Good morning!

Please take out your notebook, a pencil and a calculator.

Make sure that the calculator is in degrees.

Today

- Intro to projectiles with non-horizontal trajectory.
- Problems with no elevation change between launch and landing.
- Hand back old quizzes and the Core.

This week:

T: 2-D kinematics with non-horizontal trajectory. Launch and landing height are equal.

W: Change in launch and landing height.

R: Projectile motion lab. Review for quiz if time permits.

F: 2-D motion quiz. Preview circular motion.

Quest:

2-D kinematics with non-horizontal launch.

Due Thursday at 8:00pm.

You will have the content to do problems 1-8 by the end of today.

You will have the remaining content tomorrow.

Determining Vix and Viy

- If Initial Velocity and the angle of the velocity are given, you are able to determine the x and y components of velocity.
- Place your calculated values into your knowns.

A clown is shot from a cannon at 30° at 20m/s. How far away from the cannon should the landing net be placed?

Picture and initial set up.

X- Dir

$\Delta x = V_{ix}t + \frac{1}{2}a_x t^2$ (the a_x term $\rightarrow 0$)

$\Delta x = V_{ix}t = 17.3\,m/s \cdot 2.04\,s$

$\Delta x = 35.3\,m$

Time Using Quadratic

- You can solve for the time of the entire flight with a quadratic using the formula $\Delta y = Viyt + (1/2)ay(t)^2$.
- $\Delta y = 0m$
- Yields 2 answers. t = 0s and 2.04s
- Which is correct?

Quadratic Explained

- Solving for time in the quadratic equation yields the two times where the graph of the function is = 0.
- The function **is** the shape of the motion.
- That means that the object is at zero at launch and landing.

Another Method

- Divide the problem into two equal halves.
- You can solve for time for half of the motion.
- Multiply by 2 to get the full time.

A clown is shot from a cannon at 30° at 20m/s. How far away from the cannon should the landing net be placed?

A golf ball is hit at an angle of 48° at 65m/s.
How far away does the golf ball land?

$$V_{fy} = V_{iy} + a_y t$$

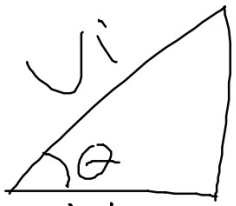
$$t = \frac{V_{fy} - V_{iy}}{a_y} = 9.8\,s$$

$$\Delta x = V_{ix} t =$$

Core Assessments

- I will hand them back.
- Check IC to make sure that the correct score is there.
- I will take general and individual questions in a moment.

A football is thrown upward at a(n) 42◦ angle to the horizontal. The acceleration of gravity is 9.8 m/s2. To throw a(n) 35.5 m pass, what must be the initial speed of the ball? This problem requires a system of equations.

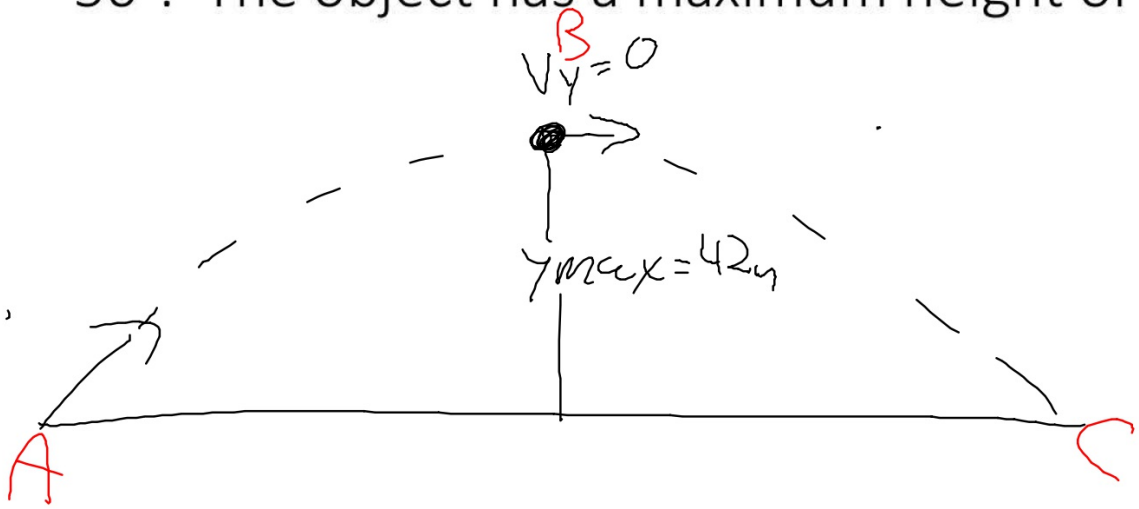


$V_{iy} = V_i \sin\theta$

$V_{ix} = V_i \cos\theta$

18.7 m/s

Determine the range of an object shot at an angle of 50°. The object has a maximum height of 42m.



A football is thrown at an angle of 30°. It peaks 8m above the height that it was thrown. If the receiver catches the ball, how far away is he?