GREENWOOD COLLEGE

YEAR 12 Applications 2016/17

Chapter 1, Test 1 Section 1

Time: 30 Minutes **No calculators allowed** **No notes**

NAME: Solutions **Marks:** ____ /30

1. [8 marks: 2, 2, 2, 2]

Mrs Mazzart teaches Music and Mathematics. She wishes to investigate the claim that mathematical competence and music competence are related. Together with some of her students, they design a statistical investigation to study this claim.

a) State a possible response and explanatory variable for the investigation.

RV: Performance in Mathematics Test ✓
EV: Performance in Music Test ✓ OR RV: Performance in Music Test
EV: Performance in Mathematics Test

b) Describe the data that need to be collected and how the data is to be collected.

- Need to identify a group of students that are enrolled in the same music course and same maths course ✓
- For each student the marks for the music course and the marks for the maths course is retrieved from the teacher's marks book. ✓

c) Describe how you would display and analyse the data.

- Display collected data on a scatter-graph ✓
- If the scatter graph indicates a liner relationship exists, calculate the coefficient of linear correlation between the variables. ✓

d) Describe how you would interpret the data you analysed.

- The strength and type of relationship between the variables is determined by the value of the coefficient of linear correlation r. ✓
- Relationship between variables is that of an association and not a causal relationship. ✓

2. [2 marks]

The linear relationship between two variables, x and y, is described as negative. The least squares regression line has equation $y=a+bx$.
Determine with reasons which of the following statement(s) must be true.

a) Both *a* and *b* must be positive
b) Both *a* and *b* must be negative
c) *a* must be positive
d) *a* must be negative
e) *b* must be negative ✓

As the relationship between x & y is negative, the least squares regression line must have a negative gradient. Hence 'b' must be negative. ✓

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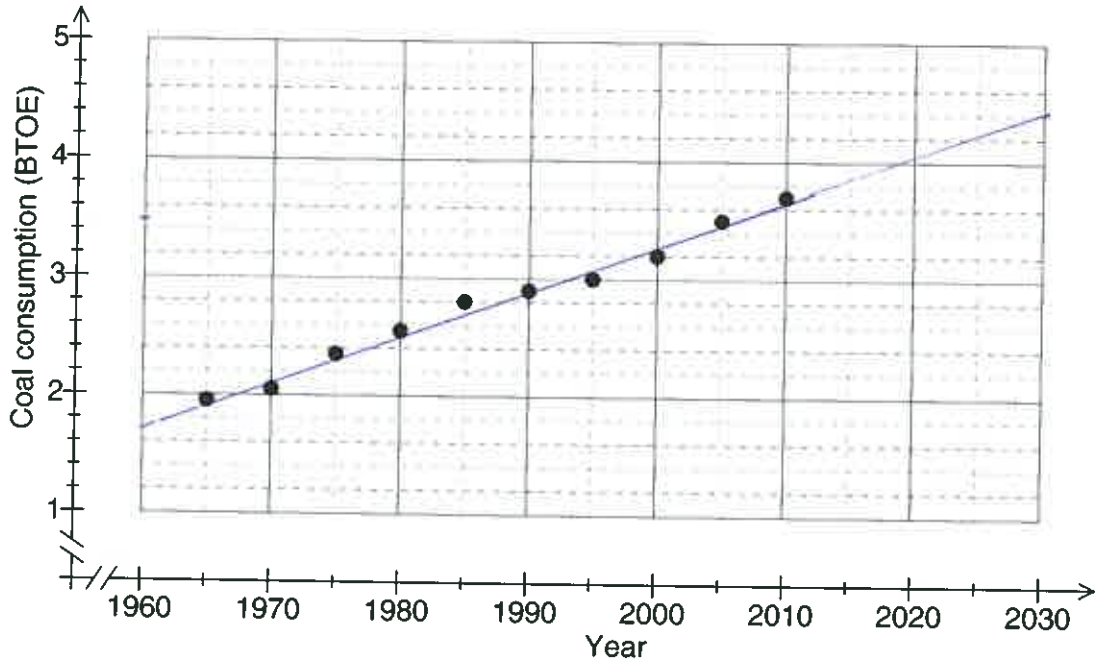
6 a b c d

3. [8 marks: 1, 1, 2, 1, 1, 2]

The worldwide consumption of coal (in billion tonnes of oil equivalent, BTOE) is shown in the graph below from 1965 until 2010. A billion is one thousand million.



(a) Use the graph to estimate the worldwide consumption of coal in 2005 in

(i) billion tonnes of oil equivalent. 3.5 billion ✓

(ii) tonnes of oil equivalent, giving your answer in scientific notation.

(b) Add a trend line to the scatterplot.

✓

(c) Estimate the worldwide consumption of coal in

(i) 1960. 1.7 billion ✓

(ii) 2030. 4.4 billion ✓

(d) Which estimate in (c) is more reliable? Explain your reasoning.

- 1960 ✓ =
- 1960's estimation is more closer to the given data compare to 2030s ✓

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4) [8 marks]

Determine the explanatory variable and response variable for each of the following:

a) Arm length and height.

Explanatory variable: Height ✓

Response variable: Arm length ✓

b) Weekly pay and the number of hours worked

Explanatory variable: Number of hours worked ✓

Response variable: Weekly pay ✓

c) Number of skiers and amount of snow

Explanatory variable: amount of snow ✓

Response variable: Skiers ✓

d) Consumption of coffee and heart rate

Explanatory variable: Consumption of coffee ✓

Response variable: heart rate ✓

5) [6 marks]

State each of the following variables as:

Numerical and discrete or continuous

Categorical and nominal or ordinal

i) Number of supporters at a cricket match

Numerical, discrete ✓✓

ii) Body temperature

Numerical, continuous ✓✓

iii) Star movie rating

Categorical, ordinal ✓✓

c) Calculate the correlation coefficient for the data, and comment briefly on your answer with reference to the appearance of the scatterplot in part (b).

$r = 0.956$ ✓

Strong positive linear relationship between tidal range and maximum tidal current. ✓

d) i) Determine the equation for the least-squares line that models these data. State the slope and vertical-intercept correct to one decimal place.

Equation: $y = ax + b$

$y = 15.98x - 18.33$ ✓

Slope : 16.0

Vertical-intercept : -18.3 } both ✓

ii) Draw this line on the scatterplot in part (b) by showing two calculated points on the graph.

when $x = 3$

$y = 15.98(3) - 18.33$

$y = 29.61$

(3, 29.61)

when $x = 5$

$y = 15.98(5) - 18.33$

$y = 45.59$

(5, 61.57)

✓ two calculated points

✓ line on the scatterplot

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