Quadratics Test Review (Solutions)

#1 $y = 2x^2 + 6x + 8$

$y = 2(0)^2 + 6(0) + 8$

$\boxed{y = 8}$ ← y-int

y-int → $x = 0$

coordinate point $(0, 8)$

#2 $y = 3(x+4)(x-2)$

$y = 3(0+4)(0-2)$

$y = 3(4)(-2)$

$\boxed{y = -24}$

coordinate point $(0, -24)$

#3 $f(x) = x^2 + 2x - 63$

$f(x) = (x+9)(x-7)$

$x+9=0$, $x=-9$ $\qquad$ $x-7=0$, $x=7$

y-int: $(0, -63)$

x-int: $(-9, 0)$ & $(7, 0)$

#4 $(-1, 4)$ & $(-5, 4)$

same y-value is needed to find the axis of symmetry.

A of S: $\frac{-1+(-5)}{2} = \frac{-6}{2} = -3$

$\boxed{\text{A of S: } x = -3}$

#5 $g(x) = 2x^2 - 5x - 3$

$g(x) = (2x^2 - 6x) + (1x - 3)$

$g(x) = 2x(x-3) + (x-3)$

$g(x) = (2x+1)(x-3)$

$2x+1=0$, $2x=-1$, $x=-\frac{1}{2}$ $\qquad$ $x-3=0$, $x=3$

Type 2 Trinomial: $\frac{-6}{-6} \times \frac{1}{1} = -6$, $\frac{-6}{-6} + \frac{1}{1} = -5$

x-int: $(-\frac{1}{2}, 0)$ & $(3, 0)$

y-int: $(0, -3)$

Axis of Sym: $x = \frac{5}{4}$ $(x = 1.25)$

Vertex: $(\frac{5}{4}, -\frac{49}{8})$ OR $(1.25, -6.12$

A of S: $\frac{-\frac{1}{2}+3}{2} = \frac{-\frac{1}{2}+\frac{6}{2}}{2}$

$= \frac{5}{2} \div 2$

$= \frac{5}{2} \times \frac{1}{2} = \frac{5}{4}$

$g(\frac{5}{4}) = 2(\frac{5}{4})^2 - 5(\frac{5}{4}) - 3$

$g(\frac{5}{4}) = 2(\frac{25}{16}) - \frac{25}{4} - 3$

$g(\frac{5}{4}) = \frac{25}{8} - \frac{50}{8} - \frac{24}{8}$

$g(\frac{5}{4}) = -\frac{49}{8}$

#6a) $y = 2x^2 + 8x$

$y = 2x(x+4)$

$2x = 0$ $\quad$ $x+4=0$

$x = 0$ $\quad$ $x = -4$

x-int: $(0,0)$ & $(-4,0)$

b) $y = x^2 - 25$

$y = (x+5)(x-5)$

$x+5=0$ $\quad$ $x-5=0$

$x = -5$ $\quad$ $x = 5$

x-int: $(-5,0)$ & $(5,0)$

c) $f(x) = -x^2 + 16$

$f(x) = -(x^2 - 16)$

$f(x) = -(x-4)(x+4)$

$x-4=0$ $\quad$ $x+4=0$

$x = 4$ $\quad$ $x = -4$

x-int: $(4,0)$ & $(-4,0)$

d) $y = x^2 - 10x + 16$

$y = (x-8)(x-2)$

$x-8=0$ $\quad$ $x-2=0$

$x = 8$ $\quad$ $x = 2$

x-int: $(8,0)$ & $(2,0)$

e) $g(x) = x^2 + 3x - 18$

$g(x) = (x+6)(x-3)$

$x+6=0$ $\quad$ $x-3=0$

$x = -6$ $\quad$ $x = 3$

x-int: $(-6,0)$ & $(3,0)$

#6 (f) $f(n) = 2n^2 - 3n - 14$

$f(n) = (2n^2 - 7n) + (4n - 14)$

$f(n) = n(2n-7) + 2(2n-7)$

$f(n) = (2n-7)(n+2)$

$2n-7=0$ $\quad$ $n+2=0$

$2n=7$ $\quad$ $n=-2$

$n=\frac{7}{2}$

$-7 \times 4 = -28$

$-7 + 4 = -3$

x-int: $(\frac{7}{2}, 0)$ & $(-2, 0)$

#7 $y = -3x^2 + 6x + 45$

$y = -3(x^2 - 2x + 15)$

$y = -3(x-5)(x+3)$

$x-5=0$ $\quad$ $x+3=0$

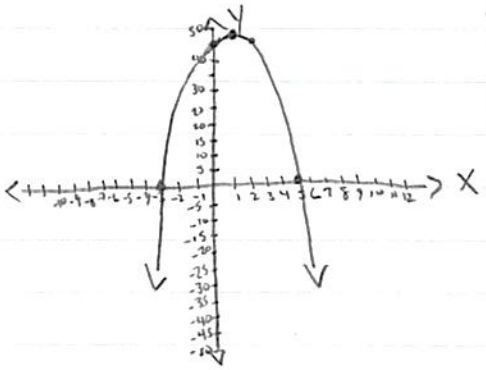
$x=5$ $\quad$ $x=-3$

A of S: $\frac{5+(-3)}{2} = \frac{2}{2} = 1$

Vertex: $y = -3(1)^2 + 6(1) + 45$

$y = -3 + 6 + 45$

$y = 48$



a) x-int: $(5,0)$ & $(-3,0)$
b) y-int: $(0,45)$
c) A of S: $x=1$
d) vertex: $(1,48)$
e) max/min: max @ $y=48$
f) D: $\{x \mid x \in \mathbb{R}\}$
g) R: $\{y \mid y \leq 48, y \in \mathbb{R}\}$

#8 $(3,0)$ & $(8,0)$

$x-r=0$ $\quad$ $x-s=0$

$3-r=0$ $\quad$ $8-s=0$

$3=r$ $\quad$ $8=s$

$y = a(x-r)(x-s)$

$y = a(x-3)(x-8)$

y-int $(0,12)$

$12 = a(0-3)(0-8)$

$12 = a(-3)(-8)$

$12 = a(24)$

$\frac{12}{24} = a$

$a = \frac{1}{2}$

$y = \frac{1}{2}(x-3)(x-8)$

#9 $x^2+5x-8=0$ $A=1$, $B=5$, $C=-8$

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

$$x=\frac{-5\pm\sqrt{5^2-4(1)(-8)}}{2(1)}$$

$$x=\frac{-5\pm\sqrt{25+32}}{2}$$

$$x=\frac{-5\pm\sqrt{57}}{2}$$

$$x\approx\frac{-5\pm 7.5498}{2}$$

$+\rightarrow x\approx\frac{-5+7.5498}{2}$ → $\boxed{x\approx 1.2749}$

$-\rightarrow x\approx\frac{-5-7.5498}{2}$ → $\boxed{x\approx -6.2749}$

$\boxed{\text{x-int: } (1.2749,0) \text{ \& } (-6.2749,0}$

#10 $0.25x^2-0.3x+0.09=0$ $A=0.25$, $B=-0.3$, $C=0.09$

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

$$x=\frac{-(-0.3)\pm\sqrt{(-0.3)^2-4(0.25)(0.09)}}{2(0.25)}$$

$$x=\frac{0.3\pm\sqrt{0.09-0.09}}{0.50}$$

$$x=\frac{0.3\pm 0}{0.50}$$ ← means there is only one root!

$$x=\frac{0.3}{0.5}$$

$\boxed{X=0.6}$

x-int: (0.6, 0)

#11 $4x^2 - 12x - 3 = 0$ $A = 4$, $B = -12$, $C = -3$

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

$$x = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(4)(-3)}}{2(4)}$$

$$x = \frac{12 \pm \sqrt{144 + 48}}{8}$$

$$x = \frac{12 \pm \sqrt{192}}{8}$$

$$x = \frac{12 \pm \sqrt{64 \cdot 3}}{8}$$

$$x = \frac{12 \pm \sqrt{64} \cdot \sqrt{3}}{8}$$

$$x = \frac{\cancel{12}^{3} \pm \cancel{8}^{2}\sqrt{3}}{\cancel{8}_{2}}$$ ← Reduce whole numbers (not what is under the square root!)

$$x = \frac{3 \pm 2\sqrt{3}}{2}$$

$+ \rightarrow \boxed{x = \frac{3 + 2\sqrt{3}}{2}}$

$- \rightarrow \boxed{x = \frac{3 - 2\sqrt{3}}{2}}$

192
64.3

#12 $5x^2 + 6x + 7 = 0$

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

$$x = \frac{-6 \pm \sqrt{5^2 - 4(5)(7)}}{2(5)}$$

$$x = \frac{-6 \pm \sqrt{25 - 140}}{10}$$

$$x = \frac{-6 \pm \sqrt{-115}}{10}$$ ← Because there is a negative under the square root there are no x-intercepts.

$x =$ no solutions

#13 $y = a(x-r)(x-s)$
$y = a(x+1)(x-2)$
$-2 = a(0+1)(0-2)$
$-2 = a(1)(-2)$
$-2 = a(-2)$
$a = 1$

$y = (x+1)(x-2)$
$y = x^2 - 2x + 1 - 2$
$y = x^2 - x - 2$

AofS: $\frac{-1+2}{2} = \frac{1}{2}$

$y = (\frac{1}{2})^2 - \frac{1}{2} - 2$
$y = \frac{1}{4} - \frac{2}{4} - \frac{8}{4}$
$y = -\frac{9}{4}$

c) x-int: $(-1,0)$ & $(2,0)$
d) y-int: $(0,-2)$
a) factored form: $y = (x+1)(x-2)$
b) standard form: $y = x^2 - x - 2$
e) Axis of Symmetry: $x = \frac{1}{2}$ $(x = 0.5)$
f) vertex: $(\frac{1}{2}, -\frac{9}{4})$ or $(0.5, -2.2$
g) minimum @ $y = -\frac{9}{4}$ $(y = -2.2$
h) D: $\{x | x \in R\}$
i) R: $\{y | y \geq -\frac{9}{4}, y \in R\}$

#14 $h(t) = -16t^2 + 160t$
$h(t) = -16t(t-10)$

a) The ball was in the air for 10 seconds.
b) After 2 seconds the ball was at a height of 256 feet
c) The maximum height of the ball is 400 feet.