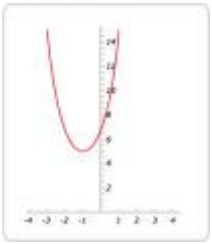
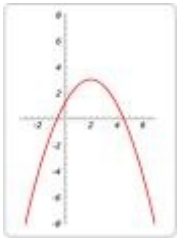
Maximum and Minimum Values





1. A football follows a path defined by $h(t) = -t^2 + 6t$ where h is height in metres and t is time in seconds. At what time, in seconds, does the football reach its maximum height?

(A) 2
(B) 3
(C) 6
(D) 9

2. What is the vertex of the graph of the function $y = 2x^2 + 12x + 18$?

(A) $(-3,0)$
(B) $(-3,9)$
(C) $(3,0)$
(D) $(3,9)$

3. Which function has a maximum value of 1?

(A) $-(y-1) = x^2$
(B) $-y = (x-1)^2$
(C) $(y-1) = x^2$
(D) $y = (x-1)^2$

4. Which value of 'c' makes $x^2 + 3x + c$ a perfect square?

(A) $\frac{9}{4}$
(B) $\frac{9}{2}$
(C) 9
(D) 36

5. For what value of x does the function $-3(y+1) = (x-2)^2$ have a maximum value?

(A) -2
(B) -1
(C) 1
(D) 2

6. Which value of 'c' makes $x^2 - 5x + c$ a perfect square?

(A) $-\frac{25}{4}$

(B) $-\frac{25}{2}$

(C) $\frac{25}{4}$

(D) 25

7. What characteristics describe the graph of $-\frac{1}{2}(y-2)=x^2$?

(A) vertex at $(0,-2)$, opens down

(B) vertex at $(0,-2)$, opens up

(C) vertex at $(0,2)$, opens down

(D) vertex at $(0,2)$, opens up

8. Which value of 'c' makes x^2-6x+c a perfect square?

(A) -36

(B) -9

(C) 9

(D) 36

9. Which has vertex (4, 3) and opens upward?

(A) $-\frac{1}{2}(y+3)=(x+4)^2$

(B) $\frac{1}{2}(y+3)=(x+4)^2$

(C) $-\frac{1}{2}(y-3)=(x-4)^2$

(D) $\frac{1}{2}(y-3)=(x-4)^2$

10. Which expression is a perfect square?

(A) x^2+9

(B) x^2-9

(C) x^2+6x+9

(D) $x^2+6x+36$

11. What is the equation of the axis of symmetry for $y = 2x - x^2 + 1$?

(A) $x = \frac{1}{4}$
(B) $x = \frac{1}{2}$
(C) $x = 1$
(D) $x = 2$

12. What value of 'c' makes $x^2 + 5x + c$ a perfect square?

(A) $\frac{5}{2}$
(B) $\frac{25}{4}$
(C) 10
(D) 25

13. The path of a model rocket launched into the air is modeled by the function $h = -4.9t^2 + 196t$, where h is height in metres and t is elapsed time in seconds. What is the maximum height in metres reached by the rocket?

(A) 1960
(B) 3724
(C) 3822
(D) 5880

Answers Maximum/Minimum Problems

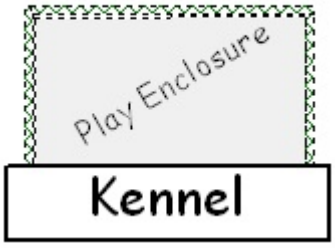
1. **B**
2. **A**
3. **A**
4. **A**
5. **D**
6. **C**
7. **C**
8. **C**
9. **D**
10. **D**
11. **A**
12. **B**
13. **A**

1. A toy rocket is launched from the top of a 30m high building so that its height, *h* in metres above the ground *t* seconds later is given by $h(t) = 30 + 64t - 16t^2$. Algebraically determine the maximum height attained by the rocket.

2. A cannonball is fired and its height, *h*, in metres, above the ground, *t* seconds after being fired, is given by $h(t) = -5t^2 + 40t + 3$. Algebraically determine the maximum height attained by the cannonball and the time taken to reach this height.

3. A person diving from a 10 m high platform has their height above the water, *h*, in metres, *t* seconds after diving, given by: $h(t) = -4t^2 + 4t + 10$. Algebraically determine the maximum height attained by the diver and the time taken to reach this height.

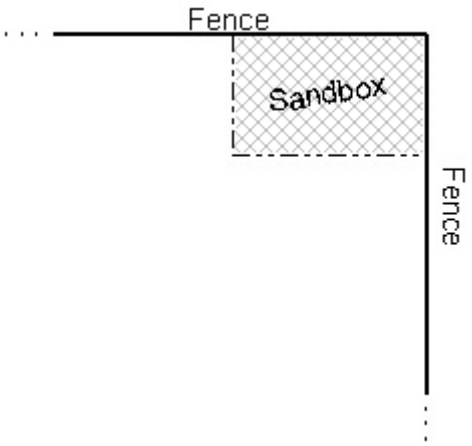
4. A rectangular play enclosure for some dogs is to be made with 60 m of fencing using the kennel as one side of the enclosure as shown. Algebraically determine the quadratic function that models the area of the enclosure and use it to find the dimensions that produce the maximum area.



5. A skier decides to jump a ramp. The path of the jump can be represented by the quadratic relationship $h(t) = -6t^2 + 12t + 1$ where *h* represents the height above the ground in metres, and *t* represents time after leaving the ramp in seconds.

Algebraically determine the maximum height reached by the jumper and the time at which this maximum height occurs.

6. A day care centre bought 20 m of board to form two sides of a rectangular sandbox against a corner in a fenced yard as shown. If all 20 m of board is used, write the quadratic function that models the area of the sandbox, and use it to determine the maximum area the sandbox can have.



7.A soccer ball is kicked into the air and first lands on the ground 20 m away. If a maximum height of 8 m is reached, determine the transformational form of the quadratic function representing the path of the soccer ball while it is in the air.