

ALG IIB WORD PROBLEM PACKET NAME _____

- ☺ Solve each problem algebraically.
- ☺ Define the variable, write an equation, and solve.
- ☺ Label answers when possible. No guess and check.
- ☺ You will need this packet for the entire semester. Do not lose it!

WORK

⌘ You may use either formula:

$$\frac{\text{time together}}{\text{time alone}_1} + \frac{\text{time together}}{\text{time alone}_2} = 1 \quad \text{OR} \quad \frac{1}{\text{time alone}_1} + \frac{1}{\text{time alone}_2} = \frac{1}{\text{time together}}$$

(1) One computer can schedule classes at Saugus High in 15 hours, while another can do the job in 10 hours. If the computers work together, how long will it take to do the job?

(2) Laura can tile a floor in 14 hours. If Sue helps her they can tile the floor together in 9 hours. How long would it take Sue to do the job alone?

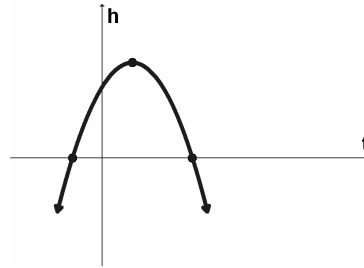
(3) Fred can paint a room in 21 hours. Ethel can paint the same size room in 28 hours. How long would it take them to paint the room if they work together?

(4) Mary can stamp envelopes for a campaign in 11 hours. If Tom helps her they can stamp the envelopes in 6 hours. How long would it take Tom to stamp the envelopes alone?

PROJECTILES

(ex) An object fired upwards from the top of a 96 foot building has an initial velocity of 80 feet per second. The height of the object t seconds after firing is given by $h(t) = -16t^2 + 80t + 96$ or $h = -16t^2 + 80t + 96$

The graph of this function is a parabola:



(a) Find the maximum height of the object and the time it takes to reach the maximum height:

The x-axis is t (time) and the y-axis is h (height) so the maximum height must be at the vertex: $\left(\frac{-b}{2a}, h\right) = \left(\frac{-80}{-32}, h\right) = (2.5, 196)$ so the time is 2.5 seconds and the height is 196 feet. ($h = -16(2.5)^2 + 80(2.5) + 96 = 196$)

(b) How long does it take the projectile to hit the ground?

If the projectile is on the ground, then $h = 0$

$$0 = -16t^2 + 80t + 96$$

$$0 = -16(t^2 - 5t - 6)$$

$$0 = -16(t + 1)(t - 6)$$

$t = -1, 6$ so since a negative time doesn't make sense, $t = 6$ seconds

(c) How high is the projectile after 3 seconds?

$$h = -16(3)^2 + 80(3) + 96 = 192 \text{ feet}$$

(5) An object fired upwards from the top of a 416 foot building has an initial velocity of 176 feet per second. The height of the object t seconds after firing is given by $h(t) = -16t^2 + 176t + 416$.

(a) Find the maximum height of the object and the time it takes to reach the maximum height.

(b) How long does it take for the projectile to hit the ground?

(c) Find the height of the projectile at 2 seconds.

(6) An object fired upwards from the top of a 640 foot building has an initial velocity of 96 feet per second. The height of the object t seconds after firing is given by $h(t) = -16t^2 + 96t + 640$.

(a) Find the maximum height of the object and the time it takes to reach the maximum height.

(b) How long does it take for the projectile to hit the ground?

(c) Find the height of the projectile at 7 seconds.

(7) An object fired upwards from the top of a 480 foot building has an initial velocity of 208 feet per second. The height of the object t seconds after firing is given by $h(t) = -16t^2 + 208t + 480$.

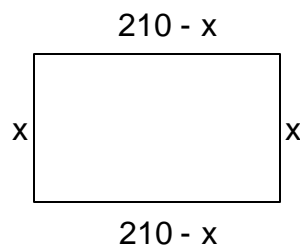
(a) Find the maximum height of the object and the time it takes to reach the maximum height.

(b) How long does it take for the projectile to hit the ground?

(c) Find the height of the projectile at 10 seconds

MAXIMUM AREA

(ex) Curly wants to enclose a rectangular garden using 420 feet of fencing. What is the length and width for the maximum area and what is the maximum area? (let the width be x and figure out the length)



$$\text{Length} = \frac{420 - 2x}{2} = 210 - x$$

$$A = x(210 - x)$$

$$A = 210x - x^2$$

$$A = -x^2 + 210x \quad (\text{an equation for a parabola})$$

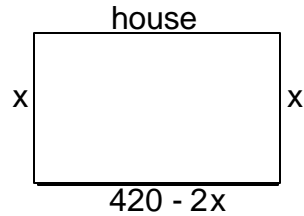
$$\text{maximum area is at the vertex: } \left(\frac{-210}{-2}, A \right) = (105, A)$$

$$\text{Width} = x = 105 \text{ ft.}$$

$$\text{Length} = 210 - x = 210 - 105 = 105 \text{ ft.}$$

$$\text{Area} = LW = (105)(105) = 11,025 \text{ sq. ft. or } -(105)^2 + 210(105) = 11,025$$

(ex) Moe wants to enclose a rectangular garden using 420 feet of fencing, but will use the house as one of the sides. What is the length and width for the maximum area and what is the maximum area? (let the width be x and figure out the length)



$$\text{Length} = 420 - 2x$$

$$A = x(420 - 2x)$$

$$A = 420x - 2x^2$$

$$A = -2x^2 + 420x \text{ (an equation for a parabola)}$$

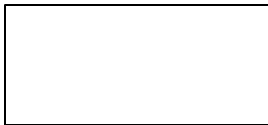
$$\text{maximum area is at the vertex: } \left(\frac{-420}{-4}, A \right) = (105, A)$$

$$\text{Width} = x = 105 \text{ ft.}$$

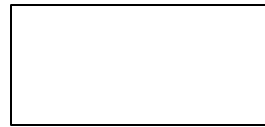
$$\text{Length} = 420 - 2x = 420 - 210 = 210 \text{ ft.}$$

$$\text{Area} = LW = (210)(105) = 22,050 \text{ sq. ft. or } -2(105)^2 + 420(105) = 22,050$$

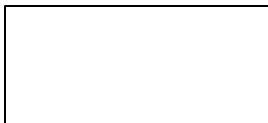
(8) Lucy wants to enclose a rectangular garden using 280 feet of fencing. What is the length and width for the maximum area and what is the maximum area?



(9) Desi wants to enclose a rectangular garden using 280 feet of fencing, but will use the house as one of the sides. What is the length and width for the maximum area and what is the maximum area?



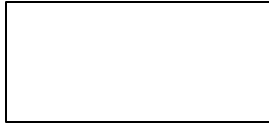
(10) Burt has 1200 feet of fencing to build a rectangular pen. What is the length and width for the maximum area and what is the maximum area?



(11) Ernie plans to build a rectangular dog run using 1200 feet of fencing with the house being used as one side of the dog run. What is the length and width for the maximum area and what is the maximum area?



(12) Larry wants to enclose a rectangular garden using 42 feet of fencing. He wants to maximize the area. What is the length and width he needs to accomplish this and what is the maximum area?



(13) Moe wants to enclose a rectangular garden using 42 feet of fencing, but will use the house as one of the sides. He wants to maximize the area. What is the length and width he needs to accomplish this and what is the maximum area?



MONEY: COINS & TICKETS

⌘ You may want to use 2 variables, write 2 equations, and use substitution or elimination to solve.

(14) Bernice has ten more dimes than quarters. All together these coins are worth \$4.15. How many of each kind of coin does Bernice have?

(15) At a spring concert, tickets for adults cost \$4.00 each and tickets for students cost \$2.50 each. How many of each kind of ticket were purchased if 125 tickets were bought for \$413?

(16) Elvira has 30 coins in nickels and dimes. In all she has \$2.10. How many nickels and how many dimes does she have?

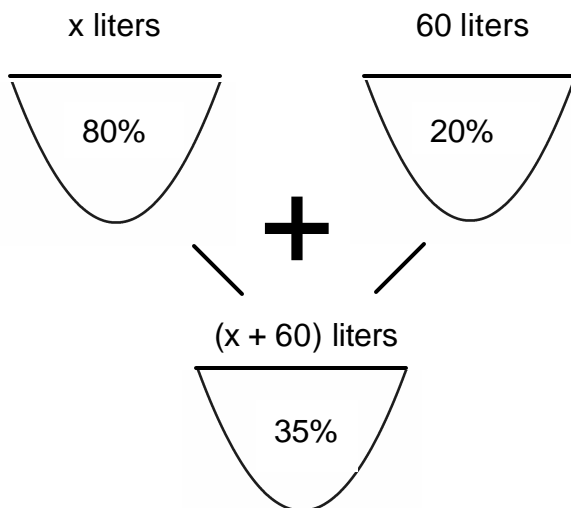
(17) Saugus High ASB sold car and truck wash tickets and took in a total of \$236.25. They charged \$3.50 for a car and \$4.25 for a truck. If they sold twice as many car tickets as truck tickets, how many of each did they sell?

(18) A parking meter only takes dimes and quarters. At the end of the day the meter held \$11.90 and the number of quarters was 3 times the number of dimes. What was the number of dimes and quarters?

(19) The Lincoln High School Drama Club sold 204 tickets to their play. A student ticket cost \$4.50 and an adult ticket cost \$6.00. If they sold \$1038 in tickets, how many of each did they sell?

MIXTURE: MONEY & PERCENT

(ex) How many liters of 80% Hawaiian Punch mixture should be added to 60 liters of 20% Hawaiian Punch mixture to end up with a 35% Hawaiian Punch mixture?



$$.8x + .2(60) = .35(x + 60)$$

$$.8x + 12 = .35x + 21$$

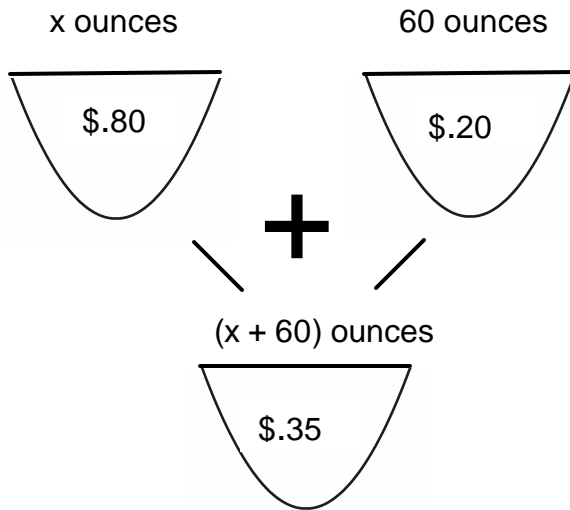
$$.45x + 12 = 21$$

$$.45x = 9$$

$$x = 20$$

$$\text{check: } .8(20) + .2(60) = .35(20 + 60) \\ 16 + 12 = 28$$

(ex) How many ounces of red beads that sell for \$.80 an ounce should be added to 60 ounces of green beads that sell for \$.20 an ounce to end up with a mix that sells for \$.35 an ounce?



Same problem!!!

(20) How many cups of ice cream that has 70% vanilla ice cream must be added to 40 cups of ice cream that has 20% vanilla ice cream to obtain ice cream with 30% vanilla ice cream?

(21) Doggy Chow dog food that sells for \$0.70 per pound is to be added to 9 pounds of Yum Yum dog food that sells for \$0.50 per pound. The mixture will sell for \$0.58 per pound. How many pounds of Doggy Chow should be added?

(22) An ad for a pineapple drink claims that the drink contains 15% pineapple juice. How much pure pineapple juice would have to be added to 8 quarts of the pineapple drink to obtain a mixture containing 50% pineapple juice. (you'll need to know how much pineapple juice is in pure pineapple juice - duh)

(23) 20 pounds of brand A bulk tea that sells for \$2.80 per pound and some brand B tea that sells for \$6 per pound are to be mixed to make a brand C that sells for \$4 per pound. How many pounds of brand B should be used?

(24) How many liters of a 72% acid solution must be added to 15 liters of an 18% acid solution to get a 45% acid solution?

(25) George likes bon bons that sell for \$3.40 a pound. Joan likes gum drops that sell for \$1.50 a pound. They mixed 6 pounds of gum drops with some bon bons and the store charged them \$2.26 a pound. How many pounds of bon bons did they buy?

MOTION

(ex) A bus leaves a bus station at 11:00 A.M. and travels at 40 kilometers per hour. A car leaves the same bus station at 4:00 P.M. and travels at 65 kilometers per hour. If the car goes in the same direction as the bus:

- (a) What time is it when the car catches up to the bus?
- (b) How many hours did the bus travel?
- (c) How many hours did the car travel?
- (d) How far did each travel?

	k/h	h	=	k
	r	• t		d
bus	40	t + 5		40(t + 5)
car	65	t		65t

$$40(t + 5) = 65t$$

$$40t + 200 = 65t$$

$$200 = 25t$$

$$t = 8$$

- (a) time is 11:00 A.M. + 8 = 7:00 P.M.
- (b) bus traveled $t + 5 = 8 + 5 = 13$ hours
- (c) car traveled $t = 8$ hours
- (d) distance = $40(t + 5) = 40(8 + 5) = 520$ kilometers
or $65t = 65(8) = 520$ kilometers

(26) A freight train takes 16 hours to travel the same distance that an express train travels in 12 hours. The rate of the express train is 15 miles per hour more than that of the freight train. Find the rate at which each travels. Find the distance each travels.

	r	• t	=	d

(27) Richard left the house driving east at 40mph. At the same time his brother, Tom, left the same house driving west at 50 mph. After how many hours were they 315 miles apart? What distance did each travel?

	r	• t	=	d

(28) A train traveling at 80 miles per hour left Newhall at 8:00 A.M. A faster train, traveling at 120 miles per hour, left the same place at 9:00 A.M. How long did it take the faster train to catch up with the 1st train? How far did each train travel?

	r	•	t	=	d

(29) Two planes start toward each other at the same time from airports located 1,120 miles apart. One plane flies at an average rate of 250 miles per hour. At what average rate must the second plane fly if they pass each other 2 hours later? What distance does each travel?

	r	•	t	=	d

(30) Barbie left the house at 7:00 A.M. to go to the airport and drove at an average speed of 40 miles per hour. Ken discovered she forgot her ticket so he left the house at 7:30 A.M. and drove at an average speed of 60 miles per hour. They both arrived at the airport at the same time. How long did each drive and how far did they drive?

	r	•	t	=	d

(31) Phil and Inez start from the same place at the same time and walk in opposite directions. Inez walks twice as fast as Phil. After ½ hour they are 24 blocks apart. How far has each walked? What was the rate of each?

	r	•	t	=	d

(32) You are 36 miles from a friend. You both start riding your bikes toward each other at the same time. You travel 15 miles per hour and your friend travels 3 miles per hour slower. How far will each of you travel before you meet? How much time did it take for you to meet?

$$r \cdot t = d$$

(33) A ship travels from a city in New York at 33 miles per hour. A plane traveling 605 miles per hour leaves the same city 104 hours after the ship to make the same trip and arrives at the same time as the ship. What distance did each travel? How many hours did each travel?

$$r \cdot t = d$$
