

MATHEMATICS 3A**Question/Answer Booklet****Semester One Examination, 2013****Materials recommended for this section**

Working time for this section: _____
 Reading time before commencing work: ten minutes
 Working time for this section: one hundred minutes

Section Two:
Calculator-assumed

Teacher's name _____

Student's name _____

This Question/Answer Booklet
 Formula Sheet (retained from Section One)

To be provided by the supervisor

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,

Council for this examination.
 and up to three calculators satisfying the conditions set by the Curriculum

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 of a non-personal nature 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	7	7	50	50	33
Section Two: Calculator-assumed	13	13	100	100	67
Total				150	100

Additional working space

Question number: _____

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2013*. Sitting this examination implies that you agree to abide by these rules.
2. 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.
 - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
 - Continuing 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.
3. **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.
4. It is recommended that you **do not use pencil**, except in diagrams.

(2 marks)

- (iv) a Ragdoll, given that they are female?

(1 mark)

- (iii) a Persian or a male?

(1 mark)

- (ii) a male?

(1 mark)

- (i) a female Siamese?

(2 marks)

- (b) What is the probability that a cat chosen at random from the sample is

- (a) Complete the missing entries in the table above.

	Perisan	Ragdoll	Siamese	Other	Total
Total			45		39
Male	28		26	21	92
Female	19				

A sample of 179 cats brought to a veterinary clinic over the course of one month were categorised on the basis of breed and gender as follows:

(7 marks)

Question 8

Working time for this section is 100 minutes.

Provided.

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

Section Two: Calculator-assumed
(100 Marks)

MATHEMATICS 3A
Additional working space

Question number: _____

CALCULATOR-ASSUMED
CALCULATOR-ASSUMED
3
MATHEMATICS 3A

Question 9**(6 marks)**

The number of page views of a website per day, following a TV advertising campaign, is shown in the table below.

Day (n)	1	2	3	4
Views (T_n)	275 562	91 854	30 618	10 206

Assume that this pattern continues over the next few weeks.

- (a) How many page views are expected on day five? (1 mark)

- (b) Write a recursive rule for the number of page views per day. (2 marks)

- (c) What is the total number of page views of the website after one week? (1 mark)

- (d) Will the total number of page views reach half a million within two weeks? Justify your answer. (2 marks)

Additional working space

Question number: _____

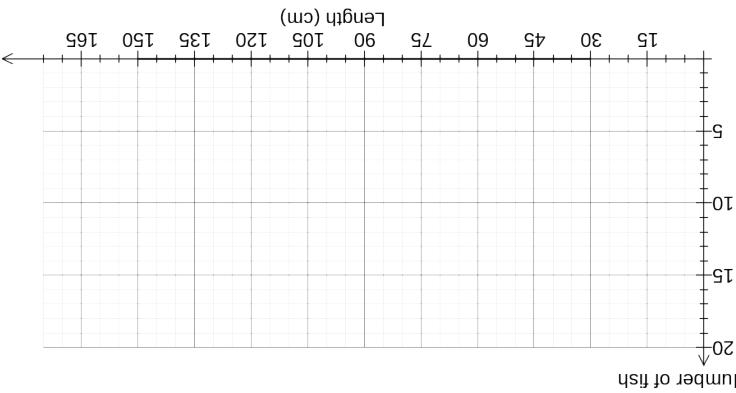
(2 marks)

If the original data was available for all 52 longtail tuna, so that the median length could be determined, would you expect it to be the same, smaller than, or greater than the mean length? Justify your answer with reference to the histogram.

(c)

(2 marks)

(b) Calculate an estimate for the mean and standard deviation of the lengths of longtail tuna.



(3 marks)

(a) Draw a histogram for the lengths of longtail tuna.

Length (cm)	Number of fish
30 < $L \leq 45$	4
45 < $L \leq 60$	1
60 < $L \leq 75$	4
75 < $L \leq 90$	11
90 < $L \leq 105$	18
105 < $L \leq 120$	12
120 < $L \leq 135$	1
135 < $L \leq 150$	1
150 < $L \leq 165$	1
Total	52

Recent research into introducing a size limit for catches of longtail tuna in Australian coastal waters included the data below from a group of recreational fishermen.

Question number: _____

(7 marks)

Question 10

Question 11

(7 marks)

Let the universal set $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$.

Two subsets, R and Q, are such that $R = \{2, 3, 5, 7\}$ and $Q = \{1, 3, 5, 7, 9\}$.

(a) Determine

(i) $R \cap Q$

(1 mark)

(ii) $n(R \cup Q)$

(1 mark)

(b) If a number is chosen at random from the universal set, determine

(i) $P(R \cap \bar{Q})$

(1 mark)

(ii) $P(Q | \bar{R})$

(2 marks)

(c) A third subset A is such that $A \cap Q = \emptyset$, $n(A \cap R) = 1$ and $n(A) = 2$. List all such possible subsets for A.

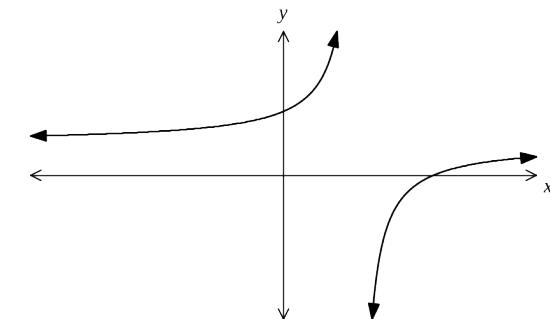
(2 marks)

Question 20

(8 marks)

The graph of the function $y = f(x)$ is shown, with a root at $(4, 0)$ and y -intercept at $(0, 2)$.

The hyperbola has asymptotes with equations $x = 2$ and $y = 1$.



Determine the

(a) coordinates of the root of the graph $y = f(x - 2)$.

(2 marks)

(b) equation of the horizontal asymptote for the graph of $y = f(x - 2) + 3$.

(2 marks)

(c) equation of the vertical asymptote for the graph of $y = f(2(x + 3))$.

(2 marks)

(d) coordinates of the y -intercept of the graph $y = 3 - f(x + 4)$.

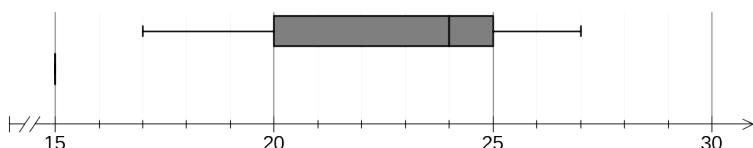
(2 marks)

(10 marks)

Question 13

37 students in a school sat a Chemistry test that had a maximum possible score of 40.

The scores of the 19 students in Class M are summarised in this boxplot.



- (a) State the interquartile range for the scores of Class M. (1 mark)

- (b) One student in Class M scored 27 out of 40. If they had scored an extra five marks, would their score be considered an outlier for the class? Justify your answer. (2 marks)

The scores of the remaining students, in Class P, are listed below in ascending order.

17	18	19	20	21	21
22	22	22	23	24	25
25	25	26	26	26	27

- (c) Construct a boxplot for these 18 scores on the above diagram, next to that for Class M. (3 marks)

- (d) Explain which class

- (i) performed better in the test (2 marks)

- (ii) had the least skewed marks (2 marks)

(5 marks)

Question 18

Using the digits 1, 2, 3, 4 and 5, with no digit used more than once, how many integers between 1000 and 9999 can be made if

- (a) there are no other restrictions? (1 mark)

- (b) the number must begin with the digit 5? (1 mark)

- (c) the number must be even? (1 mark)

- (d) the number must begin with the digit 5 and be even? (1 mark)

- (e) the number must begin with the digit 5 or be even? (1 mark)

Question 14**(8 marks)**

Two spinners, A and B, are marked with both odd and even numbers.

Spinner A has sides marked 1, 2, 3 and 4 and each score has an equal chance of occurring.

Spinner B has sides marked 6, 7 and 8 and again, each score has an equal chance of occurring.

(a) Draw a tree diagram to show all the ways spinner A and spinner B could stop. (3 marks)

(2 marks)

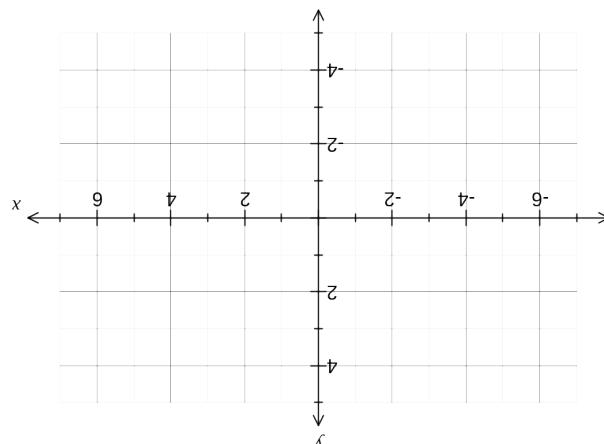
(b) Show that $b = -4$.

(ii) one spinner stops on an even and the other stops on an odd number. (1 mark)

(iii) spinner A or spinner B stops on an even number. (1 mark)

(iv) both spinners stop on an odd number. (2 marks)

(d) Solve $f(x) = g(x)$, giving your solution(s) rounded to two decimal places. (2 marks)



(c) Sketch the graphs of $y = f(x)$ and $y = g(x)$ on the axes below. (5 marks)

(e) Show how your graph can be used to obtain the solutions to (d). (1 mark)

Question 15

(6 marks)

A remotely controlled drone flies at a constant speed of 40 m s^{-1} above level ground and at a steady height, directly towards a tower.

At one point during the flight, the operator of the drone noted that the angle of depression to the base of the tower was 8.8° . Eight seconds later, this angle had increased to 11.7° .

Calculate, to the nearest metre, the height the drone was flying at.

Question 16

(7 marks)

- (a) In a science experiment, quantity P was observed to be related to the another quantity T by the equation $P = \frac{T}{255}$.

- (i) Describe the relationship between P and T . (1 mark)

- (ii) Sketch the relationship between P and T . (2 marks)



- (b) In another experiment, the quantity V was observed to be related to the another quantity A by the equation $VA = 110$

- (i) Calculate A when $V = 215$. (2 marks)

- (ii) Sketch the relationship between V and A . (2 marks)

