



PERTH MODERN SCHOOL
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Test Two

Semester One 2018 **UNIT 1 METHODS**

Calculator Free 40 minutes /40 marks

Formula Sheet is permitted

Name: **MARKING KEY**

Place a tick in the box next to your Mathematics teachers name:

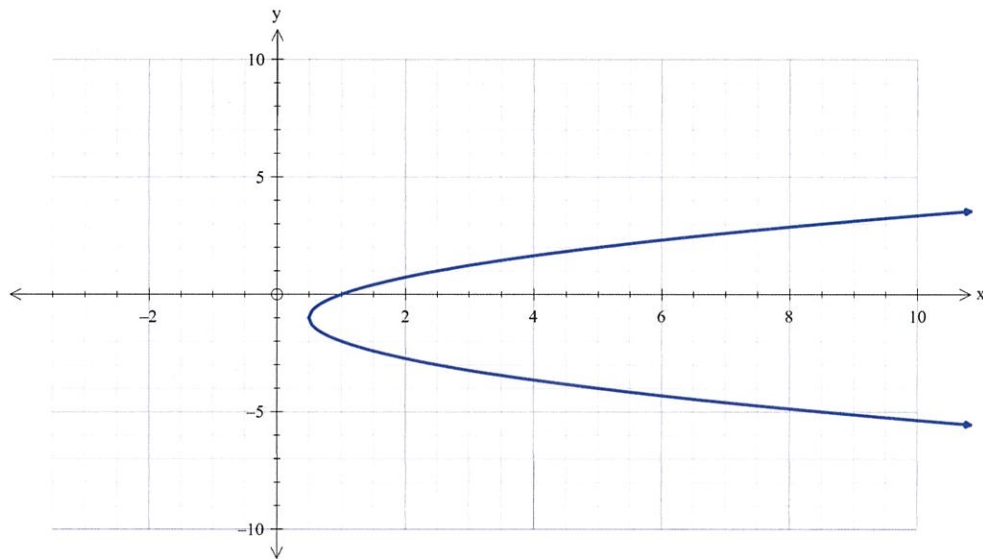
- | | |
|--------------------|--------------------------|
| Mr Strain | <input type="checkbox"/> |
| Ms Sindel | <input type="checkbox"/> |
| Mrs Rimando | <input type="checkbox"/> |
| Mr Gannon | <input type="checkbox"/> |
| Mr Young | <input type="checkbox"/> |
| Mrs Flynn | <input type="checkbox"/> |
| Ms Ensly | <input type="checkbox"/> |

Question 1

(4, 2, 2 = 8 marks)

Given $(y + 1)^2 = 2x - 1$,

- i) sketch the graph of the equation.



- ✓ shape
- ✓ vertex
- ✓ x intercept
- ✓ symmetric through $y = -1$

- ii) state its domain and range.

- ✓ Domain: $[\frac{1}{2}, \infty)$
- ✓ Range: $(-\infty, \infty)$

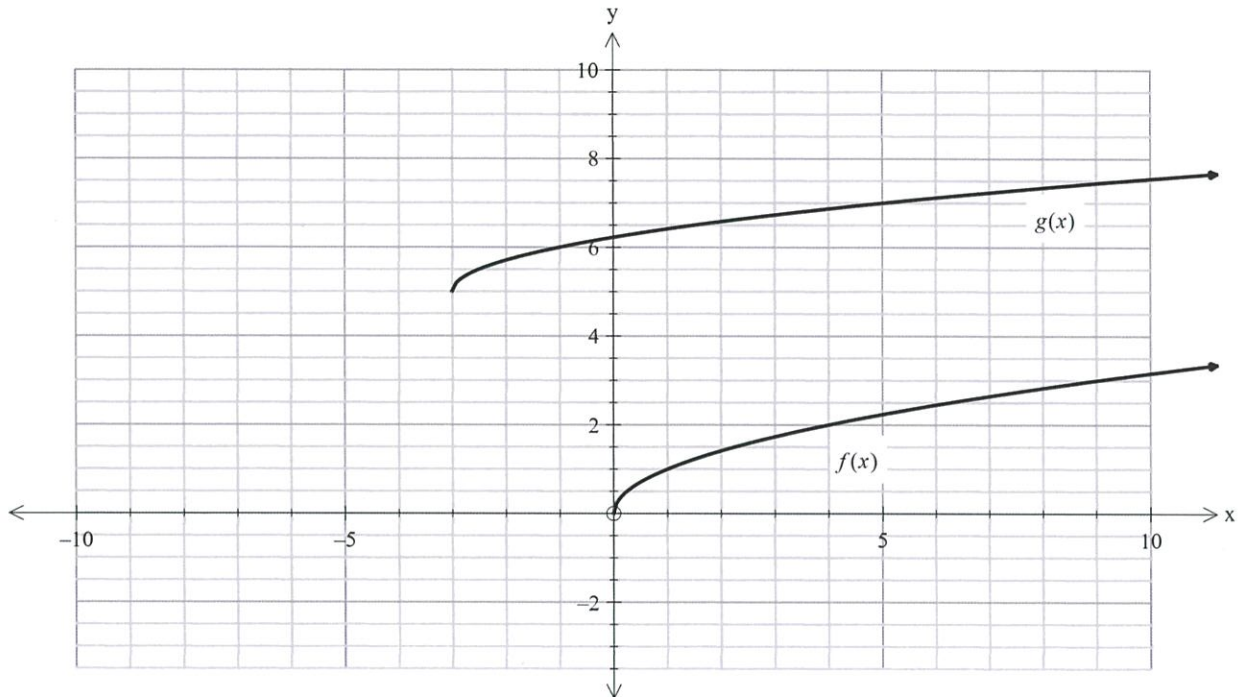
- iii) Is this graph a function? Justify.

- ✓ No.
- ✓ The graph would fail the vertical line test as there would be two y values for the same x value.

Question 2

(4, 3 = 7 marks)

The function $f(x) = \sqrt{x}$ undergoes several transformations that result to $g(x)$ as represented in the graphs below.



i) Identify the order of transformations that would transform $f(x)$ to $g(x)$.

- ✓ Vertical translation 5 units up
- ✓ Horizontal translation 1.5 units left
- ✓ Horizontal dilation by a scale factor of 2
- ✓ correct order

Or

- ✓ Vertical translation 5 units up
- ✓ Horizontal dilation by a scale factor of 2
- ✓ Horizontal translation 3 units left
- ✓ correct order

ii) Write the equation of the resulting function $g(x)$.

$$g(x) = \sqrt{\frac{1}{2}(x+3)} + 5 \quad \text{or} \quad g(x) = \sqrt{\frac{1}{2}x + \frac{3}{2}} + 5$$

- ✓ $\frac{1}{2}$, ✓ +3, ✓ +5

Question 3**(2, 2 = 4 marks)**

A circle has its centre at $(-2, -3)$ and passes through the point $(1,1)$.

- i) What is the radius of this circle?

$$\checkmark \text{ radius} = \sqrt{(-2 - 1)^2 + (-3 - 1)^2}$$

$$= \sqrt{25}$$

$$\checkmark = 5 \text{ units}$$

- ii) State the equation of the circle in expanded form.

$$(x + 2)^2 + (y + 3)^2 = 25$$

$$\checkmark x^2 + 4x + 4 + y^2 + 6y + 9 = 25$$

$$\checkmark x^2 + y^2 + 4x + 6y - 12 = 0$$

Type equation here.

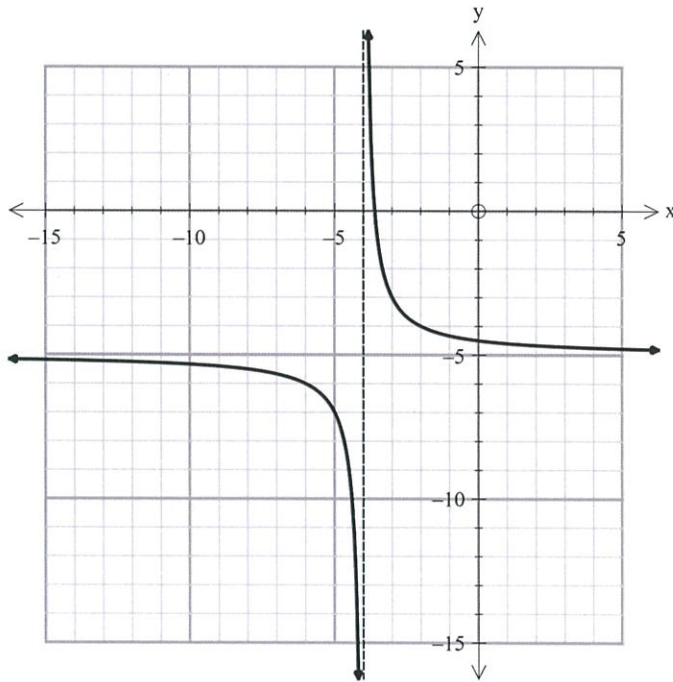
Question 4

(3, 3 = 6 marks)

Write the equations of the following graphs:

i)

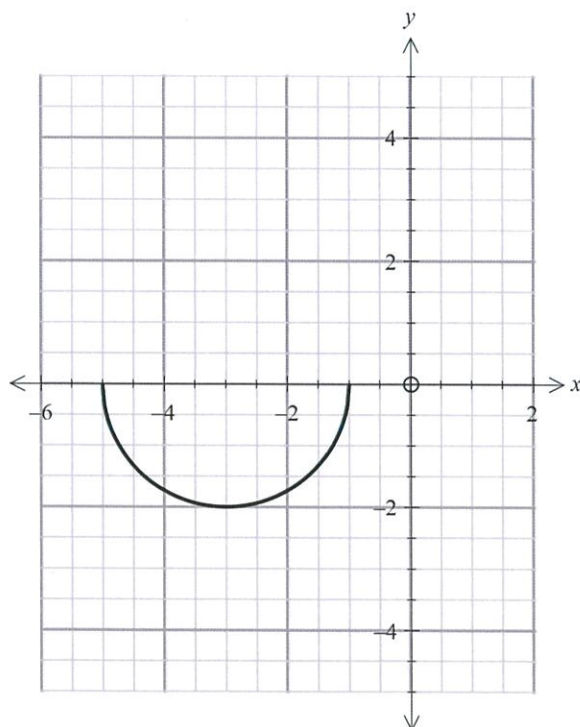
$$y = \frac{2}{x+4} - 5$$



✓ 2, ✓ +4, ✓ -5

ii)

✓ centre (-3,0), radius is 2 units



$$y = -\sqrt{4 - (x + 3)^2} \quad \checkmark -, \checkmark (x+3)$$

Question 5**(2, 2, 2 = 6 marks)**

A pebble is thrown vertically upwards. It has an initial speed of u metres per second. The pebble reaches a maximum height of h metres before falling vertically downwards. It is known that h is directly proportional to u^2 . When the pebble is thrown with an initial speed of 10 m/s , it reaches a maximum height of 5 meters.

- i) Write an equation that models this relationship.

$$h \propto u^2$$

$$\checkmark h = ku^2 \quad , \quad 5 = k(10)^2 \quad k = \frac{1}{20}$$

$$\checkmark h = \frac{1}{20}u^2$$

- ii) Calculate the maximum height reached when the pebble is thrown with an initial speed of 12 m/s .

$$\checkmark h = \frac{12^2}{20}$$

$$\checkmark h = 7.2 \text{ m}$$

- iii) Find the initial speed of the pebble if the maximum height reached is 16 meters. Write your answer as an exact value.

$$\checkmark 16 = \frac{u^2}{20}$$

$$\checkmark u = \sqrt{320} \frac{\text{m}}{\text{s}} \text{ or } 8\sqrt{5} \frac{\text{m}}{\text{s}}$$

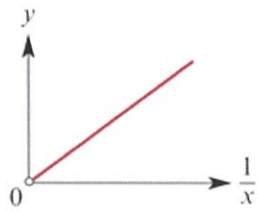
Question 6**(4 marks)**

State whether the relationships given below model a direct variation, inverse variation or neither.

i) $y = 7x - 2$ ✓ **neither**

ii) The number of hours to finish a job and the number of workers. ✓ **inverse**

iii)



✓ **inverse**

iv)

x	1	2	3
y	5	2.5	1

✓ **neither**

Question 7**(1, 4 =5 marks)**

There are 100 people in an evacuation centre. Supplies for food are being rationed and their supply will last for 20 days.

- i) Write a variation statement that relates the number of days for food supplies f , to the number of people, p .

$$\checkmark f \propto \frac{1}{p}$$

- ii) Suppose 25 more people are evacuated in the same centre. At the very latest, on what day should their supplies be replenished?

$$\checkmark f = \frac{k}{p}$$

$$20 = \frac{k}{100}, \quad \checkmark 2000 = k$$

$$f = \frac{2000}{p}$$

when $p = 125$,

$$\checkmark f = 16$$

$\therefore \checkmark$ *The food supplies will need to be replenished at the very latest on the 17th day.*