Section 4.3 Practice Master

1. For each part, sketch the graph of all four quadratic relations on the same set of axes.
  a) $y = -2x^2$
  $y = 2x^2$
  $y = -\frac{1}{2}x^2$
  $y = \frac{1}{2}x^2$
  b) $y = (x + 4)^2$
  $y = (x - 3)^2$
  $y = (x + 8)^2$
  $y = (x - 7)^2$
  c) $y = x^2 - 2$
  $y = x^2 + 2$
  $y = x^2 - 0.5$
  $y = -x^2 + 0.5$

2. For each relation,
  i) sketch a graph of the parabola
  ii) label three points on the parabola
  iii) describe the transformations from the graph of $y = x^2$
  a) $y = -\frac{1}{3}x^2$
  b) $y = -x^2 + 6$

3. Write an equation for the quadratic relation that results from each transformation.
  a) The graph of $y = x^2$ is translated 5 units upward.
  b) The graph of $y = x^2$ is translated 9 units downward.
  c) The graph of $y = x^2$ is translated 6 units to the right.
  d) The graph of $y = x^2$ is translated 10 units to the left.

4. Write an equation for the quadratic relation that results from each transformation.
  a) The graph of $y = x^2$ is reflected in the x-axis.
  b) The graph of $y = x^2$ is reflected in the y-axis.
  c) The graph of $y = x^2$ is compressed vertically by a factor of $\frac{1}{2}$.
  d) The graph of $y = x^2$ is stretched vertically by a factor of 6.

5. The relation $h = -2.5x^2 + 2.5$ can be used to model a grasshopper's jump. h represents the height and x represents the horizontal distance travelled, where $-1 \leq x \leq 1$, with all measurements in centimetres.
  a) Graph the relation.
  b) Determine the maximum height of the jump.
  c) Write a second equation to model the jump of a second grasshopper if it reaches a maximum height of 3.0 cm. Assume that the second grasshopper starts and lands at the same positions as the first.

6. The height, h, in metres, t seconds after a flare is launched from a boat can be modelled by the relation $h = -5.25(t - 4)^2 + 86$.
  a) What was the maximum height of the flare?
  b) What was its height when it was fired?
  c) How long after it was fired did the flare hit the water, to the nearest second?

7. A parabola $y = ax^2 + k$ passes through the points (1, 5) and (3, 29). Find the values of a and k.