

Materials required/recommended for this section

Name of Student: _____

Time allowed for this section: _____

Reading time before commencing work: 10 minutes

Working time for this section: 100 minutes

To be provided by the supervisor

Formula Sheet (retained from Section One)

This Question/Answer Booklet

To be provided by the student

Highlighters
Fluid/tape, ruler,
Standard items:
Pens, pencils, pencil sharpener, eraser, correction
fluid/tape, ruler,
Special items:
Drawing instruments, templates, notes on two unfolded sheets of
A4 paper,
Curriculum
Council for this examination

Curriculum

and up to three calculators satisfying the conditions set by the

Section Two:
Calculator-assumed

MATHEMATICS 3A

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

Question/Answer Booklet

REVISIOn EXAMINAtION ASSESSMENT PAPERS
Semester 1 Examination 2012
(REAP)



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

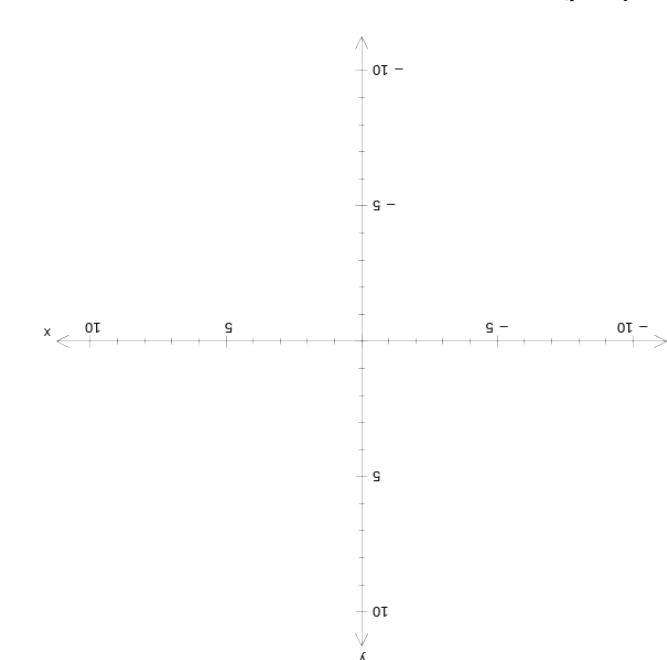
(2)

- (v) By adding **one** suitable function on the axes, show how you solve $x^2 = 5$ and estimate the solution(s) from your graph, correct to 1 decimal place.

$$(x - 5)(x - 3) = \frac{x}{5}$$

(iv)

- Read from the graph the **number** of solutions to the equation.

**Question 19 (continued)**

(1)

- Read from the graph the **number** of solutions to the equation.

(1)

Question 7

marks will be awarded)

Use the Unit circle below (there must be evidence of using the unit circle before full

(5 marks)

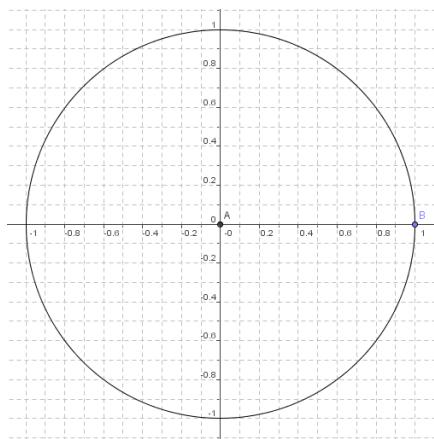
Working time: 100 minutes

the spaces provided.

This section has **thirteen (13)** questions. Answer all questions. Write your answers in**(100 marks)****Section Two: Calculator-assumed**3 It is recommended that you **do not use pencil**, except in diagrams.

Wish to have marked.

Repeat an answer to any question, ensure that you cancel the answer you do not



(i) to evaluate the value of $2\cos 120^\circ$

(2)

(ii) to find the value(s) of x , to the nearest whole number, such that

$$\sin 2x = 0.9$$

(3)

Question 19

(9 marks)

The point P(1, k) lies on the curve with equation $f(x) = (x^2 - 6x)(x - 2) + 3x$

(i) Find the value of k . (1)

(ii) Express $f(x)$ in a completely factorised form. (2)

(iii) On the axes below sketch the curves with the following equations

$f(x) = (x^2 - 6x)(x - 2) + 3x$ and $g(x) = \frac{5}{x}$, showing clearly where they meet the axes. (3)

(2)

(vi) Calculate the sum of the first 100 terms of the sequence.

(1)

(v) Which term is 61?

(2)

(iv) Write down the values of T_{99} and T_{100} .

(2)

(iii) Write a recursive formula for the sequence 5, 9, 13, 17, ...

(1)

$$T_n = \underline{\quad}, T_1 = \underline{\quad}$$

"If n is an odd number, then

(ii) In this sequence, $T_1=T_3=T_5=\dots$, complete the sentence,

(i)

(b) The test results for a group of 45 students involved in a reading program are displayed below in the form of a pair of box plots. The data collected shows the reading speed of the students both before and after the administration of the program.

Question 18 (continued)**Question 8**

(iv) The range of both sets of scores is the same.

(iii) The 'after' set of scores is more evenly distributed than the 'before' set of scores.

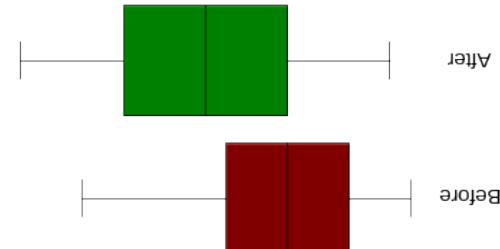
(ii) Both distributions have the same median.

increased by 4.

(i) For the "after" data, the median has increased by 8 and the interquartile range has

(4)

For each of the following, answer True (T) or False (F):-

**Reading speed**

program.

reading speed of the students both before and after the administration of the program.

displayed below in the form of a pair of box plots. The data collected shows the

reading speed of the students both before and after the administration of the

Question 9**(6 Marks)**

Four digit numbers may be formed using the digits 0, 2, 4, 6, 8 such that no digit can be used more than once. How many of these 4-digit numbers

(i) may be formed? (1)

(ii) begin with 8? (1)

(iii) end in a 2 or a 4? (1)

(iv) are less than 486? (2)

(v) What is the probability that a randomly picked 4-digit number from this set is more than 8640?

(1)

(1)

(iii) High Distinction

(1)

(iii) Hence find $P(\underline{B})$

(1)

(ii) Distinction

(1)

(iii) Hence, find $P(A)$

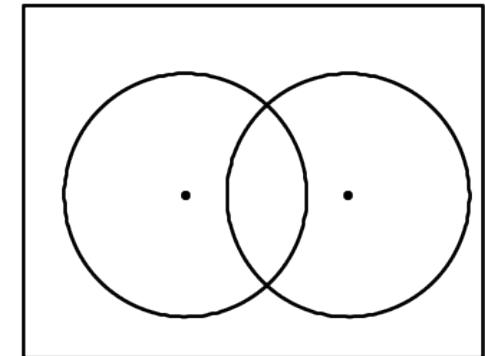
(2)

(i) Credit

If the scores were normally distributed with a mean of 75 and a standard deviation of 12, find the minimum score a competitor has to achieve to be awarded a

- Participations to the remainder
- Credits to the next 30%
- Distinctions to the next 25%
- High Distinctions to the top 15% of performances

(b) Achievement awards in a national Mathematics competition are allocated as



(6 marks)

Question 10

CALCULATOR-ASSUMED

(9 marks)

MATHEMATICS 3A

(a) The distribution of heights of a plant is normally distributed with a mean of 72 cm and a standard deviation of 6 cm. If there were 100 plants, estimate the number of plants which are less than 64 cm in height.

(i) Represent the diagram in the Venn diagram below.
(a) A and B are events such that $P(A \cup B) = 0.9$, $P(A \cap B) = 0.2$, $P(A|B) = 0.8$

(2)

(2)

(a) The distribution of heights of a plant is normally distributed with a mean of 72 cm and a standard deviation of 6 cm. If there were 100 plants, estimate the number of plants which are less than 64 cm in height.

CALCULATOR-ASSUMED MATHEMATICS 3A

Question 17

(8 marks)

The final result of the students in Mrs Bond's classes of 3CDMAT and 3CDMAS are summarised in the frequency table below.

Mark as a percentage	3CDMAT	Cumulative frequency	3CDMAS	Cumulative frequency
0 – 19	2	2	1	1
20 – 39	2	4	3	4
40 – 59	5	C	A	7
60 – 79	D	20	9	B
80 - 99	7	27	5	21

- (a) Find the values of A, B C and D

(2)

- (b) Calculate the mean and standard deviation of the 3CDMAS marks

(2)

- (c) If a student from one of these classes is picked at random, what is the probability that the student

- (i) received a mark greater than or equal to 60 ?

(1)

- (ii) was in the 3CDMAT class?

(1)

- (iii) was in the 3CD MAS class and received a mark ≥ 80 ?

(1)

- (iv) was in the 3CDMAS class if the student received a mark between 60 and 79 inclusive ?

(1)

(2)

(iii) Hence, state the lengths of the triangle.

(2)

(iii) If the area is 17.5 units², determine the value of a .

(2)

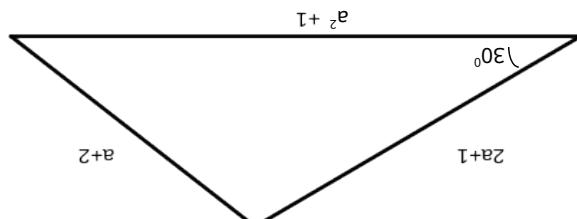
(1)

(vi) How much money does Josh save by paying in this way?

$$\sin 30^\circ = \frac{1}{2}.$$

(i)

Find a simplified algebraic expression for the area of the triangle, given that



Given the triangle below,

Question 11**Question 16 (continued)**

(2)

(v) What is the total amount that Josh will pay over the period with the increased

repayment?

(1)

(iv) How long does it take Josh to repay the loan?

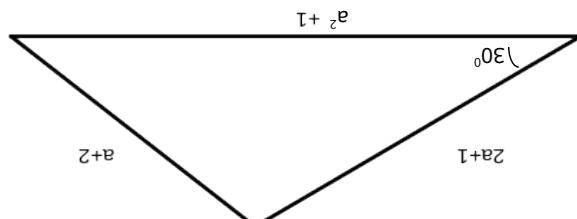
(1)

(vi) How much money does Josh save by paying in this way?

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(i)

Find a simplified algebraic expression for the area of the triangle, given that



Given the triangle below,

Question 11**Question 16 (continued)**

Month	Previous Balance	Interest	Balance Due	Payment	Balance after payment
13	1683.50		1717.20	500	1217.20
14	1217.50	24.30		500	741.50
15	741.50	14.80	756.33	500	

(5)

- (a) A group of fifteen students travelling to Tasmania have their bags weighed at the airport check-in counter. The weights of the bags in kilograms are listed in order as follows:
- m, 9, n, 10, 15, 18, 21, p, 25, 29, 35, q, 38, r, 43.
- The following statistics of this set of data are known.
- $\bar{x} = 24$, Median = 21, Interquartile range = 27.
- Josh bought a second hand Hyundai for \$4500. He borrowed the full sum of \$4500 from NO Fills Finance Company and agreed to make a minimum payment of \$300 a month. For a year he pays the minimum monthly payment. At the end of the year, he checks his statement from the Finance company and is surprised that he still owes \$1683.50. He created a spreadsheet to check whether the amount owing is correct.

(5)

The following statistics of this set of data are known.

	4500	90	4590	300	4290	Balance payment
1	4290	85.80	4375.80	300	4075.80	
2	4075.80	81.50	4157.30	300	3857.30	
3	3857.30	77.10	3934.50	300	3634.50	
4	3634.50	68.10	3707.20	300	3407.20	
5	3407.20	72.70	3751.50	300	3251.50	
6	3175.30	63.50	3475.30	300	3175.30	
7	2938.80	58.80	3238.80	300	2938.80	
8	2697.60	53.90	2997.60	300	2697.60	
9	2451.50	49.10	2751.50	300	2451.50	
10	2200.60	44.00	2244.60	300	2200.60	
11	1944.60	38.90	1983.50	300	1944.60	
12	1700.60	34.00	1744.60	300	1700.60	

Note: The values in this table have been rounded to the nearest ten cents.

(1)

- (i) Calculate the annual rate of interest Josh is paying.

(1)

- (ii) If Josh continues to pay the monthly payment of \$300, it will take him a total of 19 months to pay off his car. What would be the total amount of his payments?

(2)

- (iii) Josh decides to reduce his social life activities in order to pay an extra \$200 a month from the 13th payment onwards. Complete the table of calculation below.

(2)

Question 15 (continued)

- (c) Solve the indicial equation showing all working steps

(3)

$$2 \times 3^{2x+3} = 6 \times 9^{4x}$$

- (b) In collecting data, biased samples and poor methods of collection can lead to invalid inferences. Consider the following method to determine the extent of unemployment in a local community.
- “A team of data collectors phoned five randomly selected households on every twentieth page of the local telephone directory during regular office hours”.
- (i) List two ways which might suggest this data collection method causes bias?
- (ii) Suggest how this bias could be avoided.

(1)

(ii)

(iii)

(2)

(i)

(ii)

Question 12 (continued)

Question 13
marks)

(10

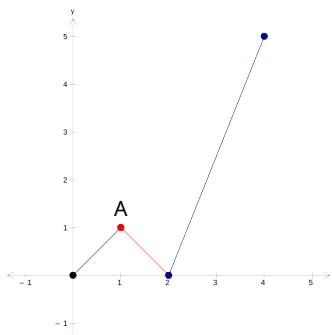
- (a) The graph of $f(x)$ is dilated parallel to the x -axis by a scale factor of 2, followed by a translation of 4 units in the positive direction of the x -axis. What is the equation of the final graph obtained?

(2)

- (b) The function $y=x^3$ is transformed to $y=-2(x+5)^3$. Describe the transformation in order.

(3)

- (c) The graph of $y=f(x)$ is given below



- (i) Sketch the graph of $y=3 - f(x)$ on the axes below. (2)

Question 15

(8 marks)

- (a) The following table shows statistics of the results of the five mathematics tests for John, Ryan, Julie and Gary.

	Mean	Standard deviation	Range
John	13.6	3.8	7
Ryan	13.9	4.2	7
Julie	13.8	2.7	7
Gary	14.0	3.4	7

Which student has the most consistent results? State a reason why you chose this student. (2)

- (b) Mrs Kendall decided to survey a sample of 10% of the students at her school. The school enrolment is shown in the table below.

Year	7	8	9	10	11	12	Total
Number of students	225	232	233	230	150	130	1200

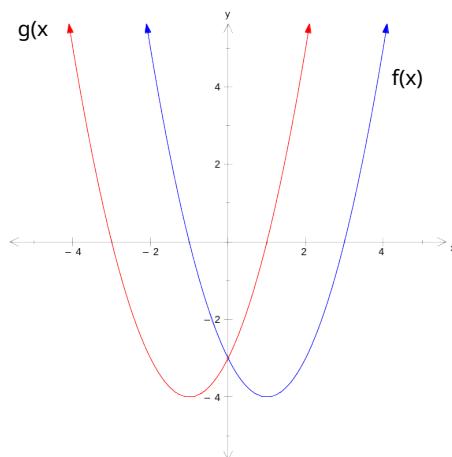
She surveyed the same number of students in each year group. Explain how would the numbers of students surveyed in Year 10 and Year 11 have changed if she had chosen to use a stratified sample based on year groups? (3)



Question 13 (continued)

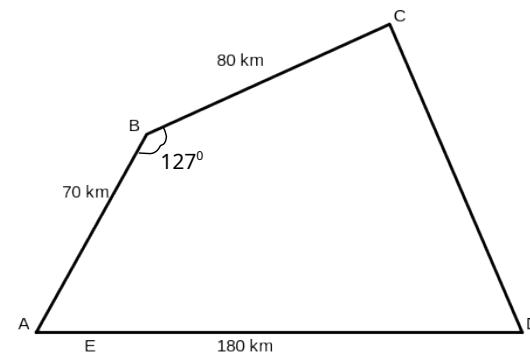
- (ii) Write the coordinates of A if $y = -f(-x+3)$. (2)

- (d) Describe how the graph of $f(x)$ can be used to obtain the graph of $g(x)$. (1)

**Question 14**

(7 marks)

The diagram shows four towns, A, B, C and D on level ground.



$$AE = \frac{1}{9} AD$$

D is 180km due east of A and E is a rest station along AD such that

The bearing of B from C is 261° .

$\angle ABC=127^\circ$, AB=70km and BC=80km.

- (a) Calculate

- (i) The distance of A from C (2)

- (ii) $\angle ACB$ using the SINE rule (2)

- (iii) The bearing of A from C. (1)

- (b) In town A, the highest peak has a height of 7500m. Find the angle of elevation of the peak from the rest station at E. (2)