

# MPM 2DI EXAM REVIEW – Chapter 4: Quadratic Relations

(Revised Fall 2016)

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

$$y = a(x - h)^2 + k$$

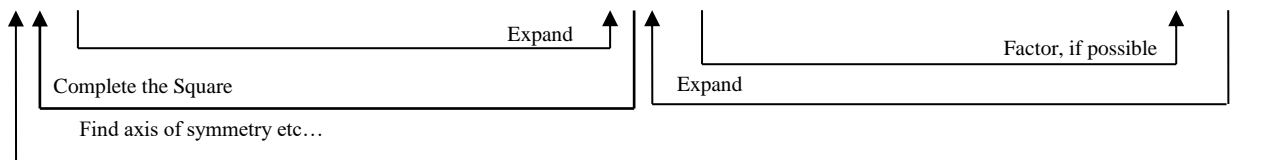
**Vertex Form**

$$y = ax^2 + bx + c$$

**Standard Form**

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

**Factored Form**

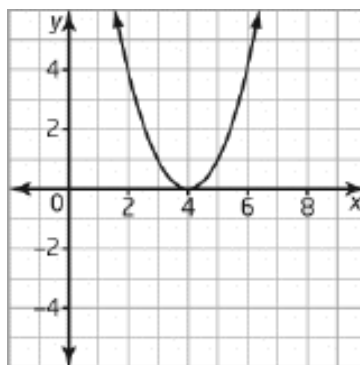


## WHERE IS YOUR GRAPH PAPER? FIND IT!

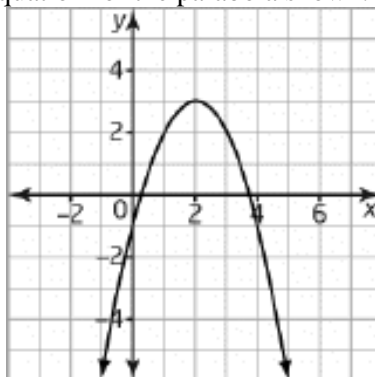
- The path of a rocket fired at a Canada Day fireworks display is given by  $h = -4.9t^2 + 19.6t + 0.4$ , where  $h$  is the height, in metres, of the rocket above the ground and  $t$  is the time, in seconds.
  - Make a **table of values** for integer values  $t = 0$  to  $t = 4$ .
  - Make a table of first and second differences. What conclusion can you make?
  - Draw the graph of the path of the rocket. Describe the path of the rocket.
  - How high above the ground was the rocket when it was set off?

**For the rest of this review booklet, quadratic relations CANNOT be graphed using a table of values, like what you just did in question #1.**

- What is the equation of the new parabola if the graph of  $y = x^2$  is translated 7 units to the right?
- What is the equation of the new parabola if the graph of  $y = x^2$  is translated 3 units to the left?
- What is the equation of the new parabola if the graph of  $y = x^2$  is translated 6 units to the left and 3 units down?
- Write an equation for the parabola shown.



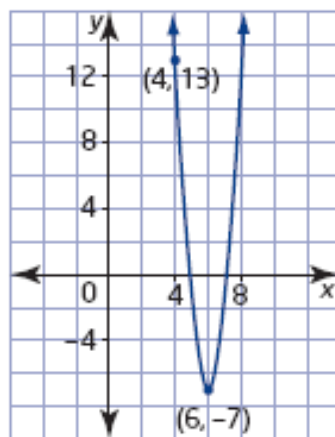
- Write an equation for the parabola shown.



- Write an equation for a parabola that is congruent to the graph of  $y = x^2$ , opens downward, and has its vertex at  $(-3, 1)$ .

8. Graph the relation  $y = -x^2 + 9$ . Label at least 5 ordered pairs on the graph.
9. Graph the relation  $y = -2(x + 6)^2 + 8$ . Label at least 5 ordered pairs on the graph.
10. Kim is drafting the windows for a new building. Their shape can be modelled by the relation  $h = -w^2 + 4$ , where  $h$  is the height and  $w$  is the width of points on the window frame, measured in metres.
- Graph the relation.
  - Find the maximum height of each window.
  - Find the width of each window at its base.
11. For the quadratic relation  $y = -3(x - 4)^2 + 5$ , state the following:
- the direction of opening
  - the stretch or compression factor
  - the coordinates of the vertex
  - the equation of the axis of symmetry
  - the maximum or minimum value of  $y$
12. A football quarterback passes the ball to a receiver 40 m down-field. The path of the ball can be described by the relation  $h = -0.01(d - 20)^2 + 6$ , where  $h$  is the height of the ball, in metres, and  $d$  is the horizontal distance of the ball from the quarterback, in metres.
- What is the maximum height of the ball?
  - What is the horizontal distance of the ball from the quarterback at its maximum height?
  - What was the height of the ball when it was thrown?
  - What was the height of the ball when it was caught?
  - If a defensive back is 2 m in front of the receiver, how far is he from the quarterback?
  - How high would the defensive back have to reach to knock down the pass?

13. Determine the equation of this parabola:



14. Graph the relation  $y = -2(x - 2)(x - 6)$ . Label at least 5 ordered pairs on the graph.
15. The path of a golf ball is described by the relation  $h = -0.005x(x - 150)$ , where  $h$  is the height of the ball (metres) and  $x$  is the horizontal distance travelled (metres).
- What is the height of the ball when it is originally struck? Explain.
  - After how many metres horizontally does the ball reach its maximum height? What is its maximum height? Explain.

☺ NOW RE-DO YOUR UNIT 4 TEST.

DO NOT PROCEED TO UNIT 5 UNTIL YOU KNOW HOW TO DO EVERY QUESTION. ☺