

Time: 45 Minutes

Total Marks: 41

Total / 41

You may have a formula sheet and 1 page (1 side) of notes for this test.

Date: Friday 12th April 7.45am

Name:	Teacher :

PERTH MODERN SCHOOL
Calculator Assumed
Year 11 Mathematics Methods
Semester One 2019
Proportion, Functions, Relations & Transformations



Test 2

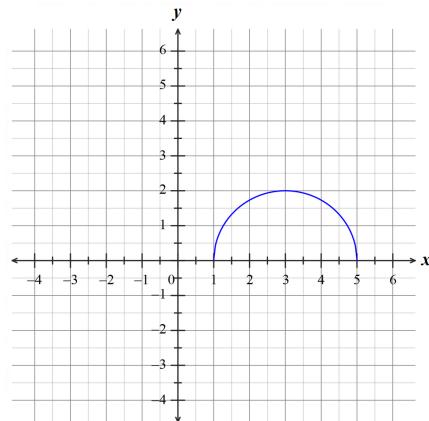
Exceptional schooling. Exceptional students.

Question 1**(3 marks)**

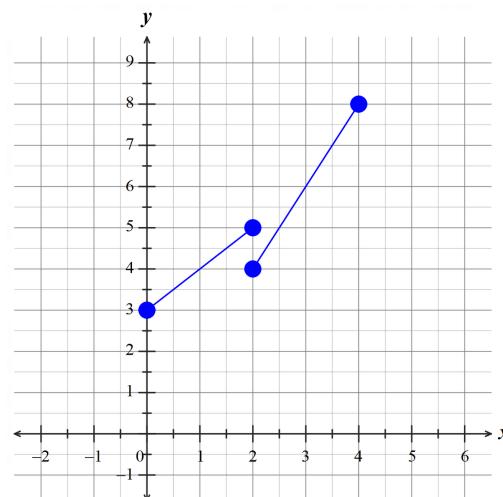
State whether the following relations are functions.

a) $\{(0, 0), (1, 1), (1, -1), (4, 2), (9, 3)\}$

b)



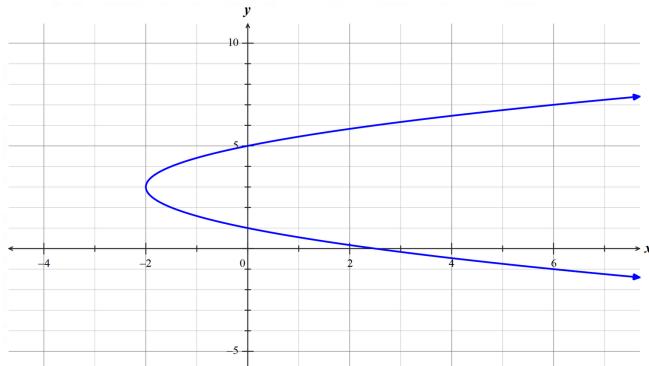
c)



Question 3**(8 marks)**

(a) Find the radius and the coordinate of the centre of the circle with equation

$$x^2 + y^2 - 4x - 6y - 3 = 0. \text{ Show your working.} \quad (3 \text{ marks})$$

(b) The variables x and y are related as demonstrated by this graph.

i) Determine the equation of the graph above.

(3 marks)

ii) State the domain.

(1 mark)

c) From **(a)** and **(b)**, what features of their graphs clearly indicate that x is not a function of y ? (1 mark)**Question 7****(7 marks)**(a) Express $f(x) = \frac{6x-15}{x-3}$ into the form $f(x) = \frac{a}{x-h} + k$.

(2 marks)

(b) Determine the coordinate of the x -intercept.

(1 mark)

(c) State the asymptotes of $f(x)$.

(2 marks)

(d) Hence, determine the range of $f(x)$.

(2 marks)

Question 6

- a) If the retaining wall must be constructed in 150 hours, how many extra workers will need to be employed? (3 marks)
- The time (t) in hours required to construct a retaining wall varies inversely to the number of workers (w) being employed. [Assume that all workers work at the same rate.]
- construct a retaining wall. [Assume that all workers work at the same rate.]

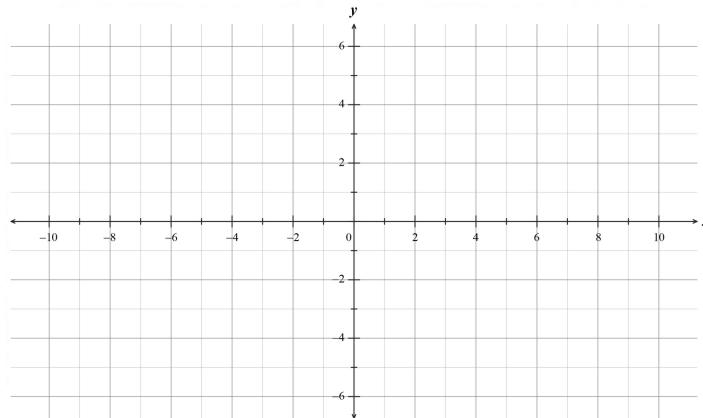
- b) If only 6 workers are available, how long will they take to construct this wall? (1 mark)

Question 4**(6 marks)**

The function $f(x) = \sqrt{x}$ is transformed into $g(x) = k\sqrt{(ax+b)} + c$ by the following sequence of transformations.

- (a) Sketch the following transformation of $f(x)$.

'A translation 5 units in the positive x -axis followed by a translation of 2 units in the positive y -axis.'
(2 marks)



- (b) Determine the equations of the resulting function $g(x)$.

- i) A translation 3 units in the direction of the negative y -axis followed by a reflection about the x -axis.
(2 marks)

- ii) A dilation parallel to the positive x -axis of factor 2 followed by a translation 4 units in the direction of the positive x -axis
(2 marks)

Question 5**(9 marks)**

Consider the functions f and g where $f(x) = ax^2 + bx + c$ and $g(x) = f(2x+3)$.

- a) Given $f(-2) = 0$, $f(5) = 0$ and $f(2) = 3$, determine the rule for $f(x)$.
(3 marks)

- b) Express the rule for $g(x)$ as a polynomial.
(3 marks)

- c) The coordinate $(1, 3)$ lies on $f(x)$. Determine the coordinate for $f(x)-4$.
(1 mark)

- d) Describe the sequence of transformations that would transform $f(x)$ to $g(x)$.
(2 marks)