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.

✓ $f \propto \frac{1}{p}$

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

✓ $f = \frac{k}{p}$

$20 = \frac{k}{100}$, ✓ $2000 = k$

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

when p = 125, ✓ $f = 16$

∴ ✓ *The food supplies will need to be replenished at the very latest on the 17th day.*

PERTH MODERN SCHOOL
Exceptional schooling. Exceptional students.

Test Two

Semester One 2018
UNIT 1 METHODS

Calculator Free 40 minutes /40 marks

Formula Sheet is permitted

Name: **MARKING KEY**

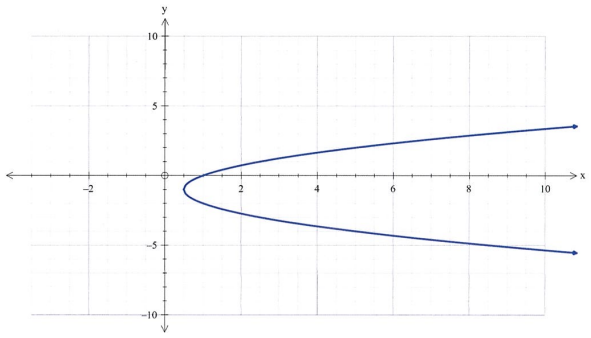
Place a tick in the box next to your Mathematics teachers name:

Mr Strain	☐
Ms Sindel	☐
Mrs Rimando	☐
Mr Gannon	☐
Mr Young	☐
Mrs Flynn	☐
Ms Ensly	☐

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.

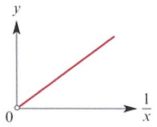
Question 6 **(4 marks)**

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 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.

$h \propto u^2$

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

✓ $h = \frac{1}{20}u^2$

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

✓ $h = \frac{12^2}{20}$

✓ $h = 7.2\ m$

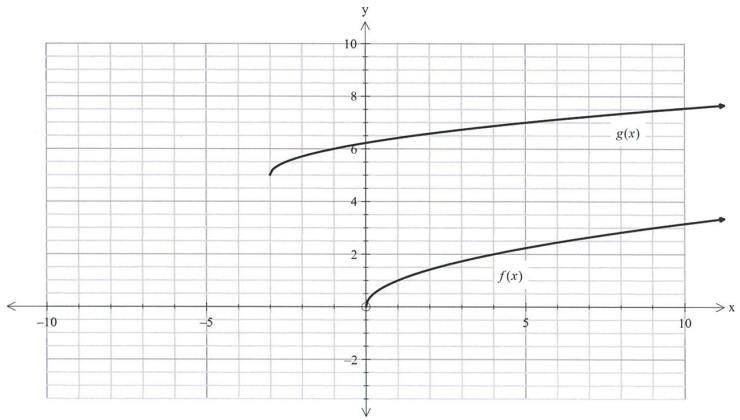
iii) Find the initial speed of the pebble if the maximum height reached is 16 meters. Write your answer as an exact value.

✓ $16 = \frac{u^2}{20}$

✓ $u = \sqrt{320}\ \frac{m}{s}$ *or* $8\sqrt{5}\ \frac{m}{s}$

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 $g(x)$.

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

✓ $\frac{1}{2}$, ✓ +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?

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

$= \sqrt{25}$

✓ $= 5\ units$

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

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

✓ $x^2 + 4x + 4 + y^2 + 6y + 9 = 25$

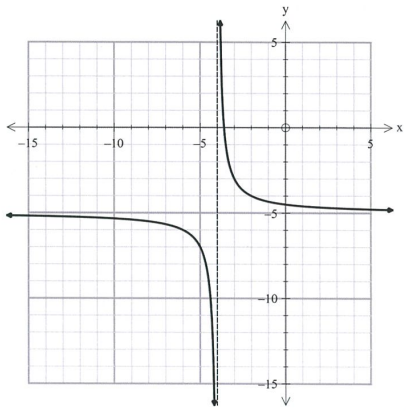
✓ $x^2 + y^2 + 4x + 6y - 12 = 0$

Type equation here.

Question 4 **(3, 3 = 6 marks)**

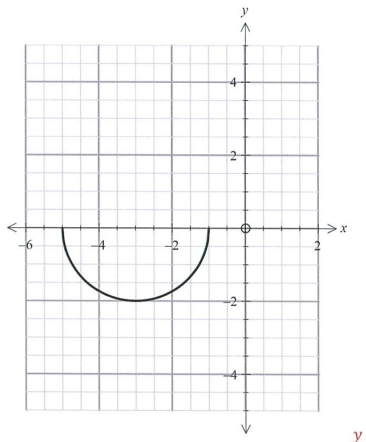
Write the equations of the following graphs:

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



✓ 2, ✓ +4, ✓-5

ii) ✓ $centre\ (-3,0), radius\ is\ 2\ units$



$y = -\sqrt{4-(x+3)^2}$ ✓ -, ✓(x+3)