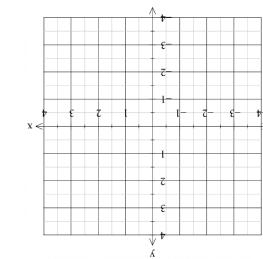


Structure of this paper

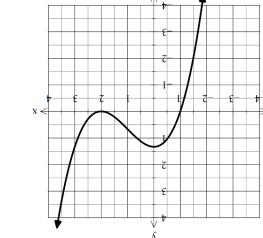
Section	Number of questions available	Number of questions to be answered	Working time (minutes)	Marks available	Percentage of examination
Section One: Calculator-free	7	7	50	50	34
Section Two: Calculator-assumed	12	12	100	96	66
Total					100

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 the 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 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 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.



(a) At $x=1$, the graph of $y=f(x)$ has a point of inflection with an instantaneous gradient of -1 . Use this information to sketch the graph of $y=f'(x)$ on the axes below. Label key features.
(b) $Ax^2 + bx + c = 0$ has turning points at $x=0$ and $x=2$. The graph of $y=f(x)$ is given below. If the turning points at $x=0$ and $x=2$ are



See next page

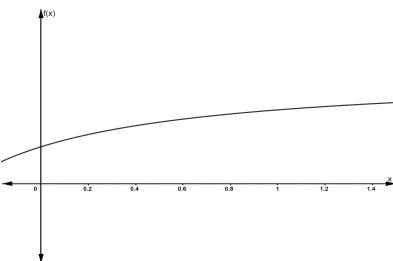
the approximate percentage change in the volume of the prism if all side lengths are increased by 2%.
The approximate percentage change in the volume of the prism if all side lengths are increased by 2%.

Question 16
CALCULATOR-ASSUMED
CALCULATOR-ASSUMED
MATHEMATICS METHODS
11
MATHEMATICS METHODS
11
(7 marks)

Question 16
CALCULATOR-ASSUMED
CALCULATOR-ASSUMED
MATHEMATICS METHODS
11
MATHEMATICS METHODS
11
(7 marks)

Question 9

x	0	0.2	0.4	0.6	0.8	1
$f(x)$	1	1.33	1.57	1.75	1.89	2



You are required to estimate the area under the curve between $x=0$ and $x=1$ using rectangles.

- (a) Using appropriate rectangles to calculate an under-estimate of the area. (3 marks)

Additional working space

Question number: _____

(d) A particular experiment has shown that the concentration of solute in pure water is 0.16 g/cm^3 . determine after how many days (since stirring the solution) the concentration of solute in the pond will be less than 0.001 g/cm^3 .

(c) The water in this pond will become toxic to frogs if the concentration of algae exceeds 0.2 g/cm^3 . On which day after the introduction of the algae will the water become toxic to frogs? (3 marks)

(b) Determine (to 2 decimal places) the concentration of algae in the pond after 7 days.

(a) Write an equation that expresses $C(t)$ in terms of t . (1 mark)

The graphs of $S'(x)$ and $S(x)$ are graphed on the axes below for $-0.5 \leq x \leq 2$.

(b) Use the appropriate rectangles to calculate an over-estimate of the area. (3 marks)

See next page

(c) Use your two values above to estimate the area under the curve between $x=0$ and $x=1$.
(1 mark)

(d) States at least two different ways to improve the estimation.
(2 marks)

(c) *Yulia wants Sam to have some of these baby bunnies for his birthday. She knows that he will be disappointed if he gets fewer than five baby bunnies. She decides to buy two of the toy boxes so that she can combine the baby bunnies if necessary. Calculate the probability that two boxes will contain a total of at least five baby bunnies.*
marks

(d) Calculate the expected number of baby bunnies in the box.
(2 marks)

(e) Given that a buyer of 3 boxes is likely to find three baby bunnies in a box as just one.
determine the values of a and b .
(2 marks)

$P(X=x)$	a	0.12	b	0.35	0.08
x	1	2	3	4	5

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Question 22
CALCULATOR-ASSUMED
17
MATHEMATICS METHODS

The discrete random variable X expresses the number of baby bunnies in the box, and the table below shows a partial probability distribution for X .
The number of baby bunnies is not known to the buyer until they open the box.
A single toy rabbit comes with 1, 2, 3, 4 or 5 toy baby bunnies included in the box. The number of baby bunnies is not known to the buyer until they open the box.
(e) Determine the x -coordinates for the stationary points of $S(x)$ and the nature of each stationary point, giving justification for your answer.
(5 marks)

(f) Determine the x -coordinates for the stationary points of $S(x)$ and the nature of each stationary point, giving justification for your answer.
(5 marks)

(g) Calculate the expected number of baby bunnies in a box as just one.
marks

