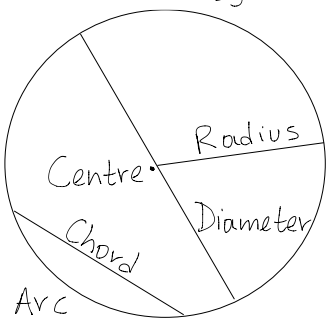
C2 - Chapter 4 - Coordinate geometry in the (x,y) plane

* For the points with coordinates (x_1, y_1) and (x_2, y_2)
  - their midpoint has coordinates $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$.
  - the distance between them is given by $\sqrt{(y_2-y_1)^2+(x_2-x_1)^2}$
  - the gradient of the line joining them is $m = \frac{y_2-y_1}{x_2-x_1}$

* For a line with gradient m and passing through the point with coordinates (x_1, y_1) its equation is given by
$$y - y_1 = m(x - x_1)$$

* Two lines with gradients m_1 and m_2, respectively are perpendicular if $m_1 \cdot m_2 = -1$

* Circle terminology



* A circle with radius r and centre (α, β) has equation
$$(x-\alpha)^2 + (y-\beta)^2 = r^2$$

* The perpendicular from the centre of a circle to a chord bisects the chord.

* The angle between the tangent and a radius is 90°.

* A line may meet a circle
  - twice
  - once (in this case the line is a tangent)
  - never