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Eastern Goldfields College
Mathematics Essentials U3&4 2018

Test 3

Question 1 **(3 marks: 1, 2)**

a) Given the four scatter graphs below, which one shows the weakest linear relationship? **[1]**

- D

b) Match each of the scatter graphs with one of these descriptions: **[2]**

½ mark per correct answer

i. B

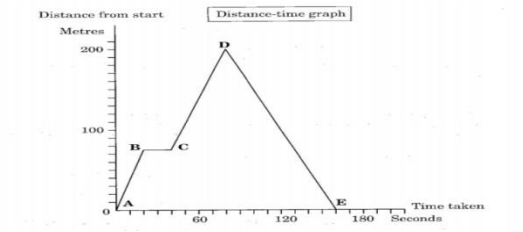
ii. A

iii. D

iv. C

Question 2 **(2 marks)**

The following graph shows the motion of a runner on a path.



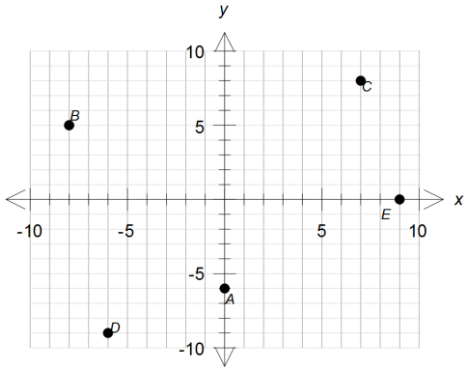
Which of the following statements is **false** and why? **[1]**

b) The runner ran up a hill and down the other side.

Reason: The section DE indicates they returned to their starting point **[1]**

Question 3 **(3 marks)**

State the coordinates of each point.

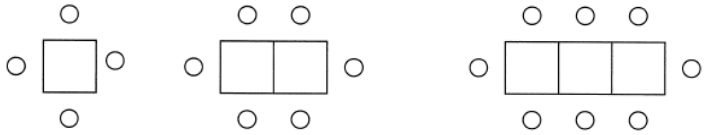


A: (0, -6)
B: (-8, 5)
C: (7, 8)
D: (-6, -9)
E: (9, 0)

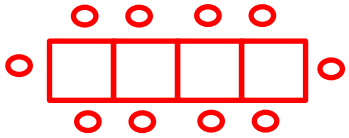
All correct - 3 marks
3 correct – 2 marks
2 correct – 1 mark
1 or none – 0 mark

Question 4 **(5 marks: 1, 1, 2, 1)**

The diagrams below represent an arrangement of tables and chairs.
This is summarized in the table below.



a) Draw the next diagram in the pattern. **[1]**



b) Complete the table for values for t = 3 and t = 4. **[1]**

Number of tables (t)	1	2	3	4	5	10	20	100
Number of chairs (n)	4	6	8	10	12	22	42	202

c) Write a linear relationship linking (t) and (n) **[2]**

- n = 2t + 2

1 mark = rate of change
1 mark = vertical intercept

d) Complete the table above **[1]**

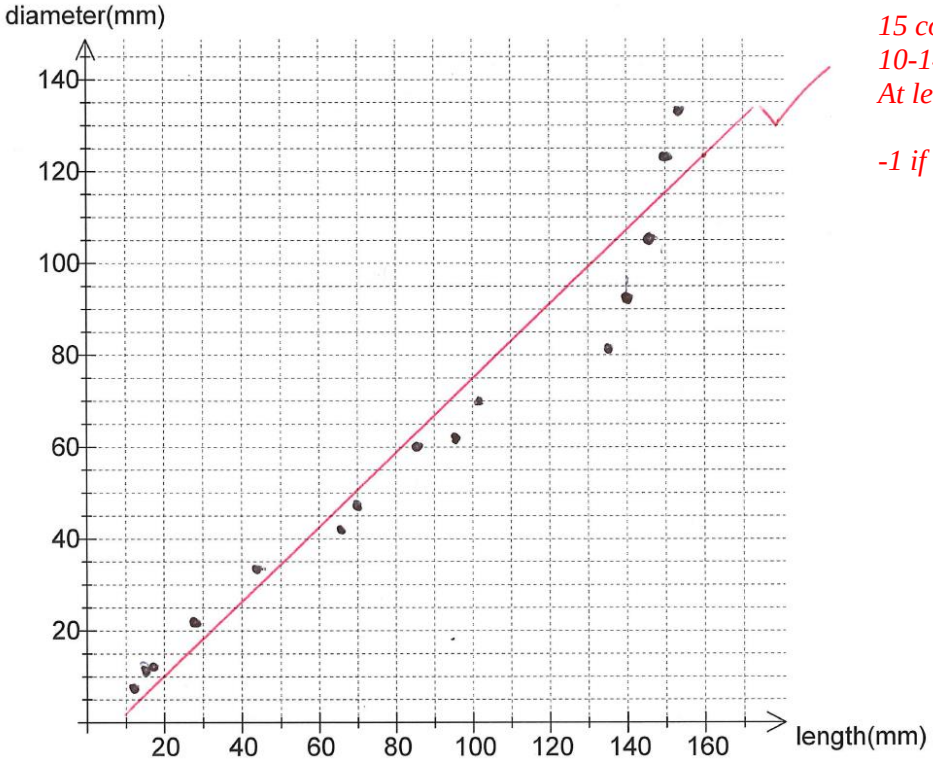
- 22, 42, 202 *all must be correct*

Question 5 **(11 marks: 3, 1, 1, 2, 1, 2, 1)**

The table below shows the length and diameter of a small sample of bird eggs from different species of birds.

length (mm)	95	18	29	70	66	11	86	101	15	135	43	147	150	153	140
diameter (mm)	62	13	21	47	42	8	60	70	13	81	34	110	124	133	89

a) Construct a scatterplot for the data. **[3]**



15 correct – 3 marks
10-14 – 2 marks
At least 8 – 1 mark

-1 if axes swapped

b) State the dependent and independent variables: **[1]**

Dependent : Diameter ½ Independent : Length ½

c) Describe the association between length and diameter for the dataset. **[1]**

- Positive moderate linear *Must have all three*

d) Draw a line of best fit and use it to predict the diameter of an egg with a length of 50 mm. **[2]**

- Line of best fit (1)
- ~35mm or according to their Line of best fit (1)

e) Predict the diameter of an egg with a length of 160 mm. **[1]**

- ~124mm or according to their line of best fit (1)

f) Which answer is likely to be more reliable/accurate (d) or (e)? Explain why. **[2]**

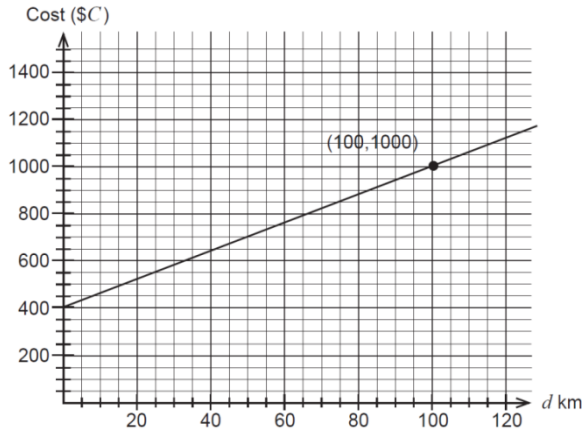
- D (1)
- Interpolation rather than extrapolation (1)

g) Describe the trend of the data. **[1]**

- Increasing

Question 6 **(13 marks 2, 2, 3, 3, 3)**

The graph below shows the cost, based on the energy used, to transport bottled water from its source to the consumer. Ampac Trucking and Beta Trucking distribute water bottles to shops and charge for this service. Beta company's cost ($*C*) per km (*d*) is shown on the graph.



a) For Beta Trucking:

i. Determine and describe the significance of the vertical intercept. **[2]**

Solution	
Vertical Intercept 400 – accept (0, 400) Represents the initial cost at 0 km, i.e. a call out fee (accept appropriate answers)	
Specific Behaviours	**Marks**
Determines vertical intercept.	1
Describes vertical intercept in terms of initial cost, zero distance or similar.	1
Total	**2**

ii. Determine the rate of change (related to the slope of the line). **[2]**

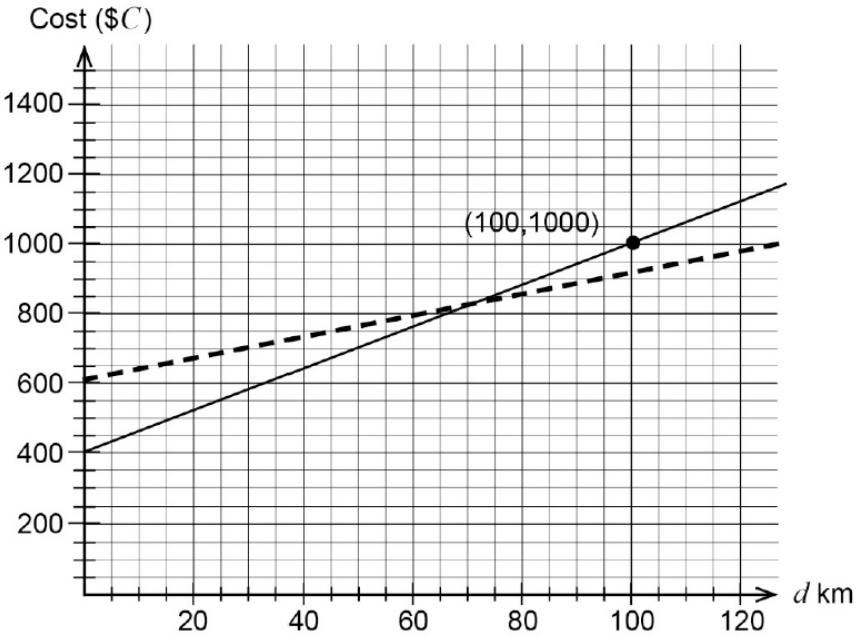
Solution	
Rate of Change = $\frac{600}{100}$ = 6 i.e. $6 per km – accept 6	
Specific Behaviours	**Marks**
Identifies a vertical change in relation to a horizontal change.	1
Determines correct rate of change.	1
Total	**2**

iii. Determine the linear relationship between cost ($*C*) and km (*d*) travelled. **[3]**

Sample solution	
From (i) Rate of Change = 6 or based on answer in part (i) From (ii) Vertical Intercept = 400 or based on answer in part (ii) Hence $C = 6d + 400$	
Specific Behaviours	**Marks**
Uses the rate of change from part (i) (1) and vertical intercept from part (ii) to determine the linear relationship (1).	1–2
Writes relationship in correct linear form.	1
Total	**3**

b) Ampac Trucking charge an initial cost of $600 and $3 per km as shown in the table below. Draw a graph of this relationship onto the previous page. **[3]**

Distance (d km)	0	50	100
Cost ($\$C$)	600	750	900



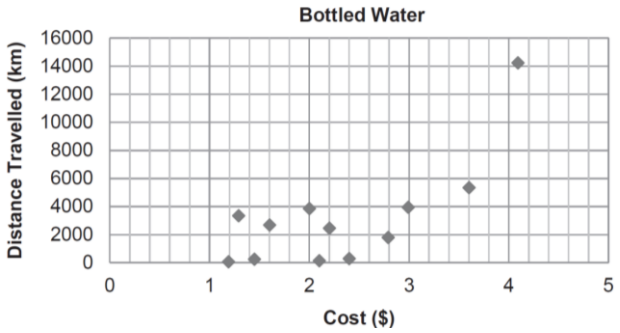
Solution	
See student's graph	
Specific Behaviours	**Marks**
Graphs the correct vertical intercept.	1
Graph has correct slope.	1
Shows a linear continuous graph.	1
Total	**3**

c) Determine the point of intersection and comment on how this relates to the two trucking companies. **[3]**

Sample solution	
~(67, 800) At 67 km both companies charge $800, i.e. the point where Ampac Trucking and Beta Trucking charge the same price for the same amount of km.	
Specific Behaviours	**Marks**
Determines point of intersection based on student's graph in part (b).	1
Relates correctly horizontal coordinate to distance based on identified point.	1
Relates correctly vertical coordinate to cost based on identified point.	1
Total	**3**

Question 7 **(9 marks 2, 1, 3, 1, 2)**

The scatterplot shows the cost ($) of 12 different brands of bottles of water and the distance travelled (km) from the water source to Perth.



a) Describe the association between the variables for **all** of the given points in terms of direction and strength. **[2]**

Solution	Marks
Positive, moderate.	
Describes the association between the variables in terms of direction (1) and strength (1).	1–2
Total	**2**

A popular brand of water is sourced in France and travels the furthest.

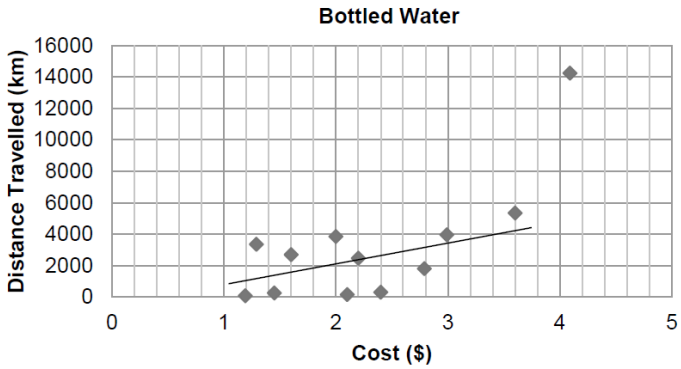
i. Identify this point on the graph. **[1]**

Solution	
See point identified on graph.	
Specific Behaviours	**Marks**
Identifies outlier on graph.	1
Total	**1**

ii. Comment on how **not** including this point affects the association between the variables in terms of form and strength. **[3]**

Solution	Marks
Strength of association increases Form becomes linear	
Identifies strength of association is increased.	1
Indicates strength of association based on point chosen in part (i).	1
Indicates form based on point chosen in part (i).	1
Total	**3**

iii. Fit a trend line by eye to the graph (without the point identified in part i.).

Sample solution	
	
Specific Behaviours	**Marks**
Trend line in appropriate position	1
Total	**1**

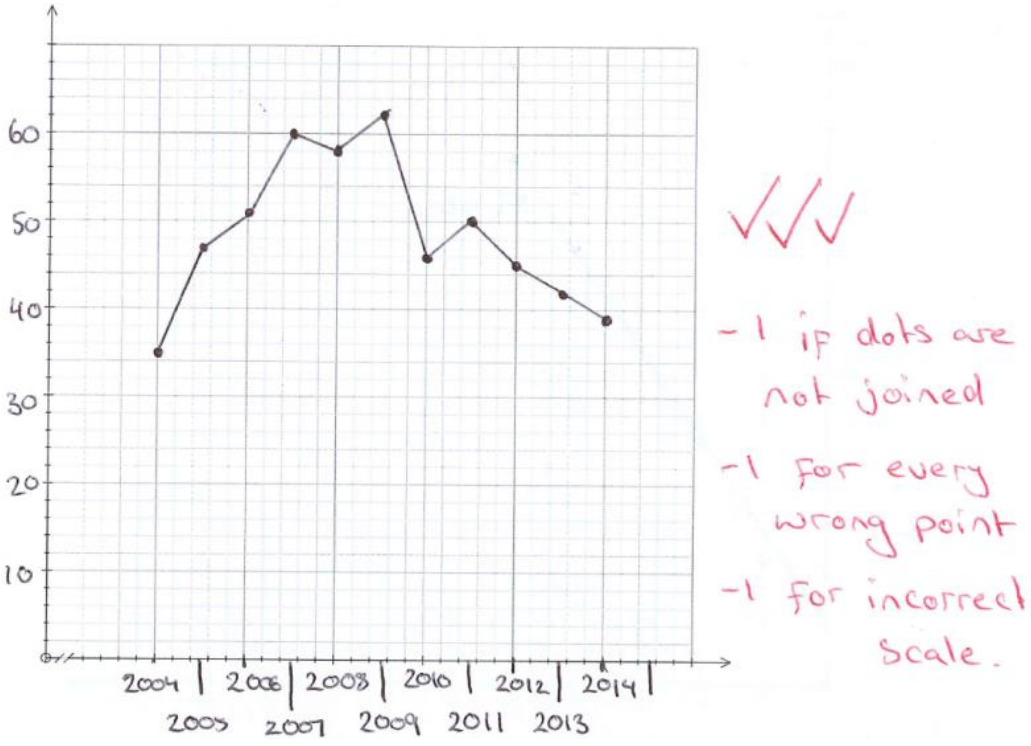
b) A local newspaper publishes the amended graph from part (b) under the headline 'The distance travelled by bottled water causes an increase in the sale price'. Do you agree with this statement? Use mathematical reasoning to justify your answer. **[2]**

Solution	
No. Even though there is a strong association between the variables, association does not imply cause.	
Specific Behaviours	**Marks**
Disagrees with statement.	1
Justifies answer distinguishing between causality and association.	1
Total	**2**

Question 8 **(5 marks: 3, 2)**

The number of babies born each year in Kojonup District Hospital is as follows:

a) Graph the data as a line graph on the grid provided below. **[3]**



b) What comment can you make about the trend in the birth rate in this town? **[2]**

- Births peaked in **2009** (1)
- But **decreased** since then (1)

END OF TEST