PERTH MODERN SCHOOL
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Test 2

Proportion, Functions, Relations & Transformations

Semester One 2019

Year 11 Mathematics Methods

Calculator Assumed

Name:	
Teacher:	

Date: Friday 12th April 7.45am

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

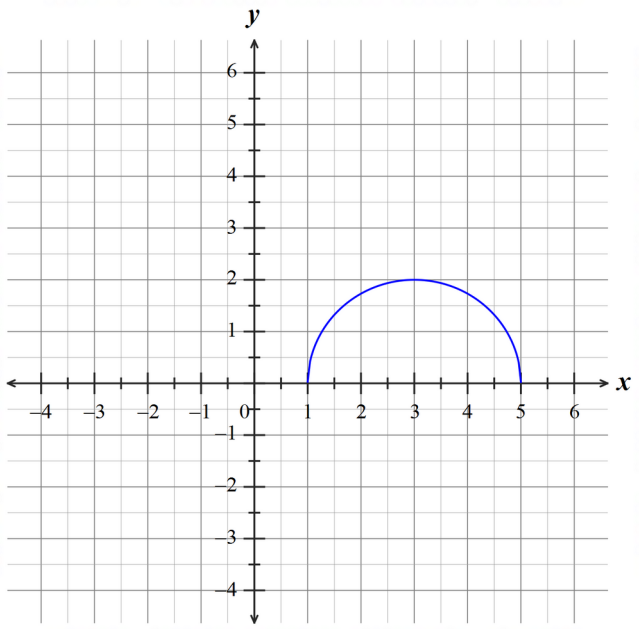
Total_____/ 41 **Total Marks:41** **Time: 45 Minutes**

Question 1 **(3 marks)**

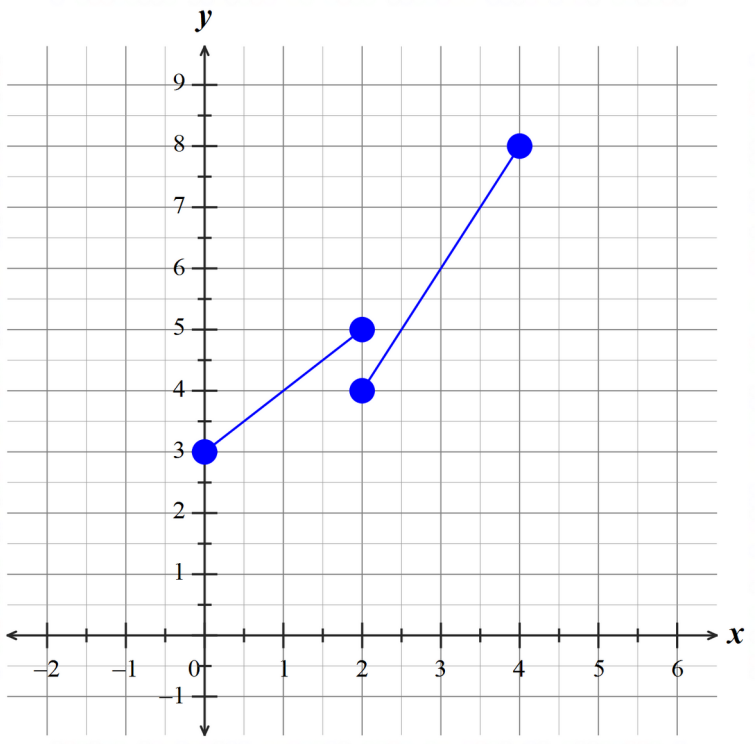
State whether the following relations are functions.

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

b)



c)



Question 2 **(4 marks)**

Given that y is directly proportional to the square of x. When $y=12,\ x=4$, find

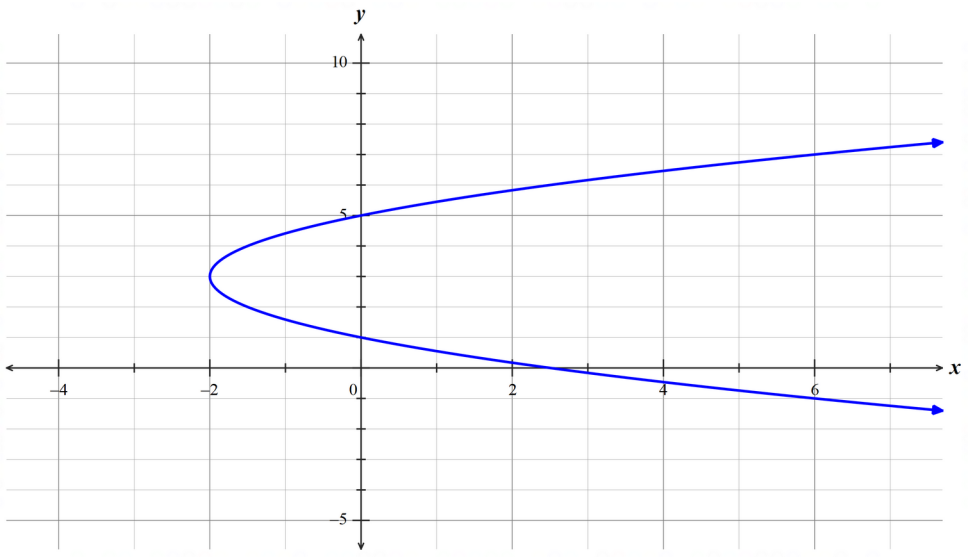
a) the constant of variation (2 marks)

b) the value(s) of x when y = 27 (2 marks)

Question 3 **(8 marks)**

(a) Find the radius and the coordinate of the centre of the circle with equation $x^2+y^2-4x-6y-3=0$. Show your working. (3 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)

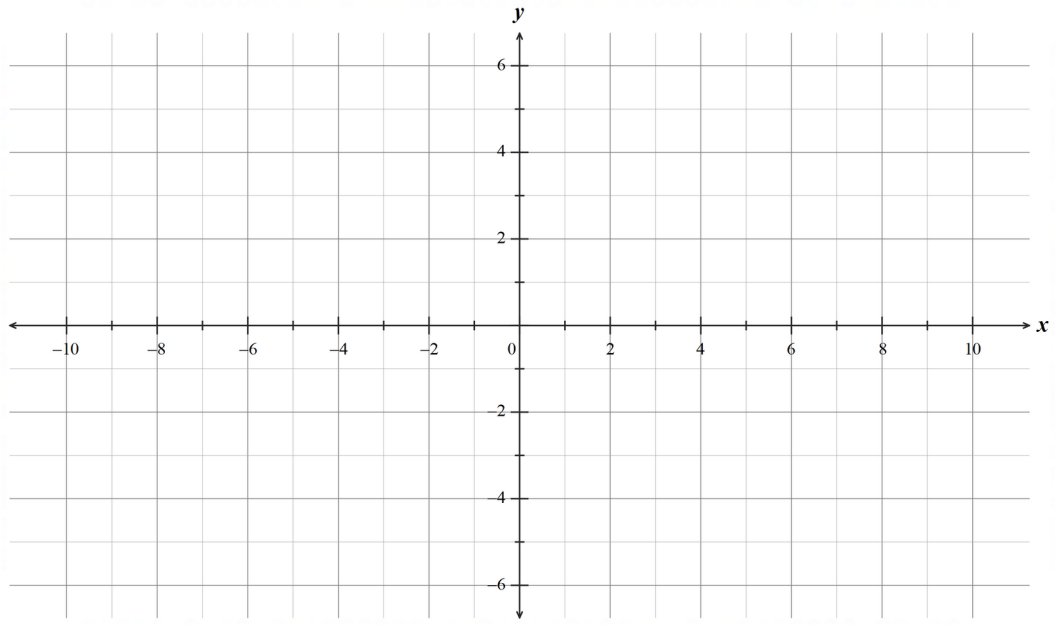
c) From **(a)** and **(b)**, what features of their graphs clearly indicate that x is not a function of y? (1 mark)

Question 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)

Question 6 **(4 marks)**

The time (t) in hours required to construct a retaining wall varies inversely to the number of workers (w) being employed. An engineer estimates that it will take 8 workers 180 hours to construct a retaining wall. [Assume that all workers work at the same rate.]

a) If the retaining wall must be constructed in 150 hours, how many extra workers will need to be employed? (3 marks)

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

END OF TEST