Hello!!

For quiz review: jump to slide 21

- In your notes, find the knowns for the following problem: Draw a picture too.
  - A ball is kicked at an angle of 40° at a velocity of 12m/s from a 7m high shed. How far from the base of the shed does it land?

Today

- 2-D kinematics with a change in the y direction.
- Break these problems into 2 parts.
- 1) Launch to maximum height.
- 2) Maximum height to the "landing" height.

Quiz Friday

- 6 total questions.
  - 2 horizontal projectiles.
  - 2 projectiles with no change in y.
  - 2 projectiles with a change in y.

Key Concepts

- Break the problems into two pieces.
- A to B: from launch to the maximum height.
- B to C: from maximum height to the end of the motion.
  - This may not be the landing.

Concepts Continued

- Determine the initial conditions.
- Use this information to solve for all information that allows you to set up the problem from B to C.
- You may/will need to combine totals (generally time) to solve for the entire problem.

- A ball is kicked at an angle of 40° at a velocity of 12m/s from a 7m high shed. How far from the base of the shed does it land? A to B.
  - x direction
  - Δx
  - Vi,x = 9.19 m/s
  - Vf,x = Vix
  - ax = 0 m/s
  - t (x and y) 0.79 s
  - Vi and θ = 40° (neither x nor y) 7.72 m/s
  - y direction:
  - Δy = 3.03 m
  - Vi,y = 7.71 m/s
  - Vf,y = 0 m/s ay = -9.8 m/s²

- A ball is kicked at an angle of 40° at a velocity of 12m/s from a 7m high shed. How far from the base of the shed does it land? B to C
  - x direction
  - Δx
  - $V_{i,x} = 9.19\ m/s$
  - $V_{f,x} = V_{i,x}$
  - $a_x = 0\ m/s$
  - t (x and y) $= 1.43\ s$
  - ~~V_i and θ (neither x nor y)~~
  - y direction:
  - $\Delta y = -10.03\ m$
  - $V_{i,y} = 0\ m/s$
  - $V_{f,y}$ $a = -9.8\ m/s$

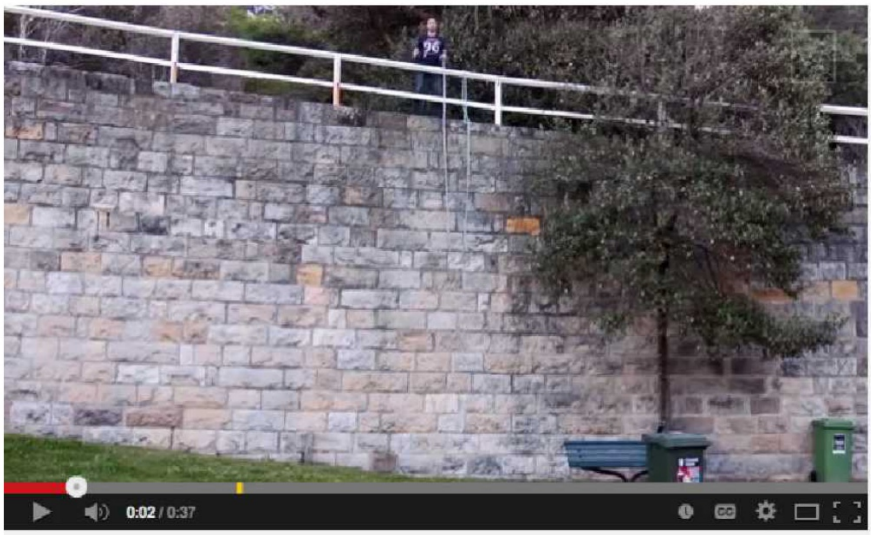
- A ball is kicked at an angle of 40° at a velocity of 12m/s from a 7m high shed. How far from the base of the shed does it land? A to C
  - x direction
  - Δx 20.41 m
  - $V_{i,x} = 9.19\ m/s$
  - $V_{f,x} = 9.19\ m/s$
  - $a_x = 0\ m/s^2$
  - t (x and y) = 2.22 s
  - Vi and θ (neither x nor y)
  - y direction:
  - $\Delta y = -7$ m
  - $V_{i,y} = 7.71\ m/s$
  - $V_{f,y}$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = t$$

$t = 2.22\,s$

or

~~$t = -0.64\,s$~~



Chain Drop Experiment

Predict

- A trebuchet launches a stone at a velocity of 40 m/s at an angle of 32° from 6m off the ground at a 8 m high wall that is 82m away. What is the clearance of the stone over the top edge of the wall? A to B.
  - x direction
  - $\Delta x = 73.3\,m$
  - $V_{i,x} = 33.29\,\frac{m}{s}$
  - $V_{f,x} = V_{i,x}$
  - ax =
  - t (x and y) $= 2.16\,s$
  - Vi and θ 32 (neither x nor y) 40
  - y direction:
  - $\Delta y = 22.9\,m$
  - $V_{i,y} = 21.2\,m/s$
  - $V_{f,y} = 0\,m/s$
  - ay

- A trebuchet launches a stone at a velocity of 40 m/s at an angle of 32° from 6m off the ground at a 18m high wall that is 82m away. What is the clearance of the stone over the top edge of the wall? B to C. 10.6m
  - x direction
  - Δx = 8.7
  - Vi,x = 33.3 m/s
  - Vf,x = Vi,x
  - ax
  - t (x and y) 0.25 s
  - Vi and θ (neither x nor y)
  - y direction:
  - Δy = −0.3
  - Vi,y = 0 m/s
  - Vf,y
  - ay

- A trebuchet launches a stone at a velocity of 40 m/s at an angle of 32° from 6m off the ground at a 18m high wall that is 82m away. What is the clearance of the stone over the top edge of the wall? A to C.
  - x direction
  - Δx
  - Vi,x
  - Vf,x
  - ax
  - t (x and y)
  - Vi and θ (neither x nor y)
  - y direction:
  - Δy
  - Vi,y
  - Vf,y
  - ay

Chain Drop Answer 2

Chain Drop Explained

Hello.

We will be putting the quiz off until Tuesday.

Today: Finish 2-D & work on quest.

Tomorrow: Marble Launcher Lab

Monday: Review for quiz.

Tuesday: 2-D kinematics quiz.

Mr. Breish and Mr. Hayden are playing basketball. Hayden soars into the air at 7m/s at an angle of 75° and dunks over Mr. B. If the ball started from 2m off of the ground and the basket is 3.4m off the ground, how far away from the basket was he when he jumped? What was his maximum height? What was his hang time?

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X-Dir

$\Delta x = 1.25\ m$

$V_{ix} = 1.81\ m/s$

$V_{fx} = 1.81\ m/s$

$a_x = 0\ m/s^2$

A to B

$t = 0.69\ s$

$V_i = 7\ m/s$

$\theta = 75°$

Y-Dir

$\Delta y = 2.33\ m$

$V_{iy} = 6.76\ m/s$

$V_{fy} = 0\ m/s$

$a_y = -9.8\ m/s^2$

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B to C

X-Dir

$\Delta x = 0.79m$

$V_{ix} = 1.81 \, m/s$

$V_{fx} = 1.81 \, m/s$

$a_x = 0 \, m/s^2$

$t = 0.44s$

Y-Dir

$\Delta y = 0.93m$

$V_{iy} = 0 \, m/s$

V_{fy}

$a_y = -9.8 \, m/s^2$

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A to C

Time permitting (before noon) get laptops and look over the quest.

Ask questions about problems that you would like to know more about.

Work in groups to solve problems.

Good Morning!

Please grab a whiteboard if you would like one.

Grab a formula sheet from the front desk.

Calculator in degrees.

There are three basic types of problems:
-Horizontal Projectiles
-Projectiles with no change in Y
-Projectiles with a change in Y.

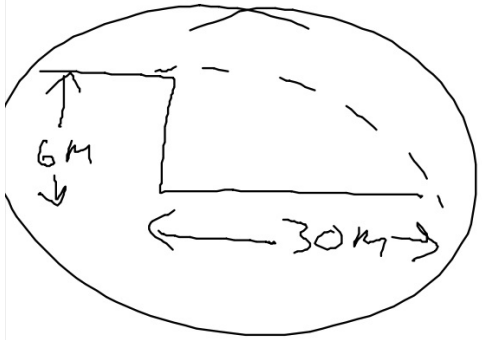
A baseball is thrown from a 50 m building with a horizontal velocity of 20 m/s. How far from the base of the building does it land?

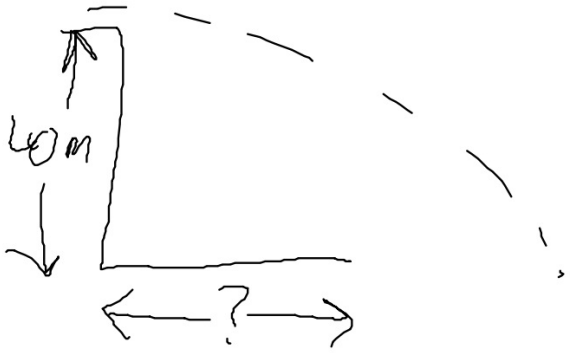
$$\Delta y = \cancel{v_{iy}t}^{\,0} + \frac{1}{2}a_y t^2$$

$$\frac{2\Delta y}{a_y} = \frac{a_y t^2}{a_y} \Rightarrow t^2 = \frac{2\Delta y}{a_y} \Rightarrow t = \sqrt{\frac{2\Delta y}{a_y}}$$

$$\Delta x = v_{ix}t + \cancel{\frac{1}{2}a_x t^2}^{\,0}$$

A rocks has a horizontal displacement of 30 m when launced from a 6 m ladder. What is it's horizontal displacement when launched horizontally from 40 m?





77.3m

Joel throws a chainsaw to Noah with a velocity of 15 m/s at an angle of 35°. How Far away is Noah if they catch it at the same height that it was thrown.

21.6 m

A Pencil is lauched from a 60 m building with a velocity of 25 m/s at an angle of 45°. How far from the base of the building does it land?

$T_{tot} = 1.8\,s + 3.93\,s = 5.73\,s$

$\Delta x = V_{ix} t = 101.48\,m$

A _____ is shot into the air at _____m/s at an angle of _____. How far has it traveled in the x direction when it is ___m off the ground on it's way back down from the maximum height?

Shoot the Monkey

Friday

Monkey Hunter

An arrow is fired at 40° at a velocity of 10m/s at the same time that a target is dropped. If the target is hit 1 second later: How far is it from the bow Δx? How high was the target dropped from?

Skip