MAX and MIN APPLICATIONS

Example 1

On a daring dive off the cliff, Alyssa's height above the water is given approximately by the equation $y = -3t^2 + 6t + 7$, where h is her height in metres and t is the time in seconds.

(a) Determine the maximum height of her dive

(b) How long does it take her to reach the maximum height?

(c) How high is the cliff ledge from which she is diving from?

Example 2

A baseball player throws a ball that travels according to the formula:

$h(t) = 9.8t + 1.1 - 4.9t^2$

Where h is the height reached in metres and t is the time taken in seconds.

(a) Determine the maximum height reached by the ball.

(b) At what time does the ball hit the ground?

Example 3

The path of a golfball hit by Mr. Michalak is described by :

$$h = -4x^2 + 56x$$

Where h is the height above the ground in metres, and x is the horizontal distance travelled in metres.

(a) What is the horizontal distance travelled by the ball when the maximum height is reached.

(b) Determine the maximum height of the ball.

(c) Determine when the ball is 160 metres above the ground.

Answers (to both sides of worksheet):

Example 1 a) 10 m b) 1 second c) 7 m
Example 2 a) 6 m b) 2.1 s
Example 3 a) 7 m b) 198 m c) 3.92 s and 10.08 s

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#8 a) 70 m b) 2 s c) 50 m
#9 $562 500
#10 min value is 2, therefore cannot be less than 1
#11 a) $5 450 000 b) $ 40 000 c) between $22971 and $57 029

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8. The height of a ball thrown vertically upward from a rooftop is modelled by $h(t) = -5t^2 + 20t + 50$, where $h(t)$ is the ball's height above the ground, in metres, at time t seconds after the throw.

a) Determine the maximum height of the ball.

b) How long does it take for the ball to reach its maximum height?

c) How high is the rooftop?

9. The cost function in a computer manufacturing plant is $C(x) = 0.28x^2 - 0.7x + 1$, where $C(x)$ is the cost per hour in millions of dollars and x is the number of items produced per hour in thousands. Determine the minimum production cost.

10. Show that the value of $3x^2 - 6x + 5$ cannot be less than 1.

11. The profit $P(x)$ of a cosmetics company, in thousands of dollars, is given by
A $P(x) = -5x^2 + 400x - 2550$, where x is the amount spent on advertising, in thousands of dollars.

a) Determine the maximum profit the company can make.

b) Determine the amount spent on advertising that will result in the maximum profit.

c) What amount must be spent on advertising to obtain a profit of at least \$4 000 000?