Date:

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4.1LastNameDirectVariation.pdf

Minds On:
Going for a Jog

Unit 4: Modelling With Graphs
Sec. 4.1 (5.1) - Direct Variation

Consolidate:
Bring it all together...

Learning Goals:

By the end of this lesson, we will be able to identify relationships which have a direct variation by looking at descriptions, tables, equations, and graphs.
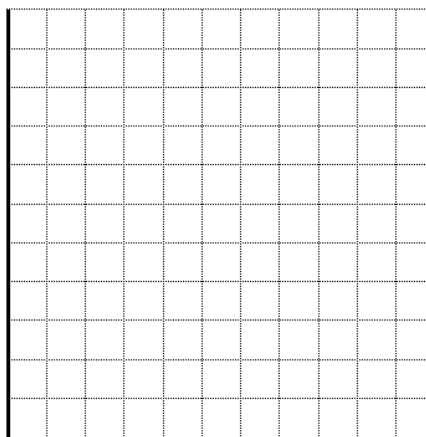
Complete the following investigation on your own. Use an elbow partner to conference with if you get stuck.

Susan can jog at a steady pace of 150m/min for the first half an hour of a race.

1.   Complete the table of values below

Time (min)	Distance (m)
0	
1	
2	

2.   Graph this relationship

3.   Identify the independent/dependent variables.

4.   Describe the shape of the graph. Where does it intersect the vertical axis?

5.   Write an equation to find the distance, *d*, in metres, that Susan jogs in *t* mins.

6.   Use the equation to determine the distance that Susan can jog in 25 mins.

7.   Consider the distance Susan jogged in 5 minutes. What happens to this distance when the time is doubled? What happens to the distance when the time is tripled?

Sec. 4.1 (5.1) - Direct Variation

> ***Direct variation*** is a relationship between two variables in which one variable is a constant multiple of the other variable.

TIME (s)	DIST(M)
0	0
1	10
2	20
3	30
4	40

- Direct Variation occurs when the ***dependent*** variable varies by the same ***factor*** as the ***independent*** variable.
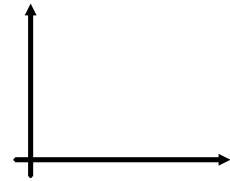
- Direct variation can be defined by the equation:

Note: The value 'm' is your ***constant of variation***.

What is 'm' and how can we find it?   ***What would the graph look like?***

Task #1: The Fredrick Family travels 250km to a relative's home.
The distance, d, in kms, varies directly with the time, t, in hours

a. Find the equation relating *d* and *t* if *d* = 43 when *t* = 0.5. What does the constant of variation represent?

b. Use the equation to determine how long it will take the Fredricks to reach their destination.
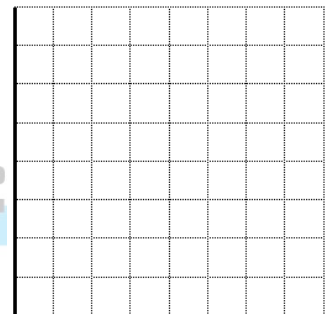

Task #2: Justin works part-time at a local sports store. He earns $7.50/h.

a. Create an equation which describes the relationship between his pay, in dollars, and the time, in hours, he works.

b. Complete the ***table*** and ***graph*** the relation.

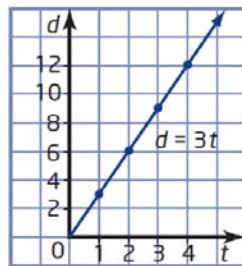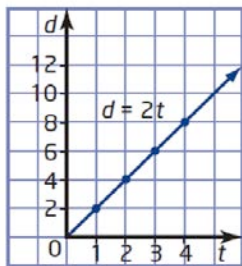| Time Worked	0	2	4	6	8
Pay					

Task #3: Indicate whether the equation represents a direct variation and explain how you know.

Equation	Direct Variation? YES or NO	Justification
A = 2C + 5		
A = 2C		

Task #4: Consider the graphs of **d = 2t** and **d = 3t**. Are these relationships **direct variation**? How do you know?

Task #5: The cost, *C*, in dollars, of building a concrete sidewalk varies directly with its length, *s*, in metres.

a) Find an equation relating *C* and *s* if a 200-m sidewalk costs $4500.

b) What does the constant of variation represent?

c) Use the equation to determine the cost of a 700-m sidewalk.

1. Indicate whether the following relationships are varied directly or not.
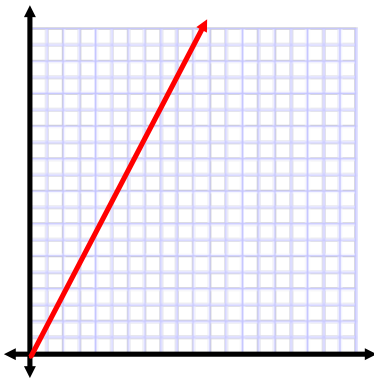
a)   C = 15n

b)   y = 20x + 10

c)   E = 25h

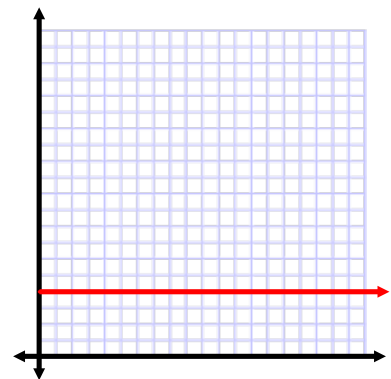**2.** Indicate whether the following relationships are varied directly or not.

a)

b)

time (h)	distance (km)
0	25
1	50
2	75
3	100
4	125
5	150

c)

3. Determine the constant of variation for each direct variation.

a) The distance travelled by a bus varies directly with time. The bus travels 240 km in 3 h.

b) The total cost varies directly with the number of books bought. Five books cost $35.

c) The volume of water varies directly with time. A swimming pool contains 500 L of water after 5 min.
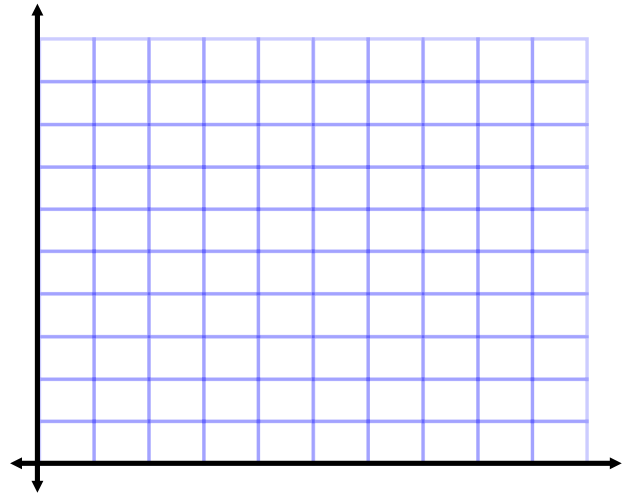
3. Passent's pay varies directly with the time, in hours, she works. She earns $8/h.

   a) Choose appropriate letters for variables. Make a table of values showing Passent's pay for 0 h, 1 h, 2 h, and 3 h.

   b) Graph the relationship.

   **c)** Write an equation in the form $y = kx$.

5. A parking garage charges $2.75/h for parking.

   a) Describe the relationship between the cost of parking and the time, in hours, parked.

   b) Illustrate the relationship graphically and represent it with an equation.

   c) Use your graph to estimate the cost for 7 h of parking.

   d) Use your equation to determine the exact cost for 7 h of parking.
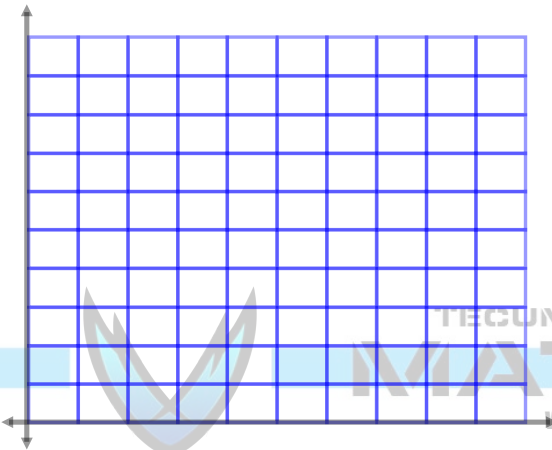
6. The cost of oranges varies directly with the total mass bought. 2 kg of oranges costs $4.50.

    a) Describe the relationship in words.

    b) Write an equation relating the cost and the mass of the oranges. What does the constant of variation represent?

    c) What is the cost of 30 kg of oranges?

9. At a bulk store, 0.5 kg of sugar costs $1.29.

    a) Explain why this relationship is considered a direct variation.

    b) Graph this relationship, using pencil and paper or technology.

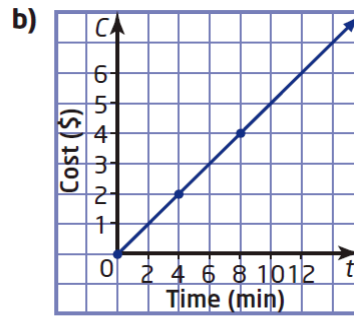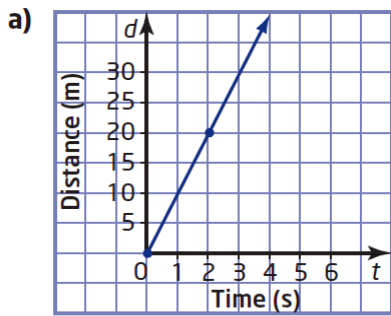   **c)** What would happen to the graph if the price increased to $1.49 for 0.5 kg?
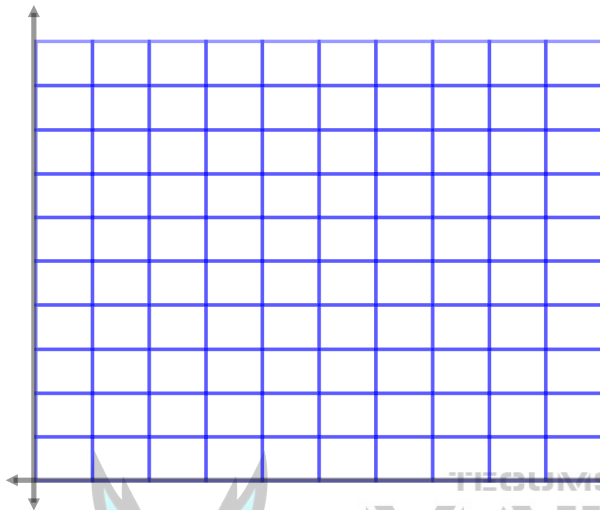
10. Describe a situation that could be illustrated by each graph.

a)

b)

11. A bat uses sound waves to avoid flying into objects. A sound wave travels at 342 m/s. The times for sound waves to reach several objects and return to the bat are shown in the table. Set up an equation to determine the distance from the bat to the object. Then, copy and complete the table.

Object	Time (s)	Distance (m)
Tree	0.1	
House	0.25	
Cliff wall	0.04	

14. To convert from kilometres to miles, multiply by 0.62. Write an equation to convert miles to kilometres.