

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

Should be programmed in your calculator. If not, you need to do it by hand.

Name _____

Date _____

~~Chapter 8~~ Chapter 9

Assignment #10

Section 8.5 Projectile Motion and Review

Put all problems on a separate piece of paper. You need to draw pictures and write and solve your equations

- 1) A ball rolls off the end of a table with a horizontal velocity of 1.5 feet/second. The table is 2.75 feet high.
 - a) Draw a picture of the situation
 - b) Write the parametric equation for the x direction $x = 1.5t$
 - c) Write the parametric equation for the y direction $y = 2.75 - 16t^2$
 - d) Solve your y equation to find total time. $.414 \text{ sec}$
 - e) Use your time to substitute into your x equation to find how far away it landed.

$$x = 1.5(.414) = \textcircled{.621 \text{ Feet}}$$

- 2) A ball rolls off the edge of a 12 meter cliff at a velocity of 2 meters per second.
 - a) Draw a picture of the situation.
 - b) Write the parametric equation for the x direction $x = 2t$
 - c) Write the parametric equation for the y direction $y = 12 - 4.9t^2$
 - d) Solve your y equation to find the total time it was in the air. $t = 1.55 \text{ sec}$
 - e) How far is the ball from the cliff at this time? $3.10 \text{ meters from cliff}$

- 3) Carolina hits a baseball so that it travels at an initial speed of 120 feet/second and at an angle of 30 degrees above the ground. If her bat contacts the ball at a height of 3 feet above the ground, how far does the ball travel horizontally before it hits the ground?
 - a) Draw the right triangle representation of this situation.
 - b) Write the parametric equation for the x direction $x = 120t \cdot \cos 30$
 - c) Write the parametric equation for the y direction $y = 120t \cdot \sin 30$
 - d) Solve your y equation (should use the quadratic formula) to find the total time it was in the air. 3.8 sec
 - e) How long does it take to get to its maximum height? 1.875 sec
 - f) What is the maximum height? 59.25 feet
 - g) What is the horizontal distance that it traveled given this time. $\textcircled{394.9 \text{ feet}}$

$$x = 120(3.8) \cos 30$$

$$y = -16t^2 + 120t \cdot \sin 30 + 3$$

4) Jo Jo the amazing circus boy is a human cannonball. He is fired out of a canon 20 feet above the ground at a speed of 60 feet per second. The cannon is at an angle of 50 degrees. His net hangs 5 feet above the ground. Where (horizontal position) does his net need to be positioned so that he will land safely?

- Draw the right triangle representation of this situation.
- Write the parametric equation for the x direction. $x = 60t \cos 50$
- Write the parametric equation for the y direction. $y = -16t^2 + 60t \sin 50 + 20$
- Solve your y equation (should be using the quadratic formula) to find the total time Jo-Jo was in the air. . 3, 26
- What was the maximum height that Jo-Jo reached (vertex). (1.44, 53)
- How many seconds does it take Jo-Jo to get to the maximum height
- Where does he need to put the net (horizontal distance) so he lands on it.

122.26 feet

5) Chuck the golfer swings a 7-iron club with a loft of 28 degrees and an initial velocity of 95 feet/second on level ground.

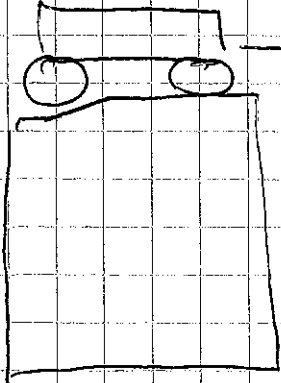
- Draw the right triangle representation of this situation.
- Write the parametric equation for the x direction
- Write the parametric equation for the y direction.
- Solve your y equation to find the total time
- What is the maximum height
- What is the horizontal distance the ball travels.

6) A ship is on a bearing of 315 traveling at 30 knots. (1 knot = 1.15078m/h).

- Draw your picture
- Write your parametric equations
- How long before the ship is 500 miles West of where it started
- How far north is it
- Hence, what is the total distance traveled by the ship.

Chapter 8 Assignment #10

①



$$x = 1.5t$$

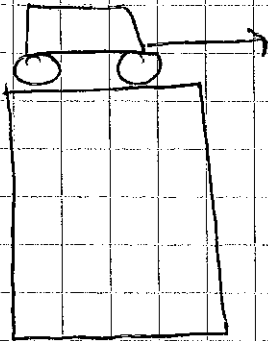
$$y = 2.75 - 16t^2$$

$$t = .414 \text{ sec}$$

$$x = 1.5(.414)$$

.621 feet from cliff

②



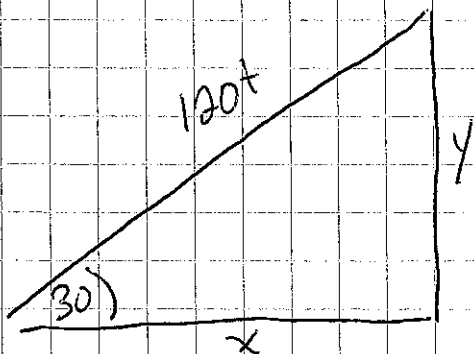
$$x = 2t$$

$$y = 12 - 4.9t^2$$

$$t = 1.55 \text{ sec}$$

$x = 3.10$ meters from cliff

③



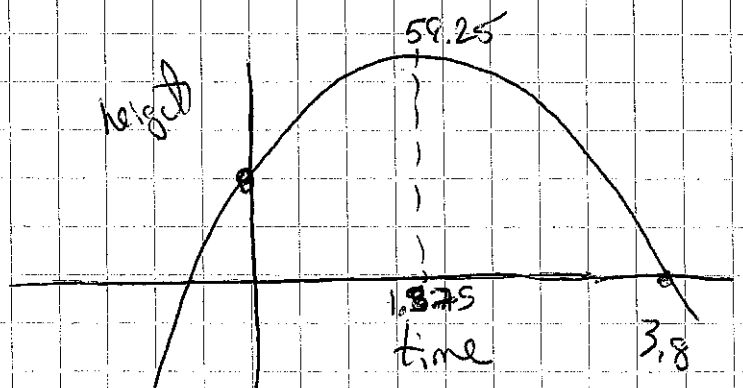
$$y = 120t \cdot \sin 30$$

$$x = 120t \cdot \cos 30$$

$$y = -16t^2 + 120t \cdot \sin 30 + 3$$

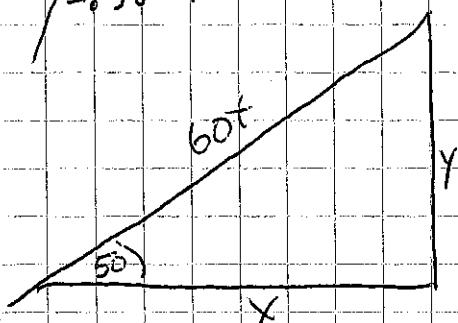
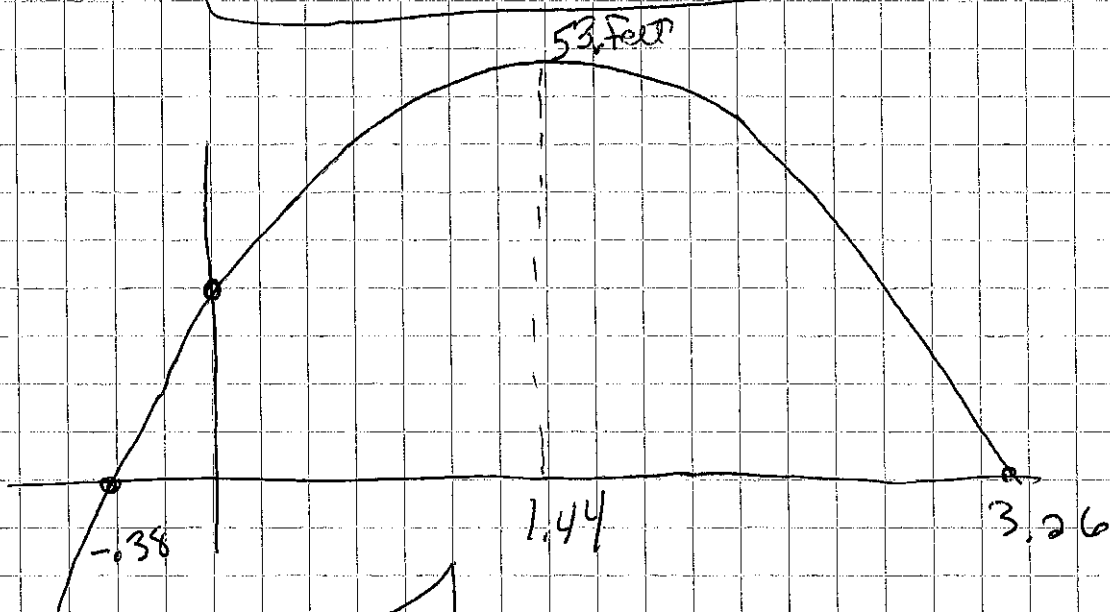
$$-16t^2 + 60t + 3$$

$$t = 3.8 \text{ sec} \quad -.05$$



Chapter 8 Assignment #10

4



$$y = -16t^2 + 60t \cdot \sin 50 + 20$$

Use QF

$$-0.358 \quad 3.26$$

$$y = 60t \cdot \sin 50$$

$$x = 60t \cdot \cos 50$$

$$-16t^2 + 60t \cdot \sin 50 + 20 = 5$$

$$-16t^2 + 60t \cdot \sin 50 + 15 = 0$$

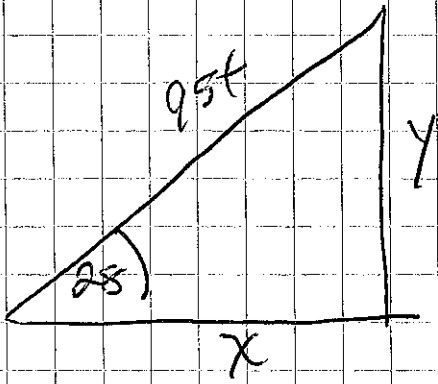
$$(3.17 \text{ sec})$$

$$x = 60(3.17) \cos 50$$

$$(122.26 \text{ feet})$$

Chapter 8 Assign #10

5

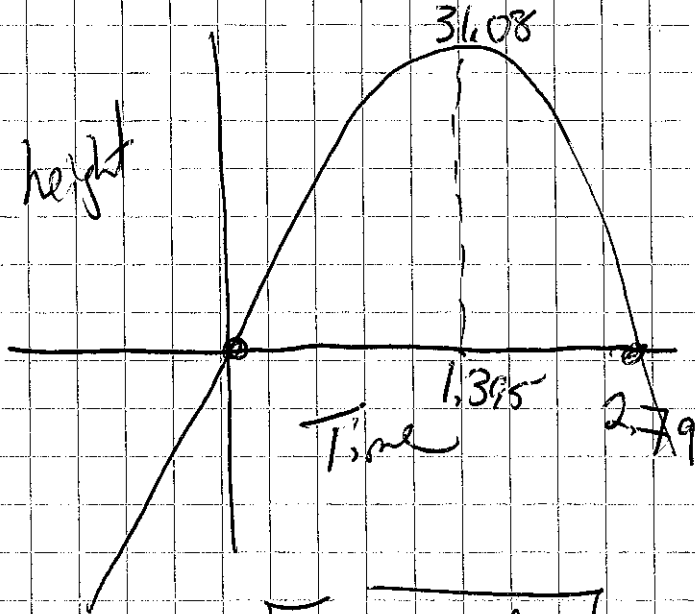


$$y = -16t^2 + 95t \sin 28 + 0$$

$$y = 95t \sin 28$$

0 and 2.79 sec

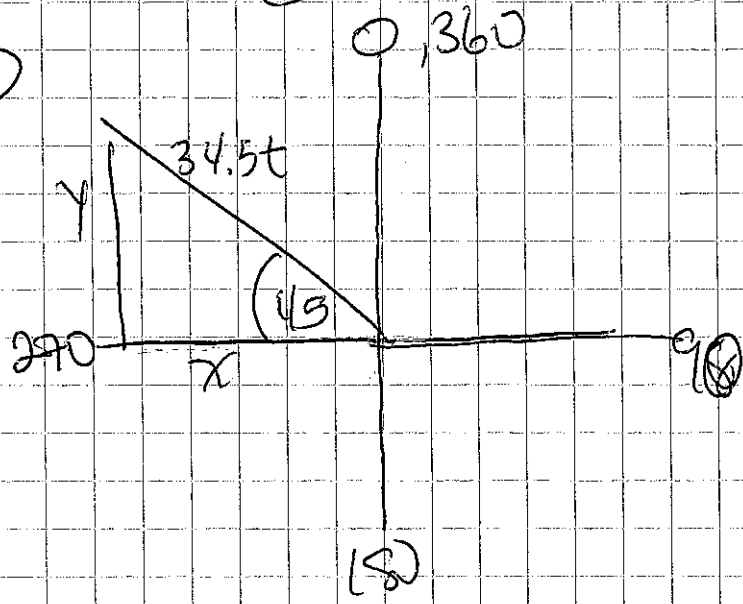
$$x = 95t \cos 28$$



$$x = 95(2.79) \cos 28 \quad \boxed{234 \text{ feet}}$$

Chapter 8 Assignment #10

6



$$30 \times 1.15078$$

$$34.5234$$

$$y = 34.5t \sin 45$$

$$x = 34.5t \cos 45$$

$$500 = 34.5t \cos 45$$

$$t = 20.5 \text{ hours}$$

d) $y = 34.5(20.5) \sin 45$

500 miles

e

