

Worksheet 2

1. Determine the equation of a straight line in each case:
 - a. The straight line passes through the point $A(2,1)$ and has a slope of -2 .
 - b. The straight line contains the points $A(3,-4)$ and $B(-1,2)$.
 - c. The straight line has y -intercept $= 5$ and x -intercept $= -3$.
 - d. The straight line is parallel to the straight line $3x - 4y = 12$ and passes through the point $(-2,-3)$.
 - e. the straight line is perpendicular to the straight line $4x + 5y = -20$ and passes through the mid-point of the line segment AB where A has coordinates $(-1,1)$ and B has coordinates $(5,-2)$.
2. Determine the equation of the circle which has diameter AB where A and B are the points given in 1(e).
3. Determine the equation of the circle which has centre at $(-2,1)$ and which passes through the point $(2,4)$.
4. Determine the equation of the circle whose centre is at the point of intersection of the lines $2x - 3y = 7$ and $3x + 5y = 1$, and which has a radius of 4 units.
5. Determine the equation of the circle which is tangent to the x -axis and which has centre at the point $(3,-1)$.
6. Determine the equation of the circle which is tangent to the y -axis and which has centre at the point $(4,-2)$.
7. A point $P(h,k)$ lies outside of the straight line AB . The straight line AB has equation $ax + by + c = 0$. Determine the perpendicular distance from the point P to the line segment AB .
8. Determine the equation of the circle which has centre the point $C(2,3)$ and radius 4 units.
9. Determine the equation of the circle which passes through the point $A(3,-1)$ and has

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centre at $C(1,2)$.

10. Determine the equation of the circle which is tangent to the straight line $y = 7$ and which has centre at the point $C(2,1)$.
11. Determine the equation of the circle which is tangent to the straight line $3x + 4y = 12$ and which has centre at the point $(1,1)$.
12. The straight lines L_1 and L_2 have slopes equal to m_1 and m_2 respectively. If the straight lines are perpendicular, neither line being parallel to either axis, show that $m_1 m_2 = -1$. [Hint: You may use the fact that the slope of a straight line is the tangent of the angle that the line makes with the positive direction of the x-axis.]
13. Show that the equation of the tangent line to the circle with equation $x^2 + y^2 = r^2$, at the point (h,k) on the circle is given by $hx + ky = r^2$.
14. A circle has equation $x^2 + y^2 + 2gx + 2fy + c = 0$. The point $P(h,k)$ is on the circle. Show that the equation of the tangent line to the circle at P is given by:
 $hx + ky + g(x + h) + f(y + k) + c = 0$

Does this generalize to other conics?