5.10: DIRECT vs. PARTIAL VARIATION

Example 1: Stephen works at a hardware store and earns \$9.25 for each hour he works. Let E represent his Earnings, and h represent the number of hours he works.	Example 2: Popcorn pops, on average, at a rate of 4 kernels per second. Let P represent the amount of popcorn kernels popped, and s represent the number of seconds.	Example 3: Branley works in sales and earns commission of 2% on the merchandise she sells. Define your variables and write an equation. E: earnings S: sales.
$E = 9.25h$ direct v.	$P = 4s$, direct variation	$E = 0.02s$

These are the examples of _direct variation_. In example 1, E varies _directly_ with the number of hours. The graph of a direct variation relationship is a straight line through the _origin_. The equation is in

the form _$y=mx$_ → $b=0$ (initial is 0) $(0,0)$

Example 4: Rio works at a local gym as a personal trainer. She earns \$50 each shift and an additional \$35 per hour of personal training. Let E represent her earnings, and h represent the number of p.t. hours.	Example 5: Rhys' bank account has \$500. Each month he spends \$50. Let B represent his balance, and let m represent the number of months that have passed.	Example 6: Jessee repairs computer problems and charges a \$50 service fee plus \$30 per hour. Let F represent her total fee, and h represent the number of hours worked.
$E = 35h + 50$	$B = -50m + 500$	$F = 30h + 50$

These are the examples of _partial variation_. In example 5, B varies _partially_ with the number of months. The graph of a **partial variation** relationship is a straight line that _does not pass through origin._ The equation is in the form _$y = mx + b$; $b \neq 0$_

| Situation	Equation	D or P
a) A cookie recipe makes 12 cookies for each egg in the recipe. C, e	$C = 12e$	D
b) An airplane was at an altitude of 1700m and is descending at 50m per minute. H: height m: minutes	$H = -50m + 1700$	P
c) Danillo works as a tree planter for the government. He can plant 900 trees in a day. T, d: days	$T = 900d$	D
d) A cell phone plan is \$20 per month but excludes text messaging. Each text message costs 20 cents. F: fee t: # of texts	$F = 0.2t + 20$	P
e) Meher cuts lawns in the summer and earns \$15 for every lawn she cuts.	$E = 15l$	D
f) A banquet hall charges \$500 for the hall rental and \$32.50 per person.	$C = 32.50p + 500$	P

C: charge p: people

DIRECT VARIATION

Example 1

The new Mazda 3 Sport has gas mileage of 6 km per litre on highway. This can be modelled by the algebraic equation $d= 6n$, where d represents the distance you can travel and n represents the number of litres you use.

Complete the table of values for the distance per number of litres and use your table to create a graphical model of this scenario.

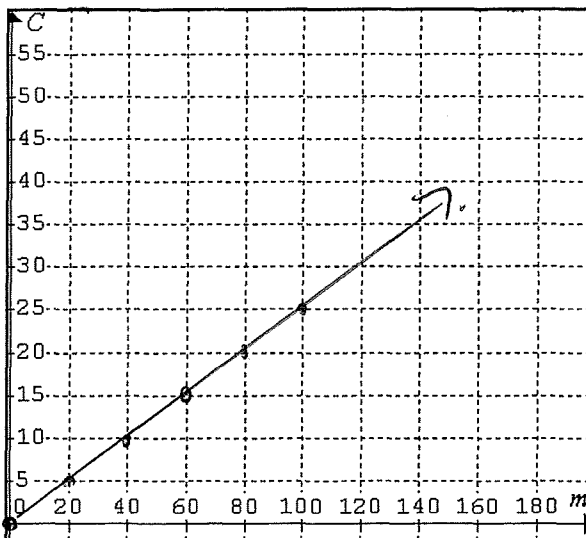| n	d = 6n
0	0
1	6
2	12
3	18
4	24
5	30
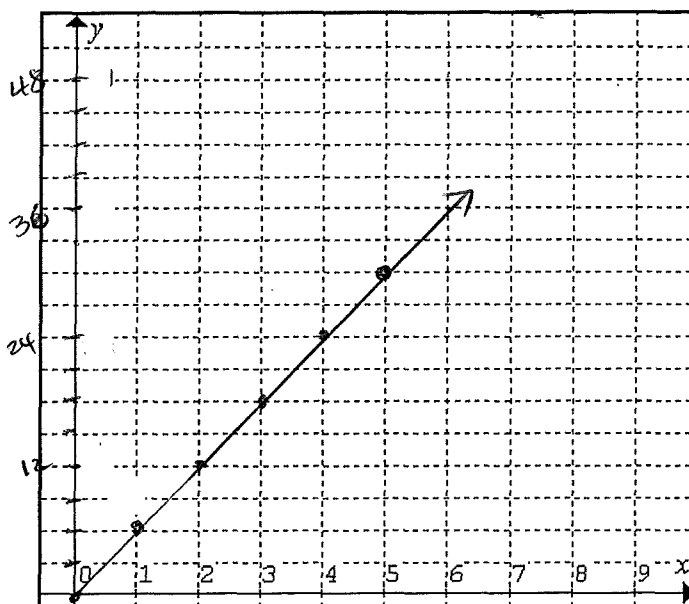
Example 2

Dooko Mobile Company does not charge any monthly fees, but charges $0.25 per minute of cell phone use. Model this scenario algebraically. $C = 0.25m$

Create a table of values using your equation and create a graphical model.

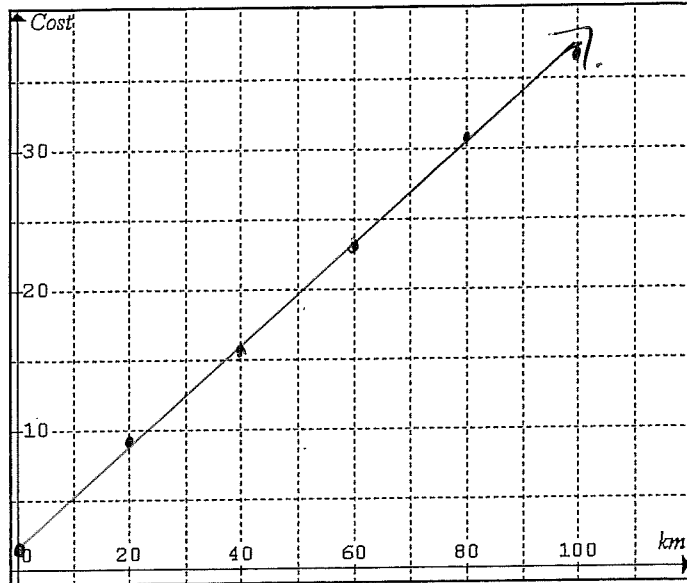| m	C
0	0
20	5
40	10
60	15
80	20
100	25

PARTIAL VARIATION

Example 1

A taxi company charges a flat rate of $2.50 plus $0.35/km. The cost can be found using the equation $c = 0.35k + 2.5$, where C represents the cost and k represents the number of kilometres.

Using the equation, complete a table of values. Using your table of values, create the graph.

k	C
0	2.50
20	9.50
40	16.50
60	23.50
80	30.50
100	37.50

Example 2

KeeDe Mobile Company charges $20 per month and an additional $0.25 per minute of long distance calls. Model this scenario algebraically. c: charge m: minutes.

$$C = 0.25m + 20$$

Create a table of values using your equation and create a graphical model.

m	C
0	20
10	22.50
20	25
30	27.50
40	30
50	32.50

Textbook p.268 #1-7, 14, and 20