Name:
Group A
Result:

1. (4 points) Sketch the following curves. Clearly indicate the coordinates of the vertex and the intercepts with the axes.

   (a) $y = x^2 - 3x + 2$

   (b) $y = -\frac{1}{2}x(x - 4)$

2. (4 points) Solve the following inequalities:

   (a) $x^2 \geqslant 9$

   (b) $x^2 - 2x \geqslant 8$

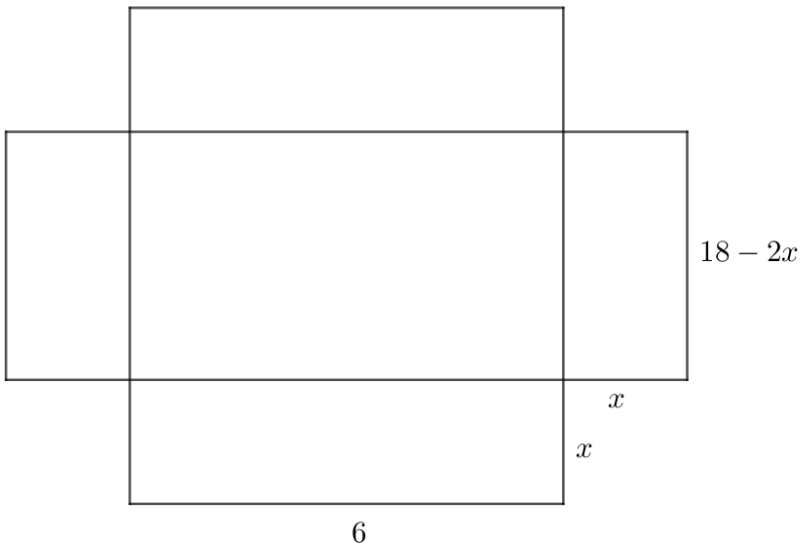
3. (4 points) The perimeter of a rectangle is 28 cm. Given that the diagonal is of length 10 cm, find the dimensions of the rectangle.

4. (4 points) Find the range of values of k for which the quadratic equation

$$x^2 + (k-4)x + (k-1) = 0$$

5. (4 points) Consider the function $f(x) = (x+a)(x-3a)$. Write in terms of a the coordinates of the vertex of the graph of $y = f(x)$. Hence, or otherwise, find the set of value of a for which the vertex lies above the line $y = -4$.

6. (4 points) The net of an open box is given below.



(a) Find an expression for the volume of the box in terms of x.

(b) Find x so that the volume is maximum.

(c) Find this maximal volume.

7. (4 points) A rocket follows a parabolic trajectory.
After t seconds, the vertical height of the rocket above the ground, in metres, is given by

$$h(t) = 30t - t^2$$

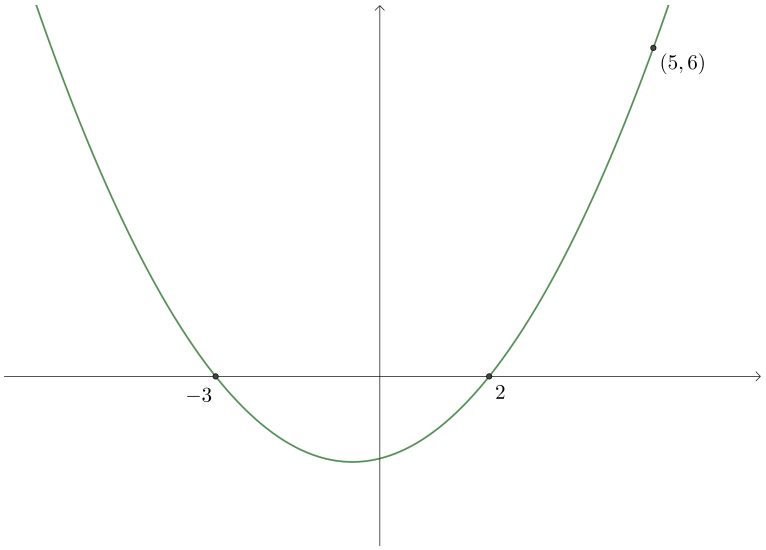
(a) Find the height of the rocket above the ground after 10 seconds.

(b) Find the maximum height of the rocket above the ground.

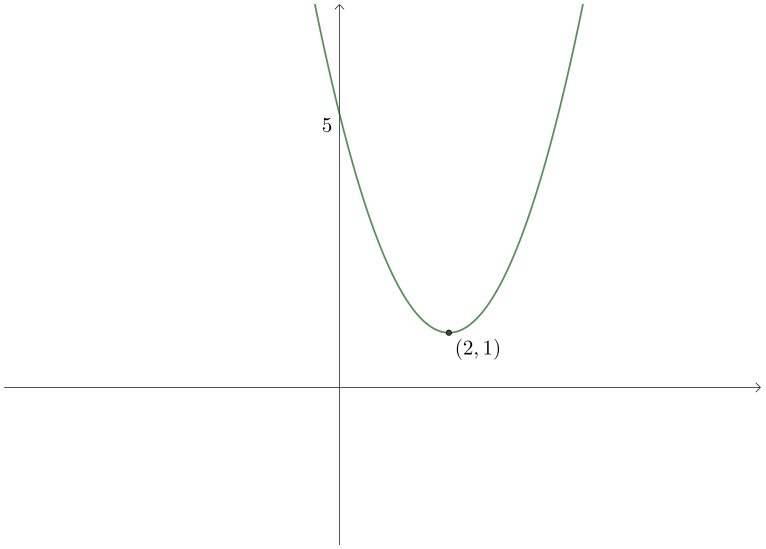
(c) Find the length of time the rocket is in the air.

8. (6 points) Find the equation of the quadratic given its graph:

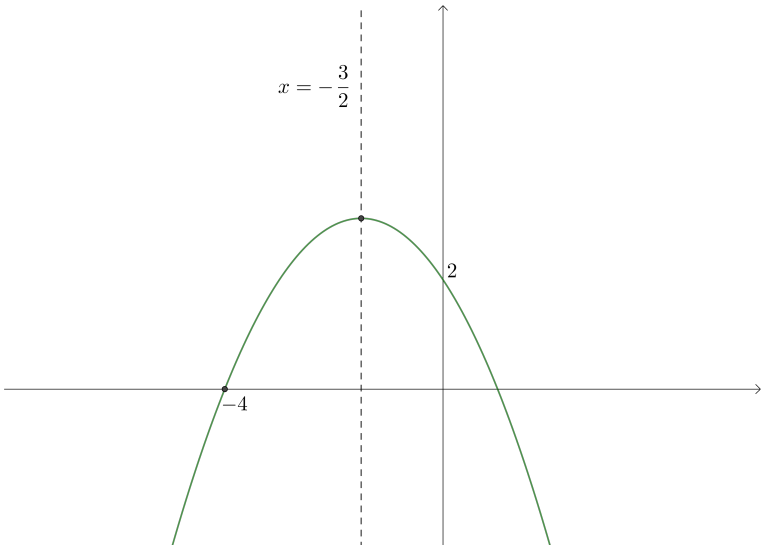
(a)



(b)



(c)



9. (6 points) (a) Solve the simultaneous equations:

$$\begin{cases} y = x^2 - 2x + 2 \\ y = -4x + 1 \end{cases}$$

(b) Sketch the graphs of $y = x^2 - 2x + 2$ and $y = -4x + 1$. Make sure to clearly indicate what you've found in part (a).