Name:
Result:

1. [7 *points*]
Solve the following equations and inequalities:

a) $2x^2 - 9 = 3x$ [2]

b) $7x - 12 \leqslant x^2$ [2]

Question continues on the following page.

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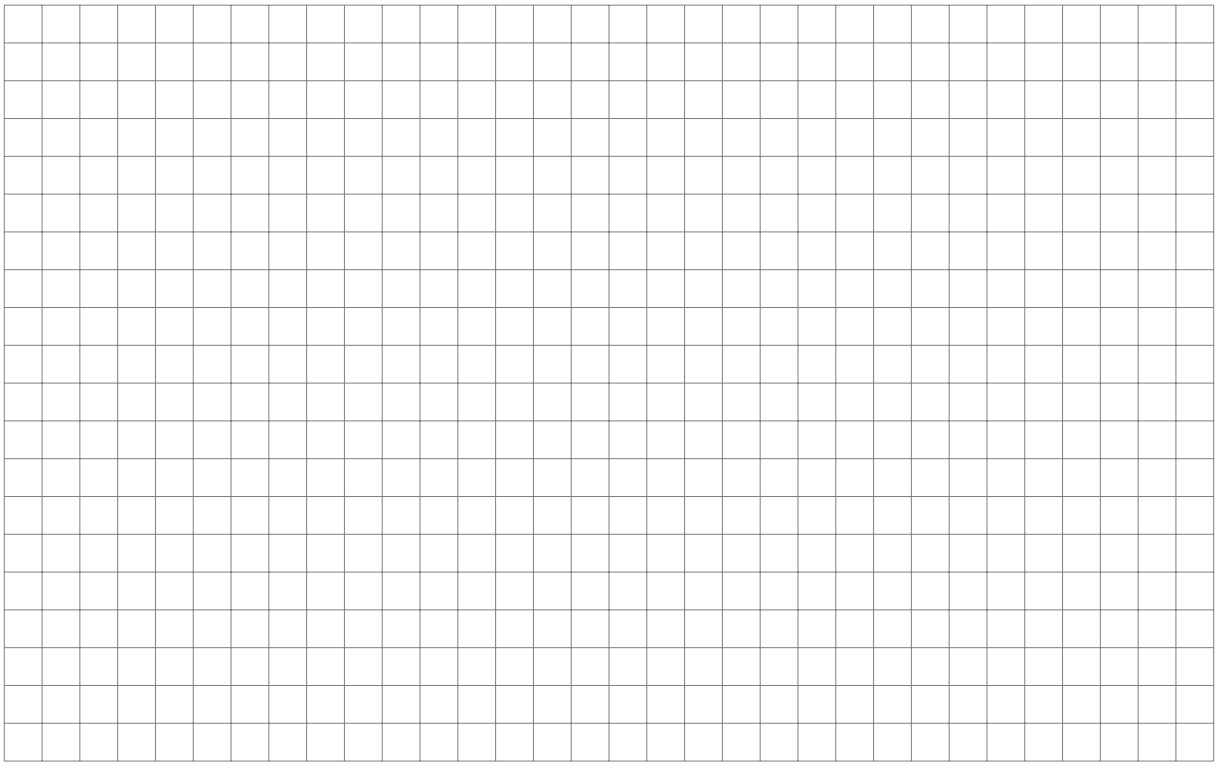
c) $(x^3+2)^2+3(x^3+2)-18=0$ [3]

2. [3 *points*]

Sketch the graph of $y=-\frac{1}{2}(x-2)^2+8$. Clearly indicate axes intercepts and the coordinates of the vertex.



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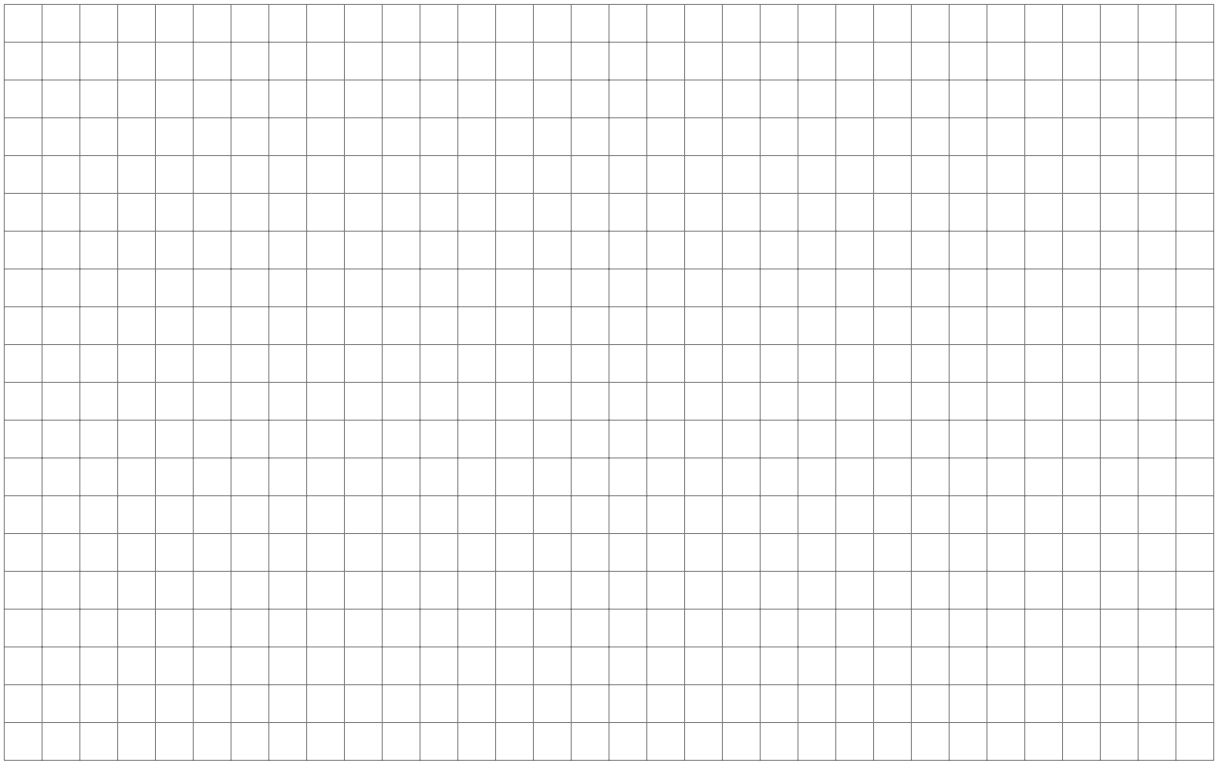
3. [7 *points*]

a) On the same diagram sketch the graphs of

$$y = \frac{1}{2}(x-4)(x+2) \qquad \text{and} \qquad y = x - \frac{3}{2}$$

Clearly indicate axes intercepts, vertex and points of intersection.

b) Find the value of c for which a line with gradient 1 and y intercept c is tangent to $y = \frac{1}{2}(x-4)(x+2)$.



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4. [4 *points*]

The demand d (the number of items the public will buy) of a certain item is related to the unit price p of this item (in dollars) by the equation:

$$d = 120 - 3p$$

Let the revenue R be the amount earned by selling the items.

a) Find the unit price that will maximize the revenue.

b) Find the demand that will maximize the revenue.

c) What is the maximum revenue?

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5. [4 *points*]

Consider the equation:

$$kx^2 - (k+1)x + (3k+2) = 0$$

The sum of the roots of this equation is equal to twice their product. Find k and hence find the roots of the equation.

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