**Cumulative Exam #1 Study Guide**

Use the following study guide to help you prepare for Cumulative Exam #1. It is taking place on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and is worth 10% of your final Math 20-2 grade.

**Helpful hints:**

* The textbook chapters we have covered so far are Ch. 4, 6 and 7.

Your textbook has the following ‘study aid’ pages that are helpful to read through: *p. 202, 226-227, 351-352, 384-385, 423, 434-435*

* Do the practice questions at the end of each chapter.
* Don’t underestimate the power of the digital age… various websites can help you with these concepts. Try <http://www.khanacademy.org> or simply search a topic in *youtube*.
* Check off each learning objective below when you feel you thoroughly understand it.

**Unit 1: Radical Expressions & Equations**

*Students will solve problems that involve operations on radicals and radical expressions with numerical and variable**radicands.*

* I can express an entire radical as a mixed radical.

$a) \sqrt{80}$$b) \sqrt{432}$ *c)* $\sqrt[3]{250}$

* I can express a mixed radical as an entire radical.

$a) 6\sqrt{3}$$b)-4\sqrt{2}$ *c)* $2\sqrt[3]{17}$

* I can perform operations (add, subtract, multiply and divide) to simplify radical expressions with numerical values in the radicand.

 $a) 12\sqrt{5}- \sqrt{180}+ 28\sqrt{80}$$b)-7\sqrt{6} (8\sqrt{3}- 2)$ *c)* $\frac{28\sqrt{10}}{4\sqrt{2}}$

* I can rationalize the denominator of a radical expression (ie. I know how to get rid of a radical in the denominator)

 $a) \frac{2\sqrt{7}}{\sqrt{2}}$$b) \frac{2\sqrt{3}+ 4}{\sqrt{3}}$ *c)* $\frac{5\sqrt{8}- 2\sqrt{3}}{3\sqrt{6}}$

* I can simplify radical expressions with numerical values and variables in the radicand.

 $a) \sqrt{242x^{8}}$$b) (4x^{3}\sqrt{x})(\sqrt{2x^{3}})$ *c)* $\frac{-18\sqrt{8x^{7}}}{9\sqrt{2x}}$

* I can identify values of the variable for which the radical expression is undefined (ie. I know which values do not make sense for *x* to be given where the *x* is in the expression).

*State the restrictions on x, then solve each equation below. Watch out for extraneous roots!*

 $a) \sqrt{x}=11$$b) \frac{44}{x}=4$ *c)* $\sqrt[3]{7-2x}+1=-3$

* I can solve problems by modelling a situation with a radical equation and solving the equation.

 $a) $*Police can use skid marks to determine how fast a vehicle was travelling. The speed, s,
 in km/h is related to the length of the skid mark d, in metres, and the coefficient of
 road friction, f, by this formula:*$$s= \sqrt{252df}$$

 *Determine the length of a skid mark made by a car travelling at 80km/h on a
 concrete road with a friction coefficient of 0.76.*

**$b)$ *A space station needs to rotate to create the illusion of gravity. A formula for
 determining the rotation rate is:*

*N* $=\frac{42}{π}\sqrt{\frac{5}{r}}$

 *where N represents the number of revolutions per minute and r represents the radius
 of the station in metres. If a station rotates 6.7 times/min, determine the radius of the
 space station.*

**Unit 2: Quadratic Functions**

*Students will demonstrate an understanding of the characteristics of quadratic functions including the vertex, intercepts, domain and range, and axis of symmetry.*

* I know the difference between standard form and vertex form of a quadratic function.
 *What do the parts of these forms of a quadratic function tell you about the graph?*
1. *y = ax2 + bx + c b) y = a(x – h)2 + k*
* I can determine with my graphing calculator AND by hand the coordinates of the vertex of the graph of a quadratic function (hint: use the axis of symmetry formula *–b/2a*).

$a) y= $ *2*$x^{2}$*–8x + 9 b) y = -6x2+3x – 1*

* I can determine the equation of the axis of symmetry of the graph of a quadratic function, given the *x*-intercepts of the graph.

$a) given x intercepts of 2 and 12, the equation of the axis of symmetry is x=$*\_\_*

 *b) determine the equation of the function if it has a minimum point of -10.*

* I can determine whether a graph will have a maximum or minimum point and whether the parabola opens upward or downward based on the ‘a’ value of a quadratic function in either standard or vertex form.

*Which way do the following quadratic functions open and do they have a max or min?*

$a) y= $*-3*$x^{2}$*+4x + 9 b) y = -7(x + 9)2– 1*

* Given a point the parabola passes through and the vertex, I can determine the equation of a quadratic function.
1. $If a parabola has vertex \left(8,3\right) and passes through the point (-1,3)$ *what is the equation?*
* I can determine the domain and range of a quadratic function.

$a) $*Consider the following. What is the domain of any parabola? Once you calculate the
 max or min point, how can you use this to determine the range?*

* I can sketch the graph of a quadratic function.
1. $Sketch the graph of y= 3x^{2}+6x-18$
* I can solve a contextual problem that involves the characteristics of a quadratic function.

*The height of a projectile that is fired from the ground can modeled by the formula
 h = 250t – 4.9t2 where h is the height in metres and t is time in seconds.*

1. *How high will the projectile be after 3 seconds?*
2. *Determine the maximum height of the projectile and how long it will take to reach it.*
3. *Determine when (to the nearest tenth of a second) the projectile will reach a height of 275 m.*
4. *What is the domain and range of this function? Why in this case does x not belong to the Real Numbers?*

**Unit 3: Quadratic Equations**

*Students will solve problems that involve quadratic equations.*

* I know that solving a quadratic equation means determining the roots, zeros, or x-intercepts. The solution(s) can be determined graphically.

*Sketch 3 different quadratic functions, one that has 2 zeros, one that has 1 zero, and one that has no zeros. What calculator sequence is used to determine the x-intercepts?*

* I can determine the x-intercepts of a quadratic equation using my graphing calculator.
 *a) 0 = 3x2 + 8x + 4 b) (x – 5)(x + 2) = (x – 3)2*
* I can determine, by factoring, the roots of a quadratic equation, and verify by substitution.

 *a) 0 = 2x2 - 11x + 12 b) 0 = 9x2 – 64 c) 0 = 6x2 + 42x*

* I can use the quadratic formula to determine the roots of a quadratic equation

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

 *a) 0 = -5x2 + 11x -1 b) 0 = 9x2 + 3x– 6*

* I can determine a quadratic equation given the zeros of the function. (Hint: Create the original factors then FOIL)
 *a) What is a quadratic function with zeros at -9 and 3?*
* I can solve a contextual problem by modelling a situation with a quadratic equation and solving the equation.
1. *An electronics company sells Personal Video Recorders (PVRs) for $189. At this price they sell 500 per day. The company wants to raise the price to increase its revenue. The function that models this situation is:*

*R(d) = -300d2 + 7165d + 94500*

 *where R is revenue and d represents how much $ the price is increased by*

* *If the company wants to generate revenue of $125,000 per day, how much will the price have to increase?*
* *Is it possible for the company to earn $140,000 per day? Explain.*
1. *A diver performs a dive from a 10m platform. She reaches a maximum height of
10.6 m after 0.35 s.*
* *What quadratic function models this scenario? (Use vertex form!)*
* *After how many seconds does the diver hit the water?*
* *At what time is the diver 5.5 m above the water?*
* *What is the domain and range of this function?*
* In this unit you learned three methods for solving a quadratic equation: 1) graphing it in your calculator and determining zeros; 2) determining the roots by factoring; and 3) using the quadratic formula. When looking at a quadratic equation how do you determine which way is most effective for solving? Which method do you prefer? Why?