

1. The height (in meters) of a projectile shot vertically upward from a point 2 meters above ground level with an initial velocity of 24.5 m/s is $h = 2 + 24.5t - 4.9t^2$ after t seconds.

a.) Find the velocity after 2 s and after 4s.

b.) When does the projectile reach its maximum height?

c.) What is the maximum height?

d.) When does it hit the ground?

e.) With what velocity does it hit the ground?

2. If a ball is thrown vertically upward with a velocity of 80ft/s, then its height after t seconds is $s = 80t - 16t^2$.

a.) What is the maximum height reached by the ball?

b.) What is the velocity of the ball when it is 96 ft. above the ground on its way up? On its way down?

3. If a rock is thrown vertically upward from the surface of Mars with velocity 15m/s, its height after t seconds is $h = 15t - 1.86t^2$.

a.) What is the velocity of the rock after 2 s?

b.) What is the velocity of the rock when its height is 25m on its way up? On its way down?

Answers:

1 a. $v(2) = 4.9 \frac{m}{s}$ b. $t = 2.5 \text{ sec}$ c. $h(2.5) = 32.625 \text{ m}$ d. $t = 5.08 \text{ sec}$ e. $v(5.08) = -25.284 \frac{m}{s}$

$v(4) = -14.7 \frac{m}{s}$

2 a. $s(2.5) = 100 \text{ ft}$ b. $v(2) = 16 \frac{ft}{s}$ 3a. $v(2) = 7.56 \frac{m}{s}$ b. $v(2.353) = 6.247 \frac{m}{s}$

$v(4) = -16 \frac{ft}{s}$ $v(5.711) = -6.245 \frac{m}{s}$

4. A particle moves with position function: $s = t^4 - 4t^3 - 20t^2 + 20t \quad t \geq 0$.

a.) At what time does the particle have a velocity of 20m/s?

b.) At what time is the acceleration 0? What is the significance of this value t?

5. The cost, in dollars, of producing x yards of a certain fabric is

$$C(x) = 1200 + 12x - 0.1x^2 + 0.0005x^3$$

a.) Find the marginal cost function.

b.) Find $C'(200)$ and explain its meaning. What does it predict?

c.) Compare $C'(200)$ with the cost of manufacturing the 201st yard of fabric (AVG ROC between 200 & 201).

6. The cost function from production of a commodity is

$$C(x) = 339 + 25x - 0.09x^2 + 0.0004x^3$$

a.) Find and interpret $C'(100)$.

b.) Compare $C'(100)$ with the cost of producing the 101st item.

Answers:

4 a. $t = 0$ & 5 sec

b. $t = 3.082$ sec

5 a. $C'(x) = 12 - .2x + .0015x^2$

b. $C'(200) = 32 \frac{\text{Cost in \$}}{\text{yd of fabric}}$ c. \$32.20

Producing the 200th yard of fabric costs you \$32.

6 a. $C'(100) = 19 \frac{\text{Cost in \$}}{\text{unit}}$

b. \$19