**Grade 11 Review – Quadratic Functions**

A quadratic function can be expressed in three forms; vertex, standard and factored. Each form provides valuable information about the graph of the function.

**Example 1**

For each quadratic relation below, determine the x-intercepts, y-intercepts, and vertex then graph the parabola.

a) y = x2 – 6x + 5 b) y = – 2x2 – 12x – 16

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**Example 2**

Create a quadratic function that passes through the point (2, -10) and has a vertex (-1, 8).

**Example 3**

Create a quadratic function that passes through the point (8, 21) and has x-ints of 1 and 7.

The discriminant (b2 – 4ac) can be used to determine the number of roots of a quadratic equation.

**Example 4**

Determine the number of solutions for each quadratic equation; do not solve.

a) 2x2 – 20x + 50 = 0 b) x2 = - 2x - 3

Quadratic equations can be solved by factoring or using the quadratic formula

**Example 5**

Solve the following quadratic equation using both methods.

6x2 + 7x – 5 = 0

**Grade 11 Review – Exponential Functions**

Rational exponents are evaluated by separating the exponent into a power and root.

**Example 6**

Evaluate the following.

a) $4^{\frac{5}{2}}$ b) $27^{-\frac{4}{3}}$ c) $(16x^{8})^{\frac{3}{4}}$

Exponential equations are solved by finding a common base or using trial and error.

**Example 7**

Solve each exponential equation

a) $4^{2x-1}=8^{x+3}$ b) $2^{10x-1}=\frac{1}{16}$ c) $3^{x}=15$

Exponential functions can be used to model real world scenarios such as compound interest investments, general exponential growth and decay problems or half-life and doubling time scenarios.

$A=P(1+i)^{n}$ $y=a(1\pm r)^{x}$ $y=a\left(\frac{1}{2}\right)^{\frac{t}{h}}$ $y=a\left(2\right)^{\frac{t}{d}}$

**Example 8**

a) Shalen invests $10000 at 6% compounded semi-annually. How long will it take until the investment is worth $20000?

b) Ben purchases a car for $40000 that depreciates by 16% each year. How much will the car be worth in a decade?

Practice

1. Determine the x-intercepts, y-intercepts and vertex of the quadratic function y = -2x2 + 4x + 6 then sketch the function.

2. Determine the equation of a quadratic function that has a vertex of (4, 8) and an x-intercept of 6.

3. Determine the equation of a quadratic function that has a y-int of -27 and has x-intercepts of 3 and -3.

4. How many solutions does each quadratic equation have?

a) x2 – 8x + 10 = 0 b) x2 + 4x + 10 = 0

5. Solve the following quadratic equations.

a) 2x2 + 7x + 3 = 0 b) x2 + 5x + 7 = 0

6. Evaluate each power.

a) $16^{\frac{3}{2}}$ b) $125^{-\frac{2}{3}}$

7. Evaluate the following.

a) $6^{3x-5}=36^{x+3}$ b) $5^{x}=1050$

8. The amount of bacteria in a Petrie dish grows exponentially with time. If there is initially 200 cells in the dish and the amount grows by 25% every hour, how long will it take until there is 10000 cells?

Answers

1. x-ints: -1, 3, y-int: 6, vertex: (1, 8), 2. y = -2(x - 4)2 + 8, 3. y = 3(x - 3)(x + 3)

4.a)2, b) none , 5.a) x = -1/2 or -3, b) No Soln, 6.a) 64, b) 1/25 (0.04),

7.a) x = 11, b) x = 4.32, 8. 17.5 hours