Additional Math with Ali Hashir

Coordinate Geometry

Answer Key

Final answers only – for full working, see the Full Worked Solutions.

Q1. $M = (3, 6)$; gradient $AB = 2$; perpendicular bisector: $y = -\frac{1}{2}x + \frac{15}{2}$

Q2. Perpendicular bisector: $y = -\frac{3}{4}x + \frac{23}{4}$; $k = 1$

Q3. Collinear since gradient AB = gradient $BC = 2$; $k = 24$ or $k = 4$

Q4. $l_2 : y = 2x + 6$; Area $OPQ = 9$ units^2; $R = (-1, 4)$

Q5. Centre $(2, -1)$, radius $3\sqrt{2}$; tangent: $y = -x - 5$; $T = (0, -5)$

Q6. $c = \frac{3}{4}$; point of contact $\left(-\frac{1}{2}, -\frac{1}{4}\right)$; enclosed area $= \frac{9}{64}$ units^2

Q7. All sides $= 5$; $PQ \perp QR$, so $PQRS$ is a square; Area $= 25$ units^2

Q8. Locus: $3x - 2y = 4$; $Q = (-2, -5)$; $QA = QB = \sqrt{65}$

Q9. $\overrightarrow{BA} \cdot \overrightarrow{BC} = 0 \Rightarrow \angle ABC = 90°$; $M = (1, 0)$, $BM = \sqrt{26} = \frac{1}{2}AC$; Area $= 24$ units^2

Q10. Perp. bisector AB: $y = -3x + 19$; perp. bisector BC: $y = \frac{1}{3}x + \frac{7}{3}$; $N = (5, 4)$, $NA = NB = NC = \sqrt{20}$

Q11. $D = (-1, 4)$; diagonals meet at $(1, 2)$; $|AB| = |AD| = \sqrt{40}$, so $ABCD$ is a rhombus

Q12. $c = -5$; point of contact $(4, 3)$; enclosed area $= \frac{25}{4}$ units^2; two distinct points when $c > -5$

Q13. Centre $(-1, -1)$, radius $4\sqrt{2}$; tangents $y = x + 8$ and $y = x - 8$; distance between them $= 8\sqrt{2}$

Q14. $ABCD$ is a square (sides $= 5$); $AC : y = -7x + 15$; $BD : y = \frac{1}{7}x + \frac{30}{7}$; centre $(1.5, 4.5)$, equidistant $\sqrt{12.5}$ from each vertex

Q15. $M = (5, 4)$; $AC = 10$, $BD : y = \frac{4}{3}x - \frac{8}{3}$; $B = (11, 12)$, $D = (-1, -4)$; Area $= 100$ units^2

Full worked solutions available separately.

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