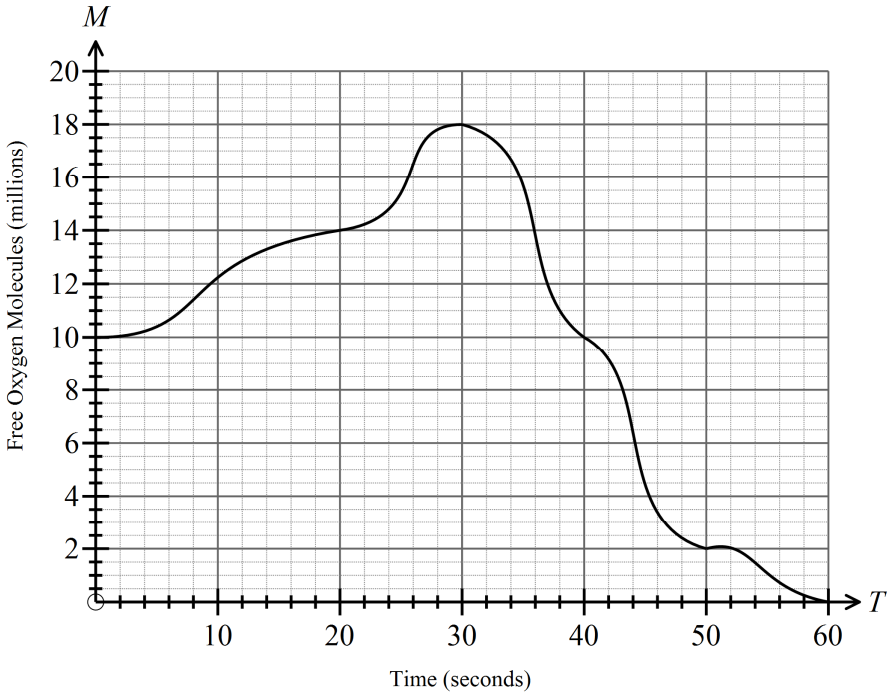
Section 2 Multiple Choice Section

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.

Questions 1 – 3 refer to the following.

The line graph shows the number of molecules of free oxygen available during a series of chemical reactions in a sealed container.



1. For how many seconds are there more than 14 million oxygen atoms free?

   A. 8 seconds B. 12 seconds C. 16 seconds D. 20 seconds

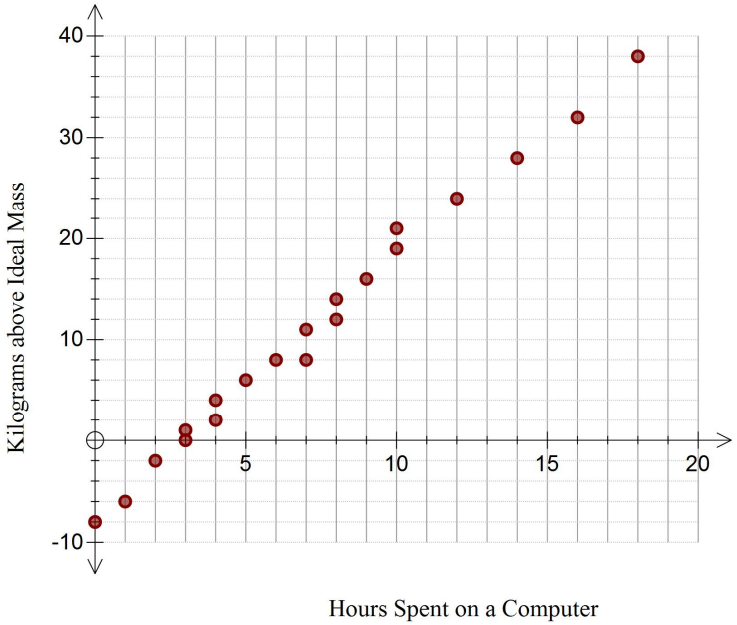
2. For how many seconds does the number of free oxygen atoms increase?

   A. 8 seconds B. 15 seconds C. 18 seconds D. 30 seconds

3. What is the decrease in numbers between the 30^{th} and 50^{th} seconds of the reaction?

   A. 8 million B. 16 million C. 18 million D. 20 million

Questions 4 – 6 refer to the scatterplot which compares the number of hours per day spent working on a computer with the number of kilograms over ideal mass, for a group of 20 subjects.



4. What percentage of the subjects were above their ideal mass?

A. 4% B. 20% C. 80% D. 96%

5. What fraction of the subjects spent ten hours or more on the computer?

A. $\frac{3}{10}$ B. $\frac{1}{2}$ C. $\frac{3}{5}$ D. $\frac{4}{5}$

6. If a line of best fit were drawn, where would it cross the vertical axis?

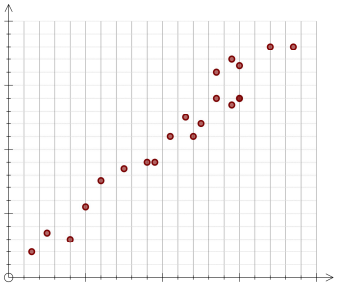
A. –12 B. –8 C. –4 D. 8

7. Of those who spent more than five hours per day working on a computer, what fraction were more than 20 kilograms above their ideal mass?

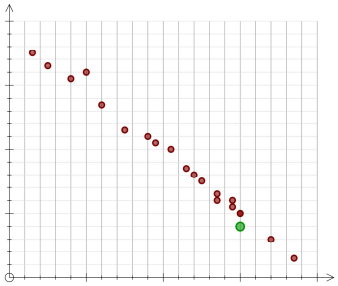
A. $\frac{1}{4}$ B. $\frac{1}{3}$ C. $\frac{5}{12}$ D. $\frac{1}{2}$

8. Which scatter graph shows a strong positive linear relationship?

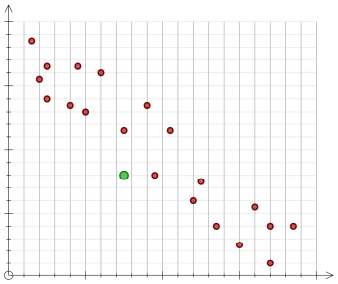
A.



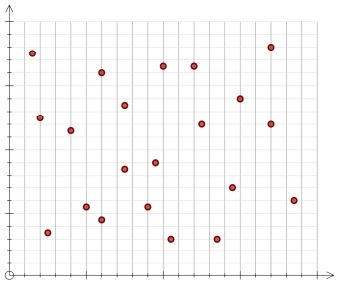
B.



C.

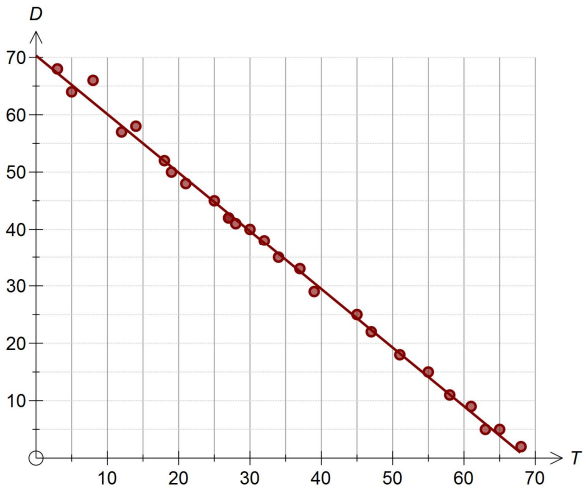


D.



9. A line of best fit has been drawn on the scatter graph.

Which would be a close estimate for the gradient of the line?



A. Gradient $= -2$

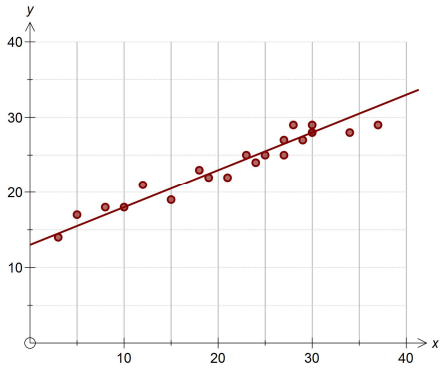
B. Gradient $= -1$

C. Gradient $= \frac{1}{2}$

D. Gradient $= 1$

10. A line of best fit has been drawn on the scatter graph.

Which could be the equation of the line?



A. $y = -\frac{1}{2}x$

B. $y = -\frac{1}{2}x + 13$

C. $y = \frac{1}{2}x$

D. $y = \frac{1}{2}x + 13$

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Section 3 Longer Answer Section

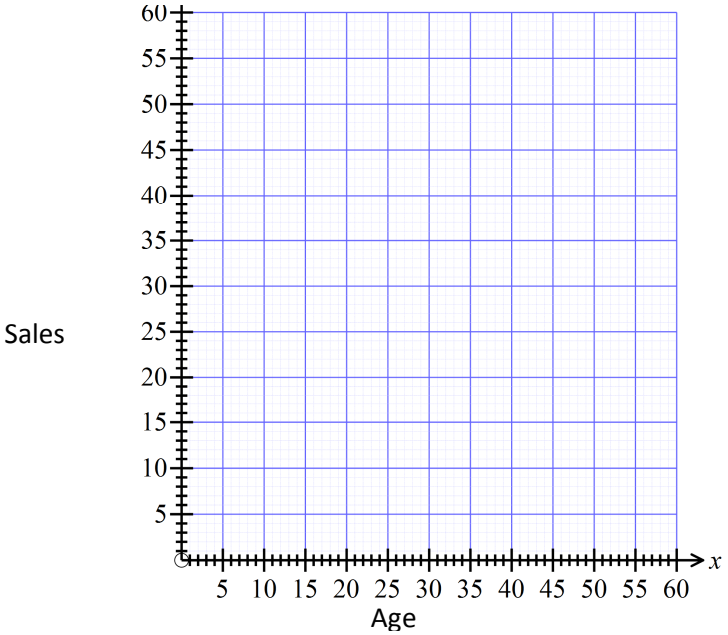
Write all working and answers in the spaces provided on this test paper.

Marks

1. The table below compares a musician's age with the sales of their recordings

Age (years)	10	18	21	25	32	39	44	51	57	55	60	35
Sales (1000s)	54	53	49	47	42	40	38	35	34	32	30	45

a) Mark the data onto a scatter plot using the grid below. **2**



b) Draw a line of best fit on the scatterplot. **1**

c) What is the equation of the line of best fit for the scatterplot? **2**

……

……

d) A musician is 56 years old. What would his sales be? **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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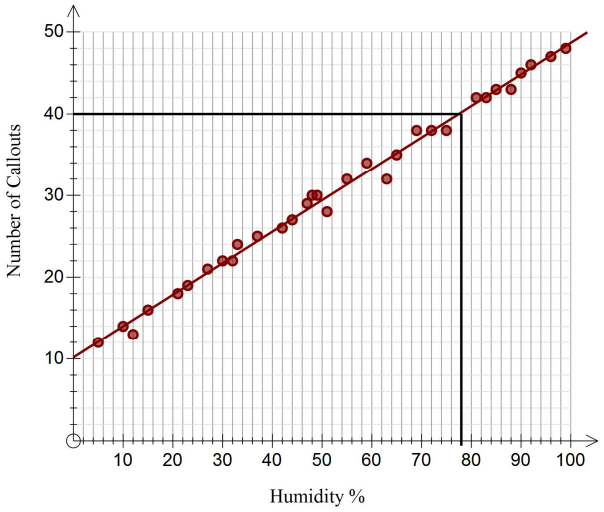
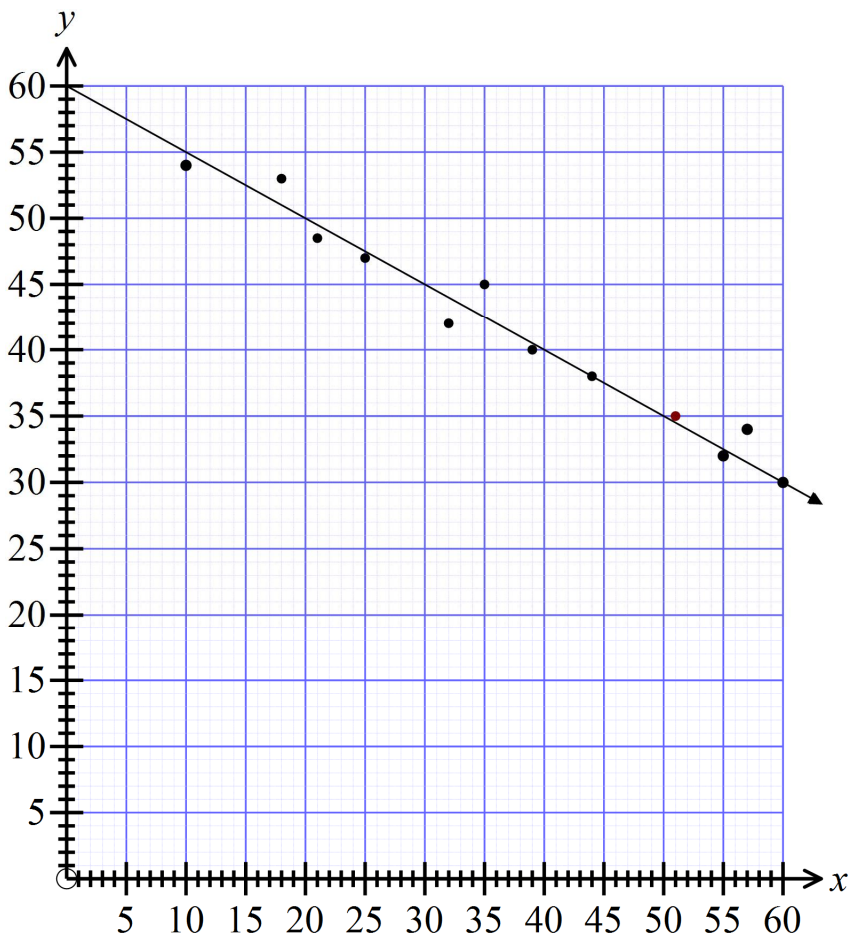
ANSWERS

Section 1	
1.	205 000
2.	2003
3.	Prior to 2009 the population was growing steadily, but after 2009 is declined steadily.
4.	There is not a straight line relationship, but there does appear to be a curved relationship.
5.	14 days out of 28 =50%
6.	There are 21 days over 10°. Of these, 14 have sales over 60. Percentage = $\frac{14}{21} \times 100 = 66\frac{2}{3}\%$
7.	There is a positive linear relationship.
8.	8 Days out of 32 = $\frac{8}{32} \times 100 = 25\%$
9.	6 out of 32 = $\frac{6}{32} \times 100 = 18.75\%$
10.	8 out of 16 = $\frac{8}{16} \times 100 = 50\%$
11.	
12.	From the line, 40 callouts corresponds to 78% humidity. (Allow ± 2)

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

Section 3	
1.	
	a) b) see graph
	c) $S = 60 - 0.5A$ (Allow ± 2 for y intercept)
	d) Sales $= 60 - 0.5 \times 56 = 60 - 28 = 32\,000$ (Allow answers consistent with answer in c))

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Multiple Choice Answer Sheet

Name Marking Sheet

Completely fill the response oval representing the most correct answer.