# Assignment
# Quadratics Relations

| Know | App | Think |
|---|---|---|
| 21 | 15 | 20 |

## Knowledge /Understanding

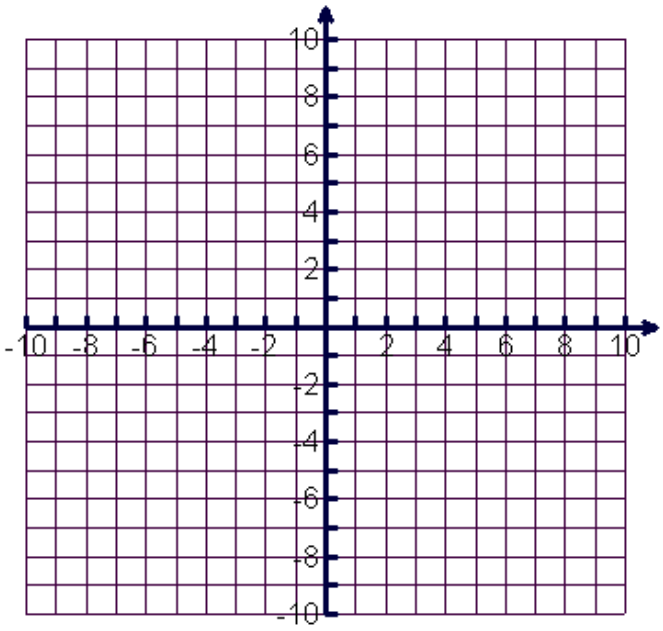
**1.** For the parabola $y = -2(x+1)^2 + 2$ answer the questions below:

**a.** State the vertex **[1 mark]**

**b.** Equation of axis of symmetry **[1 mark]**

**c.** Direction of opening **[1mark]**

**d.** Maximum/Minimum point **[1 mark]**




**e.** Determine the domain and range of the $y = -2(x+1)^2 + 2$ **[2 marks]**

**Domain**

**Range**

**f.** Describe (using proper terminology) the transformations from the graph of $y = x^2$ **[4 marks]**

**g.** Determine the mapping notation. **[3 marks]**

**h.** Graph the quadratic equation using your key points and mapping notation above **[3 marks]**

## Application

**2.** Write an equation for the quadratic relation that results from each transformation:

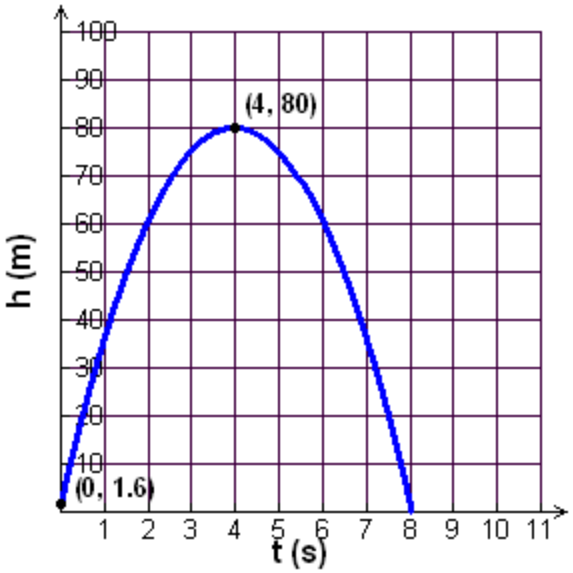
The graph of $y = x^2$ is compressed vertically by a factor of $\frac{1}{5}$, translated 3 units to the left, and 6 units downwards. **[3marks]**

**3.** The graph shows the path of a rocket fired from the deck of a barge in Lake Ontario at a Canada Day fireworks display. It is a parabola, where ***h*** the height, in meters, of the rocket above the water and ***t*** is the time, in seconds.

**a.** What is the maximum height reached by the rocket? Justify your answer. **[2 marks]**

**b.** When did the rocket reach its maximum height? Justify your answer. **[2 marks]**

**c.** How high was the rocket above the water when it was set off? Explain your answer. **[2 marks]**




**d.** After how long did the rocket fall into the water? Explain your answer. **[2 marks]**

**4.** Determine an equation to describe the flight of the rocket from question 4. **[4 marks]**

## Thinking /Inquiry

**5.** The mapping notation for a quadratic formula is; $\left(x+3,-\frac{1}{2}y+4\right)$. Find the equation of the parabola which corresponds with the above notation.**[3 marks]**

**6.** Find an equation for the parabola with vertex (1, 4) that passes through the point (3, 8). **[3 marks]**

**7.** A model rocket is launched from a platform. Its flight path can be represented by the relation $h = -4.9(t-6)^2 + 182$, where *h* represents the height of the rocket in metres and *t* represents time in seconds.

**a.** What is the height of the platform? **[1 mark]**

**b.** What is the height of the model rocket after 4 seconds? **[2 marks]**

**c.** What is the maximum height reached by the rocket? **[1 mark]**

**d.** How long does the rocket take to reach this height? **[2 marks]**

**e.** How long is the rocket above 100 m? **[2 marks]**

**8.** The path of a rocket is given by the relation $h = -5(x - 2)(x - 12)$, where x represents the horizontal distance, in metres, the rocket travels and h represents the height, in metres, above the ground of the rocket at this horizontal distance.

**a.** Sketch the path of the rocket. **[2 marks]**

**b.** What is the maximum height of the rocket? **[1 mark]**

**c.** What is the horizontal distance when this occurs? **[1 mark]**

**d.** What is the height of the rocket at a horizontal distance of 5 m? **[1 mark]**

**e.** Find another horizontal distance where the height is the same as in part d). **[1 mark]**