

## 8.2 (continued)

$$9/1/11 \quad x^2 + y^2 = 25$$

$$y = \frac{1}{2}x^2 - 5$$

$$2(y+5) = (\frac{1}{2}x^2)2$$

$$2y+10 = x^2$$

$$2y+10 + y^2 = 25$$

$$y^2 + 2y - 15 = 0$$

$$y^2 + 2y = 15$$

$$y^2 + 2y - 15 = 0$$

$$(y-3)(y+5)$$

$$y = 3 \quad y = -5$$

$$(4, 3)$$

$$(-4, -3)$$

$$x^2 + y^2 = 25$$

$$\rightarrow -9$$

$$x^2 = 16$$

$$x = 4$$

$$25 + y^2 = 25$$

$$\rightarrow -25$$

$$x^2 = 0$$

$$x = 0$$

$$(0, -5)$$

$$(4x^2 + 3y^2 = 48)2$$

$$(3x^2 + 2y^2 = 35)3$$

$$8x^2 + 6y^2 = 96$$

$$-9x^2 - 6y^2 = -105$$

$$-1x^2 = -9$$

$$x^2 = 9$$

$$x = \pm 3$$

$$x = 3$$

$$3(3)^2 + 2y^2 = 35$$

$$27 + 2y^2 = 35$$

$$\rightarrow -27$$

$$2y^2 = 8$$

$$\frac{2}{2} \quad \frac{8}{2}$$

$$y^2 = 4$$

$$y = \pm 2$$

$$\frac{35}{3}$$

$$10$$

$$+35$$

$$105$$

$$(3, 2) \quad (3, -2) \\ (-3, 2) \quad (-3, -2)$$

## 8.3 Modeling with Systems

A satellite is in a circular orbit around the earth. A space rock is drawn toward the earth by its gravitation. Given the equations of the satellite and rock, will they collide?

→ on back

$$x^2 + y^2 = 250000 \quad (\text{satellite})$$

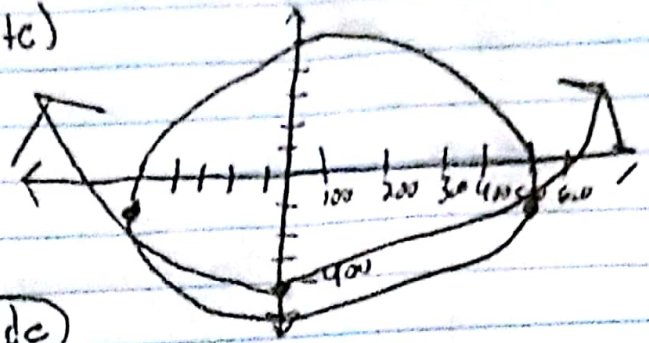
$$y = \frac{1}{1600} x^2 - 400 \quad (\text{rock})$$

$$x^2 + y^2 = 250000$$

center (0,0)

$$R^2 = 250,000 \quad R = 500$$

Yes they will collide



$$y = \frac{1}{1600} x^2 - 400 \quad \frac{500}{-25}$$

$$[y + 400 = \frac{1}{1600} x^2] \quad 1600y + 640,000 = x^2$$

$$1600y + 640,000 = x^2$$

$$x^2 + (-300)^2 = 250,000$$

$$x^2 + 90,000 = 250,000$$

$$\rightarrow -90,000$$

$$x^2 = 160,000$$

$$x = \pm 400$$

$$1600y + 640,000 + y^2 = 250,000$$

$$y^2 + 1600y + 390,000$$

$$(y + 1300)(y + 300)$$

$$y = -300$$

$$y = -1300$$

$$(400, -300)$$

$$(-400, -300)$$

An ~~plane~~ elevator begins to ascend at a rate of 15 ft/second.

At the same time a ball is thrown straight upward into the air next to the elevator. After how many seconds (100ths) will they be the same height? given  $h = 15t$   
 $h = -16t^2 + 40t$

$$-16t^2 + 25t = 0$$

$$\rightarrow 9$$

$$16t^2 - 25t = 0$$

$$+ (16t - 25) = 0$$

$$t = 0$$

$$t = 1.56 \text{ seconds}$$

$$16t - 25 = 0$$

$$16t = 25$$

$$t = 25$$

$$16 \quad 16$$

Suppose a paint that is 15% gloss is mixed with a paint of 30% gloss to make 5 gallons of a 21% gloss. How much of each mixture mix?



$$x = 15\% \quad y = 30\%$$

$$(x + y = 5) - .15$$

$$.15x + .30y = 1.05$$

$$-.15x - .15y = -.75$$

$$.15y = .3$$

$$y = \frac{.3}{.15}$$

$x = 3$  gallons @ 15%  
gloss

$y = 2$  gallons @ 30%  
gloss

An airplane travels 460 miles against the wind in 1 hour and 15 minutes. The same plane makes the trip with the wind in 1 hour. Find the speed of the plane and the wind.

Assume uniform motion

$$D = RT$$

$$\frac{460}{1.25} = \frac{750}{1}$$

Rate	Time	Distance
$p + w$	1	460
$p - w$	1.25	460

$$460 = (p + w)(1)$$

$$p + w = 460$$

$$p - w(1.25) = 460$$

$$1.25p - 1.25w = 460$$

$$p + w = 460$$

$$p - w = 368$$

$$2p = 828$$

$$p = 414 \text{ mph}$$

$$w = 46 \text{ mph}$$

A bank customer invests a total of \$661 into two saving accounts with simple interest. One account yields 9.5% simple interest and the other yields 8.0% simple interest. How much does she invest in each if the total annual interest is \$52?

Principal	Rate	Time	Interest
$x$	$.095$	$1$	$.095x$
$y$	$.08$	$1$	$.08y$

$$.095x + .08y = 52$$

$$x + y = 661$$

$$.095x + .08y = 552$$

$$-0.95x - 0.095y = -634.645$$

$$\cdot 95 \times t.c.p.y = 552$$

$$\text{m/s } y = -17.52$$

$$\dot{y} = 1.16d$$

$$\bar{X} = 5513$$

$V = \$1168$  @  $9.5\%$   
simple interest

$x = \$5513$  @ 890  
simple interest