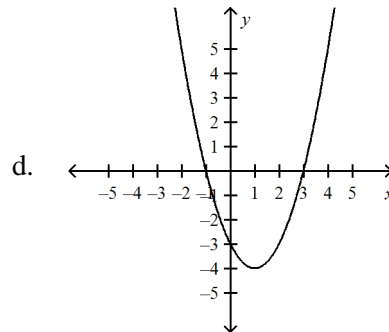
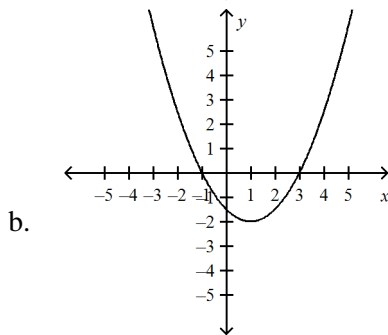
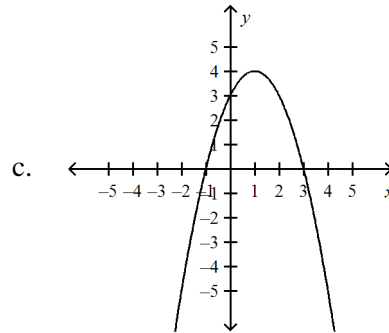
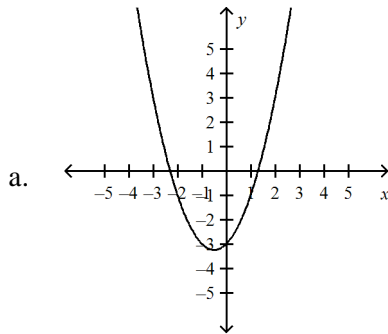






3. Given the quadratic function:  $f(x) = x^2 - 2x - 3$ . Find the y-intercept. Find the roots. Sketch the graph.



ANS: D

The y-intercept is:  $y = -3$ .

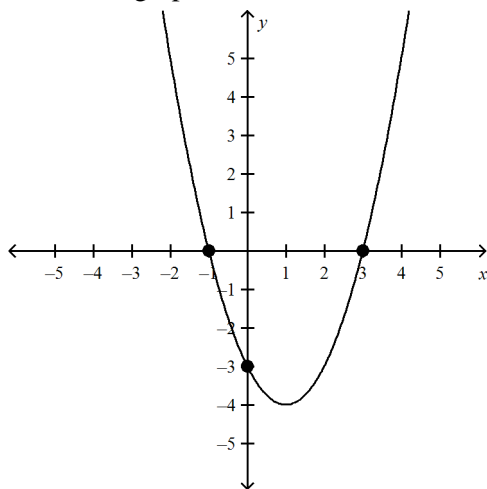
The x-intercepts or roots of the function are the solutions to the quadratic formula:

$$x_1, x_2 = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \text{ where for the function } f(x) = x^2 - 2x - 3: a = 1, b = -2 \text{ and } c = -3.$$

It follows that:  $x_1 = 3$  and  $x_2 = -1$ .

Graph the y-intercept and the two roots. That is, graph the points:  $(0, -3)$ ,  $(-1, 0)$  and  $(3, 0)$ . Note that the first coefficient is positive so the function opens upward.

Sketch the graph of the function.



Feedback	
A	Intercept is good. Roots are incorrect.



5. Given the quadratic function:  $f(x) = 0.2x^2 - 0.8x - 1$ . Find the roots.

a.  $x = 1, x = -0.2$

c.  $x = -5, x = 1$

b.  $x = 5, x = -1$

d.  $y = 5, y = -1$

ANS: B

The roots of a function are the  $x$ -intercepts ( $y = 0$ ).

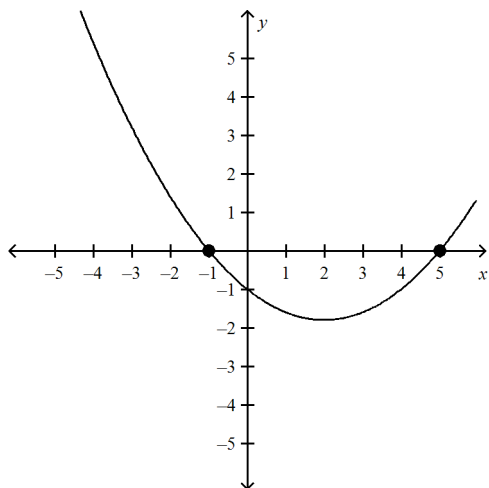
That is, the roots are the solutions (if any) to the equation:  $f(x) = 0$  or  $0.2x^2 - 0.8x - 1 = 0$ .

To solve this equation, use the quadratic formula:  $x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

where for the function  $f(x) = 0.2x^2 - 0.8x - 1$ :  $a = 0.2$ ,  $b = -0.8$  and  $c = -1$ .

$$\text{Substituting: } x_{1,2} = \frac{-(-0.8) \pm \sqrt{(-0.8)^2 - 4 \cdot 0.2 \cdot (-1)}}{2 \cdot 0.2} = \frac{-(-0.8) \pm \sqrt{1.44}}{0.4} = \frac{-(-0.8) \pm 1.2}{0.4}.$$

$$\text{It follows that: } x_1 = \frac{-(-0.8) + 1.2}{0.4} = 5 \text{ and } x_2 = \frac{-(-0.8) - 1.2}{0.4} = -1.$$



	Feedback
A	You forgot to divide by $2a$ in the formula.
B	Correct!
C	Remember that you need $-b$ in the quadratic formula.
D	Roots are always $x$ -values (where $y=0$ ).

PTS: 3

DIF: Grade 8

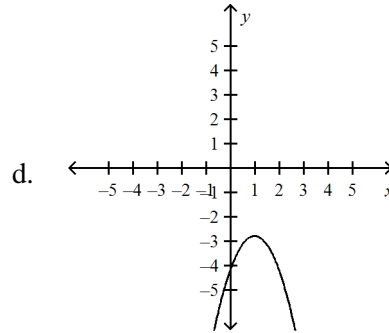
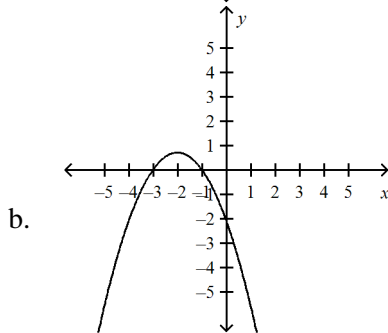
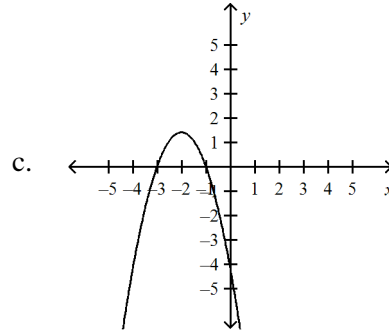
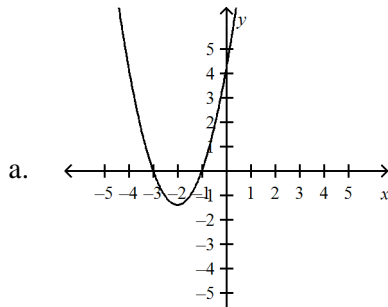
REF: 1ALG.21.0

OBJ: Students graph quadratic functions and know that their roots are the  $x$ - intercepts.

TOP: Algebra 1 KEY: quadratics, roots

MSC: decimal coefficients | real non-equal integer roots

6. Given the quadratic function:  $f(x) = -1.4x^2 - 5.6x - 4.2$ . Find the y-intercept. Find the roots. Sketch the graph.



ANS: C

The y-intercept is:  $y = -4.2$ .

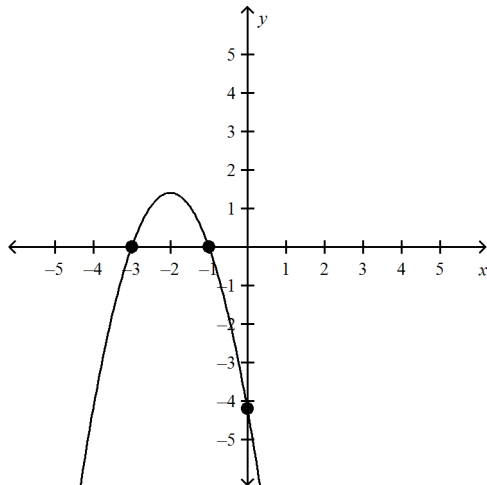
The roots of the function are the solutions to the quadratic formula:  $x_1, x_2 = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

where for the function  $f(x) = -1.4x^2 - 5.6x - 4.2$ :  $a = -1.4$ ,  $b = -5.6$  and  $c = -4.2$ .

It follows that:  $x_1 = -1$  and  $x_2 = -3$ .

Graph the y-intercept and the two roots. That is, graph the points:  $(0, -4.2)$ ,  $(-3, 0)$  and  $(-1, 0)$ . Note that the first coefficient is negative so the function opens downward.

Sketch the graph of the function.



Feedback

<b>A</b>	Graph is inverted. Check sign of first coefficient.
<b>B</b>	Roots are good. Check y-intercept.
<b>C</b>	Correct!
<b>D</b>	Intercept is good. Roots are incorrect.

PTS: 4

DIF: Grade 8

REF: 1ALG.21.0

OBJ: Students graph quadratic functions and know that their roots are the x- intercepts.

TOP: Algebra 1 KEY: quadratics, intercepts, roots, sketch, graph

MSC: decimal coefficients | real non-equal integer roots