**1.** Nov/2021/Paper_9709/11/No.2

A curve has equation $y = kx^2 + 2x - k$ and a line has equation $y = kx - 2$, where $k$ is a constant.

Find the set of values of $k$ for which the curve and line do not intersect. [5]

**2.** Nov/2021/Paper_9709/11/No.7

A circle with centre (5, 2) passes through the point (7, 5).

**(a)** Find an equation of the circle. [2]

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The line $y = 5x - 10$ intersects the circle at $A$ and $B$.

**(b)** Find the exact length of the chord $AB$. [7]

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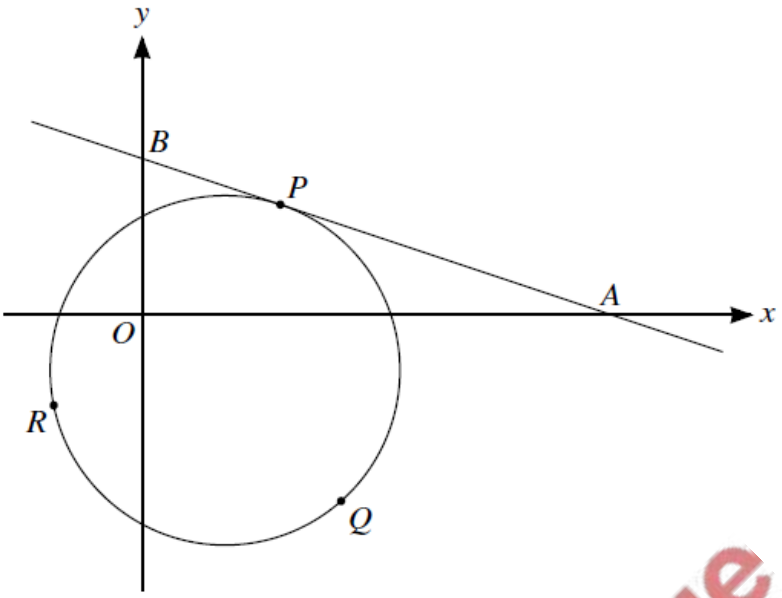
**3.** Nov/2021/Paper_9709/12/No.12




The diagram shows the circle with equation $x^2 + y^2 - 6x + 4y - 27 = 0$ and the tangent to the circle at the point $P(5, 4)$.

**(a)** The tangent to the circle at $P$ meets the $x$-axis at $A$ and the $y$-axis at $B$.

Find the area of triangle $OAB$, where $O$ is the origin. [5]

**(b)** Points $Q$ and $R$ also lie on the circle, such that $PQR$ is an equilateral triangle.

Find the exact area of triangle $PQR$. [3]

**4.** Nov/2021/Paper_9709/13/No.9

The line $y = 2x + 5$ intersects the circle with equation $x^2 + y^2 = 20$ at $A$ and $B$.

**(a)** Find the coordinates of $A$ and $B$ in surd form and hence find the exact length of the chord $AB$. [7]

A straight line through the point (10, 0) with gradient $m$ is a tangent to the circle.

**(b)** Find the two possible values of $m$. [5]