



## Structure of this paper

Section	Number of questions available	Number of questions to be answered	Working time (minutes)	Marks available	Percentage of examination
Section One: Calculator-free	7	7	50	52	34
Section Two: Calculator-assumed	13	13	100	103	66
<b>Total</b>					<b>100</b>

## Instructions to candidates

- The rules for the conduct of the Western Australian Certificate of Education ATAR course examinations are detailed in the Year 12 Information Handbook 2019. Sitting this examination implies that you agree to abide by these rules.
- Write your answers in this Question/Answer booklet.
- You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.
- Additional pages for the use of planning your answer to a question or continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number.
- 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 to questions for which working 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 any question, ensure that you cancel the answer you do not wish to have marked.
- It is recommended that you do not use pencil, except in diagrams.
- The Formula sheet is not to be handed in with your Question/Answer booklet.

See next page

see next page

see next page

(c)

see next page

(2 marks)

see next page

(3 marks)

(d) if you would like to throw the die three times an even number. Find the minimum even number of times that the die shows an even number. (3 marks)

see next page

(6 marks)

(e) Determine the probability, to 4 decimal places, that there are in total, even

(f) Determine the probability that you will end up with more even numbers than odd

numbers. (4 marks)

(g) Determine the probability that you will end up with more even numbers than odd numbers. (4 marks)

(h) If you throw the die 11 times,

(i) Consider a bar with the numbers 1, 2, 3, 4, 5, 6. The random variable  $X$  is defined as the(j) Sketch the graph of  $f$ , on the same axes as the graph of  $g$  above. (5 marks)

see next page

(11 marks)

CALCULATOR-ASSUMED

MATHEMATICS METHODS

See next page

(8)

Question 15

(6 marks)

(c)

Question 16

(5 marks)

(2 marks)

(2 marks)

(4 marks)

(4 marks)

Let  $X \geq 2$  be the monthly earnings of the realtor.

Determine:

The expected monthly earnings of the realtor,  $E(X)$ .Let  $X \geq 2$  be the monthly earnings of the realtor.

The realtor is paid \$1000 every month with a bonus of \$1800 if four or more houses are sold in a month.

Therefore, there are a special bonus of \$1800 if four or more houses are sold in a month.

A realtor's sales history over any month can be represented by the following probability distribution:

Probability	0.15	0.4	0.3	0.2	0.05
Number of houses sold in a month	0	1	2	3	4

(6 marks)

(6 marks)

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

- 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 that you are continuing to answer at the top of the page.

Working time: 100 minutes.

Question 8

(6 marks)

Consider the following table.

$x$	1	2	3	4	5
$P(X \leq x)$	0.1	0.4	0.7	0.9	1

- a) Complete the probabilities in the table below (2 marks)

$x$	1	2	3	4	5
$P(X=x)$	0.1				

- b) Determine  $P(x \geq 4)$  (1 mark)

- c) Determine  $P(x > 2 | x < 4)$  (simplify) (3 marks)

Question 9

(8 marks)

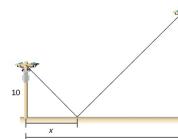


### Additional working space

Question number: \_\_\_\_\_

### Question 10

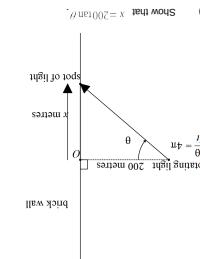
Two power poles need to be joined using a wire that is also connected to the ground, as shown below. The two poles are 10 and 20 metres high, and are separated by 30 metres.



- (a) Determine an expression for the length of wire needed in terms of  $x$  metres. (2 marks)  
(No need to simplify)

$$\text{By using } \tan \theta = \frac{\sin \theta}{\cos \theta} \text{ and the quotient rule, show that } \frac{d}{d\theta} (\tan \theta) = \frac{1}{\cos^2 \theta} \quad (3 \text{ marks})$$

- (b) Using **calculus**, show how to determine the value of  $x$  to minimize the length of wire required. Determine this length to the nearest centimetre. (4 marks)  
(Use of a classpad is required)



It is a simple matter to calculate the distance between the two points of impact. The distance between the two points of impact is equal to the distance between the two points of impact multiplied by the ratio of the distance between the two points of impact to the distance between the two points of impact.

a) By considering the areas of the rectangles shown, demonstrate and explain why  $\int_{2.5}^4 f(x) dx < 5.9$ . (3 marks)

$f(x)$	1.8	2.6	3.8	5.4
$x$	1	1.5	2	2.5

The graph illustrates a function  $y = f(x)$  plotted against  $x$ . The horizontal axis is labeled with points  $x \ll -\zeta$ ,  $\zeta$ ,  $1$ , and  $1 \ll$ . A vertical dashed line is drawn at  $x = \zeta$ . The function is continuous from the left at  $x = \zeta$ , indicated by a solid line segment. At  $x = 1$ , there is a jump discontinuity: the function value is lower from the left ( $\zeta$ ) than it is from the right ( $1$ ). A blue arrow points from the label  $(x)f = \delta'$  towards the jump at  $x = 1$ .

Consider the given x

(9 marks)

Question 20 (11 marks)

See next page

