Unit 2 Graphing System of linear equation word problems

Objective: Students will be able to:

*Write & graph a linear system from a real world problem.

*Analyze the graph to find an appropriate solution to the system.

The following chart gives a summary of the possibilities for the graph of two linear equations in two variables.

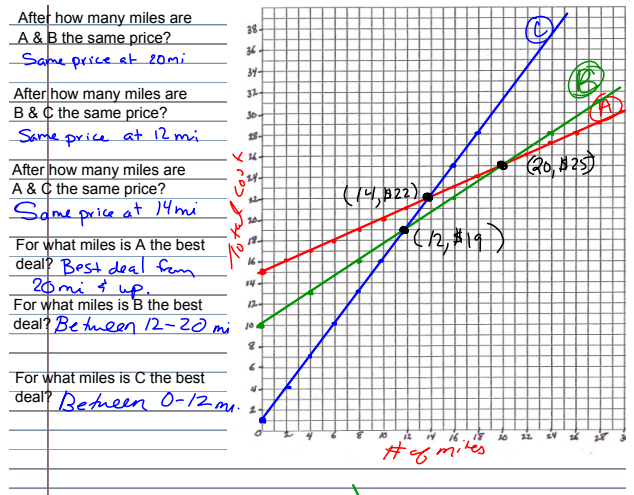| Type of System	Example	Nature of Solutions	Graphic
Dependent, Consistent	Same slope & y-intercept $x + y = 2 \Rightarrow$ $y = -x + 2$ $3x + 3y = 6 \Rightarrow$ $y = -x + 2$	Infinite number of solutions – they are the same line!	One line "on top of" another
Independent, Consistent	Different Slope $x + 2y = 5 \Rightarrow$ $y = -\frac{1}{2}x + \frac{5}{2}$ $-2x + y = 15 \Rightarrow$ $y = 2x + 15$	One Unique solution – the lines intersect at one point	Intersection
Independent, Inconsistent	Same slope but different y-intercept $2x + 5y = 25 \Rightarrow$ $y = -\frac{2}{5}x + 5$ $6x + 15y = 30 \Rightarrow$ $y = -\frac{2}{5}x + 2$	No solutions – the lines are parallel	

① Example

Compare three towing companies by writing an equation and graphing the charge of the two based on the number of miles that need to be taken. ~~three~~
Write their equations and graph then to compare companies.

⊙ Auto Shop Towing: $m = \#$ of miles

$15 to come pick you up, $0.50 a mile for the tow. m

Benny's Wrecker service:

$10 to come pick you up, $0.75 a mile for the tow. m

Cary Automotive:

6 miles cost $10, 12 miles cost $19 (Find the slope and y-intercept, change to slope intercept form) (6, 10)

Auto Shop
$y = .50m + 15$
(A) $y = \frac{1}{2}m + 15$

Benny's wreckers (12, 19)
$y = .075m + 10$
(B) $y = \frac{3}{4}m + 10$

Cary Automotive (12, 19)
$m = \frac{19 - 10}{12 - 6} = \frac{9}{6} = \boxed{\frac{3}{2}}$
$y = \frac{3}{2}x + b$
$10 = \frac{3}{2}(6) + b$
$10 = \frac{18}{2} + b$
$10 = 9 + b$
$\frac{-9 \quad -9}{1 = b}$
(C) $y = \frac{3}{2}m + 1$

After how many miles are A & B the same price?
Same price at 20mi

After how many miles are B & C the same price?
Same price at 12 mi

After how many miles are A & C the same price?
Same price at 14mi

For what miles is A the best deal? Best deal from 20mi & up.

For what miles is B the best deal? Between 12–20 mi

For what miles is C the best deal? Between 0–12 mi.

(4, $22) (20, $25) (12, $19)

Total cost
# of miles

② Example

The Yellow Cab Company charges just $0.25 a mile, but it cost $5 to get into he cab. Express Cab charges no fee to get in the cab, but $1.50 a mile for the ride. Write the system of equations and graph the system.

$\frac{150}{100}$ $\frac{15}{10}$

Yellow Cab Company: **Express Cab:**
$y = .25m + 5$ $y = 1.50m + 0$
$y = \frac{1}{4}m + 5$ $y = \frac{3}{2}m + 0$

a) If you are going 7 miles which cab company should you call?

b) If you are going 3 miles, which company should you call?

c) For what length of a drive is the cost equal?

Yellow
$y = \frac{1}{4}m + 5$

Express Cab
$y = \frac{3}{2}m + 0$

Express cab
Yellow cab
(4, $6)
Total cost
# of miles