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 2A**

**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 | 11 | 11 | 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 **eleven (11)** questions. Answer all questions. Write your answers in the spaces provided.

Working time: 100 minutes

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**Question 7 (9 marks)**

(a) Mr Barker needs to purchase 80 litres of paint for his house. At the paint shop, he can

purchase either 10-litre cans of paint @ $70 per can or 4-litre cans of paint @ $45 per can. How much does Mr Barker save by purchasing the 10-litre cans of paint rather than the

4-litre cans? Show your working fully. (3)

|  |
| --- |
| **Solution** |
| 8 cans of 10litre tins @ $70 = $560  20 cans of 4 litre tins @ $45 = $900  Savings of (900 – 560) = $ 340 |
| **Specific behaviours** |
| ✓ cost for the 10 litre cans  ✓ cost of the 4 litre cans  ✓ savings |

(b) At the end of 2009, Casper bought a house for $400 000. During 2010, Casper’s house

increased in value by 10%. In 2011, house values fell by 10%. Has his house lost, gained

or remained the same in value at the end of 2011?

Justify your answer with relevant calculations. (3)

|  |
| --- |
| **Solution** |
| 2009: value = $ 400 000  2010: value = $ 440 000  2011: value = $ 396 000  Loss in value of $ 4 000 |
| **Specific behaviours** |
| ✓✓ values in 2010, 2011  ✓ Loss in value by $4 000 |

(c) Evaluate  showing working steps (2)

|  |
| --- |
| **Solution** |
| =  =  =  = |
| **Specific behaviours** |
| ✓ uses BIMDAS in order  ✓ correct answer of -1 |

(d) Expand and simplify  (1)

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

**Question 8 (9 marks)**

(a) Given the diagram below,



find the length of , correct to two decimal places

1. BD (2)

|  |
| --- |
| **Solution** |
| (to 2 decimal places) |
| **Specific behaviours** |
| ✓ use Pythagoras Theorem  ✓ correct answer to 2 decimal places |

1. BC (2)

|  |
| --- |
| **Solution** |
| (to 2 decimal places) |
| **Specific behaviours** |
| ✓ use of Pythagoras Theorem  ✓ correct answer correct to 2 decimal places |

(b) Draw the second half of the symmetrical shape below. (1)



|  |
| --- |
| **Solution** |
| As shown in diagram above |
| **Specific behaviours** |
| ✓ or X |

**Question 8 (continued)**

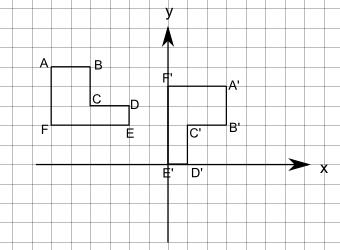
(c) What is the order of rotational symmetry for the dart board below? (1)



|  |
| --- |
| **Solution** |
| Rotational symmetry order is 10 |
| **Specific behaviours** |
| ✓ or X |

(d) The L-shape A’B’C’D’E’F’ is the image of the L-shape ABCDEF.

Describe the transformation involved. (3)



|  |
| --- |
| **Solution** |
| A 900 clockwise rotation about the point ( -2, 0) |
| **Specific behaviours** |
| ✓ 900  ✓clockwise rotation  ✓ centre of rotation (-2,0)  OR other possibilities |

**Question 9 (10 marks)**

(a) A sample of 14 students in Mrs Jones class were asked how many hours they had spent watching television on the previous night. The results are displayed in the following

dot-frequency plot.



1. Calculate the mean  and standard deviation of these times? (2)

|  |
| --- |
| **Solution** |
| , |
| **Specific behaviours** |
| ✓✓ 1 mark each |

1. An outlier is defined if it is less than  and greater than,

how many outlier(s) are there? Show all your working. (3)

|  |
| --- |
| **Solution** |
| Only 1 outlier which is 5 |
| **Specific behaviours** |
| ✓✓ working  ✓ states 1 outlier of 5 |

**Question 9 (continued)**

(b) Mary spends her free time at home watching television and listening to music. The following chart shows the amount of time spent in minutes by her doing these activities in one particular week. For example, on Friday, she spent 50 minutes watching television and 30 minutes listening to music.

1. On what day did she spend the least amount of time watching television? (1)
2. Which day shows the greatest difference between time spent watching television and time spent listening to music? (1)
3. On which days did she spend more than two hours in total watching television and listening to music? (1)
4. What is the average time per day she spent watching television during that week? (1)
5. During that week, how much more of her free time did she spend watching television than listening to music? (1)

|  |
| --- |
| **Solution** |
| 1. Thursday 2. Wednesday 3. Saturday and Sunday 4. (35+50+80+30+50+100+75)/7 = 60 mins 5. 25+5-50+20-20-45-25 = 90 minutes |
| **Specific behaviours** |
| ✓✓✓✓✓ 1 mark each |

**Question 10 (6 marks)**

(a) John, Steve and Malcolm are business partners. Together they invest in the business in

the ratio 3 : 8 : 4 respectively. If the total amount invested is $480 000, how much did Malcolm invest? (3)

|  |
| --- |
| **Solution** |
| Unit share =  Malcolm invested |
| **Specific behaviours** |
| ✓ unit share  ✓ correct answer of $128 000 |

(b) Find, in simplest form, the fraction which is exactly halfway between  and  (3)

|  |
| --- |
| **Solution** |
| Distance between  and  is =  Half of is  Fraction exactly halfway  or |
| **Specific behaviours** |
| ✓ finds distance between the two fractions  ✓ take half of this fraction  ✓ exact fraction halfway between  and |

**Question 11 (7 marks)**

(a) The eye colours of a sample of children were recorded. When the data is analysed,

which of the following statistics, mean, median, mode, range could be found and why? (2)

|  |
| --- |
| **Solution** |
| Mode because the data is not numerical  I.e. data is categorical – mean , median and range cannot be found |
| **Specific behaviours** |
| ✓ stating mode  ✓ valid reason |

(b) The graph below displays information about three cyclists. If Joshua covered the most distance, Daniel rode for the longest time and Richard had the fastest speed, match each line with each of the three cyclists. (2)



C

B

A

|  |  |
| --- | --- |
| Cyclist | Graph |
| Joshua | B |
| Daniel | C |
| Richard | A |

|  |
| --- |
| **Solution** |
| As displayed in table above |
| **Specific behaviours** |
| ✓✓✓ 1 mark each |

**Question 11 (continued)**

(c) Draw a time travel graph to represent the following,

* Tony travels 20 km in the 1st hour
* He rests in the second hour
* He then travels at 40km/h for the next hour. (3)



|  |
| --- |
| **Solution** |
| ✓ label axes  ✓✓ line segments passing through (1,20) and (2.5,40) and (2,20) |
| **Specific behaviours** |
|  |

**Question 12 (11 marks)**

(a) A budding scientist wanted to know the population profile of the earthworms in a garden. He set out to measure the lengths of some worms in his garden. A histogram is partially drawn with an incomplete frequency table.

Frequency

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| 4 |  |  |  |  |  |  |  |  |  |
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| 2 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| 0 | 2 |  | 4 |  | 6 |  | 8 |  | Length |
|  |  |  |  |  |  |  |  |  |  |

|  |  |
| --- | --- |
| Length (L mm) | Frequency |
|  | 5 |
|  | 4 |
|  | **3** |
|  | 3 |

(i) Complete the frequency table and the histogram labelling both axes. (2)

|  |
| --- |
| **Solution** |
| As shown above |
| **Specific behaviours** |
| ✓✓ labels axes, columns, frequency of 3 in missing row |

(ii) A pie chart is drawn to represent the above data. Calculate the angle of the sector

that represents the length  (2)

|  |
| --- |
| **Solution** |
|  |
| **Specific behaviours** |
| ✓ calculation  ✓ correct answer |

1. Can you state the modal length of the worms in his garden? If it is not possible,

state why not? (2)

|  |
| --- |
| **Solution** |
| No because data is grouped. Can state the modal length not an individual modal length |
| **Specific behaviours** |
| ✓ states NO  ✓valid reason |

**Question 12 (continued)**

(b) The graph shows the population age distribution in Australia in 2008.

Population in millions.

(i) How many females are in the 80+ age group? (1)

|  |
| --- |
| **Solution** |
| 0.5 million or 500 000 |
| **Specific behaviours** |
| ✓ or X |

(ii) What is the modal age group, not including the 0 -14 age group? (1)

|  |
| --- |
| **Solution** |
| 35 - 39 |
| **Specific behaviours** |
| ✓ or X |

(iii) How many people are in the 45-49 age group? (2)

|  |
| --- |
| **Solution** |
| 0.75+0.75 = 1.5 million |
| **Specific behaviours** |
| ✓ calculation  ✓ correct answer |

1. Give ONE reason why there are more people in the 80+ age group than

In the 75-79 age group? (1)

|  |
| --- |
| **Solution** |
| 80+ age group has a greater range in age while 75 – 79 age group has only a range of 5 years |
| **Specific behaviours** |
| ✓ or X for valid reason |

**Question 13 (9 marks)**

****

N

M

L

The three lines intersect at L, M, N such that LMN is a right-angled triangle at M.

(i) Determine the gradient of the line LM. (1)

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

(ii) State the equation of the line passing through M and N in the form . (2)

|  |
| --- |
| **Solution** |
|  |
| **Specific behaviours** |
| ✓ gradient  ✓ y-intercept |

(iii) What can be said about the gradients of LM and MN? (2)

|  |
| --- |
| **Solution** |
| One is a negative reciprocal of the other  OR product is -1 Or |
| **Specific behaviours** |
| ✓ gradient of MN  ✓ product is -1 |

(iv) Explain how you use the graphs to solve  and state the solution. (2)

|  |
| --- |
| **Solution** |
| Where both lines LM and MN intersect , at M, hence solution is x = 2 |
| **Specific behaviours** |
| ✓ intersection of lines LM and MN  ✓ x = 2 |

(v) Show how you use the graph to solve the following equation and state its solution . (2)

|  |
| --- |
| **Solution** |
| Draw the line y = 5 and read off the x –value where both lines, y=5 and MN intersect, at x = 8 |
| **Specific behaviours** |
| ✓ explanation  ✓ x = 8 |

**Question 14 (10 marks)**

The retirement ages of two million people are displayed in a table.

|  |  |  |
| --- | --- | --- |
| Retirement age | Number of people (thousands) | Relative Frequency |
| 36 – 40 | 5 | 0.0025 |
| 41 – 45 | 10 | 0.005 |
| 46 – 50 | 20 | 0.01 |
| 51 – 55 | 35 | 0.0175 |
| 56 – 60 | 180 | **0.09** |
| 61 – 65 | 700 | **0.35** |
| 66 – 70 | **500** | 0.25 |
| 71 – 75 | 400 | **0.2** |
| 76 – 80 | **150** | 0.075 |

(i) Complete the table. Explain what the relative frequency column represents. (3)

|  |
| --- |
| **Solution** |
| As displayed in table  Relative frequency represents the proportion of people that are in the given retirement age |
| **Specific behaviours** |
| ✓✓ correct missing entries  ✓ explanation |

(ii) Determine the interval that contains the median age. (1)

|  |
| --- |
| **Solution** |
| 66 - 70 |
| **Specific behaviours** |
| ✓ or X |

(iii) Determine an approximation for the mean retirement age for this group of people. (1)

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

(iv) On the axes below, draw a frequency histogram to represent this data. (3)



Retirement ages of 2 million people

Retirement age

Number of people (‘000)

800

600

400

200

85

80

70

75

65

60

55

50

45

35

4035

|  |
| --- |
| **Solution** |
| As shown above |
| **Specific behaviours** |
| ✓ labels axes, title  ✓ correct scales used along the horizontal axis,35.5-40.5,40.5-45.5,…, 75.5 –80.5  ✓ columns (no gaps in between columns) |

**Question 14 (continued)**

(v) Give one advantage of displaying the data as a graph instead of a table. (1)

|  |
| --- |
| **Solution** |
| Easy to see how the shape of the distribution and read |
| **Specific behaviours** |
| ✓ valid reason |

(vi) Describe the distribution. (1)

|  |
| --- |
| **Solution** |
| Negatively skewed, approx. 80% of retirement ages between 61 and 75 |
| **Specific behaviours** |
| ✓ valid explanation |

**Question 15 (7 marks)**

In a rectangle below, The length is three more than twice  while the width is one less than four times .

(i) Write an algebraic expression for the length. (1)

|  |
| --- |
| **Solution** |
| 2x + 3 |
| **Specific behaviours** |
| ✓ or X |

(ii) Write an algebraic expression for the width. (1)

|  |
| --- |
| **Solution** |
| 4x - 1 |
| **Specific behaviours** |
| ✓ or X |

(iii) Hence, write a simplified expression (not in factorised form) for the area

of this rectangle. (2)

|  |
| --- |
| **Solution** |
| = |
| **Specific behaviours** |
| ✓  ✓simplified form |

(iv) If , what can be said about the rectangle? (1)

|  |
| --- |
| **Solution** |
| Length = width = 7 , shape is a square |
| **Specific behaviours** |
| ✓ or X |

(v) Find the area if the width of the rectangle is 5cm? (2)

|  |
| --- |
| **Solution** |
| cm2 |
| **Specific behaviours** |
| ✓ x value  ✓ area |

**Question 16 (10 marks)**

(a) The equation of a line, L is 

1. Write down the slope or gradient of L. (2)

|  |
| --- |
| **Solution** |
| Gradient is -2 |
| **Specific behaviours** |
| ✓ expand and simplify  ✓ gradient |

1. Verify that the point P(1,2) lies on the line. (1)

|  |
| --- |
| **Solution** |
| Substitute (1,2) into equation , ✓ point lies on line |
| **Specific behaviours** |
| ✓ show substitution |

1. What is the -intercept? (1)

|  |
| --- |
| **Solution** |
| x-intercept is 2 |
| **Specific behaviours** |
| ✓ x-intercept = 2, Accept (2,0) |

1. L intersects the -axis at M. Find the coordinates of M. (2)

|  |
| --- |
| **Solution** |
| x = 0, y = 4  Coordinates of M = (0, 4) |
| **Specific behaviours** |
| ✓ y value of 4  ✓ express as an ordered pair |

**Question 16 (continued)**

(b) Given the four dot frequency diagrams below, use the appropriate letter(s) to identify



A

B



C

D

1. Two with equal means. (1)
2. One with the greatest spread. (1)
3. Three with the same range. (1)
4. What is the central score for set D. (1)

|  |
| --- |
| **Solution** |
| 1. A and B 2. A 3. B, C, D 4. 4 |
| **Specific behaviours** |
| ✓✓✓✓ 1 mark each |

**Question 17 (12 marks)**

(a) Colleen wants to create a pattern around the square as shown below. She started with the figure on the top right hand corner, reflect it about the line XY and reflect the two figures about the line PQ. Complete the diagram with the transformations. (2)

X

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| P |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Q |
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Y

(b) Draw the images of the trapezium below if it is translated 7 units right and 2 units down

and then rotated clockwise  about the point marked as A. (2)

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**Question 17 (continued)**

(c) A new combined object (shown below) could be produced either by a reflection or a rotation of the original shape.

1. If the transformation was a reflection, draw in the line that the original shape was reflected about. State the equation of this line. (2)

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1. If the transformation was a rotation, mark the point P, where the original object was rotated about. (1)

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| **Solution** |
| (a),(b),(c) ash shown above |
| **Specific behaviours** |
| 1. ✓✓ 2. ✓✓ 3. (i) ✓ line, ✓ equation of line is y = x (ii) ✓ |

**Question 17 (continued)**

(d)



ABC is in direct proportion to ADE such that .

If AB = 34 cm, BC = 16 cm, find the lengths of

1. AC (2)

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| **Solution** |
| cm |
| **Specific behaviours** |
| ✓ Pythagoras Theorem  ✓ correct answer |

1. DE (2)

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| **Solution** |
| DE = 8 cm |
| **Specific behaviours** |
| ✓ ratio  ✓ correct answer |

1. AE (1)

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| **Solution** |
| AE = 15 cm |
| **Specific behaviours** |
| ✓ Pythagoras theorem  ✓ correct answer |