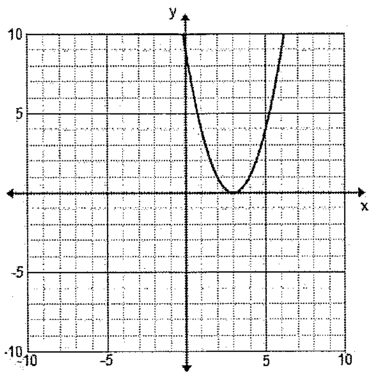
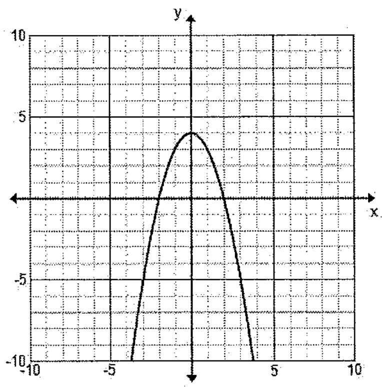
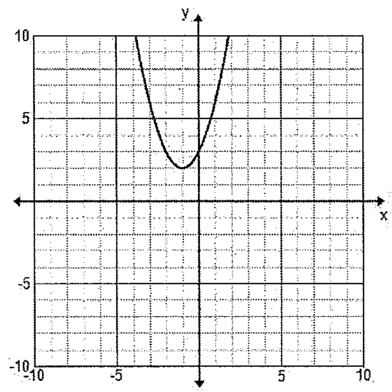
Intermediate Algebra (B) **Name** Key

Review – Unit 5 Part 2– Solving Quadratic Equations *Class period* 1 2 3 4 5

Problems 1-3: Given the graph of a quadratic function, determine if the discriminant is positive, zero, or negative.







1. zero 2. positive 3. negative

Simplify Solutions:

4. $x = \frac{-4\pm\sqrt{64}}{4}$

$= \frac{-4 \pm 8}{4}$

$= -1 \pm 2$

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

5. $x = \frac{6\pm\sqrt{24}}{4}$ = $\sqrt{4}\cdot\sqrt{6}$

$= \frac{6 \pm 2\sqrt{6}}{4}$

$x = \frac{3 \pm \sqrt{6}}{2}$ ← These are acceptible too

$x = \frac{3}{2} + \sqrt{6}$ or $x = \frac{3}{2} - \sqrt{6}$

6. $x = \frac{24\pm\sqrt{-40}}{10}$ → $\sqrt{-1}\,\sqrt{4}\cdot\sqrt{10}$

$= \frac{24 \pm 2i\sqrt{10}}{10}$

$x = \frac{12 \pm i\sqrt{10}}{5}$

$x = \frac{12}{5} + i\sqrt{10}$ or $x = \frac{12}{5} - i\sqrt{10}$

7. $x = \frac{4\pm\sqrt{121}}{20}$

$= \frac{4 \pm 11}{20}$

$x = \frac{15}{20}$ or $x = \frac{-7}{20}$

$x = \frac{3}{4}$

8. $x = \frac{9\pm\sqrt{-27}}{21}$ → $\sqrt{-1}\cdot\sqrt{9}\,\sqrt{3}$

$= \frac{9 \pm 3i\sqrt{3}}{21}$

$= \frac{3 \pm i\sqrt{3}}{7}$

$x = \frac{3}{7} + i\sqrt{3}$ or $x = \frac{3}{7} - i\sqrt{3}$

9. $x = \frac{12\pm\sqrt{20}}{10}$ → $\sqrt{4}\cdot\sqrt{5}$

$= \frac{12 \pm 2\sqrt{5}}{10} = \frac{6 \pm \sqrt{5}}{5}$

$x = \frac{6}{5} + \sqrt{5}$ or $x = \frac{6}{5} - \sqrt{5}$

10. $x^2 - 4x + 18 = 0$

$b^2 - 4ac$

Value of the discriminant: -56

$(-4)^2 - 4(1)(18) =$

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

Can this equation be factored? Why? NO, discriminant is negative

Number and type of solutions: *(Multiple Choice)*

a) 2 Real & Rational Numbers
b) 2 Real & Irrational Numbers
c) 1 Real Number
d) 2 Complex Numbers (circled)

Solve using the Quadratic Formula OR Factoring:

$x = \frac{-(-4) \pm \sqrt{-56}}{2(1)} = \frac{4 \pm \sqrt{-1}\cdot\sqrt{4}\cdot\sqrt{14}}{2} = \frac{4 \pm 2i\sqrt{14}}{2} = 2 \pm i\sqrt{14}$

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

11. $3x^2 - 7x - 6 = 0$

$(-7)^2 - 4(3)(-6)$

Value of the discriminant: 121

Can this equation be factored? Why? Yes, discriminant is a perfect square #

Number and type of solutions: *(Multiple Choice)*

a) 2 Real & Rational Numbers
b) 2 Real & Irrational Numbers
c) 1 Real Number
d) 2 Complex Numbers

Solve using the Quadratic Formula OR Factoring:

$x = \frac{-(-7) \pm \sqrt{121}}{2(3)} = \frac{7 \pm 11}{6}$

$x = \frac{18}{6} = 3$

$x = \frac{-4}{6} = \frac{-2}{3}$

12. $x^2 - 10x = -9$

$x^2 - 10x + 9 = 0$

Value of the discriminant: 64

Can this equation be factored? Why? Yes, discriminant is perfect square #

Number and type of solutions: *(Multiple Choice)*

a) 2 Real & Rational Numbers
b) 2 Real & Irrational Numbers
c) 1 Real Number
d) 2 Complex Numbers

Solve using the Quadratic Formula OR Factoring:

$x = \frac{-(-10) \pm \sqrt{64}}{2(1)} = \frac{10 \pm 8}{2}$

$x = \frac{18}{2} = 9$

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

13. $2x^2 - 36 = 0$

Value of the discriminant: 228

Can this equation be factored? Why? NO, discriminant is not a perfect square

Number and type of solutions: *(Multiple Choice)*

a) 2 Real & Rational Numbers
b) 2 Real & Irrational Numbers
c) 1 Real Number
d) 2 Complex Numbers

Solve using the Quadratic Formula OR Factoring:

$x = \frac{-(0) \pm \sqrt{228}}{2(2)} = \frac{\pm 2\sqrt{57}}{4} = \frac{\pm \sqrt{57}}{2}$

14. $x^2 + x = 2$
$x^2+x-2=0$
Value of the discriminant: 9

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

Can this equation be factored? Why? yes, discriminant is perfect square #

Number and type of solutions: *(Multiple Choice)*
- a) 2 Real & Rational Numbers
- b) 2 Real & Irrational Numbers
- c) 1 Real Number
- d) 2 Complex Numbers

Solve using the Quadratic Formula OR Factoring:

$x = \frac{-(1) \pm \sqrt{9}}{2(1)} = \frac{-1 \pm 3}{2}$

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

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

15. $4x^2 + 1 = 4x$
$4x^2-4x+1=0$
Value of the discriminant: 0

Can this equation be factored? Why? yes, discriminant is perfect square #

Number and type of solutions: *(Multiple Choice)*
- a) 2 Real & Rational Numbers
- b) 2 Real & Irrational Numbers
- c) 1 Real Number
- d) 2 Complex Numbers

Solve using the Quadratic Formula OR Factoring:

$4x^2 - 4x + 1 = 0$

$(2x-1)(2x-1) = 0$

$2x - 1 = 0$
$+1 \quad +1$
$\frac{2x}{2} = \frac{1}{2}$

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

16. $x^2 + 5x = 14$
$x^2+5x-14=0$
Value of the discriminant: 81

Can this equation be factored? Why? yes, discriminant is a perfect square

Number and type of solutions: *(Multiple Choice)*
- a) 2 Real & Rational Numbers
- b) 2 Real & Irrational Numbers
- c) 1 Real Number
- d) 2 Complex Numbers

Solve using the Quadratic Formula OR Factoring:

$x = \frac{-(5) \pm \sqrt{81}}{2(1)} = \frac{-5 \pm 9}{2}$

$x = \frac{-14}{2} = -7$

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

17. The height of an object launched vertically is given by $h(t) = -16t^2 + 128t + 10$ where h is the height of the object in feet and t is the time in seconds.

WORK SPACE

a.) Find the height of the rocket after 1 second.

122 ft

b.) At what time(s) is the rocket at a height of 202 ft?

x = 2 sec. and x = 6 sec.

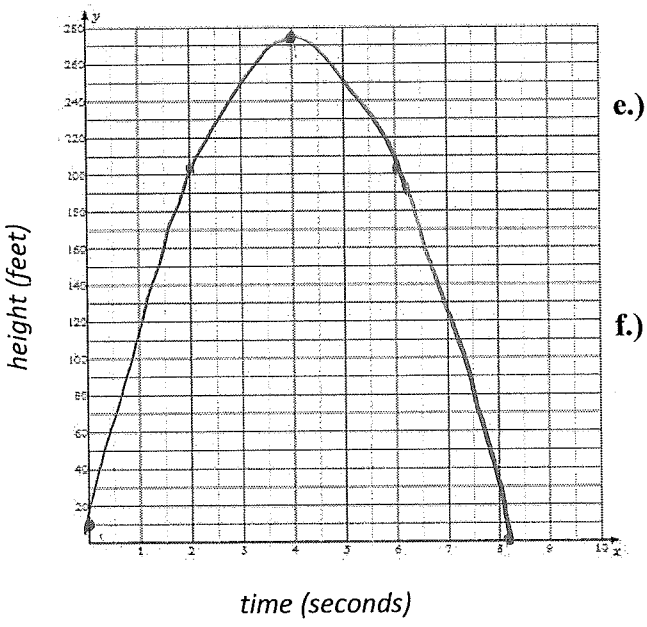
c.) When does the rocket reach the maximum height? What is the maximum height?

maximum time is 4 seconds

maximum height is 266 ft

d.) When does the rocket land on the ground?

At 8.07 seconds



e.) Using the information you have collected above, sketch a graph depicting the rockets height at time t.

f.) The equation you wrote above only models the height of the rocket while it is in the air. Find the domain and range of this function.

Domain: R

Range: $y \leq 266$

HIGHER LEVEL THINKING!!

b^2-4ac

18. Given the equation, $x^2 + bx + 9 = 0$, find the value(s) of b to make the equation have the following discriminants. Explain your reasoning.

a) For what value(s) would we need *b* to become in order for the equation to get a **negative** discriminant?

For $b < 6$, the discriminant becomes negative because the value for 4ac is larger. So the difference will be negative.

b) For what value(s) would we need *b* to become in order for the equation to get a **positive** discriminant?

For $b > 6$, the discriminant becomes positive because the value for 4ac becomes smaller. So the difference will be positive.

c) For what value would we need *b* to become in order for the equation to get a **zero** discriminant?

For $b = 6$, it would make equation factorable and when we have a zero discriminant, we will only get one solution.