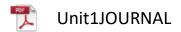
### Unit1JOURNAL

August 23, 2016 11:55 AM



J See below

1   Unit 1 10D Date:	Name:	
	straight lines	

# UNIT 1 - Linear Systems JOURNAL more than one



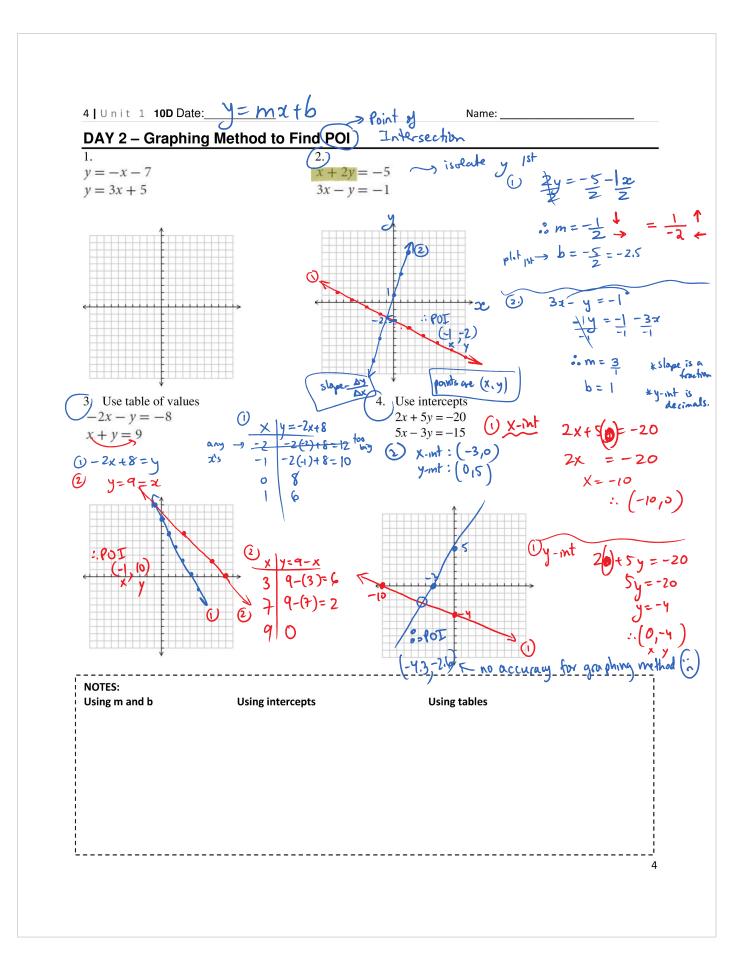
**Big idea/Learning Goals**In this unit you will learn how to solve two equations with two unknowns. The unit is called linear systems since there will be more than one line involved. There are three methods you'll be shown in class: graphing method, elimination method, and substitution method.

			I	FRI.Od.7th
		Finished the journal?	How many questions did you finish from HW?	Tentative TEST date:
Date	Topics	7		Questions to ask the teacher:
	Modelling DAY 1 HW text pg17 #1,2,3,6		/13	
	Graphing method DAY 2 HW text pg17 #8cd,9cd,12,13,16,17		/17	
2days	Substitution Method DAY 3 HW text pg26 #4,7,9,10		/11	
	DAY 4 HW text pg26 5,8,11,12,16		/15	
2days	Elimination Method DAY 5 HW text pg40 #7,15,16,17		/11	
	DAY 6 HW text pg40 #8,9,12,14,18		/11	
	Analyze Solutions DAY 7 HW text pg32 #1,2,3,4,5,6		/8	
2days	Problem Solving DAY 8 HW text pg46 #1,2,3,4,9,10,11		/9	
	DAY 9 HW text pg46 #7,8,12,14,15,16,17		/7	

Reflect – previous TEST mark	_, Overall mark now
Looking back, what can you improve upon?	

2   U n it 1 10D Date:		Name:	
DAY 1 – Modelling Word Problems	s into Math Sym	nbols	
Mathematics is a language like any other. Below is	a statement in Russia	ın that we will translate w	ord by word to English.
Pronunciation: preevet! Kak DENA  Translation: Hil How are ye	( Х ОРО ШО.		
Pronunciation: preevet! kak dela	? Harasho		
Translation: Hil How are you	ou? Good.		
Same idea is applied when translating English to M	lath. But first we'll nee	d a Dictionary:	ı
add subtract	x	÷	=
more than less than	times	divide	is equals same a
increase difference	multiply	quotient	eguals
blus minus	product	ratio	same a
possitive decrease	(of )	Loutren	
sum decrease regative	` /	14 person	
total			
	<del> </del>		
1. Translate each phrase into an algebraic exp  (a) five less than one third a value	ression. 2. Transl equation	ate each sentence into a	an algebraic
$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	(a) Thre	ee times a value, decrea	sed by four,
<b>b</b> ) a number increased by four, times anoth	er is tw	70	_
number		32-4	- 2
<b>c</b> ) a value decreased by the fraction one	<b>b</b> ) One	third a number, increas	sed by two,
quarter	is or		,
al) three times a longth			
<b>d</b> ) three times a length	c) One	number subtracted from	n five is
(e) fifteen percent of an area	,	more than a second nur	
f) increase by eleven percent in mass			
1) increase by eleven percent in mass	d) The	price of a meal, includi	ng fourteen percent
X + 11% x [12+0.1]		is ninety-five dollars ar	
(1.11x			
NOTES: When you see commas: insect brackets	When you see "i	s" or "are":	_
(sometimes)	TTHEM YES SEE	o or are.	-
When you see the words "less than" or "subtracted	from": watch	the order?	
,,			
When you see a phrase;)	and when you see a s	entence)	:
will be an expression	^	will be come	equations
**************************************		*	V

3   U n i t 1 10D Date:	Name:
3. Translate into TWO algebraic equation, do let statements for what variables represent.  (a) At a school concert, 355 tickets were sold. There were 51 more student tickets sold than adult tickets.  Let A be # of adults  Let X be # of students  5 + A = X	<ul><li>4. Translate each sentence into an algebraic equation. Record let statements.</li><li>a) Buy the phone for \$400 and pay \$45 per month</li></ul>
51 + A = x $X + A = 355$	<b>b)</b> Webz charges a flat monthly fee of \$5 plus \$1 per hour
The length of the rectangle is 23 cm longer than twice the width.  Let L be length  let W be width	c) Brian's car costs him \$4000 plus \$0.20 per km every year.
The sum of two times the smaller of two consecutive numbers and three times the larger number is 113.  Let x be the 1st the 1st the 1st the 2xt y be	5. Translate into TWO algebraic equations. Record let statements.  29.95    Smaller table  a) Smaller tables cost \$29.95 each and bigger tables cost \$39.95 each. The total price is 39.95   1; 99    1;
J+7=E J+E=183	b) Charlene is looking into cell phone plans. Cell
NOTES: y=mxtb  Rate of change number is slope. Look for  words: "per" "each" "every"  Initial value number is y-int.  Look for the beginning amount.  Deciding on the variables  Look at units (words) around the  slope #.	Plus gives unlimited minutes for \$50 in a month. Al Cell offers a \$10 monthly fee, plus  50 min  let y be total cost (in \$)  let a be # of minutes  y = 50
ex. 10km/hr : let y	be total # of kilometers 3 be # of his.

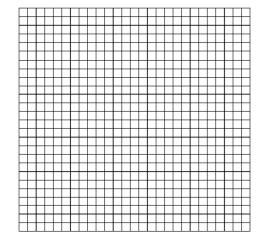


<b>5  </b> Unit 1	<b>10D</b> Date:
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/ Name: \_\_\_\_\_

Solve by graphing. Ensure you use appropriate scale, label axes, label lines and give the graph a title. Once POI is found, explain what it means.

- For Megan's sixteenth birthday, her parents are planning a party. Tony's Pizzeria charges \$150 for the party room and \$12 per guest for the cost of food. Hamburger Joey charges \$180 for the party room and \$10 per guest.
  - Write a system of linear equations to represent the situation.

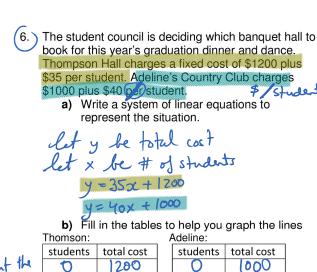


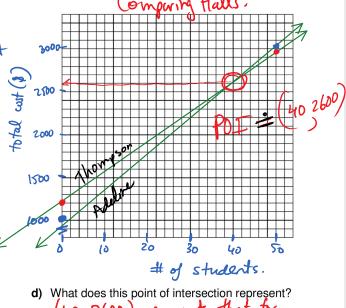
b) Fill in the tables to help you graph the lines

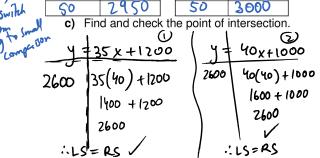
Tony's:	
guests	total cost

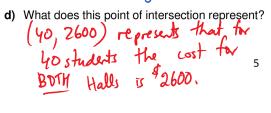
	JUEY S.			
	guests	total cost		
Γ				
Γ				
Γ				

- c) Find and check the point of intersection.
- d) What does this point of intersection represent?







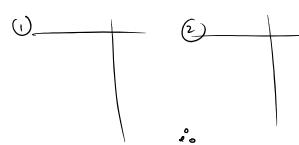


#### DAY 3 & 4 - Substitution Method

1. Is (2, -3) the solution for the following linear system? Explain how you can tell.

$$3x + 6y = -12$$

$$2y - 8x = -22$$

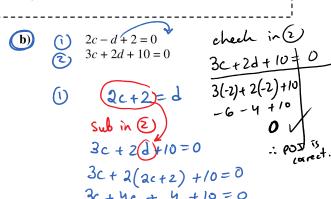


2. Solve by substitution. Check your solution.

**a**) 
$$4x + y = 0 \\ x + 2y + 1 = 0$$

NOTES: for Substitution Method

- · isolate
- · substitute
- · expand + solve
- · substitute into ANY (alkenate equations)
- · Therefore POI (, )
  · cheek if asked. alternate?



$$2c-d+2=0$$
 or  $2c+2=d$   
  $2(-2)-d+2=0$ 

$$-d = 0$$
 $-2=d$ 
.: POI is  $(-2, -2)$ 
c'd

7	Unit	1	<b>10D</b> Date:
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3. Phoenix Health Club charges a \$200 initiation fee, plus \$15 per month. Champion Health Club charges a \$100 initiation fee, plus \$20 per month.

\$100 initiation fee, plus \$20 per month.

Write a linear equation to represent the charges for each club. Fun

**b**) Solve the linear system.

c) After how many months are the costs the same?

d) If you joined a club for only 1 year, which club would be less expensive?

@ let y be total cost let x be # of months

> (1) y= 15x + 200 (1) y= 20x + 100

5) sub in (1) into (2) since y's are isolated

20x+100 = 15x + 200

\( \frac{7}{5} = \frac{100}{5} \)

sub in 2) y=201+100

y = 20(20) + 100

I (20 500)

independent
you control
how many
month's you go

C) After 20 months the costs of both Clubs are \$500.

200 Liverit 20 months

cheaper at lyr. smee initial cost was lower.

NOTES:

Ensure you record the POI in

· Don't forget let statements

· Justity your answers by showing work / graph / reasoning.

- (4.) Simplify each equation, and then solve the linear system by substitution.
  - (1) 3(x+1) 2(y-2) = -6(2) x + 4(y+3) = 29

Simplify (1): 3x + 3 - 2y + 4 = -63x - 2y = -13

Simplify (2): x+4y+12=29

3(17-4y)-2y=-13 51-12y-2y=-13-51

sub in @ x = 17-49) 2=17-4/32

X=7.17 - 128

7= 119 - 128 7 - 9 7= -9

 $\stackrel{\circ}{\sim}$  POT is  $\left(-\frac{9}{7}, \frac{32}{7}\right)$ 

3(-9)-2(34) -91 7 =-13 1

- 5. The number of tickets sold for a school event is 330. Let a represent the number of adult tickets sold and represent the number of student tickets sold. The cost of a student ticket is \$6 and the cost of an adult ticket is \$10. In total, \$2380 was taken in from ticket sales.
  - a) Write a linear system to represent the information.
  - b) Solve the linear system to find the number of each type of ticket sold.

(1) 10a + 6x = 2380 = all about the morey
(2) x + a = 330 = all about tichets. a)

#### DAY 5 & 6 - Elimination Method

1.) Solve the system using elimination.

$$0.6a - 0.2b = 1.8$$
  
 $0.5b - 0.4a - 0.7 = 0$ 

- align

(0.6a - 0.2b = 1.8

(2) -0.4a + 0.5b = 0.7

(06) (0.6)

2 -0.24a + 0.30b = 0.42

$$\emptyset a + 0.22 b = 1.14$$

$$0.22 b = 1.14$$

$$0.22 b = 0.12$$

$$0.22$$

$$b = 5.18$$

$$\begin{array}{cccc} (1) & 0.6a & -0.2b & = 1.8 \\ (2) & -0.4a & +0.5b & = 0.7 \\ & \times (-0.2) & \times (-0.2) & -(0.2) \end{array}$$

(1) 
$$0.3a\sqrt{-0.1b} = 0.9$$
  
(2)  $0.08a\sqrt{-0.1b} = -0.14$ 

$$0.22 a + 05 = 1.04$$

$$0.22 a = 1.04$$

$$0.22 a = 1.04$$

$$0.22 a = 1.04$$

$$0.22 a = 4.72$$

% POI is (4.72 5.18)

NOTES:

2. Some provinces have names with First Nations origins. For example, "Ontario" comes from an Iroquois word meaning "beautiful water." If the number of provincial names with First Nations origins is *a*, and the number with other origins is *b*, the numbers are related by the following equations.

a+b=10

3a - 2b = 0

- a) Interpret each equation in words.
- **b**) Find the number of provinces that have names with First Nations origins.
- 3. At Lisa's Sub Shop, two veggie subs and four roast beef subs cost \$34. Five veggie subs and six roast beef subs cost \$61. Write and solve a system of equations to find the cost of each type of sub.

Let b represent price of beef sub.

Let V = 11 - 11 - 11 - 11 - 12(1) 2V + 4b = 34(2) 5V + 6b = 61

(i) lov + 20b = 170 (2) lov + 12b = 122

> Swb in (8) 5v + 6(6) = 61 5v + 36 = 61 5v = 25v = 5v = 25

60 price of beef sul was \$6

4. Solve by elimination. Check the solution.

$$2(a-4) + 5(b+1) = 8$$

$$3(a-1)-2(b-2)=-11$$

Solve by elimination.

$$\frac{12(x-6)}{4} = 0$$

> LCD

$$(x+1) \frac{(y-5)}{3} = 3(6)$$

Simplify (1):

$$\frac{12}{4}(x-6)+\frac{12}{3}(y+2)=0$$

$$3(x-6) + 4(y+2) = 0$$

$$3x - 18 + 4y + 8 = 0$$

$$3x + 4y = 10$$

$$3x - 18 + 4y + 8 = 0$$

$$3x + 4y = 10$$

simplify 2

$$\frac{6}{3}(x+1) - \frac{6}{2}(y-5) = 18$$

$$2(x+1) - 3(y-5) = 18$$

$$2x+2-3y+15=18$$

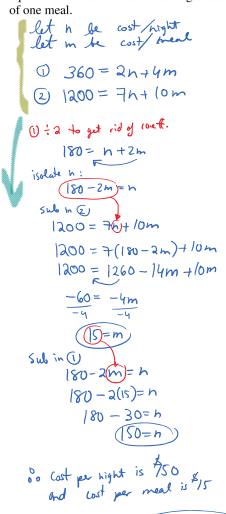
$$2x - 3y = 1$$

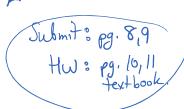
$$82 - 12y = 9$$
  
 $-172 + 99 = -39$ 

. Solution is X=Z

POI is (2,1)

- 6.) A weekend at Skyview Lodge costs \$360 and includes two nights' accommodation and four meals. A week costs \$1200 and includes seven nights' accommodation and ten meals. Write and solve a system of equations to find the cost of one night and the cost of one meal.
- 7. The Mackenzie, the longest river in Canada, is 1056 km longer than the Yukon, the second-longest river. The total length of the two rivers is 7426 km. Find the length of each river.





# DAY 7 - Equivalent/Linear Relations & Number of Solutions > 1 POI, no POI, w POI

1. Which two equations are equivalent?

**A** 
$$y = 2x + 6$$

**B** 
$$2y = x + 12$$

**C** 
$$3y = x + 2$$

**D** 
$$2y = 4x + 12$$

Write two equivalent equations for each.

(a) 
$$y = -4x + 3$$

**b**) 
$$2x + 5y - 6 = 0$$

- (4.) The perimeter of a rectangle is 30 cm Write an equation to represent this situation Then, write an equivalent linear equation Solve this system and explain what happens when solving equivalent relations.
  - @ let L be the length let w be the width
- (e) 20L + 20W = 300 20L + 20W = 300 subt. OL + OW = 0 This is a TRUE But all the variables disappeared .. this means the two equations represent ONE line

This system will have infinitely many POI or (00) solutions.

2. The value of the quarters and nickels in Michael's coin jar is \$1.65 Write an equation to represent this situation 6Then, write a NON equivalent linear equation that has the SAME slope Solve this system and explain what happens when solving parallel lines.

let Q be # of quarters let N be # of hichels

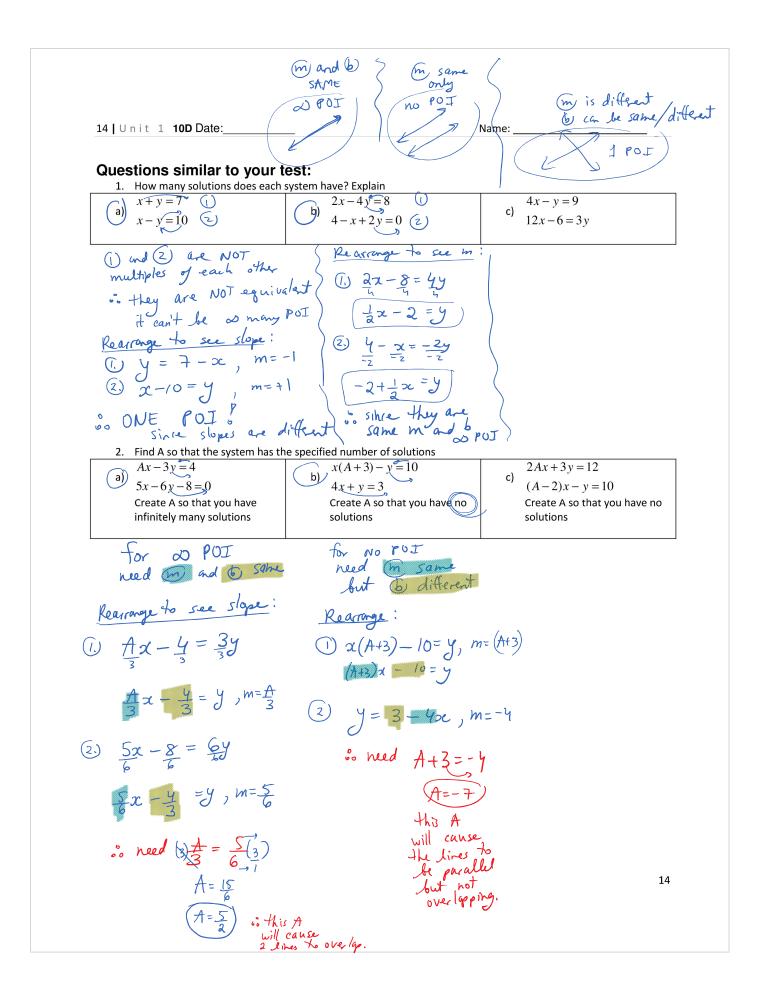
© sub 0 mt = 2 33 - 5a = 11-5a 22 = 0a 22 \$0 FALSE ! no

5. Cindy buys a large pizza for \$10 plus \$0.75 per topping Write an equation to represent this situation Then, write a NON equivalent linear equation that has the DIFFERENT slope. Solve this system and explain what happens when solving non parallel lines.

6= 0.252 0.25

If you do not get stuck with 0=0 poly no POI Then the system has

13

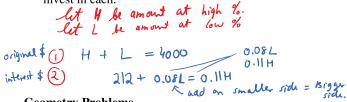


#### DAY 8 & 9 – Problem Solving with Linear Systems

#### **Money Problems**

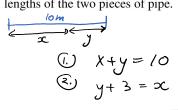
- 1. The cost of printing a magazine is based on a fixed set-up cost and the number of pages to be printed. One printing company charges a \$250 set-up fee and \$5/page, while a second company charges a \$400 set-up fee plus \$4/page.
  - a) Write an equation to represent the cost for each company. Define your variables.
  - **b)** Solve the linear system.
  - c) What does the point of intersection represent?
  - d) Which company should Richard choose to print 175 pages?

(2.) Joe invests a total of \$4000 in two plans. Part of the money is invested at 8% per year and the rest at 11% per year. The interest paid after 1 year on the 11% investment is \$212 more than the interest paid on the 8% investment. Set up equations with variables on how much did Joe invest in each.

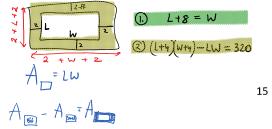


#### **Geometry Problems**

- 3. The perimeter of a rectangular pool is 38m. The length is 3m more than the width. Set up equations with variables being the dimensions of the pool.
- (4.) A 10m pipe is to be cut into two pieces of different length. One piece is 3m longer than the other. Set up equations with variables being the lengths of the two pieces of pipe.



5. Linda has a garden. The width of her garden is 8 feet longer than the length of it. Around the garden she has a 2 foot wide sidewalk. The area of the sidewalk is 320 feet squared. Set up equations with variables being the dimensions of the garden.



## Mixture Problems like interest #

6.) What volume, in millilitres, of a 60% hydrochloric acid solution must be added to 100 mL of a 30% hydrochloric acid solution to make a 36% hydrochloric acid solution? Set up equations only.

let x be volume at 60% strength let y be total volume at 36% strength.

only original (1)  $X + 100 = y^{4}$ with % (2.) 0.60x + 0.30(100) = 0.36y

7. One type of granola is 30% fruit, and another type is 15% fruit. What mass of each type of granola should be mixed to make 600 g of granola that is 21% fruit? Solve.

#### **Age Problems**

8. Bill is 11 years younger than Sue. Nine years ago, Sue was twice as old as Bill. How old is each person now? Set up equations only.

lit B represent Bill's age now B-9 is 9yrs ago lit U represent Sue's age now , U-9 " "

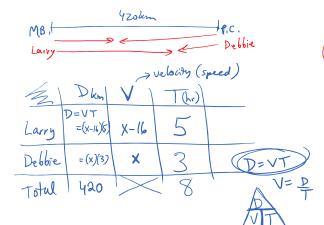
Now: (1) B+11=U or B=U-11  $Q_{yz}$ : (2) Q(B-Q)=U-Q  $Q_{yz}$ :  $Q_{yz$ 

9. Heidi's mother is twice as old as Heidi. The sum of their ages in 6 years will be 72. What are their present ages? Solve.

#### **Motion Problems**

10. Erika drove from Ottawa at 80 km/h. Julie left Ottawa 1 h later and drove along the same road at 100 km/h. How far from Ottawa did Julie overtake Erika? Set up equations only.

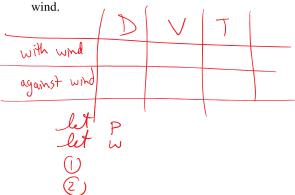
11. Debbie drove her car for 3h to Moose Bay and Larry drove his motorcycle in the opposite direction to Peggy's Cove for 5h when they passed each other. The distance between Moose Bay and Peggy's Cove is 420km. If Larry drove 16km/h slower than Debby, how fast did each of them go? Set up equations only.



oo equation is 5(x-16) + 3x = 420 since used only 1 variable need only one equation æ

#### Wind/Current Problems

12. Suppose it takes a small airplame flying with a head wind 16 hours to travel 1800 miles. When flying with a tail wind, the airplane can travel the same distance in only 9 hours. Set up equations with variables being the speed of the wind and the speed of the plane without the



13.) A boat goes 32 miles downstream in three hours. The return trip against the current takes sixteen hours. Find the rate of the boat in calm water and the rate of the current. Set up equations only.

	$\mathcal{D}_{(mi)}$	V	T(ho)
Downstream (current pushs)	32	B+C	3
Upstream (against i	32	B-C	16

let B rep. boût's speed.

let C rep current's speed.

Rows we D=VT

(1) 
$$32 = (8+c)(3)$$
  
(2)  $32 = (8-c)(16)$ 

(2) 
$$32 = (B-c)(16)$$

① 
$$5x+3y=420$$
  
②  $y-16=71 \sim x+16=y$ 

18   Unit 1 10D Date:	Name:
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#### **Rate Problems**

- 14. Playing tennis burns energy at a rate of about 25 kJ/min. Cycling burns energy at about 35 kJ/min. Hans exercised by playing tennis and then cycling. He exercised for 50 min altogether and used a total of 1450 kJ of energy. For how long did he play tennis? Set up equations only.
- 16. A street has a row of 15 new houses for sale.

  The middle house is on the most desirable piece of property and is the most expensive. The second house from one end costs \$3000 more than the first house, the third house costs \$3000 more than the second house, and so on, up to and including the middle house. The second house from the other end costs \$5000 more than the first house, the third house costs \$5000 more than the second house, and so on, up to and including the middle house. All the houses on the street cost a total of \$3 091 000. Set up equations with variables being the selling price of the house at each end of the street?

#### **Other Problems**

15. The sum of two numbers is 56. One number exceeds the other number by 2. Find the two numbers. Set up equations only.