

Name : _____

Teacher : _____

Sydney Technical High School

2010 August Common Test

Section 2

Part B (20 marks)

General Instructions

- Write using black or blue pen
- You may use pencil to draw or complete diagrams
- Attempt all questions
- Calculators may be used in Section 2
- Answer the questions in the space provided
- Show all working

Question 81	Question 82	Question 83	Question 84	Question 85	Total

Question 81 (4 marks)

Sharyn is sterilising a bottle to kill bacteria before she puts sauce in it. This table shows the number, n , of live bacteria in the bottle after t minutes.

t	0	1	2	3	4
n	21 870	7 290	2 430	810	

- (a) Fill in the missing value in the table, assuming the number pattern continues. 1

- (b) How many bacteria were killed in the first two minutes? 1

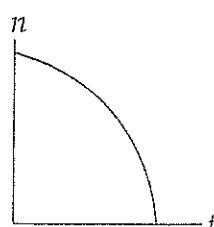
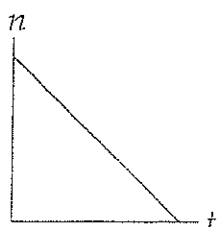
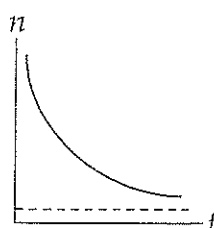
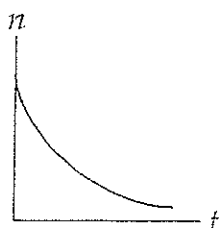
.....

- (c) The formula that relates t to n is $n = \square \times \left(\frac{1}{3}\right)^t$. 1

Calculate the value represented by \square .

.....

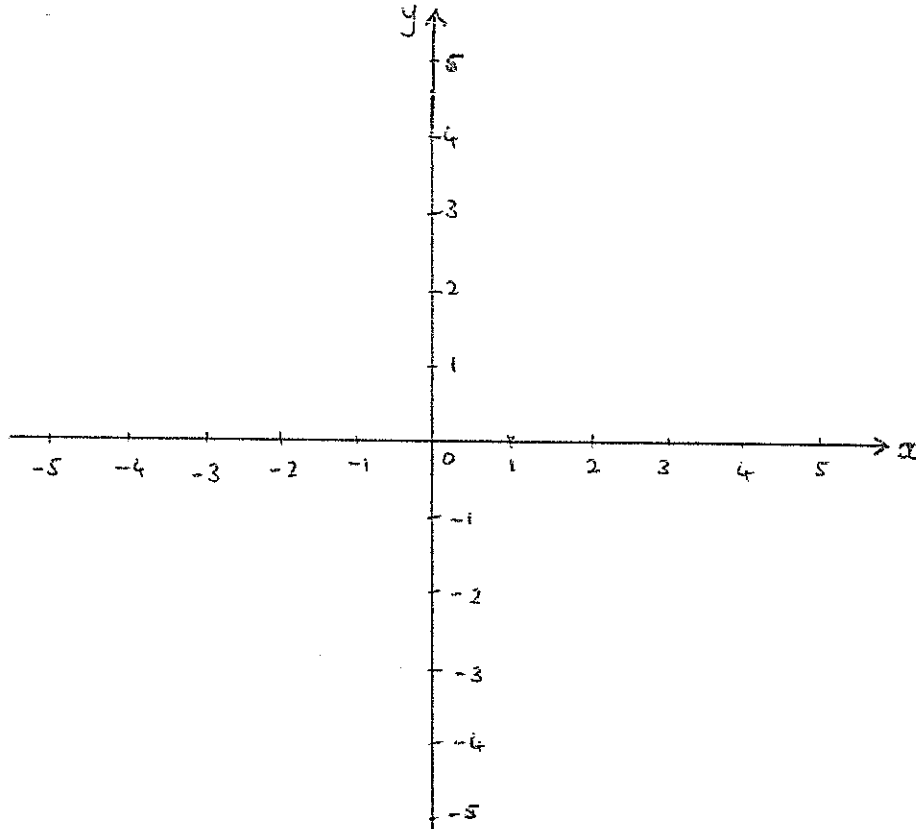
- (d) Circle the graph that best shows the number of live bacteria in the first five minutes. 1



Question 82 (4 marks)

- a) On the number plane below, accurately sketch the graphs of $x - y + 2 = 0$ and $y = \frac{2}{x}$.

2



- b) Solve the two equations simultaneously to find the exact x values at the points of intersection of the two graphs.

2

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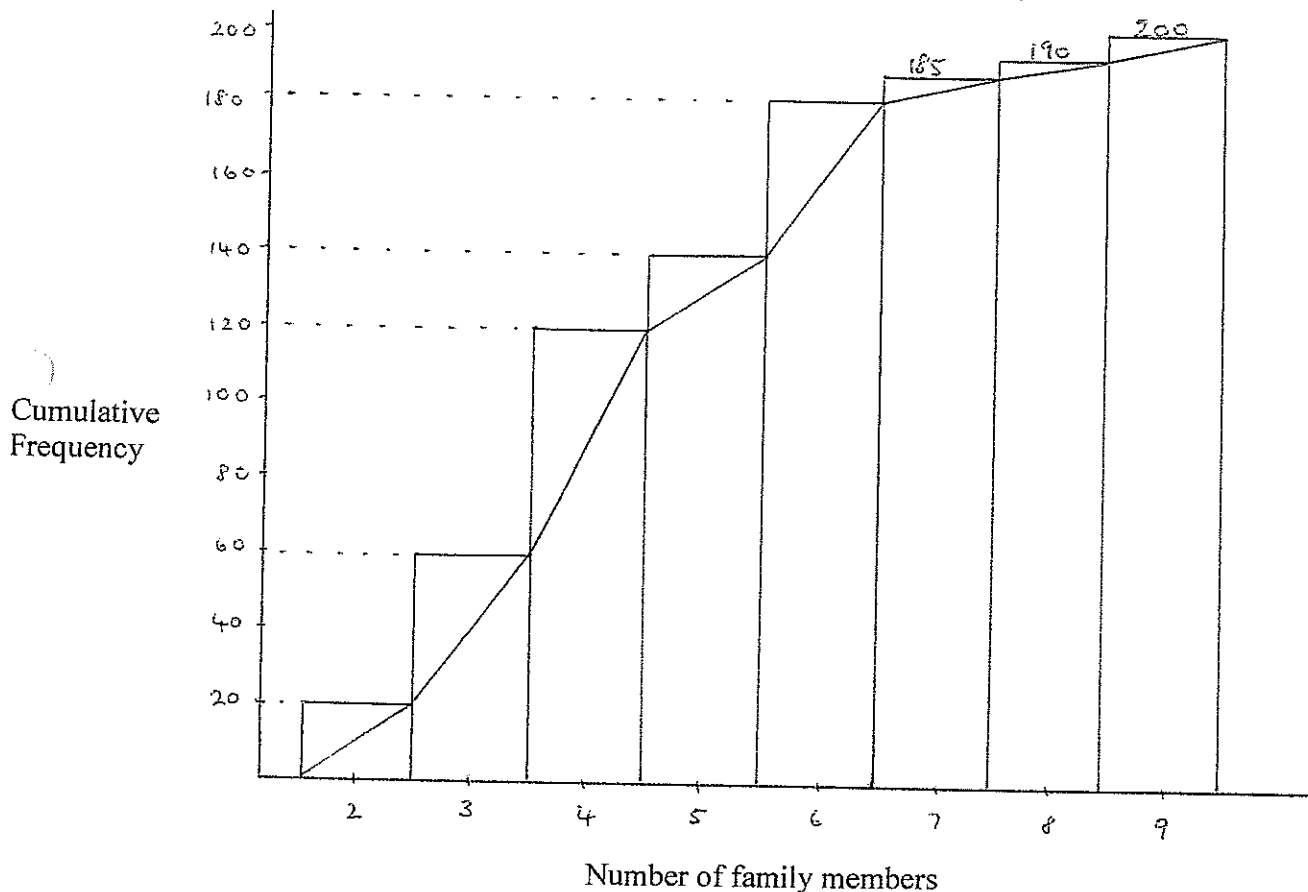
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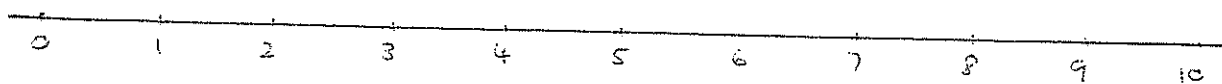
Question 83 (4 marks)

Two hundred families were surveyed and asked to state the total number of family members living at home. Their responses are shown in the cumulative frequency histogram below.

Totals for the last three columns are provided for accuracy. The ogive is also shown.



- What is the median number of family members?
- Find the interquartile range.
.....
- Calculate the mean
.....
.....
.....
- Construct a box-and-whisker plot representing the data. Use the scale provided below.



(Use a ruler)

Question 84 (4 marks)

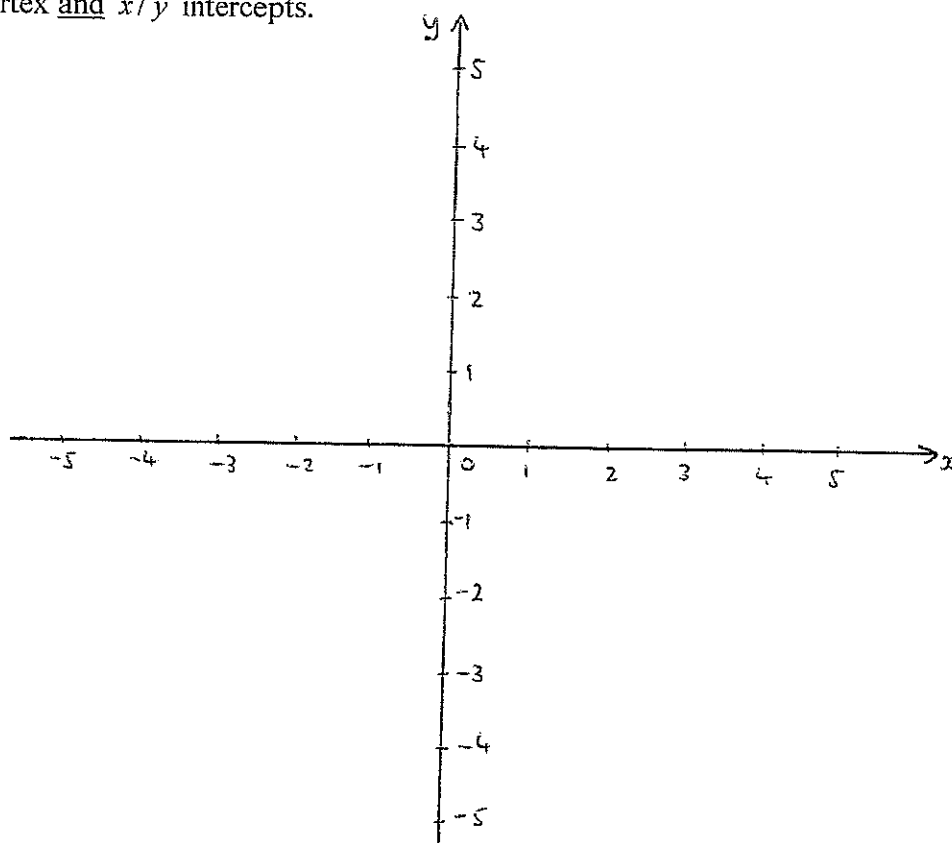
You are given the parabola $y = (x - 2)^2 - 1$.

a) What are the coordinates of the vertex?

.....

.....

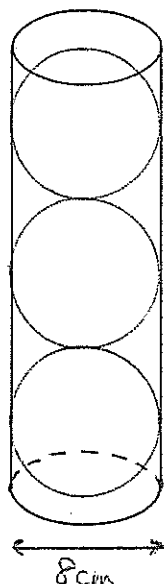
b) Sketch the above parabola on the number plane below. Clearly show the position of the vertex and x/y intercepts.



c) On the same axes also sketch the curve $y = 1 - (x - 2)^2$. Clearly label this second curve.

Question 85 (4 marks)

Three tennis balls exactly fit inside a cylindrical tube of diameter 8 cm as shown.



- a) Find the surface area of each ball. Leave your answer in terms of π .

.....

.....

- b) Find the volume of each ball. Leave your answer in terms of π .

.....

.....

- c) Twenty four of the cylindrical tubes are packed to fit exactly inside a rectangular prism box, arranged 6×4 .

Find the percentage of the box's volume that is occupied by the cylinders. Give your answer correct to the nearest whole percent.

.....

.....

.....

.....

.....

Question 81 (4 marks)

(2)

Sharyn is sterilising a bottle to kill bacteria before she puts sauce in it. This table shows the number, n , of live bacteria in the bottle after t minutes.

t	0	1	2	3	4
n	21 870	7 290	2 430	810	270



- (a) Fill in the missing value in the table, assuming the number pattern continues. 1

- (b) How many bacteria were killed in the first two minutes? 1

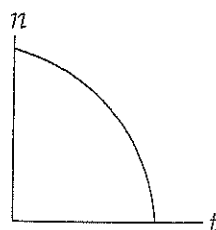
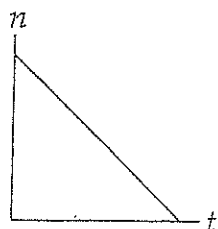
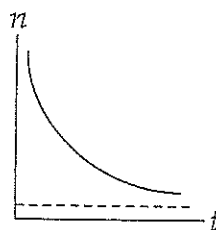
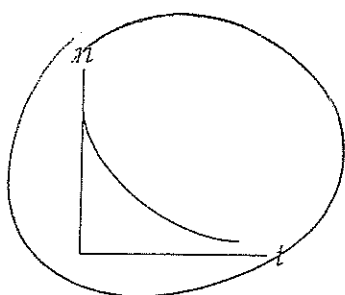
$$21870 - 2430 = 19440$$

- (c) The formula that relates t to n is $n = \square \times \left(\frac{1}{3}\right)^t$. 1

Calculate the value represented by \square .

21870

- (d) Circle the graph that best shows the number of live bacteria in the first five minutes. 1

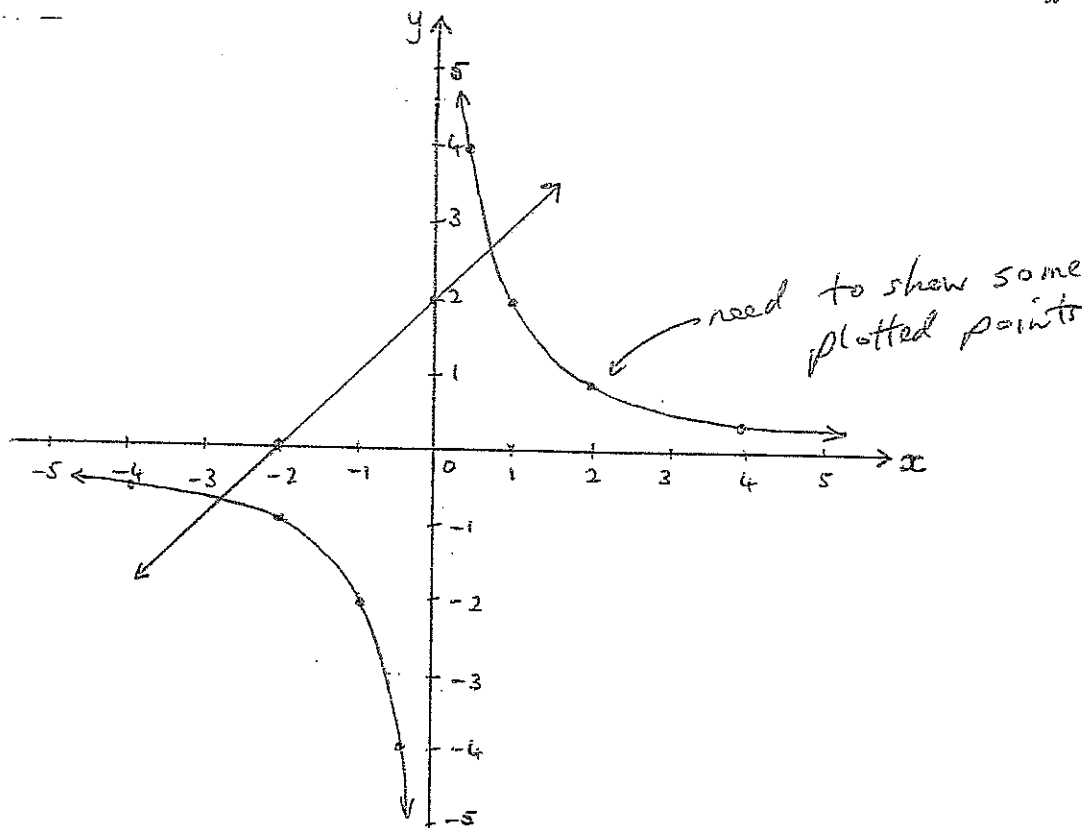


Question 82 (4 marks)

2

- a) On the number plane below, accurately sketch the graphs of $x - y + 2 = 0$ and $y = \frac{2}{x}$.

2



- b) Solve the two equations simultaneously to find the exact x values at the points of intersection of the two graphs.

2

$$x - \frac{2}{x} + 2 = 0$$

$$x^2 - 2 + 2x = 0$$

$$x^2 + 2x - 2 = 0$$

$$x = \frac{-2 \pm \sqrt{12}}{2} \quad \text{or} \quad -1 \pm \sqrt{3}$$

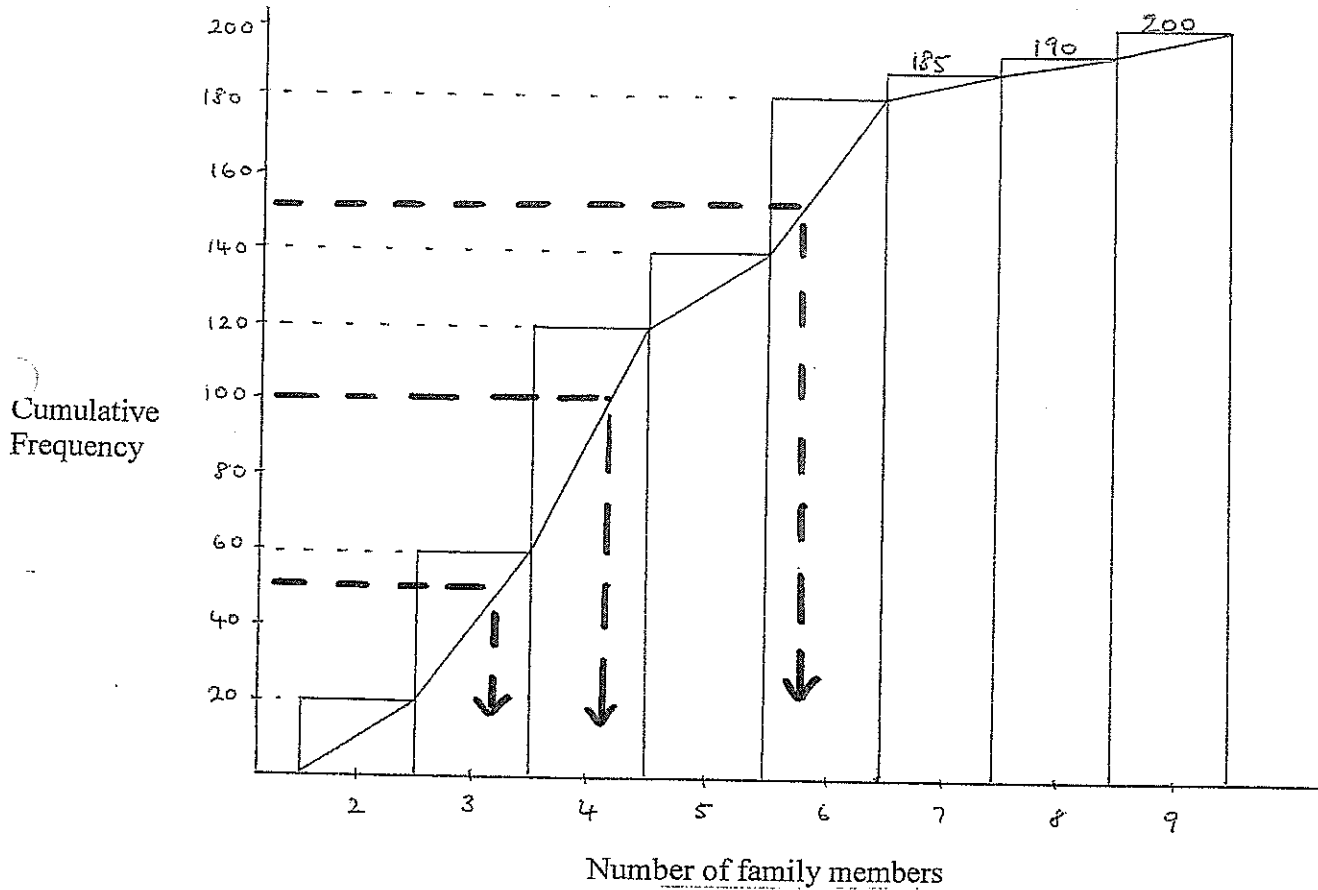
2

accept

Question 83 (4 marks)

Two hundred families were surveyed and asked to state the total number of family members living at home. Their responses are shown in the cumulative frequency histogram below.

Totals for the last three columns are provided for accuracy. The ogive is also shown.



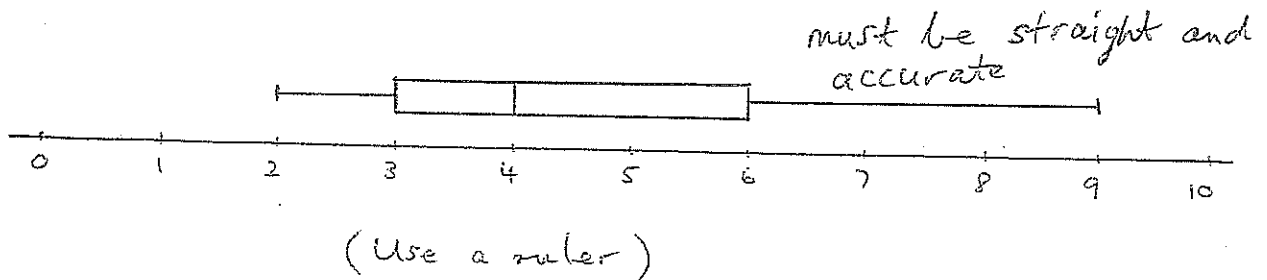
a) What is the median number of family members? 4

b) Find the interquartile range. $6 - 3 = 3$

c) Calculate the mean

$$\frac{905}{200} = 4.525$$

d) Construct a box-and-whisker plot representing the data. Use the scale provided below.



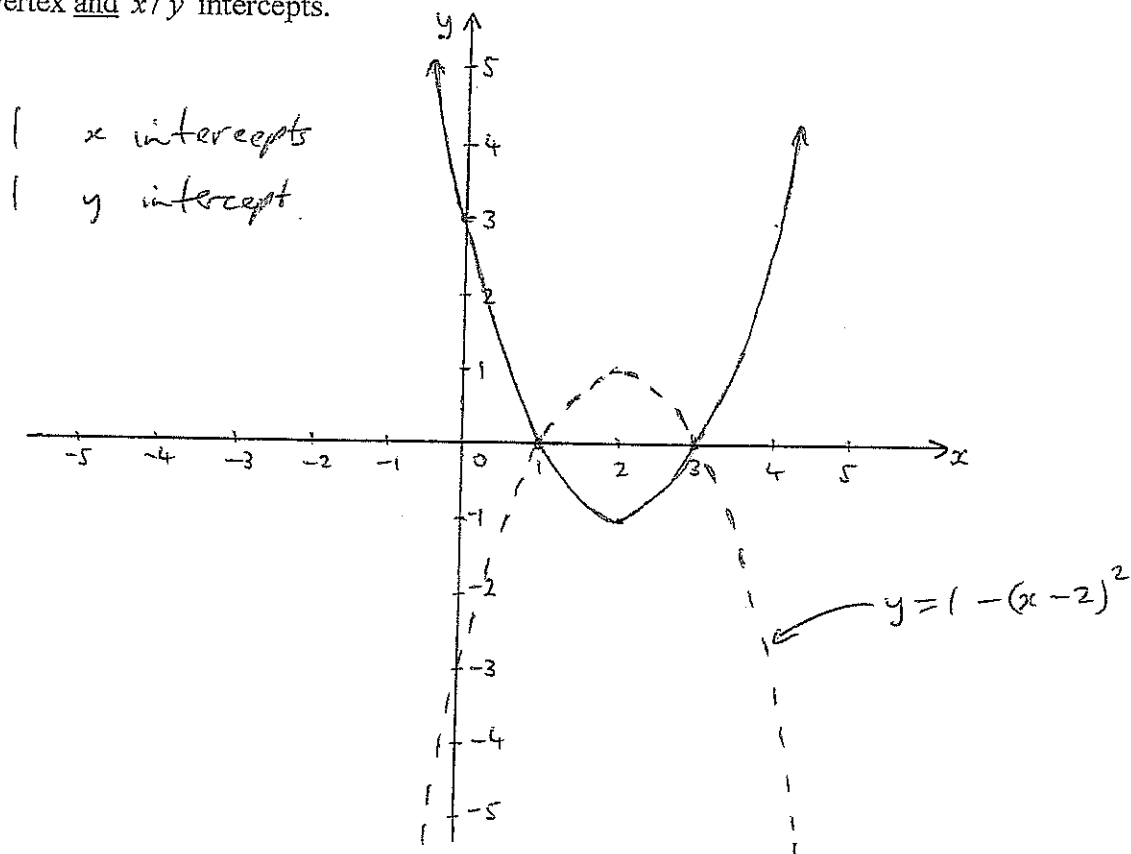
Question 84 (4 marks)

You are given the parabola $y = (x - 2)^2 - 1$.

a) What are the coordinates of the vertex?

(2, -1)

b) Sketch the above parabola on the number plane below. Clearly show the position of the vertex and x/y intercepts.

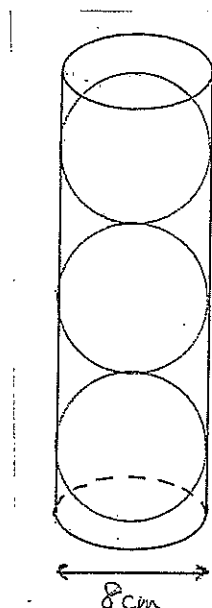


c) On the same axes also sketch the curve $y = 1 - (x - 2)^2$. Clearly label this second curve.

(above)

Question 85 (4 marks)

Three tennis balls exactly fit inside a cylindrical tube of diameter 8 cm as shown.



2

- a) Find the surface area of each ball. Leave your answer in terms of π .

$$\begin{aligned} S.A. &= 4\pi \times 4^2 \\ &= 64\pi \text{ cm}^2 \end{aligned}$$

- b) Find the volume of each ball. Leave your answer in terms of π .

$$\begin{aligned} V &= \frac{4}{3}\pi \times 4^3 \\ &= \frac{256\pi}{3} \text{ cm}^3 \end{aligned}$$

- c) Twenty four of the cylindrical tubes are packed to fit exactly inside a rectangular prism box, arranged 6×4 .

Find the percentage of the box's volume that is occupied by the cylinders. Give your answer correct to the nearest whole percent.

$$\frac{24 \times (\pi \times 4^2 \times 24)}{48 \times 32 \times 24} \times 100\% \approx 79\%$$