IB Math SL Midterm Review #1   **Name**_____

Do your work on a separate sheet of paper. *Attempt as many without a calculator as possible.*

1. Find the term in x^4 in the expansion of $\left(3x^2 - \dfrac{2}{x}\right)^5$.

(Total 6 marks)

2. Determine the constant term in the expansion of $\left(x - \dfrac{2}{x^2}\right)^9$.

(Total 4 marks)

3. The quadratic equation $4x^2 + 4kx + 9 = 0$, $k > 0$ has exactly one solution for x.
Find the value of k.

(Total 4 marks)

4. The equation $x^2 - 2kx + 1 = 0$ has two distinct real roots. Find the set of all possible values of k.

(Total 6 marks)

5. Consider the function $f(x) = 2x^2 - 8x + 5$.

(a) Express $f(x)$ in the form $a(x - p)^2 + q$, where $a, p, q \in \mathbb{Z}$.

(b) Find the minimum value of $f(x)$.

(Total 6 marks)

6. Find the sum of the infinite geometric series

$$\frac{2}{3} - \frac{4}{9} + \frac{8}{27} - \frac{16}{81} + \dots$$

(Total 4 marks)

7. (a) Consider the geometric sequence −3, 6, −12, 24, ….

      (i)   Write down the common ratio.

      (ii)   Find the 15th term.

Consider the sequence $x − 3$, $x + 1$, $2x + 8$, ….

(3)

(b) When $x = 5$, the sequence is geometric.

      (i)   Write down the first three terms.

      (ii)   Find the common ratio.

(2)

(c) Find the other value of x for which the sequence is geometric.
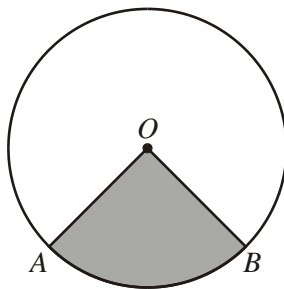
(4)

(d) For this value of x, find

      (i)   the common ratio;

      (ii)   the sum of the infinite sequence.

(3)
(Total 12 marks)

8. O is the centre of the circle which has a radius of 5.4 cm.

The area of the shaded sector OAB is 21.6 cm^2. Find the length of the minor arc AB.

(Total 4 marks)

9. A triangle has sides of length 4, 5, 7 units. Find, to the nearest tenth of a degree, the size of the largest angle.

(Total 4 marks)

10. The following diagram shows a circle of centre O, and radius 15 cm. The arc ACB subtends an angle of 2 radians at the centre O.
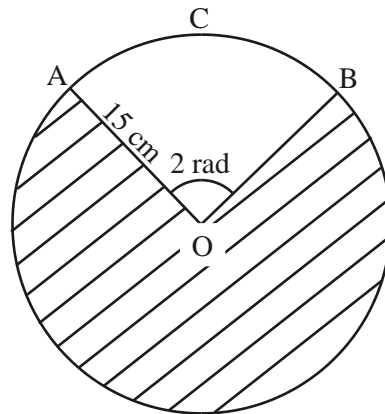

Diagram not to scale

$A\hat{O}B = 2$ radians
OA = 15 cm

Find

(a) the length of the arc ACB;

(b) the area of the shaded region.

(Total 6 marks)

11. In a triangle ABC, AB = 4 cm, AC = 3 cm and the area of the triangle is 4.5 cm^2.

Find the **two** possible values of the angle $B\hat{A}C$.

(Total 6 marks)