5.1 Direct Variation Worksheet
MPM1D
Jensen

1. Determine the constant of variation for each direct variation. $\qquad m = \frac{\Delta dependent}{\Delta independent}$

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

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 minutes.

2. The cost, C, in dollars, of building a concrete sidewalk varies directly with its length, s, in meters.

a) Find an equation relating C and s if a 200-m sidewalk costs $4500.
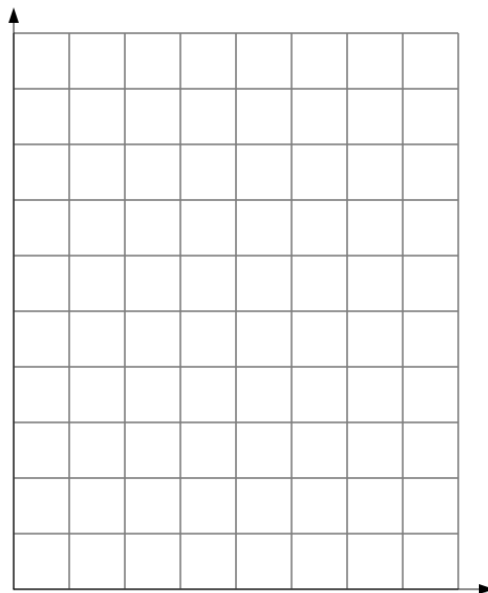
b) What does the constant of variation represent?

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

3. Passent's pay varies directly with the time, in hours, she works. She earns $8/h.

a) Complete the following table of values

Hours Worked	Pay
0	
1	
2	
3	

b) Graph the relation. Choose an appropriate scale and label your axes.
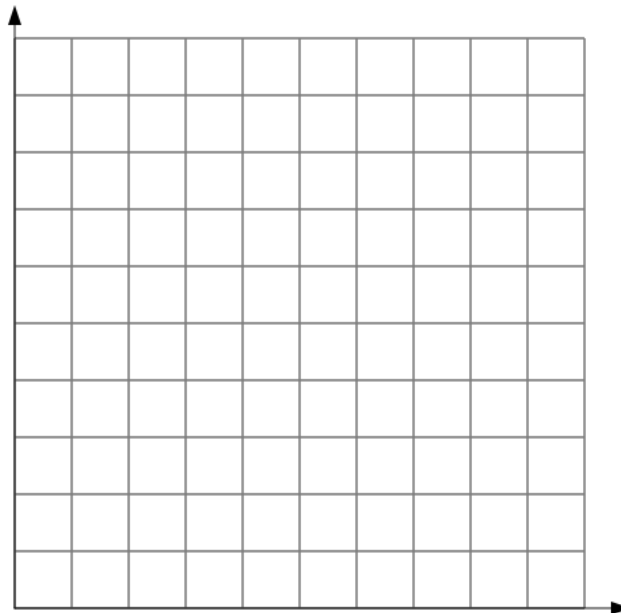
c) Write an equation in the form $y = mx$.

4. The total cost of apples varies directly with the mass, in kilograms, bought. Apples cost $1.50/ kg.

a) Complete the following table of values:

Mass (kg)	Cost ($)
0	
1	
2	
3	

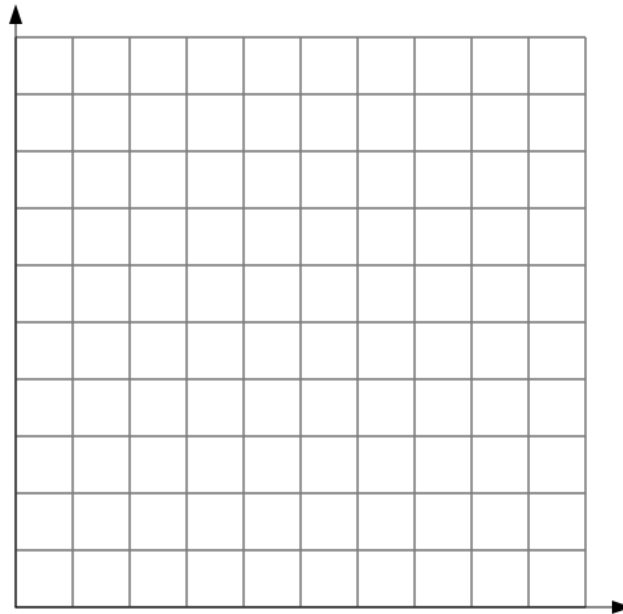b) Graph the relation. Choose an appropriate scale and label the axes.

c) Write an equation in the form $y = mx$

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.

Equation: _____

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

d) Use your equation to determine the exact cost for 7 hours 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 oranges. What does the constant of variation represent?

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

7. The volume of water in a swimming pool varies directly with time. 500 L of water is in the pool after 4 minutes.

a) Write an equation relating the volume of water and time. What does the constant of variation represent?

b) Graph this relationship. Choose an appropriate scale and label your axes.
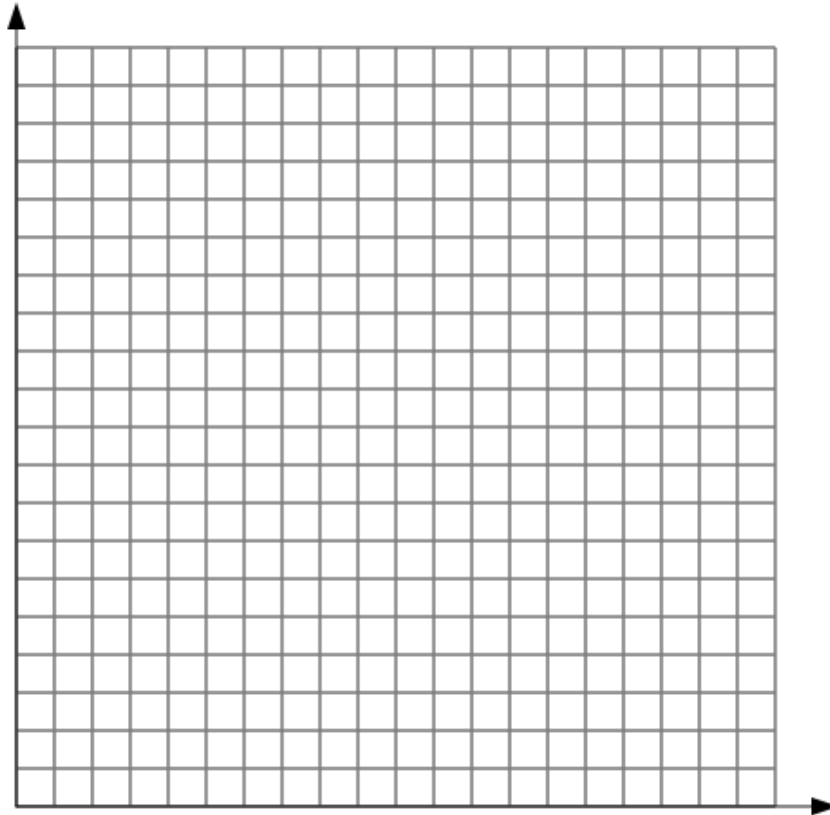
c) What volume of water is in the swimming pool after 20 minutes?

d) How long will it take to fill a swimming pool that holds 115 000 L of water?

e) Describe the changes to the equation and graph if only 400 L of water is in the pool after 4 minutes.

8. [BONUS] From a bag of disks numbered 1 through 100, one disk is chosen. What is the probability that the number on the disk contains a 3? Justify your answer.

Answers

1. a) 80   **b)** 7   **c)** 100

2. a) $C = 22.5s$ **b)** the cost of 1 m of sidewalk   **c)** $15 750

3. a)

Time, t (h)	Pay, p ($)
0	0
1	8
2	16
3	24

b) Graphs may vary depending on scales used.
c) $p = 8t$

4. a)

Mass of Apples, a (kg)	Cost, c ($)
0	0.00
1	1.50
2	3.00
3	4.50

b) Graphs may vary depending on scales used.
c) $c = 1.5a$

5. a) To get the cost of parking, multiply the time parked, in hours, by $2.75. The cost c, in dollars, of parking, varies directly with the time, t, in hours, for which the car is parked.
b) $c = 2.75t$
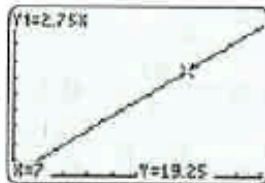
c) Answers will vary. Example: about $20
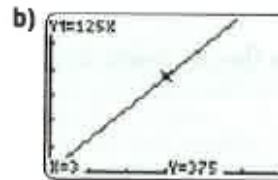**d)** $19.25

6. a) To get the cost C, of oranges, multiply the mass r, in kilograms, of oranges, by $2.25.
b) $C = 2.25r$; the constant of variation represents the constant average cost, $2.25/kg.
c) $67.50

7.

a) $V = 125t$, where V is the volume of the water, in litres, and t is the time, in minutes. The constant of variation represents the constant average increase in volume, 125 L/min.

b)

c) 2500 L   **d)** 920 min or 15 h 20 min
e) New equation: $V = 100t$. The graph would still increase to the right, but less steeply. It would take longer to fill the pool.