Coordinate Geometry: Lines and Circles

Pure: Coordinate geometry · 6 questions · step-by-step answers at the end

Name: Date: Score: / 6

USEFUL EQUATIONS

$(x-a)^2+(y-b)^2=r^2$ $y-y_1=m(x-x_1)$ $m_1m_2=-1$ $d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

Questions

Show your working in the space under each question.

1. EASY Find the distance between $(-1, 2)$ and $(5, 10)$.

2. EASY Write the equation of the circle with centre $(2, -1)$ and radius 3.

3. MEDIUM Find the line through $(2, 3)$ perpendicular to $3x - y = 4$.

4. MEDIUM A circle has diameter from $(0, 0)$ to $(6, 8)$. Find its equation.

5. HARD Find where the line $y = x + 1$ meets the circle $x^2 + y^2 = 13$.

6. HARD Show that $y = 2x + 5$ is a tangent to $x^2 + y^2 = 5$ and find the point of contact.

Step-by-step answers

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1. $\sqrt{(6^2 + 8^2)} = \mathbf{10}$.
2. $\mathbf{(x - 2)^2 + (y + 1)^2 = 9}$.
3. The given line has gradient 3, so the perpendicular gradient is $-1/3$: $\mathbf{y - 3 = -(1/3)(x - 2)}$.
4. Centre = midpoint (3, 4). Radius = half of 10 = 5. $\mathbf{(x - 3)^2 + (y - 4)^2 = 25}$.
5. $x^2 + (x + 1)^2 = 13$ gives $x^2 + x - 6 = 0$, so $x = 2$ or -3. Points **(2, 3) and (−3, −2)**.
6. $x^2 + (2x + 5)^2 = 5$ gives $5x^2 + 20x + 20 = 0$, so $(x + 2)^2 = 0$: a repeated root, so the line is a tangent. $x = -2$, $y = 1$: **(−2, 1)**.