

# Equation of a Tangent to a Curve

## 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  $\theta$  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 4

The skills in this series of worksheets appear frequently.

These are the GIFTS you must take to succeed



Tangent to a Curve (Non Calculator)

Find the equation of the tangent to the curve at the given point:

1.  $y = 3x^2 - 4; x = 2$

2.  $y = 6x - x^3; x = -2$

3.  $y = 4\sqrt{x}; x = 9$

4.  $f(x) = x^3 - 4x + 3; x = -1$

5.  $y = x^3 - 2x + 5; x = 2$

6.  $y = 5x^3 - 12x; x = 1$

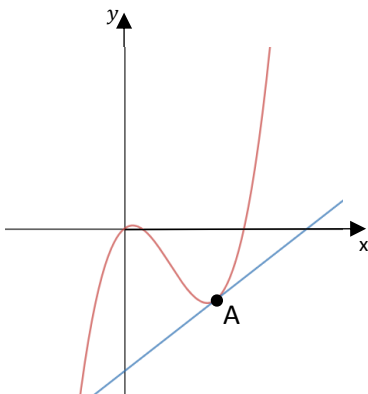
7.  $f(x) = (x - 3)^2; x = 4$

8.  $y = x^2(2x - 1); x = -1$

9.  $y = 2\sqrt{x}; x = 25$

10.  $y = 3 - \frac{2}{x}; x = -2$

### APPLYING QUESTION



The tangent to the curve  $y = x^3 - 3x^2 + x$  makes an angle of  $45^\circ$  with the positive direction of the  $x$ -axis.

Establish the co-ordinates of point A.