

TMUA Practice - Coordinate Geometry

- 1) The line  $y = mx + 4$  where  $m > 0$  is the normal to the curve  $y = 6 - x^2$  at the point  $(p, q)$ . What is the value of  $p$ ?

A  $\frac{\sqrt{2}}{6}$       B  $-\frac{\sqrt{2}}{6}$       C  $\sqrt{\frac{3}{2}}$       D  $\pm\sqrt{\frac{3}{2}}$       E  $\sqrt{\frac{5}{2}}$

- 2) Find the shortest distance between the line  $y = 2x - 1$  and the curve  $y = x^2 + 5$

A 2      B  $\sqrt{5}$       C  $\sqrt{\frac{5}{2}}$       D 3      E 5

- 3) A line is drawn normal to the curve  $y = \frac{2}{x}$  at the point where  $x = 1$ .

This line cuts the  $x$ -axis at  $P$  and  $y$ -axis at  $Q$ . Find the length of  $PQ$ .

A  $\frac{3}{2}$       B  $\frac{3}{2}\sqrt{5}$       C  $\sqrt{\frac{15}{2}}$       D  $2\sqrt{5}$       E 3

- 4) The line  $y = mx + 2$  passes through the points  $(5, \log_3 p)$  and  $(\log_3 p, 2)$   
What is the difference between the possible values of  $p$ ?

A 8            B 3            C  $\frac{2}{5}$             D 2            E 10

- 5) The line segment joining the points  $(2,2)$  and  $(6,8)$  is a diameter of a circle.  
This circle is translated by 3 units in the positive  $x$ -direction, then reflected in the  $x$ -axis, and then enlarged by a scale factor of 2 about the centre of the resulting circle.

Find the equation of the final circle.

A  $(x - 7)^2 + (y - 5)^2 = 26$             B  $(x - 7)^2 + (y + 5)^2 = 26$   
C  $(x - 1)^2 + (y - 5)^2 = 52$             D  $(x - 1)^2 + (y + 5)^2 = 52$   
E  $(x - 7)^2 + (y + 5)^2 = 52$             F  $(x - 1)^2 + (y - 5)^2 = 26$

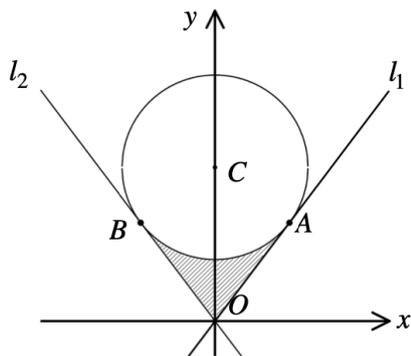
- 6) A point  $P$  lies on the curve with equation  $x^2 + y^2 - 6x + 8y = 24$

What is the difference between the greatest and least possible values of the length  $OP$ , where  $O$  is the origin.

A 2            B 7            C 10            D 12            E 14

- 7) The diagram shows a circle with equation  $x^2 + (y - 4)^2 = 12$  and lines  $l_1$  and  $l_2$  which are tangents to the circle at  $A$  and  $B$ .

Find the area of the shaded region enclosed by the circle and the lines  $l_1$  and  $l_2$ .

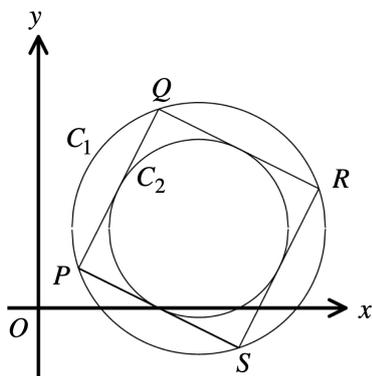


- A  $\pi - 2$       B  $2\sqrt{3} - \pi$       C  $\frac{3\pi}{2}$       D  $4\sqrt{3} - 2\pi$       E  $2\sqrt{3} + \pi$

- 8) The diagram shows a square PQRS with vertices at the points P (1,1), Q (3,5), R (7,3) S (5,-1).

The square is circumscribed by the circle  $C_1$  and inscribed by the circle  $C_2$

Find the area of the annulus between these two circles.



- A  $(\sqrt{10} - \sqrt{5})\pi$       B  $2\pi$       C  $5\pi$       D  $\frac{5\pi}{2}$       E  $\sqrt{5}\pi$

9) Find the area bounded by the graphs  $y = \sqrt{2 - x^2}$  and  $x + (\sqrt{2} - 1)y = \sqrt{2}$

- (a)  $\frac{\pi}{4} - \frac{1}{\sqrt{2}}$       (b)  $\frac{\sin\sqrt{2}}{\sqrt{2}}$       (c)  $\frac{\pi}{2\sqrt{2}}$       (d)  $\frac{\pi^2}{6}$

10) The lines given by the following equations are perpendicular.

$$(1 + \sqrt{3})y = px + 5 \quad y = (2 - \sqrt{3})x + 8$$

What is the value of  $p$ ?

- A  $-5 - 3\sqrt{3}$   
B  $-5 + 3\sqrt{3}$   
C  $5 - 3\sqrt{3}$   
D  $5 + 3\sqrt{3}$

11) Let  $a$  and  $b$  be positive real numbers such that  $a \leq b$

Given that  $x^2 + y^2 \leq 1$  then the largest value that  $ax + by$  can equal is:

- A  $a + b$   
B  $b$   
C  $\sqrt{a^2 + b^2}$   
D  $a^2 + ab + b^2$   
E  $\frac{1}{a} + \frac{1}{b}$