

(c) Assuming that the model continues to be valid, during which year will the cost of computer memory fall below 20 cents per gigabyte? (2 marks)

$$0.2 = 18.5 \times 0.35^x$$

$$x = 14.6 \text{ years}$$

By the year 2019 (round 14)
or the year 2020 rounded

End of section 2

Mark Available:

10/17

(7 marks)

(2 marks)

(a) Simplify $\sqrt{4-5}$.

$$(4-5)^{\frac{1}{2}}$$

$$4-5 = -1$$

Question 1

Time Allowed: 25 minutes
Student's Name: *Chen, M. H.*

(b) Write the value of xy in scientific notation when $x = 2.5 \times 10^3$ and $y = 5 \times 10^2$. (2 marks)

$$2.5 \times 5 \times 10^3 \times 10^2$$

$$12.5 \times 10^5$$

$$1.25 \times 10^6$$

(c) Determine the value of n given that $9n+1 = \sqrt{27}$. (3 marks)

$$(3n+1)^{\frac{1}{2}} = 27^{\frac{1}{2}}$$

$$3n+1 = (3)^3$$

$$3n+1 = 27$$

$$3n = 26$$

$$n = \frac{26}{3}$$

31/40

Question 2

a. Simplify the following, leaving all indices positive.

$$(1) \left(\frac{8a^{-1}b^2}{27a^2b^{-1}} \right)^{-\frac{1}{3}} \left(\frac{2^3 a^1 b^2}{3^3 a^2 b^{-1}} \right)^{\frac{1}{3}} = \frac{3a}{2b} \quad (2 \text{ marks})$$

$$(2) \frac{3^n + 3^{n+2}}{3^{n-1}} = \frac{3^n(1+3^2)}{3^{n-1}} = \frac{3^n(10)}{3^{n-1}} = 10 \cdot 3 = 30 \quad (2 \text{ marks})$$

b. Solve for x.

$$4^x = \sqrt{8}$$

$$\begin{aligned} (2^2)^x &= 2^{\frac{1}{2}} \\ (2^2)^x &= (2^3)^{\frac{1}{2}} \\ 2^x &= 2^{\frac{3}{2}} \end{aligned}$$

$$\frac{2}{x} = \frac{3}{2} \quad x = \frac{4}{3} \quad (2 \text{ marks})$$

(c) Solve algebraically for x.

$$16^{\frac{x-5}{2}} = \sqrt[3]{64} \quad (4^2)^{\frac{x-5}{2}} = (64)^{\frac{1}{3}} \quad \frac{2x-5}{2} = 1 \quad 2x-5=2 \quad 2x=7 \quad x=\frac{7}{2} \quad (2 \text{ marks})$$

(d) Given

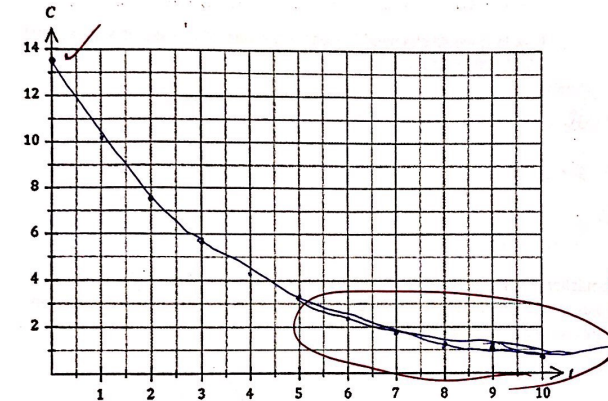
Question 6

The cost, C dollars, for a gigabyte of computer memory between the end of year 2005 ($t = 0$) and the end of year 2015 ($t = 10$) can be modelled by the equation $C = 13.5(0.75)^t$.

(a) Calculate C at the end of year 2010.

$$C = 13.5(0.75)^5 = 49.20 \quad (1 \text{ mark})$$

(b) Draw the graph of C against t on the axes below.



End of section 1

② (your km) \times 1.055 = 1.055 km

(6 marks)

(d) Given that $3^x = 5$, determine the value of 9^{x+1} .

(2 marks)

[illegible]

Saigon International College
Department of Mathematics and Science
Semester 2, 2022
Year 11 ATAR Mathematics Methods
Test 4
(Indices, exponential functions)

Section Two (Calculator assumed)

21

Mark Available: 23

Time Allowed: 45 minutes

Student's Name: ... Chu Minh Day

Question 3

(5 marks)

The area of forest in Methodland is estimated to be decreasing at a rate of 12% per year. In January 2010 the area of the forest was 275 km².

- i. Write down an equation in the form $A = A_0 k^t$, where A_0 is the initial area, t is the time in years, after 2010 and k is a fixed constant. [2 marks]

$$A = 275 \times 0.88^t$$

- ii. What is the area of the forest expected to be in 2020? [1 mark]

$$275 \times 0.88^{10}$$

$$76.58 \text{ km}^2$$

- iii. In what year is the area of the forest expected to be 50 km²? [2 marks]

$$50 = 275 \times 0.88^t$$

$$t = 12.3$$

beginning of year 2024 rounded

or April of 2023 to be exact

Question 4

(6 marks)

- (a) Determine the solution(s), if any exist, when $3^{x-1} = 6$. Give your answer correct to one decimal place. (2 marks)

$$3^{x-1} = 6$$

one solution

$$x = 2.6$$

- (b) (i) Determine the coordinates of the points of intersection of the functions $y = 3^{x-1}$ and $y = x + 1$. (2 marks)

$$y = 3^{x-1} \text{ and } y = x + 1$$

$$x + 1 = 3^{x-1}$$

$$x = -0.8721, 0.1278$$

$$(-0.8721, 0.1278)$$

$$x = 2$$

$$y = 2 + 1$$

$$y = 3$$

$$(2, 3)$$

- (ii) Calculate the distance between the points of intersection in correct to 2 significant figures. (2 marks)

$$3 - 0.127869 = 2.87213$$

$$2 + 0.87213 = 2.87213$$

$$y = 3 - 0.12 = 2.88$$

$$x = 2 - 0.87 = 2.87$$

$$4.06$$

$$\text{answer: } 4.06$$

2 sig fig