

Intersection of a Straight Line and a Circle

FORMULAE LIST

Circle:

The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents a circle centre $(-g, -f)$ and radius $\sqrt{g^2 + f^2 - c}$.

The equation $(x - a)^2 + (y - b)^2 = r^2$ represents a circle centre (a, b) and radius r .

Scalar Product: $\mathbf{a} \cdot \mathbf{b} = |\mathbf{a}| |\mathbf{b}| \cos \theta$, where θ is the angle between \mathbf{a} and \mathbf{b}

or $\mathbf{a} \cdot \mathbf{b} = a_1 b_1 + a_2 b_2 + a_3 b_3$ where $\mathbf{a} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix}$.

Trigonometric formulae:

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\sin 2A = 2 \sin A \cos A$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$= 2 \cos^2 A - 1$$

$$= 1 - 2 \sin^2 A$$

Table of standard derivatives:

$f(x)$	$f'(x)$
$\sin ax$	$a \cos ax$
$\cos ax$	$-a \sin ax$

Table of standard integrals:

$f(x)$	$\int f(x) dx$
$\sin ax$	$-\frac{1}{a} \cos ax + c$
$\cos ax$	$\frac{1}{a} \sin ax + c$

Essential Skills 9

The skills in this series of worksheets appear frequently.

These are the GIFTS you must take to succeed



Intersection of Straight Line and a Circle

Find the coordinates of the points of intersection on each:

1. $x^2 + y^2 - 6x + 2y - 35 = 0$ and $y = 2x + 8$
2. $x^2 + y^2 - 6x - 4y + 8 = 0$ and $y = 2x + 1$
3. $x^2 + y^2 - 6x - 8y - 55 = 0$ and $x = 31 - 2y$
4. $x^2 + y^2 - 4x - 10y - 24 = 0$ and $y = 12 - x$
5. $x^2 + y^2 = 8$ and $y = 4 - x$
6. $x^2 + y^2 - 6x - 2y - 24 = 0$ and $y = x$
7. $x^2 + y^2 + 4x + 2y - 20 = 0$ and $y = 2x + 8$
8. $x^2 + y^2 + 18x + 20y + 81 = 0$ and $y = x + 1$
9. $x^2 + y^2 - 6x - 8y - 4 = 0$ and $y = 14 - x$
10. $x^2 + y^2 - 2x - 4y + 1 = 0$ and $x + y = 1$



APPLYING QUESTION

- (a) Find the equation of a circle which has D (4, 1) and F (-2, -7) as its diameter. Leave your answer in the form $x^2 + y^2 + 2gx + 2fy + c = 0$.
- (b) Establish the coordinates of the points of intersection between the circle and the line $y = x + 1$