

## Using Logs to Determine the Connection between Two Variables

### 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 32

The skills in this series of worksheets appear frequently.

These are the GIFTS you must take to succeed

Using Logarithms to Determine the Connection between Two Variables



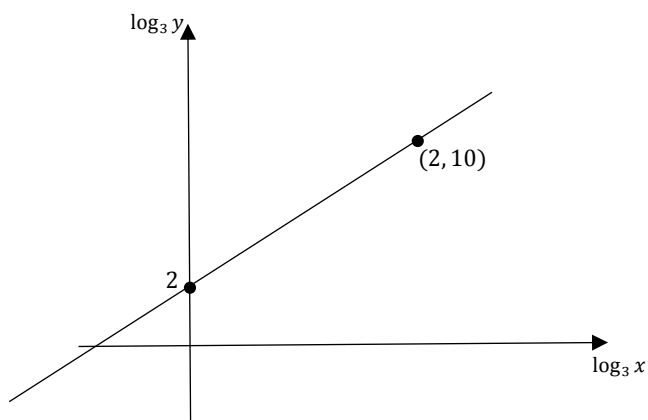
Obtain a formula for  $y$  in terms of  $x$  for each:

1.  $\log_5 y = 3 \log_5 x + \log_5 2$
2.  $\log_2 y = 2 \log_2 x + \log_2 0.5$
3.  $\log_3 y = \log_3 7 - \log_3 x$
4.  $\log_{10} y = \log_{10} 13 - \frac{1}{2} \log_{10} x$
5.  $\log_e y = 0.2 \log_e x + \log_e 3$
6.  $\log_2 y = x \log_2 3 + \log_2 8$
7.  $\log_5 y = x \log_5 0.8 - \log_5 0.2$
8.  $\log_2 y = 4 \log_2 x + 3$
9.  $\log_9 y = 2 \log_9 x + \frac{3}{2}$
10.  $\log_6 y = x \log_6 \frac{1}{6} + 1$

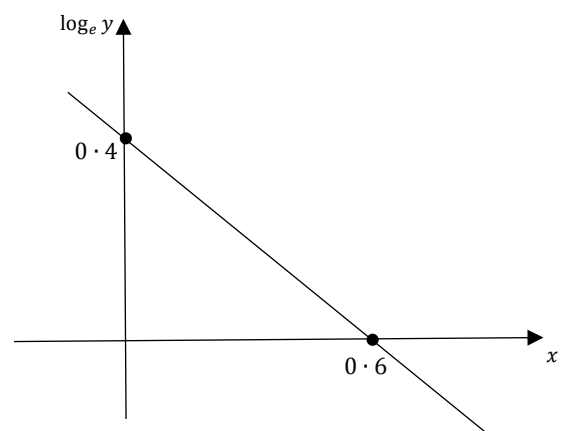
## APPLYING QUESTIONS

Find a formula for each:

(a)  $y = kx^n$



(b)  $y = ab^x$



## Essential Skills 32 - Answers

1	$y = 2x^3$
2	$y = 0.5x^2$
3	$y = \frac{7}{x}$
4	$y = \frac{13}{\sqrt{x}}$
5	$y = 3x^{0.2}$
6	$y = 8 \times 3^x$
7	$y = \frac{0.8^x}{0.2}$
8	$y = 8x^4$
9	$y = 27x^2$
10	$y = 6 \times \left(\frac{1}{6}\right)^x$
AQ	(a) $y = 9x^4$ (b) $y = 1.49 \times 0.51^x$

## Online Study Pack

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