Assignment

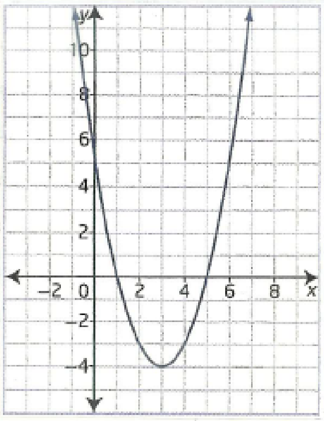
Complete pgs. 261 - 262

Questions 1, 2, 6, 8, 9, 11a, 14ab

Solutions

Multiple Choice

1. What points on the graph of this quadratic function represent the location of the zeros of the function?



x-intercepts located at $x=1$ and $x=5$.

CHOICE ⇒ C

2. What is one of the factors of $x^2-3x-10$?

$x^2-3x-10$
$=(x-5)(x+2)$

CHOICE B

Solutions

6. Determine the roots of each quadratic equation.

*You can either factor or use the quadratic formula.

a) $0 = x^2 - 4x + 3$

$0 = (x-1)(x-3)$

$x - 1 = 0$ or $x - 3 = 0$

$x = 1$ $\quad$ $x = 3$

OR $a = 1, b = -4, c = 3$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(3)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{16 - 12}}{2}$$

$$x = \frac{4 \pm \sqrt{4}}{2}$$

$$x = \frac{4 \pm 2}{2}$$

$$x = \frac{4+2}{2} \text{ or } x = \frac{4-2}{2}$$

$$x = \frac{6}{2} \qquad x = \frac{2}{2}$$

$$x = 3 \qquad x = 1$$

Solutions

b) $0 = 2x^2 - 7x - 15$

$0 = \left(x + \frac{3}{2}\right)\left(x - \frac{10}{2}\right)$

$0 = (2x+3)(x-5)$

$2x+3=0$ or $x-5=0$

$\frac{\cancel{2}x}{\cancel{2}} = \frac{-3}{2}$ $\quad x = 5$

$x = \frac{-3}{2}$

OR

$a=2,\ b=-7,\ c=-15$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \frac{7 \pm \sqrt{(-7)^2-4(2)(-15)}}{2(2)}$

$x = \frac{7 \pm \sqrt{49+120}}{4}$

$x = \frac{7 \pm \sqrt{169}}{4}$

$x = \frac{7 \pm 13}{4}$

$x = \frac{7+13}{4}$ or $x = \frac{7-13}{4}$

$x = \frac{20}{4}$ $\quad x = \frac{-6}{4}$

$x = 5$ $\quad x = \frac{-3}{2}$

Solutions

c) $-1x^2 - 2x + 3 = 0$

$(x + \frac{1}{-1})(x - \frac{3}{-1}) = 0$

$(x-1)(x+3) = 0$

$x - 1 = 0$ or $x + 3 = 0$

$x = 1$ $\quad$ $x = -3$

OR $a = -1,\ b = -2,\ c = 3$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{2 \pm \sqrt{(-2)^2 - 4(-1)(3)}}{2(-1)}$

$x = \frac{2 \pm \sqrt{4 + 12}}{-2}$

$x = \frac{2 \pm \sqrt{16}}{-2}$

$x = \frac{2 \pm 4}{-2}$

$x = \frac{2+4}{-2}$ or $x = \frac{2-4}{-2}$

$x = \frac{6}{-2}$ $\quad$ $x = \frac{-2}{-2}$

$x = -3$ $\quad$ $x = 1$

Solutions

8. Use the quadratic formula to determine the roots of the equation $x^2+4x-7=0$. Express your answers as exact roots in simplest radical form.

$x^2+4x-7=0$ $a=1, b=4, c=-7$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$x=\frac{-4\pm\sqrt{(4)^2-4(1)(-7)}}{2(1)}$$

$$x=\frac{-4\pm\sqrt{16+28}}{2}$$

$$x=\frac{-4\pm\sqrt{44}}{2}$$ {We will stop here for now}

Solutions

9. Without solving, determine the nature of the roots for each quadratic equation.

a) $x^2+10x+25=0$ $a=1, b=10, c=25$

$D=b^2-4ac$
$D=(10)^2-4(1)(25)$
$D=100-100$
$D=0$

Since $D=0$, there is 1 real root.

b) $2x^2+x=5$
$2x^2+x-5=0$ $a=2, b=1, c=-5$

$D=b^2-4ac$
$D=(1)^2-4(2)(-5)$
$D=1+40$
$D=41$

Since $D>0$, there are 2 real roots.

d) $2x^2+6=4x$
$2x^2-4x+6=0$ $a=2, b=-4, c=6$

$D=b^2-4ac$
$D=(-4)^2-4(2)(6)$
$D=16-48$
$D=-32$

Since $D<0$, there are no real roots.

Solutions

11. A pepple is tossed upward from a scenic lookout and falls to the river below. The approximate height, h, in meters, of the pebble above the river t seconds after being tossed is modelled by the function $h(x) = -5t^2 + 10t + 35$.

a) After how many seconds does the pebble hit the river? Express your answer to the nearest tenth of a second.

$$-5t^2 + 10t + 35 = 0$$
$$t^2 - 2t - 7 = 0 \qquad a=1,\ b=-2,\ c=-7$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(1)(-7)}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{4 + 28}}{2}$$

$$x = \frac{2 \pm \sqrt{32}}{2}$$

$$x = \frac{2 + \sqrt{32}}{2} \quad \text{or} \quad x = \frac{2 - \sqrt{32}}{2}$$

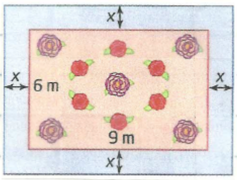
$$x = 3.8 \qquad\qquad x = -1.8$$

Extraneous Root

The pepple hits the river after 3.8 s.

Solutions

14. The parks department is planning a new flower bed. It will be rectangular with dimensions 9m by 6m. The flower bed will be surrounded by a grass strip of constant width with the same area as the flower bed.



a) Write a quadratic equation to model the situation.

$A = lw$

$2(6)(9) = (9+2x)(6+2x)$

$108 = 54 + 18x + 12x + 4x^2$

$108 = 4x^2 + 30x + 54$

$0 = 4x^2 + 30x + 54 - 108$

$0 = 4x^2 + 30x - 54$ $\quad a=4, b=30, c=-54$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \frac{-30 \pm \sqrt{(30)^2-4(4)(-54)}}{2(4)}$

$x = \frac{-30 \pm \sqrt{900+864}}{8}$

$x = \frac{-30 \pm \sqrt{1764}}{8}$

$x = \frac{-30 \pm 42}{8}$

$x = \frac{-30+42}{8}$ or $x = \frac{-30-42}{8}$

$x = \frac{12}{8}$ $\qquad x = \frac{-72}{8}$

$x = \frac{3}{2}$ $\qquad x = -9$

Extraneous Root

The grass strip will be 3/2 or 1.5m wide.