Edinburgh Napier UNIVERSITY

Physics-Based Animation (SET09119)

Tutorial 03 - Projectile Motion

1 Question

A stone is dropped from a bridge reaches the ground in 2 seconds. How high is the bridge (gravity is $9.8ms^{-2}$)?

2 Question

A grenade, laying on a horizontal surface, is kicked into the air at 7.11 ms^{-1} at 1.15 radians to the horizontal (we assume gravity is 9.8 ms^{-2}).
Find:

1. the time taken to reach its maximum height

2. the maximum height in metres

3. the range

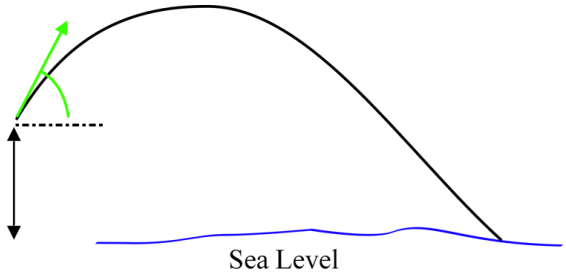
4. what is the speed, and what direction is it moving after $\frac{1}{2}$ second?

3 Question

A balloon which is stationary starts to rise with an acceleration of $2ms^{-2}$. What is its velocity 10 seconds later (gravity is $9.8ms^{-2}$)?

If ballast is dropped at the end of 10 seconds, what will be the velocity of the ballast after another 10 seconds?

4 Question



A cannon is on a mountain, 123.69 m above the sea level. The cannon is fired with velocity 81.06 ms^{-1} at 1.06 *radians*.
Find:

1. the maximum height of the cannon above the sea
2. the time taken to hit the sea
3. the horizontal distance from the cannon to the position where the bomb hits the sea
4. the velocity magnitude and direction of the cannon when it hits the sea

5 Question

A jet of water leaves a hose-pipe with horizontal and vertical velocities of $15ms^{-1}$ and $25ms^{-1}$. Find for how long each particle of water is in the air, and how far the jet reaches.

6 Question

A tank is on a mountain, 122.34 m above the sea level. The tank is fired with velocity 60.85 ms^{-1} at 0.92 *radians*.
Find:

1. the maximum height of the tank above the sea
2. the time taken to hit the sea
3. the horizontal distance from the tank to the position where the bomb hits the sea
4. the velocity magnitude and direction of the tank when it hits the sea

7 Question

A frog, laying on a horizontal surface, is kicked into the air at 6.69 ms^{-1} at 1.37 radians to the horizontal (we assume gravity is 9.8 ms^{-2}).
Find:

1. the time taken to reach its maximum height

2. the maximum height in metres

3. the range

4. what is the speed, and what direction is it moving after $\frac{1}{2}$ second?