ANSWERS (Quadratic Functions – Extra Practice)

1. Determine the domain and range of the following functions.

a) $f(x) = -3(x-2)^2 + 5$

dom f = ℝ

ran f =]−∞, 5]

b) $f(x) = 2x^2 + 4x - 9$

dom f = ℝ

ran f = [−11, +∞[

2. Determine the zeros of the function $f(x) = -3(x+1)^2 + 12$. *$x_1 = -3$ and $x_2 = 1$*

3. Determine the y-intercept of $f(x) = -\frac{1}{2}(x+4)^2 + 9$. *$y = 1$*

4. Determine over what interval the function $f(x) = 2x^2 - 5x - 3$ is positive.

$f(x) \geq 0$ over $\left]-\infty, -\frac{1}{2}\right] \cup [3, +\infty[$

5. Determine over what interval the function $f(x) = 3x^2 + 6x - 5$ is increasing. *[−1, +∞[*

6. Determine the extrema of the function $f(x) = -2x^2 + 12x - 7$. *max f = 11*

7. What is the axis of symmetry of the function $f(x) = -\frac{1}{4}x^2 + 3x + 1$? *x = 6*

8. Determine the values of x for which the function $f(x) = -3(x+4)^2 + 5$ is equal to -7.

x = −6 or x = −2

9. Find the rule of the quadratic function represented by a parabola with a vertex at V(−1, 5) and passing through the point P(1, 3).

$y = -\frac{1}{2}(x+1)^2 + 5$

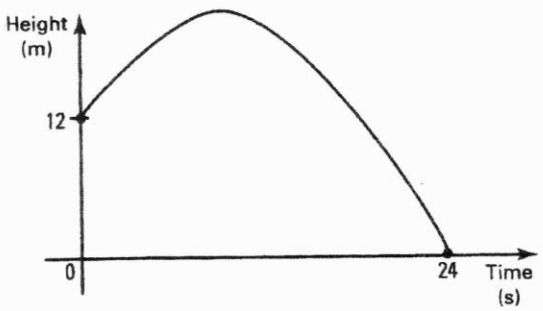
10. A stone is thrown upward from the top of a seaside cliff. The function which gives the stone's height h (in m) above sea level as a function of time t (in sec) since it was thrown has the rule: $h = -t^2 + 12t + 160$.
Find the interval of time over which the height of the stone is at least 180 m above sea level.

Between the instants t = 2 and t = 10 seconds after it was thrown.

11. The height h, in metres, of a diver relative to the water level is described by the rule $h = \frac{1}{2}t^2 - 6t + 10$ where t represents the elapsed time, in seconds, since the start of the dive.
How long did the diver remain underwater?

During 8 seconds.

12. A projectile is thrown upward from a height of 12 m. After 10 seconds, it reaches its maximum height and after 24 seconds, it hits the ground.
Knowing that its trajectory follows the rule of a quadratic function, find the elapsed time between the moment it reaches a height of 6.5 m, on its descent, and the time when it hits the ground.



$y = -\frac{1}{8}(x+4)(x-24)$.

It reaches, on its descent, a height of 6.5 m at the instant t = 22 sec. The elapsed time is therefore 2 sec.