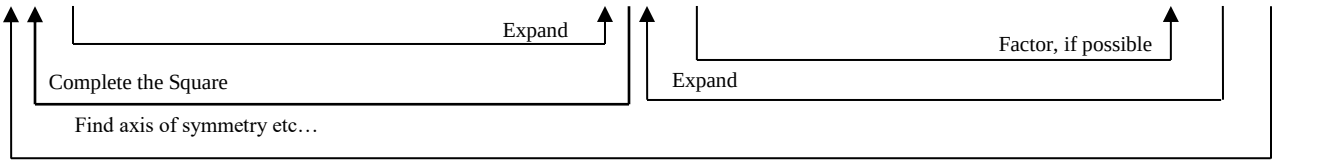
MPM 2DI EXAM REVIEW – Chapter 6: Quadratic Equations

(Revised Fall 2016)

Recall: Three forms of a **quadratic relation**:

$y = a(x-h)^2 + k$ $\qquad$ $y = ax^2 + bx + c$ $\qquad$ $y = a(x-r)(x-s)$

Vertex Form $\qquad$ **Standard Form** $\qquad$ **Factored Form**



Recall: A **quadratic equation** is of the form $0 = ax^2 + bx + c$ **,** where $a \neq 0$

Recall: The **quadratic formula*** is used to find the roots/zeroes (if they exist) of quadratic equations.

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

* only apply the quadratic formula once factoring has been attempted to find the roots/zeroes

1. Determine the coordinates of the vertex for the relation $y = x^2 + 10x + 13$ by **first completing the square** and writing the equation in the form $y = a(x-h)^2 + k$.

2. **GRAPH PAPER REQUIRED.** Graph $y = 2x^2 + 12x + 10$ **by first completing the square** and writing the equation in the form $y = a(x-h)^2 + k$. Be sure to clearly indicate the vertex and label four other points on the parabola.

3. Find the maximum or minimum for the relation $y = -3x^2 + 24x - 22$ **by completing the square**, and state the value for which the maximum or minimum occurs. Finally, state the axis of symmetry.

4. Solve by **factoring** (this means you may not use the Quadratic Formula)
   a) $x^2 + x - 6 = 0$ $\qquad$ b) $3p^2 + 15p = 0$ $\qquad$ c) $10x^2 + 21x - 10 = 0$ $\qquad$ d) $10x^2 + 11x - 6 = 0$

5. Solve the following using the **quadratic formula**. Round to the nearest hundredth for part a) only.
   a) $2x^2 + 9x + 3 = 0$ $\qquad$ b) $4x^2 - 12x + 9 = 0$

6. Solve $(3x-4)^2 = (x+5)(x-3)$

7. The height (h) metres of a basketball based on horizontal distance (d) metres, from the player can be modeled by the relation $h = -0.09d^2 + 0.9d + 2$.
   a) What is the maximum height of the basketball? *(Hint: complete the square, to find the vertex)*
   b) What is the horizontal distance of the basketball when it is at maximum height?
   c) At what horizontal distance is the ball 3 m high? Round to the nearest tenth.

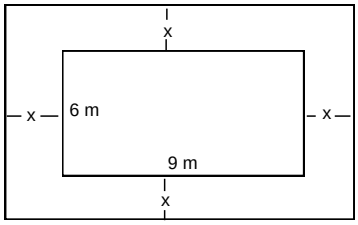
The remaining questions must be answered by determining a quadratic model, then solving it.

8. Two integers differ by 31. The sum of the squares of the integers is 485. Find the integers.

9. The area of a triangle is 18 cm^2, and the height is 3 cm greater than the base. Find the length of the base, to the nearest hundredth of a centimetre.

10. The length of a rectangular flower garden is 2 metres more than twice the width. The area of the flower bed is 6 m^2. Find the **exact** dimensions of the flower bed.

11. The municipal Parks Department is planning a new flower bed outside city hall. It will be rectangular with dimensions 9 m by 6 m (as shown in the diagram). The flower bed will be surrounded by a path of constant width (x metres) with the ***same area as the flower bed***. Find x.



☺ NOW RE-DO YOUR UNIT 6 TEST.
DO NOT PROCEED TO UNIT 7 UNTIL YOU KNOW HOW TO DO EVERY QUESTION. ☺