#of Solutions and Distance Problems

A system of equations can have:

0 solutions if the lines are parallel (x and y are the same multiple)

∞ solutions if the lines are the same (all parts are the same multiple)

1 solutions if the slopes are different (x and y are different multiples)

1) Without solving, how many solutions will the following systems have:

a) $8x + 9y = 20$
$16x + 18y = 40$

x2 x2 x2
all the same multiple
∞ solutions

b) $8x + y = 10$
$16x + 2y = 5$

x2 x2 ÷2
x, y multiples
0 solutions

c) $y = 9x - 19$
$y = 9x + 3$

same slope of 9
parallel
0 solutions

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d) $15x – 2y = 30$
$7x + 8y = 11$

x7/15 x 4
different multiples
1 solution

e) $4x - 3y = 20$
$12x + 9y = 60$

looks like all x 3
but y's x-3
1 solution

f) $y = 2x + 30$
$4x - 2y = 7$

rearrange $4x – 7 = 2y$
$2x – 3.5 = y$
same slope of 2
0 solutions

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2) Given the equation $6x – 3y = 5$ ***write a second equation so that the system has***

a) 0 solutions

just x, y multiples of … 9
$54x – 27y = 3.14$

b) ∞ solutions

all multiples of … 5
$30x – 15y = 25$

c) 1 solution

anything 1 multiple
$36x – 11y = 962$

<u>Distance problems</u>

A common formula is $D = Rt$

D = distance R = rate T = time

This is for the famous train problem

1) A train leaves Chicago at noon traveling 60km/h. At 2 pm, a second train leaves Chicago traveling 82 km/h on parallel tracks. How long will it take the 2nd train to catch the first?

Train 1 *train 2*

D = 60t *D = 82(t – 2)* *since 2 hours less*

Since train 2 catches train 1 D = D *60t = 82t – 164* *-22t = -164* *t = 7.45 hours*
(distance = 447 km)

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2) Two towns (Rockstar and Wreckingball) are 800 km apart. Car A leaves town Rockstar traveling 90 km/h. Car B leaves Wreckingball traveling 65 km/h, 2 hours later. When and where will the two cars meet?

Car 1: *$D_1 = 90t$* *Car 2:* *$D_2 = 65(t – 2)$* *since leaves 2 hours later*

But Car 1 + Car 2 = 800 km travelled so…

90t + 65(t – 2) = 800 *(that's 1 variable so just solve)*
90t + 65t – 130 = 800 *155t = 930* *t = 6 hours*
Car A is 540 km from Rockstar
Car B is 260 km from Wreckingball

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3) Kelsey drove 404 km from Edmonton to Banff in the same length of time that Spencer took to drive 364 km from Edmonton to Jasper. Spencer drove 15 km/h slower than Kelsey. What speed did they drive at?

Kelsey *Spencer*

404 = Rt *364 = (R-15)t*

$\frac{404}{R} = t$ $\frac{364}{R-15} = t$ *since we know t is same for both make =*

$\frac{364}{R-15} = \frac{404}{R}$ → *364R = 404R – 6060* *-40R = -6060* *R = 151.5 km/h Kelsey*
R = 136.5 km/h Spencer

They both deserve speeding tickets ….

Assignment: Worksheet

Distance Problems and # of solutions worksheet

1) Without solving, state the number of solutions to the following systems

a) $2x + y = 8$, $4x + 2y = 16$

b) $3x + y = 9$, $6x + 2y = 12$

c) $x + y = 8$, $-5x + y = 1$

d) $4x - y = 8$, $-2x + y = -3$

e) $-4x + 2y = -10$, $2x - y = 3$

f) $2x + y = -1$, $6x + 3y = -3$

g) $y = -6x + 7$, $y = 5x - 6$

h) $2x + y = 5$, $4x + y = 9$

i) $3x - y = 0$, $6x - 2y = 0$

j) $x + y = 2$, $3x = 6 - 3y$

k) $x + 4y = 8$, $y = -2x$

l) $2y = 3x - 1$, $8y - 4 = 12x$

2) For what value of 'C' will the following have ∞ solutions

a) $2x - 6y = C$, $6x - 18y = 30$

b) $Cx - 4y = 14$, $9x - 6y = 21$

c) $x + 2y = 6$, $Cx + 10y = 30$

3) A car leaves Revelstoke traveling at 75 km/h at 3pm. At 5pm a second car leaves Revelstoke traveling at 95km/h. How long will it take the 2nd car to catch the first?

4) A car leaves Banff traveling at 92 km/h at noon. At 1.5 pm a second car leaves Banff traveling at 102km/h. How long will it take the 2nd car to catch the first?

5) ***Two towns are 460 km apart. Melanie leaves town A traveling 80 km/h. Annick leaves town B traveling 75 km/h, but leaves 2 hours later. When and where will the two cars meet?***

6) ***Two cities are 190 km apart, one car leaves town A at 60 km/h, the other leaves town B going 72 km/h. If they are meeting for a picnic, how far from town A will the picnic take place?***

7) ***Jasdeep flew 604 km in the same length of time that Razvessh took to fly 580 km. If Jasdeep flew 20 km/h faster than Razvessh, what speed did each of them fly at?***

8) ***The speed of a plane is seven times as great as the speed of the car. The car takes 3 hours longer than a plane to travel 315 km. Find the speed of the plane and car.***

Now try Text Page 448

#10 _____ #11 _____ #22

ai) 1, 0, ∞ aii) 1, 0, ∞ aiii) 1, 0, ∞

#19a) b) #20a) b)