

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:

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

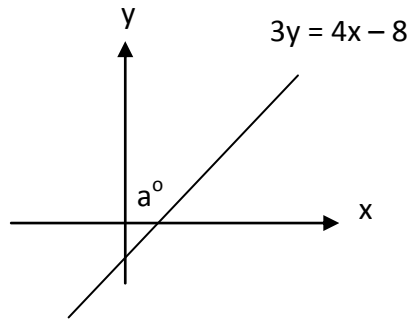
Table of standard integrals:

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

Unit 1 - Practice NAB B

- Find the equation of the line through the point $(-1, 4)$ which is parallel to the line with equation $y = 3x - 2$
- Find the equation of the line through the point $(0, -3)$ which is perpendicular to the line with equation $4x + 3y - 4 = 0$

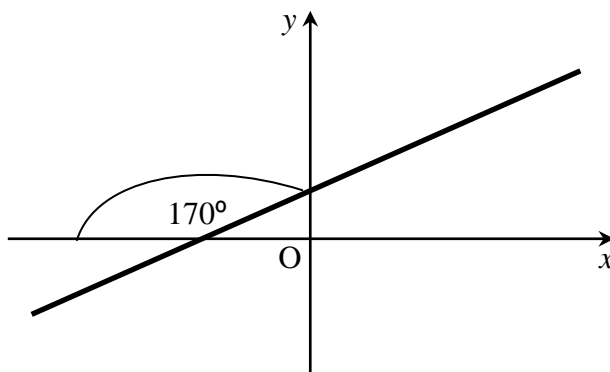
- Calculate the size of the obtuse angle, a°



- A ski slope is categorised by its gradient as shown in the table.

| Dry slope category | Gradient (m) of slope |
|-----------------------------|---------------------------|
| Teaching and general skiing | $0 < m \leq 0.6$ |
| Extreme skiing | $m > 0.6$ |

Which category does the ski slope in the diagram below belong to?
Explain your answer fully.



- The functions f and g defined on suitable domains, are given by

$$f(x) = 8x - 3 \quad \text{and} \quad g(x) = \sqrt{x}.$$

A third function $h(x)$ is defined as $h(x) = g(f(x))$

(a) Find an expression for $h(x)$.

(b) Explain why the largest domain for $h(x)$ is given by $x \geq \frac{3}{8}$

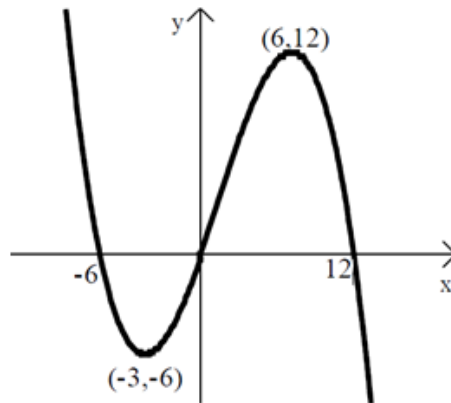
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6. A function is given by. $f(x) = 5x + 6$. Find the inverse function $f^{-1}(x)$.

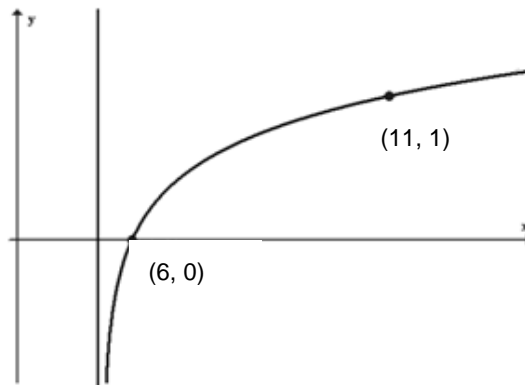
7. Part of the graph of $y = h(x)$ is shown.

On a separate diagram sketch the graph of

$$y = h(x + 3) - 1$$



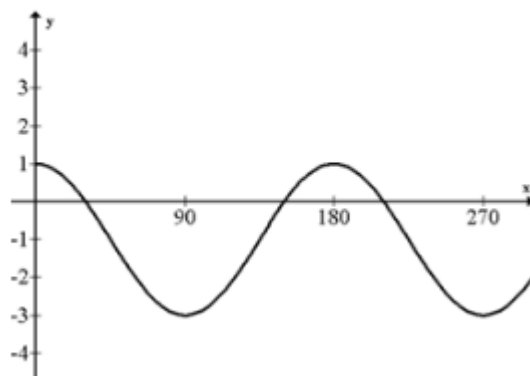
8. The diagram shows the graph of $y = \log_b(x + a)$



Find the values of a and b .

9. Sketch the graph of $y = d \cos(x - \pi/4)$ for $0 \leq x \leq 2\pi$ and $d > 0$ clearly showing the maximum and minimum values and where it cuts the x -axis.

10. The diagram shows the graph of $y = a \cos bx + c$



Write down the values of a , b and c .

11. Solve, for $0 \leq x \leq 180^\circ$, $2\cos 3x - \sqrt{3} = 0$

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