













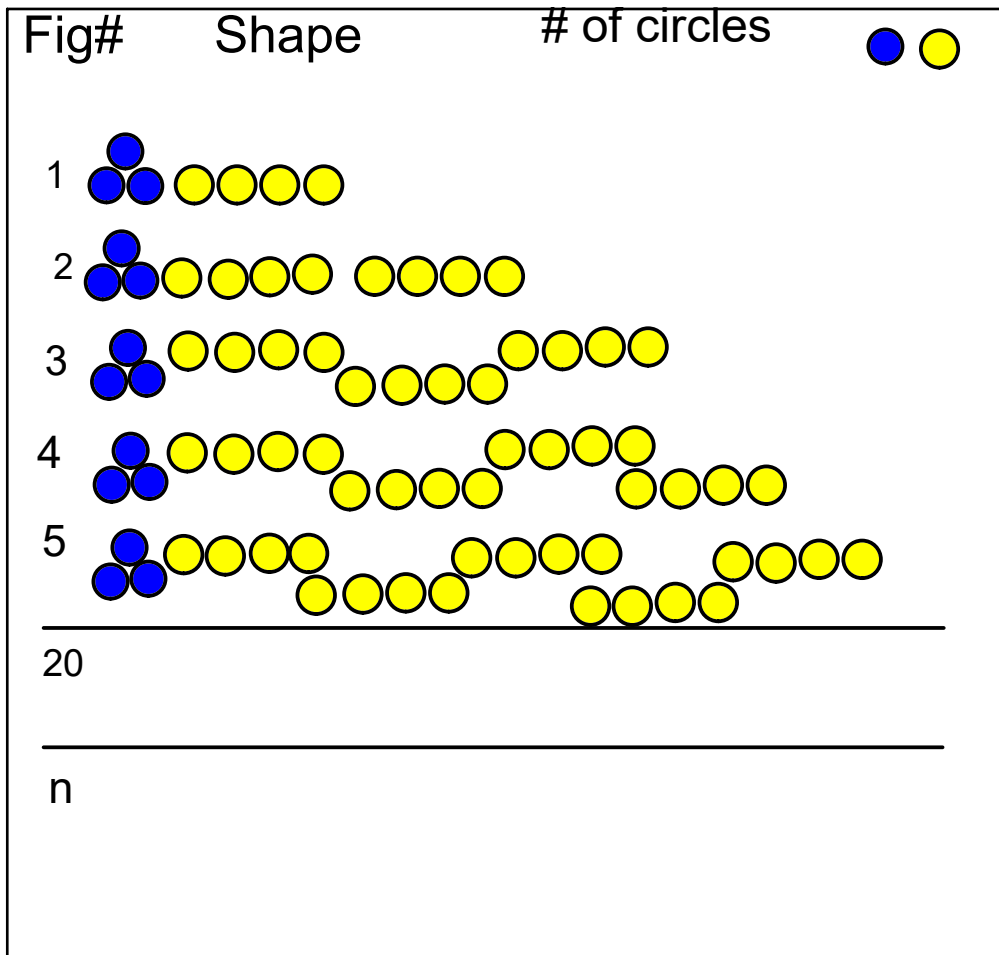


Fig#	Shape	# of circles	 
1		2	
2		4	
3		6	
4		8	
5		10	
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20			
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n			

Fig#	Shape	# of circles	 
1		3	
2		5	
3		7	
4		9	
5		11	
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20			
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Linear Relations

Direct and Partial Variation

Learning Goal:

By the end of today, I will be able to recognize the two types of linear relations, direct and partial, from their respective graphs, equations and table of values.

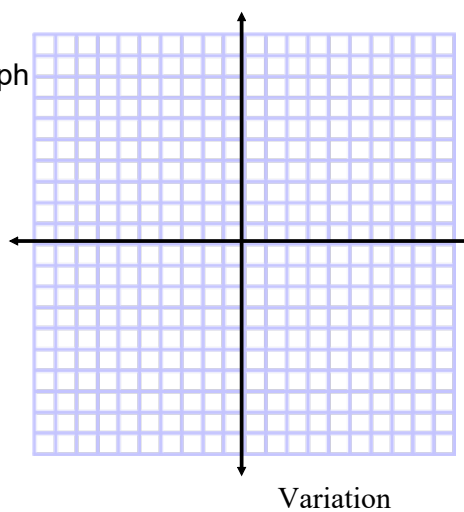
Vocabulary

linear relation: A relation in which the graph forms a straight line

first difference: The difference between two consecutive y-values in a table in which the difference between the x-values is constant - if the F.D. is constant then the relationship is Linear

Complete the table based on the pattern you observe, and then graph the points.

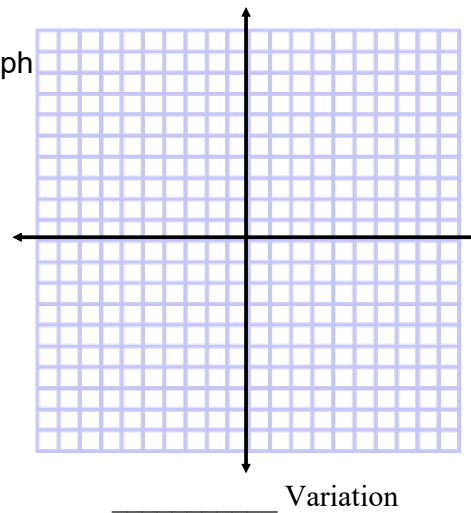
x	y	First Difference
-1	-2	
0	0	
1	2	



What is the equation that relates the x and the y value?

Complete the table based on the pattern you observe, and then graph the points.

x	y	First Difference
-1	-1	
0	1	
1	3	



What is the equation that relates the x and the y value?

Direct variation: A relation in which one variable is a multiple of the other; recognizable because:

- (i) the table of values will have the entry (0,0),
- (ii) the graph of the line will pass through the origin, or
- (iii) the equation will have the form $y = mx$ (where m is a number multiplier)

Partial variation: A relation in which one variable is a multiple of the other **plus** a constant amount; recognizable because:

- (i) the table of values will NOT have the entry (0,0),
- (ii) the graph of the line will NOT pass through the origin, or
- (iii) the equation will have the form $y = mx+b$ (where m is a number multiplier and b is the amount we start with or initial value or y intercept)

Vocabulary

discrete: A set of data that cannot be broken into smaller parts ie. number of humans

continuous: A set of data that can be broken down into smaller and smaller parts and still have meaning ie. time, dollars

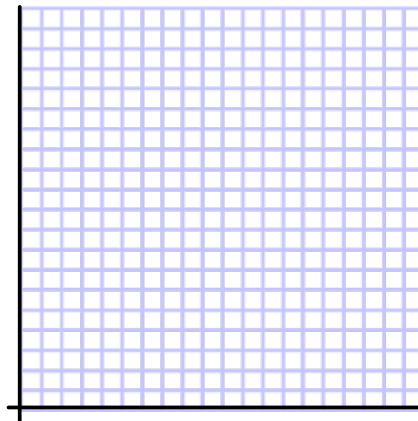
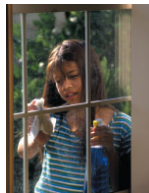
independent variable: In a relation, the variable whose values you choose; usually placed in the LEFT column in a table of values and on the horizontal axis in a graph

dependent variable: In a relation, the variable whose values you calculate; usually placed in the RIGHT column in a table of values and on the vertical axis in a graph

Chris runs a window-washing service.

She charges a flat rate of \$5, plus \$3 per window.

# of Windows	Cost \$
0	
1	
2	
3	
4	



Is this Direct or Partial Variation?

What is the equation of the relationship?

Computer Choices (Pause and Try)

Rana's Computer Repair Service charges \$30/h.

Bill's Computer Repair Service charges a flat fee of \$25 plus \$20/h.

Each company charges for parts of hours (ie. half an hour is 0.5h).

- (i) To compare both companies, what variables are involved?
- (ii) Which of the variables is the independent and which is the dependent variable?
- (iii) Create the table of values.
- (iv) Is the data continuous or discrete? Explain.
- (v) Plot both relations on the same graph paper.
- (vi) Are the relationships Direct, Partial or Both?

The variables are hours and Cost.

The cost depends on the number of hours of service, so it is the dependent variable. This makes the number of hours the independent variable.

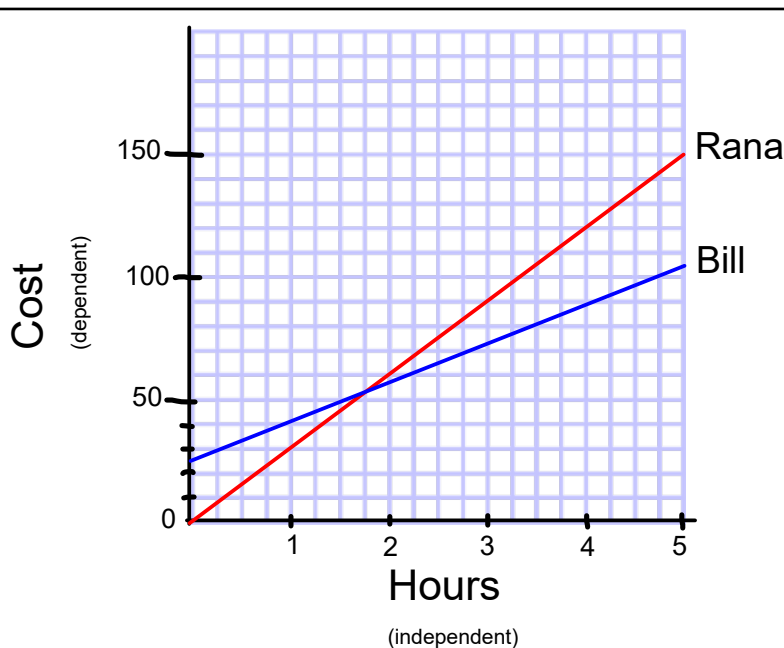
Rana's Computer Repair
Service charges \$30/h

Hours	Cost \$
0	0
1	30
2	60
3	90
4	120
n	

Bill's Computer Repair
Service charges a flat fee of \$25 plus \$20/h.

Hours	Cost \$
0	25
1	25+20=45
2	25+40=65
3	25+60=85
4	25+80=105
n	

This data is continuous because there can be smaller parts of the hours variable (ie. 2.5hrs).



The lower graph is cheaper, notice how it changes from one company to the other.

Rana is direct variation, graph goes through the origin.
Bill is partial variation, there is a y intercept of 25.

Consolidation Questions:

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