

Related Graphs

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 20

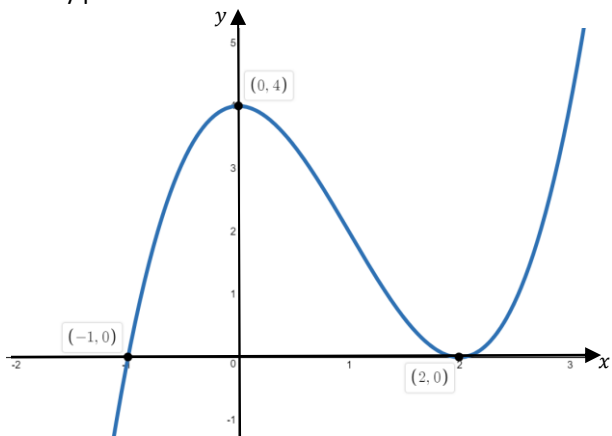
The skills in this series of worksheets appear frequently.

These are the GIFTS you must take to succeed.



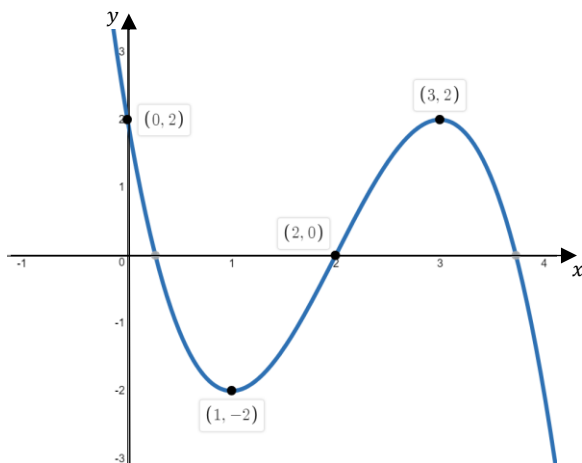
Related Graphs (Non Calculator)

1. The diagram below shows the graph of $y = f(x)$. Sketch the graph of each the following on separate diagrams, indicating all key points:



- (a) $y = f(x) - 4$
- (b) $y = f(x - 2)$
- (c) $y = f(-x)$
- (d) $y = 3 - f(x)$
- (e) $y = f(2x)$

2. The diagram below shows the graph of $y = g(x)$. Sketch the graph of each the following on separate diagrams, indicating all key points:

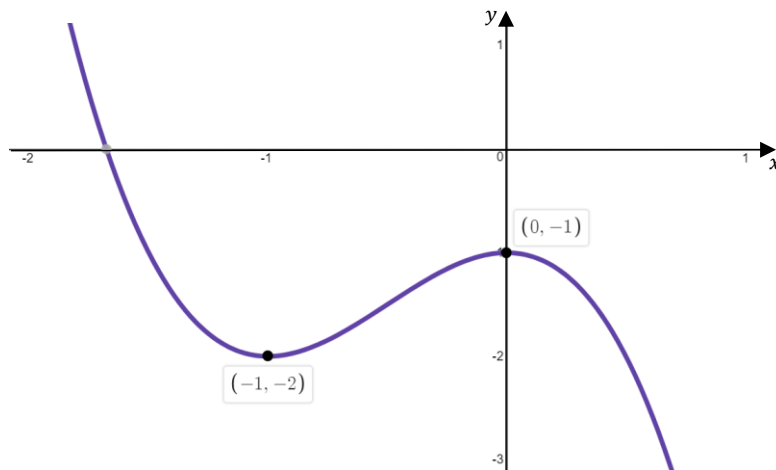


- (a) $y = g(x + 3)$
- (b) $y = g(x) + 3$
- (c) $y = g(-x) - 1$
- (d) $y = -2g(x)$
- (e) $y = g\left(\frac{1}{3}x\right)$



APPLYING QUESTION

The diagram below shows the graph of $y = h(x)$, Sketch $y = 3 - h(x + 1)$, indicating all key points.



Essential Skills 20 - Answers

1a	<i>Correct shape; $(-1, -4), (0, 0), (2, -4)$</i>
b	<i>Correct shape; $(1, 0), (2, 4), (4, 0)$</i>
c	<i>Correct shape; $(1, 0), (0, 4), (-2, 0)$</i>
d	<i>Correct shape; $(-1, 3), (0, -1), (2, 3)$</i>
e	<i>Correct shape; $(-\frac{1}{2}, 0), (0, 4), (1, 0)$</i>
2a	<i>Correct shape; $(-3, 2), (-2, -2), (-1, 0), (0, 2)$</i>
b	<i>Correct shape; $(0, 5), (1, 1), (2, 3), (3, 5)$</i>
c	<i>Correct shape; $(0, 1), (-1, -3), (-2, -1), (-3, 1)$</i>
d	<i>Correct shape; $(0, -4), (1, 4), (2, 0), (3, -4)$</i>
e	<i>Correct shape; $(0, 2), (3, -2), (6, 0), (9, 2)$</i>
AQ	<i>Correct shape; $(-2, 5)$ and $(-1, 4)$</i>

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