

MATHEMATICS DEPARTMENT

Year 11 Methods - Test Number 3 2019

Relations, Function Transformations,

Trig Functions & Counting

Resource Free

Name: _____

Teacher: _____

Marks: 45

Time Allowed: Reading: 2 minutes

Working: 43 minutes

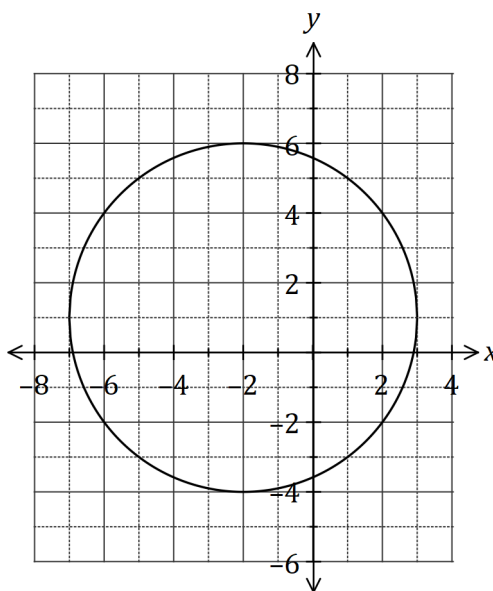
Instructions: You ARE NOT permitted any notes or calculator.

The formula sheet will be provided.

1. [3, 4 = 7 marks]

- a) The graph of the relation $y^2 = x$ passes through the points $(36, p)$ and $(q, -9)$. Determine the values of p and q .

- b) The graph of a relationship is circular, as shown below.



Determine the equation of this circle in the form $x^2 + y^2 = a + bx + cy$, where a, b and c are constants.

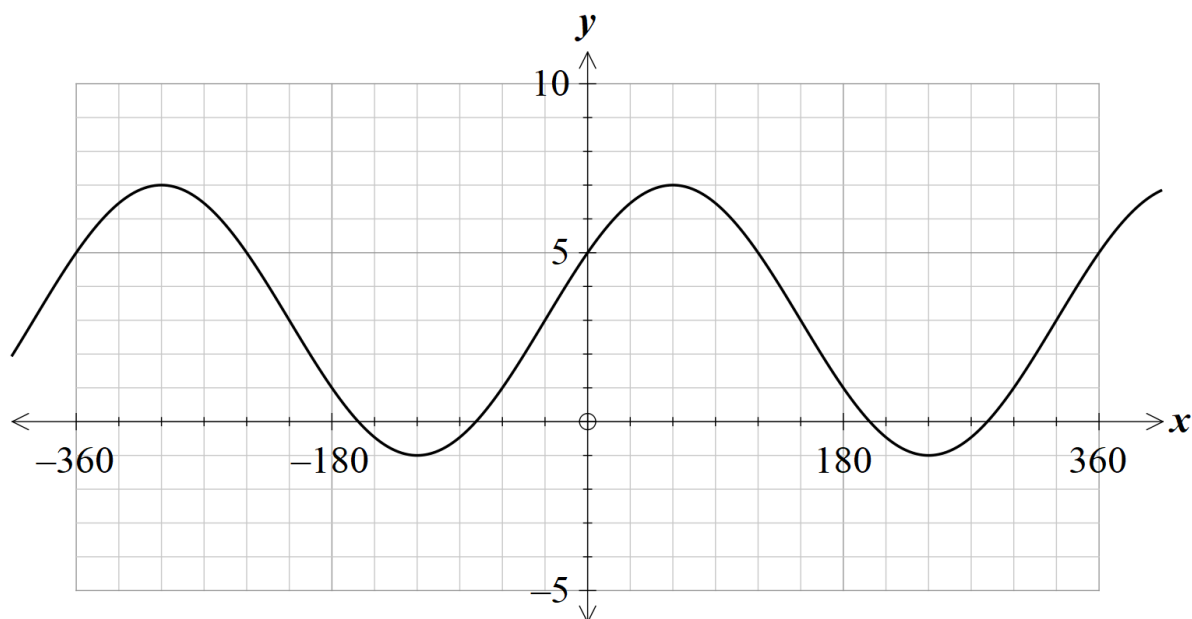
2. [2, 3 = 5 marks]

a) Use an appropriate identity to show that $\cos(\pi - \theta) = -\cos \theta$

b) Evaluate: $\sin(250^\circ)\cos(25^\circ) - \cos(250^\circ)\sin(25^\circ)$

3. [4 marks]

The sketch of the curve $y = a \sin(x + b) + c$ is shown in the diagram below. Given that $a > 0$, find the values of a, b and c



$$a = 4$$

$$b = 180^\circ$$

$$c = 5$$

4. [3, 3 = 6 marks]

Use the Binomial theorem to answer the following:

- a) Find the sixth term in the expansion of $\left(2x - \frac{1}{2}\right)^9$. Give your answer in simplified form.

- b) Find the term independent of x (ie which contains no x) in the expansion of $\left[x + \left(\frac{1}{x^2}\right)\right]^{12}$

5. [1, 1, 3 = 5 marks] (YOU NEED NOT SIMPLIFY YOUR ANSWERS)

An examination is divided into two sections, A and B, with 5 and 7 questions respectively. How many different combinations of questions are there if students are required to:

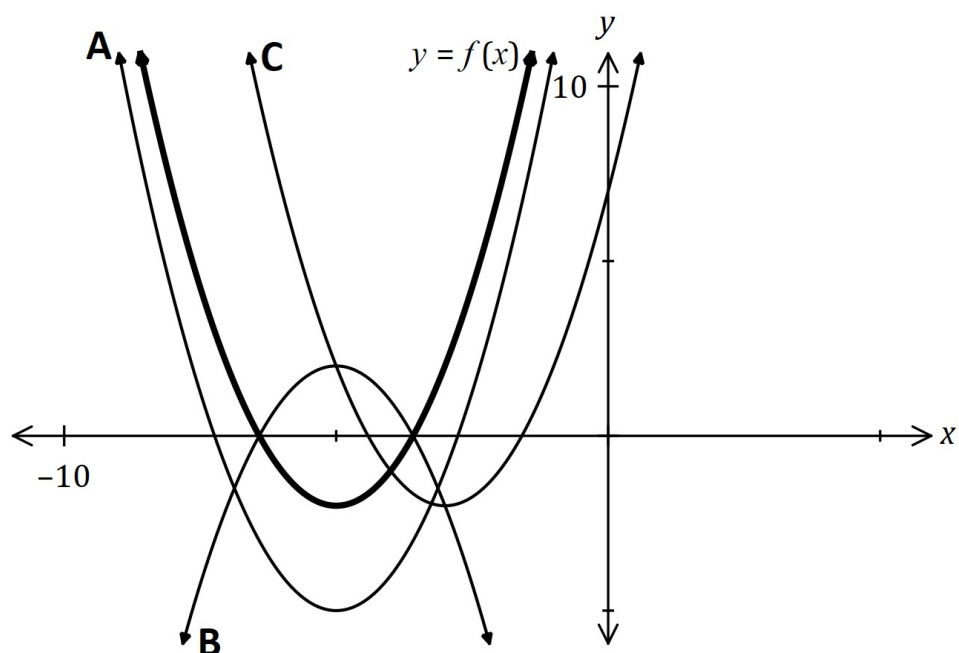
- a) answer all the questions in each section?

- b) answer all the questions in Section A and any two questions from Section B?

- c) answer a total of 5 questions with at least one question from each section?

6. [3 marks]

The graph of $y = f(x)$ is shown in bold below. The graphs of $y = -f(x)$, $y = f(x+p)$ and $y = f(x)+q$ are also shown, where p and q are constants.

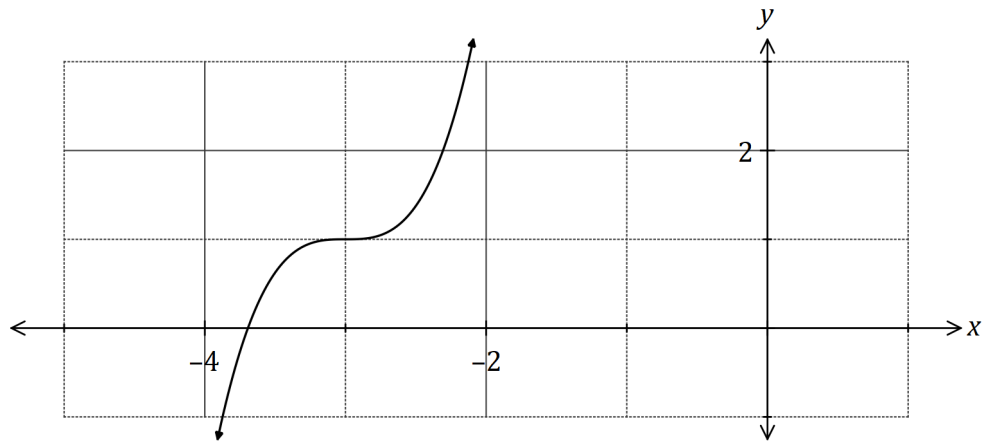


Complete the table below, by identifying the defining equation of each graph:

Graph	Equation
A	
B	
C	

7. [1, 2, 2 = 5 marks]

- (a) Part of the graph of $y=f(x)$ is shown below, where $f(x)=3(x+b)^3+c$, and b and c are constants.



- (i) Determine the value of b .

- (ii) Determine $f(0)$.

- b) Another function, $g(x)$, is a transformation of $f(x)$, where $g(x)=f(2x-3)$.

Describe how to obtain the graph of $y=g(x)$ from the graph of $y=f(x)$.

8. [3, 3, 4 = 10 marks]

Solve the following trigonometric equations in the given domain:

$$\begin{array}{c} \theta - 2 \\ \theta - 1 \\ \text{a) } 2 \sin \theta = 0, 0^\circ \leq \theta \leq 360^\circ \\ \theta \\ \sin \theta \\ \theta \end{array}$$

$$\text{b) } 4 \cos^2 x = 3, 0 \leq x \leq 2\pi$$

$$\text{c) } 2 \sin 3x - 1 = 0, 0 \leq x \leq \pi$$

****End of Test****