C:\Documents and Settings\Amy Shaw\Local Settings\Temporary Internet Files\Content.IE5\Y7YD832X\MC900154518[1].wmf **Revision Examination Assessment Papers (REAP)**

**Semester 1 Examination 2012**

**Question/Answer Booklet**

(This paper is not to be released to take home before 25/6/2012)

**MATHEMATICS 2C**

**Section Two:**

**Calculator-assumed**

Name of Student: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Marking key\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Time allowed for this section**

Reading time before commencing work: 10 minutes

Working time for this section: 100 minutes

**Materials required/recommended for this section**

***To be provided by the supervisor***

This Question/Answer Booklet

Formula Sheet (retained from Section One)

***To be provided by the student***

Standard items: pens, pencils, pencil sharpener, eraser, correction fluid/tape, ruler,

Highlighters

Special items: drawing instruments, templates, notes on two unfolded sheets of A4 paper,

and up to three calculators satisfying the conditions set by the Curriculum

Council for this examination

**Important note to students**

No other items may be used in this section of the examination. It is **your** responsibility to ensure

that you do not have any unauthorised notes or other items in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

**Structure of this paper**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Section | Number of questions available | Number of questions to be answered | Working time  (minutes) | Marks available | Percentage of exam |
| Section One  Calculator-free | 6 | 6 | 50 | 50 |  |
| Section Two  Calculator-assumed | 13 | 13 | 100 | 100 |  |

|  |  |  |
| --- | --- | --- |
| Total | 150 | 100 |

**Instructions to students**

1 Write your answers in the spaces provided in this Question/Answer Booklet. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer. If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued. i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

2 **Show all your working clearly**. Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks. If you repeat an answer to any question, ensure that you cancel the answer you do not wish to have marked.

3 It is recommended that you **do not use pencil**, except in diagrams.

**Section Two: Calculator-assumed (100 marks)**

This section has **thirteen (13)** questions. Answer all questions. Write your answers in the spaces provided.

Working time: 100 minutes

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 7 (6 marks)**

In Tony’s garden he has a network of pipes connected to the bore water supply at B as shown below. The flow rates are given in litres per minute. The water can be directed to any outlet as required.



(i) Determine the maximum flow which can be directed from B to V. (3)

|  |
| --- |
| **Solution** |
| BLRV 30  BHLRV 30  BHRV 30  BHPV 30  BPV 30  Total 150 litres |
| **Specific behaviours** |
| ✓✓ working  ✓ maximum flow |

(ii) If the flow from H to R is increased by 10 litres per minute, how does this affect

the maximum flow? (1)

|  |
| --- |
| **Solution** |
| Increase maximum flow by 10 to 160 litres |
| **Specific behaviours** |
| ✓ or X |

(iii) Is the maximum flow affected if the flow from P to V is 70 litres per minute?

Justify your answer. (2)

|  |
| --- |
| **Solution** |
| No, maximum flow is still 150 litres as flow from B to P is still 30 |
| **Specific behaviours** |
| ✓ or X |

**Question 8 (7 marks)**

Naomi works in the Finance Department of a factory which employs 100 men and 100 women. She wanted to determine whether there was any difference in the hourly earnings between men and women. The information collected on all these non-salaried employees is tabulated below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Hourly rate $ | 16 | 18 | 20 | 22 | 24 |
| Number of men | 6 | 31 | 15 | 29 | 19 |
| Number of women | 7 | 25 | 21 | 24 | 23 |

(i) Calculate the mean for the hourly earnings for the women. (1)

|  |
| --- |
| **Solution** |
|  |
| **Specific behaviours** |
| ✓ or X |

(ii) Calculate the standard deviation for the hourly earnings for the women. (1)

|  |
| --- |
| **Solution** |
|  |
| **Specific behaviours** |
| ✓ or X |

(iii) Naomi calculated the statistics for the men such that

Mean = $20.48

Standard deviation = $2.50

She concluded that there was little difference in the hourly earnings

between men and women at this factory.

Do you agree with Naomi? Explain. (2)

|  |
| --- |
| **Solution** |
| Yes, little difference in the mean and standard deviation |
| **Specific behaviours** |
| ✓ |

(iv) Determine the median and modal hourly earnings for both the men and women. (1)

|  |
| --- |
| **Solution** |
| Median = $20, Mode = $18 |
| **Specific behaviours** |
| ✓ for both |

(v) If Kevin, a union representative wants to push for a pay rise for these employees,

which of the median, mode or mean would he use and why? (2)

|  |
| --- |
| **Solution** |
| Mode as it is the smallest measure of central tendency |
| **Specific behaviours** |
| ✓ mode  ✓ reason |

**Question 9 (8 marks)**

(a) Match each set of equations with the graphs below. (5)

Set A:  and 

Set B:  and 

Set C:  and 

Graph (i) Graph (ii) Graph (iii)



|  |  |
| --- | --- |
| Graph | Set of equations |
| (i) | **C ✓** |
| (ii) | **A ✓✓** |
| (iii) | **B ✓✓** |

(b) Given the line PQ with equation 

1. State the gradient of the family of lines perpendicular to PQ. (1)

|  |
| --- |
| **Solution** |
| m = -2 |
| **Specific behaviours** |
| ✓ or X |

1. Find the distance between the -intercept of PQ and (0, 4). (2)

|  |
| --- |
| **Solution** |
| Distance between (0,1) and (0,4) is 3 units |
| **Specific behaviours** |
| ✓ point (0,1)  ✓ distance of 3 |

**Question 10 (5 marks)**

Capel Vine Golf Club purchased new lawn mowers for $22 000.

(i) If the depreciation rate of the lawn mowers is a flat rate of 12% per annum,

find the depreciation value of the lawn mowers after four years. (2)

|  |
| --- |
| **Solution** |
|  |
| **Specific behaviours** |
| ✓ identifies and uses Simple Interest formula  ✓ correct answer for 4 years |

(ii) Use the reducing balance depreciation method with a depreciation rate of 12% per annum

to calculate the depreciated value of the lawn mowers after four years, to the nearest dollar. (2)

|  |
| --- |
| **Solution** |
|  |
| **Specific behaviours** |
| ✓  ✓ correct answer to nearest dollar |

(iii) Which of the above methods, after 4 years will give the greater depreciation? (1)

|  |
| --- |
| **Solution** |
| Flat rate |
| **Specific behaviours** |
| ✓ or X |

**Question 11 (11 marks)**

(a) Match these probabilities with the statements that follow

0, 0.19, 0.25, 0.5, 1

1. The next person who walks into the classroom will be a female. (1)
2. You will score perfect marks (100%) in all your end-of-year WACE examinations. (1)
3. A card drawn from a normal playing pack is a heart. (1)
4. Good Friday is a public holiday in Australia. (1)
5. You pick a vowel from the alphabet. (1)

|  |
| --- |
| **Solution** |
| 1. 0.5 2. 0 3. 0.25 4. 1 5. 0.19 |
| **Specific behaviours** |
| ✓✓✓✓✓ 1 mark each |

(b) Consider the family of curves with the equations 

Use your CAS calculator to answer the following questions

1. What feature is common to the graphs of this family of curves? (1)
2. What value(s) of  gives one -intercept? (1)
3. What value(s) of  gives two -intercepts? (1)
4. What value(s) of  gives no  -intercepts? (1)
5. What value(s) of  gives an -intercepts that is also a -intercept? (2)

|  |
| --- |
| **Solution** |
| 1. Line of symmetry (LOS)  2. k = 9 🗸 3. k < 9 🗸 4. *k* > 9 🗸 5. *k = 0 🗸🗸* |
| **Specific behaviours** |
| Marks allocation as shown above |

**Question 12 (9 marks)**

(a) The table below shows the level of educational attainment of the labour force

older than 15 years, 20 years ago.

|  |  |  |  |
| --- | --- | --- | --- |
| Education attainment | Male | Female | Total |
| With Post school qualification | 2 393 721 | 1 443 605 | 3 837 326 |
| Without post school qualification | 2 362 846 | 1 906 387 | 4 269 233 |
| Never attended school | 4 852 | 3 454 | 8 306 |
| Still at school | 90 881 | 100 154 | 191 035 |
| Total | 4 852 300 | 3 453 600 | 8 305 900 |

Determine the probability that a person in the workforce selected at random

1. had completed a post school qualification (1)
2. was a female who never attended school (1)
3. had no post school qualification given that he was a male (1)

|  |
| --- |
| **Solution** |
| 1. = 0.462 |
| **Specific behaviours** |
| ✓✓✓ or X for each part |

(b) List the elements in each of the following sets.

(i) A is the set of integers between 1 and 50 divisible by 7. (1)

(ii) The set  (1)

(c) Hence state  (1)

(d) How many subsets can be formed from the set ? (1)

List all the subsets that have exactly three elements. (2)

|  |
| --- |
| **Solution** |
| (b)(i)  (ii)  (c) one  (d) Number of subsets = 24 = 16 |
| **Specific behaviours** |
| (b) ✓✓ 1 each  (c) ✓ or X  (d) ✓ number of subsets  ✓✓ all four subsets |

**Question13 (7 marks)**

The curve  cuts the -axis at points P(2,0) and Q(6,0) and the -axis at R

(i) Find the value of b and the value of c. (3)

|  |
| --- |
| **Solution** |
| 0=4+2b+c  0=36+6b+c  b = -8, c = 12 |
| **Specific behaviours** |
| ✓ two simultaneous equations  ✓ value for b  ✓ value for c |

(ii) Find the coordinates of point R, the -intercept. (1)

|  |
| --- |
| **Solution** |
| (0,12) |
| **Specific behaviours** |
| ✓ or X (must be an ordered pair) |

(iii) State the equation of the line of symmetry. (1)

|  |
| --- |
| **Solution** |
| LOS is x = 4 |
| **Specific behaviours** |
| ✓ or X for equation. Do not accept just 4 |

(iv) A line, L, of equation passes through the curve at points S and T.

Find the coordinates of T and S. (2)

|  |
| --- |
| **Solution** |
| Coordinates of T = (8,12) Coordinates of S = (1,5) |
| **Specific behaviours** |
| ✓✓ 1 mark for each point |

**Question 14 (9 marks)**

(a) A bag contains red, green, yellow and black balls. The table below shows the

probability of choosing a red, green or black ball from the bag.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Colour | Red | Green | Yellow | Black |
| Probability |  |  | p |  |

If there are 12 yellow balls in the bag, how many balls are in the bag altogether? (4)

|  |
| --- |
| **Solution** |
| Let number of balls be x    x = 48  There are 48 balls in the bag |
| **Specific behaviours** |
| ✓✓ value of p  ✓  ✓ concludes 48 balls |

(b) The frequency table shows the marks obtained by some students in a test.

|  |  |  |
| --- | --- | --- |
| Class | Mid-point | Frequency |
|  | 20 | 5 |
|  | 47.5 | 10 |
|  | **65** | y |
|  | **87.5** | 12 |

1. Fill in the blanks in the table. (1)

|  |
| --- |
| **Solution** |
| As displayed in table |
| **Specific behaviours** |
| ✓ or X |

**Question 14 Continued**

1. If the modal class is , write down the minimum and the maximum value of . (2)

|  |
| --- |
| **Solution** |
| y < 12  Minimum y is 0  Max y is 11 |
| **Specific behaviours** |
| ✓✓ 1 mark for each |

(iii) If the estimated value for the mean is , calculate the value of . (2)

|  |
| --- |
| **Solution** |
| Using CAS, y = 3 |
| **Specific behaviours** |
| ✓ calculation  ✓ correct answer of 3 |

**Question 15 (9 marks)**

(a) The Goodde family receives a water use account as shown below.

|  |  |  |  |
| --- | --- | --- | --- |
| Meter Reading details |  |  |  |
| Meter Number | This Reading | Last Reading | Use (kL) |
| BK 05 005 45 | 19th Jan 2012, 2499 | 5 Sep 2011, 2337 | 162 |
| Total water used | in 136 days was | 162 kilolitres | ( 1 kL = 1000 litres) |

The table below shows the charges associated with water usage.

Rates

|  |  |
| --- | --- |
| Use (kL) | Price per kL |
| First 35 kL | $ 0.982 |
| Next 65 kL | $ 1.192 |
| Next 134 kL | $ 1.535 |
| Next 150 kL | $ 1.582 |

1. Calculate the amount they are required to pay for their water usage

during this period. (3)

|  |
| --- |
| **Solution** |
| = $ 207.02 |
| **Specific behaviours** |
| ✓ identifies correct breakup of water usage  ✓ determines correct cost for each part  ✓ calculates total amount correctly |

1. What was the daily water usage and cost per day? (2)

|  |
| --- |
| **Solution** |
| Daily water usagekL  Daily cost |
| **Specific behaviours** |
| ✓✓ 1 mark each |

**Question 15 Continued**

(b) In February, Miss Alotof received a statement for her credit card account.

The account has no interest free period. Simple interest is charged to her account

on the statement date.

Miss Eva Alotof Lots of Money BANK

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Previous Balance Payments Purchases Interest charged $ 529.46 $ 529.46 $ 1721.50 ???

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date Purchases Amount Closing Balance

1st Feb HP Laptop computer $ 1721.50 ???

Credit card statement

Statement date: 25 February 2012

Annual Percentage rate: 19%

Daily percentage rate: 0.0521%

Note: Interest is charged on amounts from and including the date of purchase

up to and including the statement date.

Minimum payment due: $25 or 5% of closing balance whichever is the larger.

1. Calculate the interest charged? (2)

|  |
| --- |
| **Solution** |
| Interest charged = |
| **Specific behaviours** |
| 🗸 calculation  ✓ correct answer of $22.42 |

1. Calculate the closing balance (1)

|  |
| --- |
| **Solution** |
| $ 1721.50 + $ 22.42 = $ 1743.92 |
| **Specific behaviours** |
| ✓ or X |

1. Calculate the minimum payment due on this account? (1)

|  |
| --- |
| **Solution** |
| 0.05 X 1743.92 = $ 87.20 |
| **Specific behaviours** |
| ✓ or X |

**Question 16 (6 marks)**

(a) David is planning to buy a new car. The current cash price of the car he wants to buy

is $60 000 on-the-road. The local bank manager has provided him with a monthly car repayment table so he can consider repayment options. The current interest rate for car loans is 8% p.a.

|  |
| --- |
| **Monthly car repayment table** |
| **Principal and interest per $1 000 borrowed** |
| **Term of loan in years** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Interest rate per annum** | 1 | 2 | 3 | 4 | 5 | 6 | | 7% | 86.53 | 44.77 | 30.88 | 23.95 | 19.80 | 17.05 | | 8% | 86.99 | 45.23 | 31.34 | 24.41 | 20.28 | 17.53 | | 9% | 87.45 | 45.68 | 31.80 | 24.89 | 20.76 | 18.03 | |

David decides to buy the car, paying a deposit of $32 000 and borrowing the rest of the money he needs from the bank.

1. David will pay back the balance of the loan over four years.

What will be his monthly repayment on the car? (3)

|  |
| --- |
| **Solution** |
| Loan = $ 28 000  Monthly repayment =24.41 x 28 = $ 683.48 |
| **Specific behaviours** |
| ✓ calculates loan amount  ✓ correct monthly repayment for $1000 from chart  ✓ calculates monthly repayment correctly |

1. What is the total interest David pays on the loan? (2)

|  |
| --- |
| **Solution** |
| Total repayment = 683.48 x 12 x 4 = $ 32 807.04  Interest = 32807.04 – 28000 = $ 4 807.04 |
| **Specific behaviours** |
| ✓ total repayment amount  ✓ correct interest paid |

1. What is the total cost of the car to David? (1)

|  |
| --- |
| **Solution** |
| 60 000 + 4807.04 = $ 64 807.04 |
| **Specific behaviours** |
| ✓ or X |

**Question 17 (10 marks)**

(a) John and Kim wish to purchase a new vehicle. They like the Honda Civic, Subaru Impreza

and the Mazda 3. They could not decide which car to buy so they rank them based on the weighted average they achieve from the three categories, Value, Fuel consumption and Safety Features.

Each car received a score out of 10 for each of these three categories.

Rank the cars in order according to their weighted means, from highest to lowest.

(3)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Feature | Weighting | Honda | Subaru | Mazda |
| Value | 3 | 7 | 9 | 7 |
| Fuel Consumption | 3 | 9 | 7 | 8 |
| Safety Features | 4 | 8 | 8 | 9 |

|  |
| --- |
| **Solution** |
| Honda:  Subaru:  Mazda:  Rank: Mazda, Honda, Subaru |
| **Specific behaviours** |
| ✓✓ weighted mean for all three  ✓ correct ranking |

**Question 17 (continued)**

(b) Six newly recruits of the Always Fit Health Club were tested for their ‘fitness rating’

on a scale from 0 to 100 (high rating indicating high level fitness). They undertook moderately demanding physical exercises for 10 minutes and their pulse was recorded. They were then asked to run, jog or walk as far as they could in 20 minutes and these distances were recorded.

|  |  |  |  |
| --- | --- | --- | --- |
| Member | Pulse | Distance(km) | Fitness Rating |
| Allan | 140 | 2.0 | 50 |
| Bryce | 110 | 2.3 | 90 |
| Cameron | 150 | 1.5 | 30 |
| Doug | 120 | 2.5 | 80 |
| Elvis | 140 | 1.7 | 40 |
| Frank | 120 | 2.0 | 70 |

1. Draw a scatter graph for Pulse and Fitness. (2) 
2. Draw a ‘line of best fit’ (1)

|  |
| --- |
| **Solution** |
| 1. Scatter plot as shown 2. As shown |
| **Specific behaviours** |
| 1. ✓At least 5 correct points plotted ✓ label axes 2. ✓ Reasonable line |

**Question 17 (continued)**

1. Predict a fitness rating for a member who has a pulse recording of 130

and comment on the reliability of this prediction. (2)

|  |
| --- |
| **Solution** |
| About 60, reliable because it is an interpolation |
| **Specific behaviours** |
| ✓  ✓ reliable, interpolation |

1. The Scatter graph for distance and fitness rating is given below.



Which of the two, ‘Pulse’ or ‘Distance’ is the better predictor of fitness?

Justify your answer. (2)

|  |
| --- |
| **Solution** |
| From the scatterplots, PULSE is the better predictor of Fitness because there is a stronger linear relationship between pulse and fitness. The plots are more linearly closer to each other. |
| **Specific behaviours** |
| ✓ Fitness  ✓ valid reason |

**Question 18 (7 marks)**

The rectangle of given length and width is drawn below.

3x - 1

5 - x

(i) Give an expression for the area , of the rectangle.

Leave this in expanded form. (2)

|  |
| --- |
| **Solution** |
| A(x) = |
| **Specific behaviours** |
| ✓ product  ✓ expanded form |

(ii) On the axes below, sketch the area function  from (i)

Label all important features. (3)



⅓

5

(2⅔,16⅓)

|  |
| --- |
| **Solution** |
| As shown above |
| **Specific behaviours** |
| ✓ correct parabola shape  ✓ correct x-, y- intercepts  ✓ labels turning point |

**Question 18 (continued)**

(iii) Hence determine the maximum possible area of the rectangle,

correct to 1 significant figure. (2)

|  |
| --- |
| **Solution** |
| From graph or CAS max area =  = 20 (to 1 significant figure) |
| **Specific behaviours** |
| ✓  ✓ correct answer of 20 to I sig fig |

**Question 19 (6 marks)**

It is given that the points , ,  all lie on a straight line

(i) Find the value of . (3)

|  |
| --- |
| **Solution** |
| Equating: |
| **Specific behaviours** |
| ✓✓ two expressions for the gradient  ✓ solves correctly for n |

(ii) Hence, determine equation of the line passing through these points. (3)

|  |
| --- |
| **Solution** |
| Equation of the line is y -12 = 3( x – 1 ) which is y = 3x + 9 |
| **Specific behaviours** |
| ✓ gradient of 3 for the line  ✓✓ equation of line |