



## Year 12 MATHEMATICS 3CD

### Section Two:

### Calculator-assumed

Student name \_\_\_\_\_

Teacher name \_\_\_\_\_

#### **Time and marks available for this section**

Reading time before commencing work: 3 minutes  
Working time for this section: 30 minutes  
Marks available: 30 marks

#### **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 candidate***

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: drawing instruments, templates, notes on **one single side** of an A4 sheet and up to three calculators approved for use in the WACE examinations

#### **Important note to candidates**

No other items may be taken into the examination room. 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.

**Instructions to candidates**

1. Write your answers in this Question/Answer Booklet.
2. Answer all questions.
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.

**Question 5****(6 marks)**

For events  $A$  and  $B$ ,  $P(A) = a$ ,  $P(B) = b$  and  $P(\bar{A} \cap \bar{B}) = 0.25$ .

- (a) Determine an expression for  $P(A \cap B)$  in terms of  $a$  and  $b$ . (2 marks)

It is also known that  $P(A | B) = 0.6$ .

- (b) Determine an expression for  $a$  in terms of  $b$ . (2 marks)

- (c) Determine the values of  $a$  and  $b$  if  $A$  and  $B$  are independent. (2 marks)

**Question 6**

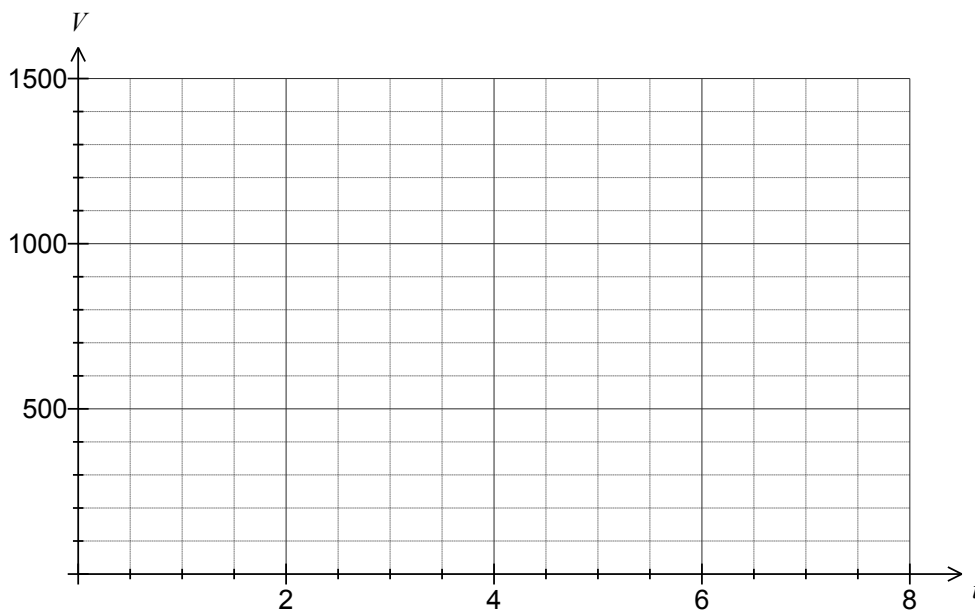
**(6 marks)**

The value,  $V$ , of a computer that was bought new for \$1350 is changing at a rate given by  $\frac{dV}{dt} = -0.22V$ , where  $t$  is the time in years since the computer was bought.

(a) State an equation for  $V$  in terms of  $t$ . (1 mark)

(b) Calculate the value of the computer after 8 years. (1 mark)

(c) Draw the graph of  $V$  against  $t$  on the axes below. (2 marks)



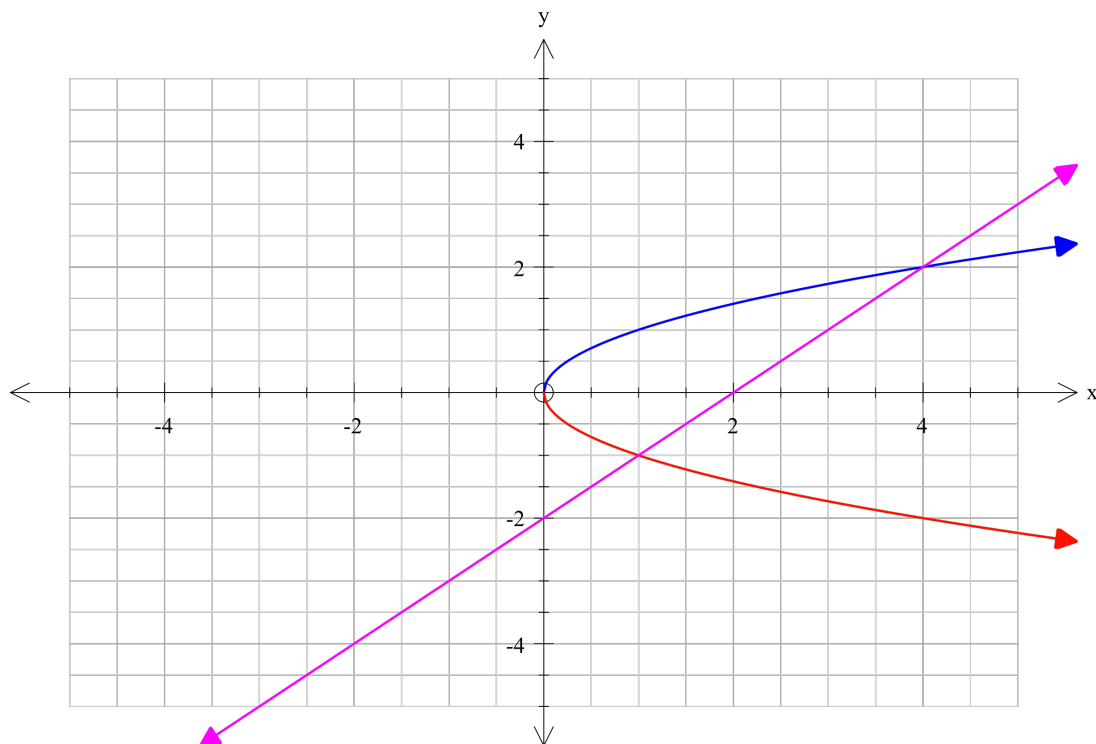
(d) At the same time the computer was purchased, the school also bought a treadmill for \$2350. The value of this treadmill after  $t$  years is given by  $2350e^{-0.3297t}$ . After how long did the value of the treadmill first fall below that of the computer? Give your answer to the nearest **number of months**. (2 marks)

Question 7

(3 marks)

The diagram below shows the graphs of  $y = x - 2$ ,  $y = \sqrt{x}$  and  $y = -\sqrt{x}$ .

Find the area bounded by the three graphs.



**Question 8****(5 marks)**

In a large urban city in Australia, the personality types of the population can be classified as Type A, Type B and neither of these types. 42% of the population are of Type A, 0.5% of the population are of Type B and the remaining 57.5% of the population are neither of these types.

- (a) Calculate the probability that in a random sample of nine persons, exactly three persons will be of Type A. (1 mark)
- (b) The random variable  $Y$  is the number of Type B persons in a random sample of  $n$  persons. If the mean of the distribution of  $Y$  is 0.8, determine the value of  $n$  and the standard deviation of the distribution of  $Y$ . (2 marks)
- (c) Determine the probability that in a random sample of 40 persons, the total number of Type A and Type B persons is at least 24. (2 marks)

**Question 9****(4 marks)**

The time to process orders received by a company is a uniformly distributed random variable with minimum and maximum values of 20 minutes and 120 minutes. Processing times can be assumed to be independent of each other.

(a) Determine the probability that a randomly chosen order takes

(i) less than one hour to process.

(1 mark)

(ii) more than 80 minutes to process, given that it has already taken 60 minutes.

(1 mark)

(b) Determine the probability that at least half of the next 10 orders take less than one hour to process.

(2 marks)

**Question 10****(6 marks)**

The time in minutes spent by customers in a Claremont bank are normally distributed with a mean 16.5 minutes and standard deviation 3.9 minutes.

Assume that on any given day, customers' times in the bank are independent of each other.

- (a) On a day when there are 16 customers to the bank, how many of these customers are expected to spend at least 20 minutes in the bank? (2 marks)
- (b) If a customer has already spent 15 minutes in the bank, what is the probability that he will spend less than 20 minutes in the bank? (2 marks)
- (c) On a day when the bank has 16 customers, what is the probability that no more than 8 of them spend more than 15 minutes in the bank? (2 marks)

**End of questions**