

Bellwork: ACT Prep

Given that x is an integer, for what value of x is

$$x + \frac{4}{5}x > 16 \text{ and } x + 4 < 16?$$

$$1.8x > 16 \quad -4 \quad -4$$

$$A. \quad x < 12$$

$$B. \quad x > 8.8$$

C. 10

D. 12

E. 13

The 12:00 p.m. eastbound train left the station at a constant speed of 40 miles per hour. At 12:45 p.m., the next eastbound train left the station at a constant speed of 60 miles per hour. Assuming neither train stops along the way, how far apart will the two trains be at 2:00 p.m.?

(A) 5 miles

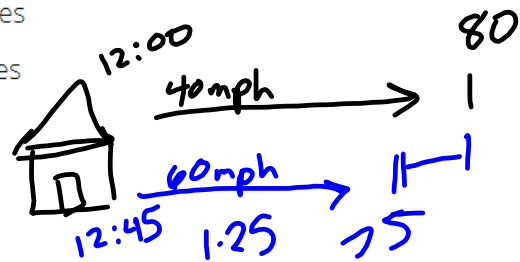
(B) 10 miles

(C) 12 miles

(D) 15 miles

(E) 18 miles

$$r \cdot t = d$$



$$O = y + 3 \quad y = M - 1$$

$$M = y + 1$$

$$OMy = 987 + 3(O + M + y)$$

$$(y+3)(y+1)y = 987 + 3(y+3+y+1+y)$$

$$(y+3)(y+1)(y) = 987 + 3(3y+4)$$

$$987 + 9y + 12$$

$$(y+3)(y+1)y = 9y + 999$$

$$-9y - 999 - 9y \quad -999$$

$$(y+3)(y+1)y - 9y - 999 = 0$$

$$\begin{aligned} y &= 9 \\ M &= 10 \\ O &= 12 \end{aligned}$$

Homework 4.4 Solutions

1. 3 in
2. height is 18 in and base is 36 in
3. youngest is 9, middle is 10, and oldest is 12 years old
4. height is 8 in, length is 20 in, and width is 14 in
5. Together it would take 2.4 days
6. Jeff runs 5 mph and Suzie runs 7.5 mph

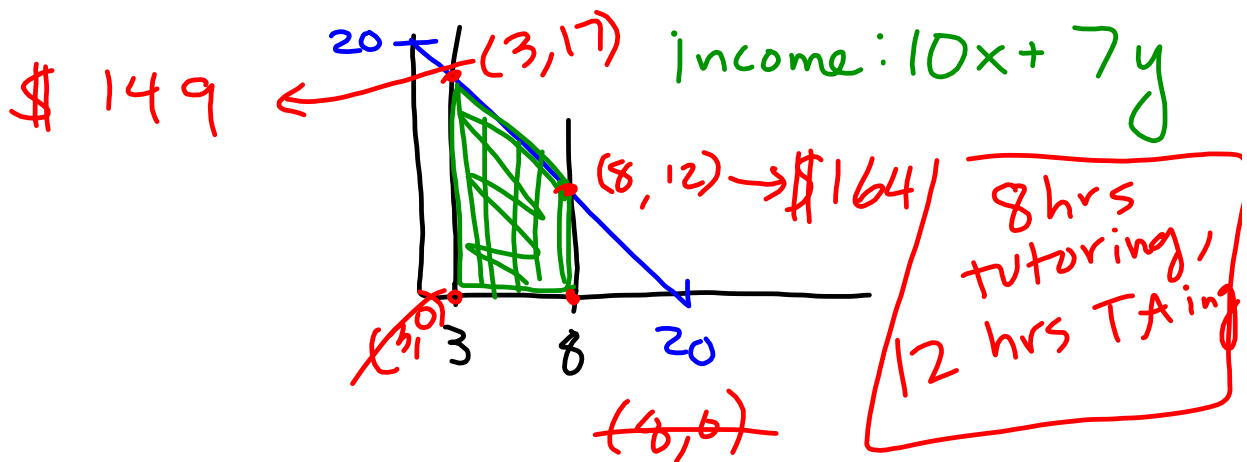
Homework 6.2 Solutions

1. $(-1, 3) \cup (3, \infty)$
2. $(-\infty, -3) \cup [0, \infty)$
3. $(-2, 1) \cup (2, \infty)$
4. $(-4, 1/2)$
5. $[4/3, \infty)$
6. $(-\infty, -4] \cup [1, \infty)$
7. $(0, 7] \cup [23, 30)$ one side is between 0 and 7, and the other between 23 and 30
8. $[500, \infty)$ at least 500 calculators

Bellwork:

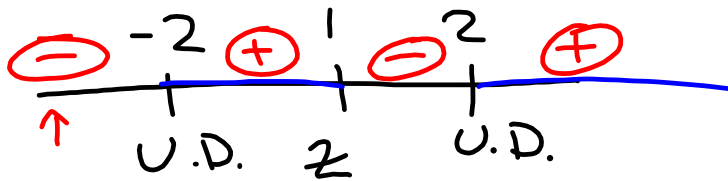
Read "Strategies for taking the ACT Mathematics Test" and write a paragraph on which strategies you think will be most beneficial to you.

4) Tutoring: $3 \leq x \leq 8$ tutoring: x
 time: $x + y \leq 20 \rightarrow y \leq -x + 20$ TAing: y



$$3) \frac{x-1}{x^2-4} > 0$$

$$\frac{x-1}{(x+2)(x-2)} > 0$$



$$|(-2, 1) \cup (2, \infty)$$

$$\frac{-6}{21} \frac{-5-1}{(-8)^2-4}$$

Lesson 6.3 Objectives

I can create equations in two or more variables

I can graph equations on coordinate axes with labels and scales

I can represent constraints by systems of equations and inequalities, and interpret solutions as viable or non-viable

Example 1

All-a-Shirt budgets \$6000 to restock 200 shirts. T-shirts sell for \$12, polo for \$24, and rugby for \$36. You need to buy twice as many rugby shirts as polo shirts. If you buy all three types of shirts, how many of each type should you buy?

cost: $12t + 24p + 36r = 6000$
(2p)

number: $t + p + r = 200$
(2p)

$r = 2p$

$12t + 24p + 72p = 6000$

$12t + 96p = 6000$

$t + 3p = 200$

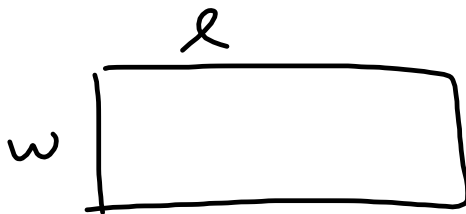
$t = 200 - 3p$

$12(200 - 3p) + 96p = 6000$

$2400 - 36p + 96p = 6000 - 2400$
~~-2400~~

$\frac{60p}{60} = \frac{3600}{60}$

$p = 60$
 $r = 120$
 $t = 20$



Perimeter: $2l + 2w = 60$

~~-2l~~ ~~-2l~~

$\frac{2w}{2} = \frac{60 - 2l}{2}$

$w = 30 - l$

Area: $l \cdot w \leq 161$

$l(30 - l) \leq 161$

$30l - l^2 \leq 161 + l^2$

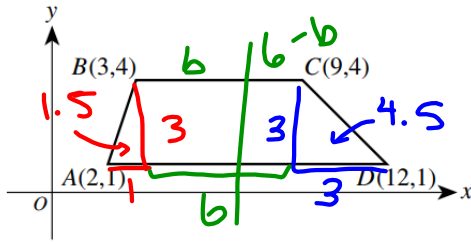
~~-30l~~ ~~+l^2~~ ~~-30l~~

$0 \leq w^2 - 30l + 161$

~~161~~
~~-30~~

Bellwork: ACT Prep

Trapezoid $ABCD$ is graphed in the standard (x,y) coordinate plane below.



1. $\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

What is the slope of \overline{CD} ?

A. -3

B. -1

C. 1

D. $\frac{5}{21}$

E. $\frac{3}{2}$

$\frac{-3}{3}$

2. When $ABCD$ is reflected over the y -axis to $A'B'C'D'$, what are the coordinates of D' ?

- F. $(-12, 1)$
- G. $(-12, -1)$
- H. $(12, -1)$
- J. $(1, 12)$
- K. $(1, -12)$

3. Which of the following vertical lines cuts $ABCD$ into 2 trapezoids with equal areas?

- A. ~~$x = 2.5$~~
- B. ~~$x = 3.5$~~
- C. ~~$x = 4.5$~~
- D. ~~$x = 5.5$~~
- E. $x = 6.5$

$1.5 + 3b = 4.5 + 3(6-b)$

$1.5 + 3b = 4.5 + 18 - 3b$

$-1.5 + 3b \quad -1.5 + 3b$

$6b = 21$

$\frac{6b}{6} = \frac{21}{6} \quad b = 3.5$

1) cutting: $4x + 3y \leq 60$

$y \leq \frac{60 - 4x}{3}$

finishing: $3x + 2y \leq 42$

$y \leq \frac{42 - 3x}{2}$

profit: $10x + 7y = ?$

backpack: x messenger: y $(6, 12)$

6 backpacks \$
12 messenger bags

$140 = (0, 20)$

$140 = (14, 0)$

When solving contextual type problems it is important to:

- Identify what you know
- Determine what you are trying to find.
- Draw a picture **or graph** and label it if possible
- Use familiar formulas
- Check answer to see if it is reasonable
- Answer the entire question
- Use appropriate units.

Example 3:

x : deluxe y : plain

The Sweet Tooth Candy Shoppe is purchasing a candy mix with two types of chocolate: dark chocolate and white chocolate. They need at least 180 pounds of dark chocolate and 90 pounds of white. Their supplier has two mixes for them to buy. The deluxe mix costs \$10.00 a bag and has 4 pounds of dark and 1 pound of white. The plain mix costs \$5.00 a pound of each. The Sweet Tooth Candy Shoppe can pay at most \$800 for the chocolate. How many bags of each can be purchased? Use a graph to help you decide.

dark: $4x + y \geq 180$

white: $x + y \geq 90$

money: $10x + 5y \leq 800$

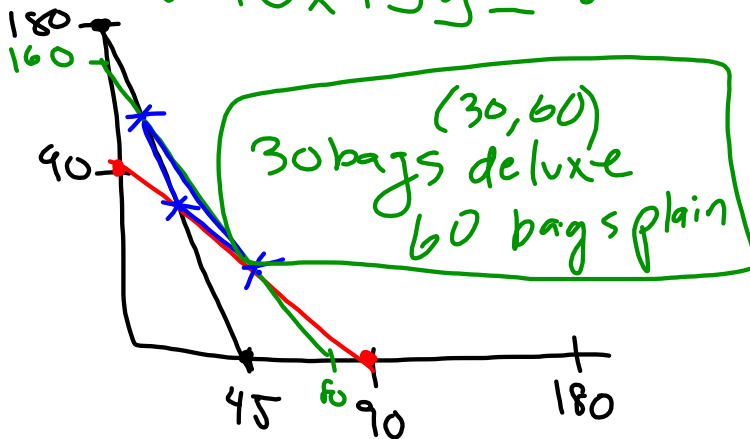
$y \geq -4x + 180$

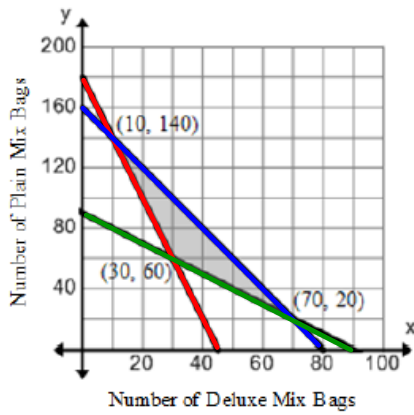
$y \geq 90 - x$

~~$y \leq \frac{800 - 10x}{5}$~~

$y \leq 160 - 2x$

$y = mx + b$





$$4x + y \geq 180$$

$$x + y \geq 90$$

$$10x + 5y \leq 800$$

$$x \geq 0$$

$$y \geq 0$$

Example 4:

x : project y : packet

For his math grade, Carter can do extra homework packets for 70 points each or math projects for 80 points each. He estimates that each homework packet will take 9 hours and each project will take 15 hours and that he will have at most 120 hours to spend. He may turn in a total of no more than 12 packets or projects. How many of each should he complete in order to receive the highest score?

time: $15x + 9y \leq 120$

assignments: $x + y \leq 12$

points: $80x + 70y$

$$y \leq \frac{(120 - 15x)}{9}$$

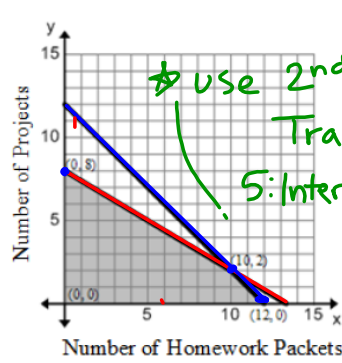
$$y \leq 12 - x$$

(x, y)
 $(2, 10) = 860$

$(0, 12) = 840$

$(8, 0) = 640$

2 projects 10 packets



$M = y \quad H = x$

$x + y \leq 12 \quad x \geq 0$

$9x + 15y \leq 120 \quad y \geq 0$

$70x + 80y = \text{maximum}$

$y \leq 12 - x \quad y \leq \frac{120 - 9x}{15}$

3 points of interest

$(0, 8) \quad (10, 2) \quad (12, 0)$

Plug into points equation & see which gives him the most points.

Points = $70(0) + 80(8) = 640$ points

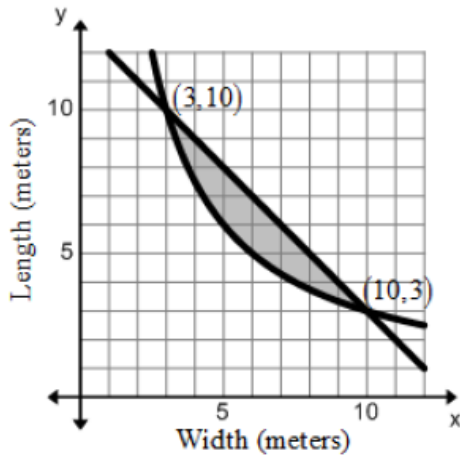
= $70(10) + 80(2) = 860$ points

= $70(12) + 80(0) = 840$ points

So 10 homework packets and 2 math projects.

Example 5:

The perimeter of a rectangle is at most 26 meters. Its area is at least 30 square meters. What are the possible dimensions of the rectangle?



x: backpack y: messenger

i) cutting: $4x + 3y \leq 60$

finishing: $3x + 2y \leq 42$

profit: $10x + 7y$

$$y \leq \frac{60 - 4x}{3}$$

$$y \leq \frac{42 - 3x}{2}$$