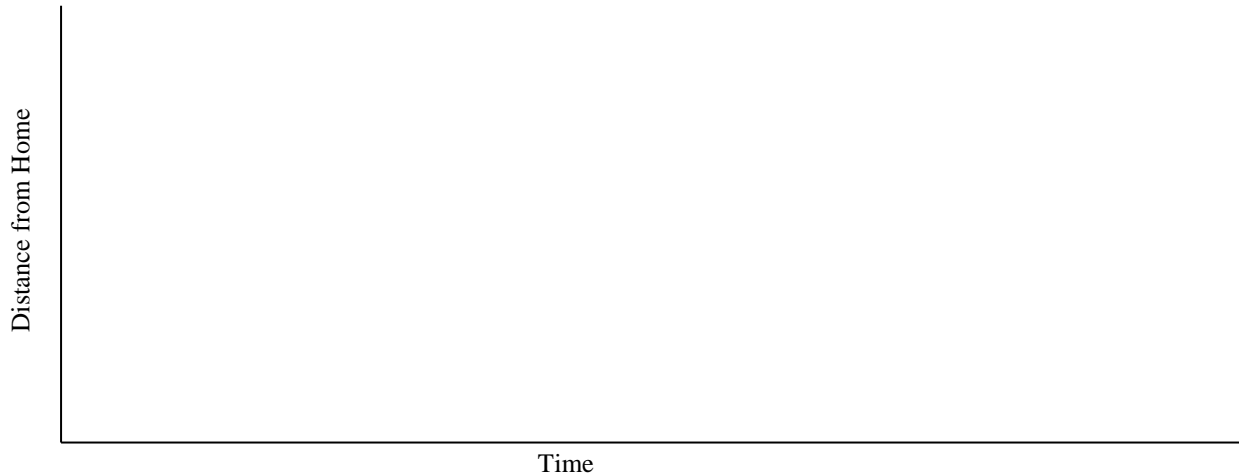# Unit #7 Progress Check – Modeling Linear Relations
MPM1D1

1. Draw the graph described by the following story.

   Malcolm takes his dog for a walk. He leaves his house and slowly walks along the sidewalk. Uh Oh! His dog sees a cat and runs after it. Malcolm chases after his dog and catches him. Malcolm takes a short break to catch his breath and then slowly walks back home.
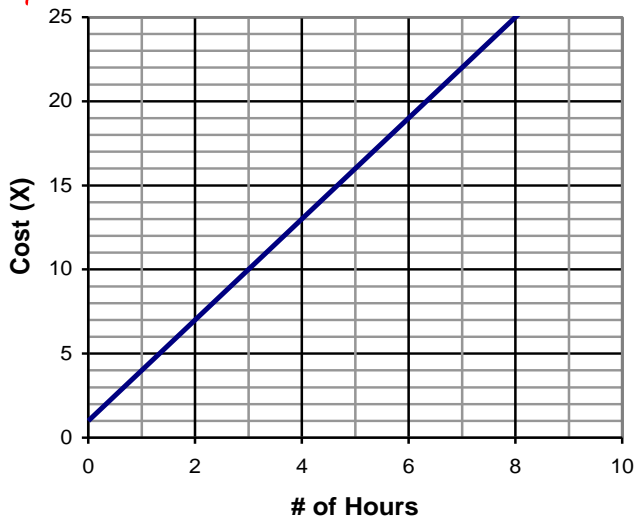

2. Write a story to describe the events in the following graph.

Mallory's Trip Home From School
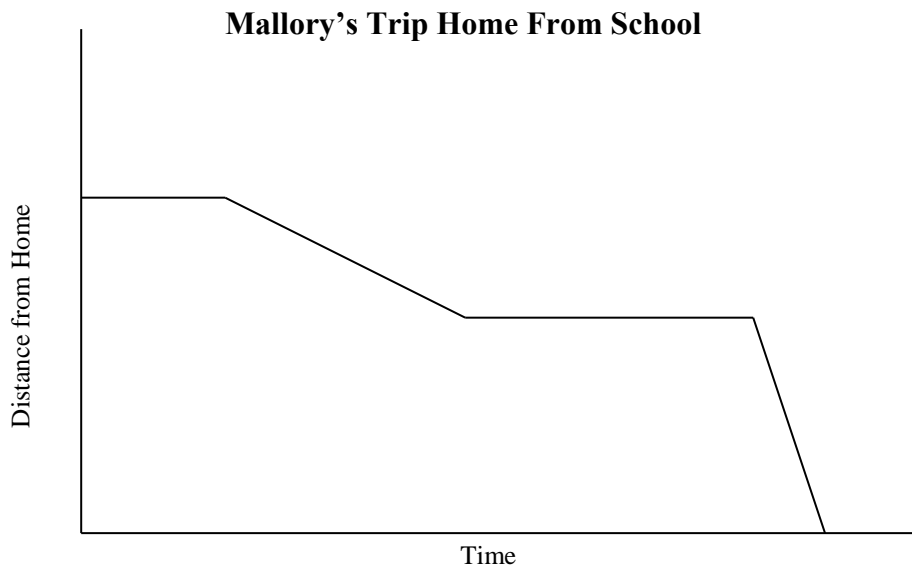
3. Determine the initial value, rate of change, and equation for each of the following graphs:

a)

b)

Initial Value: Initial Value:

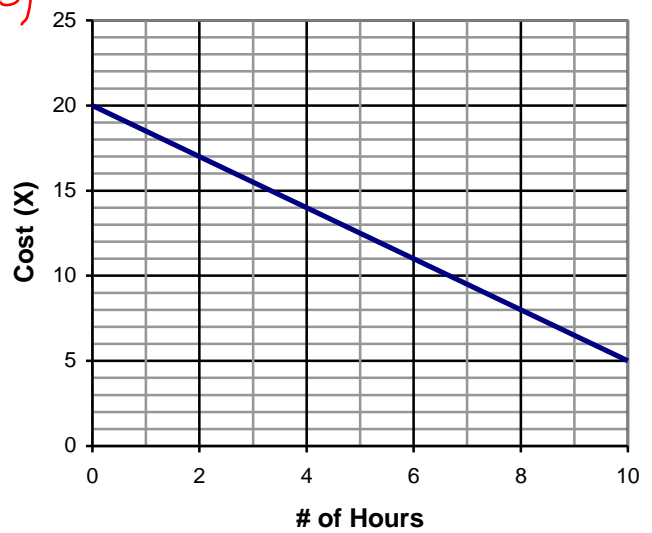Rate of Change: Rate of Change:

Equation: Equation:

4. Write the equation to represent the cost of each of the following.

a) Admission for a theme park is $10.00 and $2.00 per ride.

b) A plumber charges $100 to make a house call and an additional $50 per hour.

c) A newspaper delivery person earns $0.25 per paper delivered.

d) A bowling alley charges $5.00 for the shoes and $10.00 per game.

5. Write an equation for each of the following relations.

a)

Hours	Temperature
0	25
2	22
4	19
6	16
8	13
10	10

b)

Hours Worked	Money Earned
3	35
4	40
5	45
6	50
7	55
8	60

6. Gretchen's salary can be represented four different ways. Complete the missing sections:

Description	
Equation	
Table	Hours Worked / Salary: 0, 1, 2, 3, 4
Graph	

Table:

Hours Worked	Salary
0	
1	
2	
3	
4	

Graph axes: Salary ($) vs Hours Worked

7. The number of candies left in a candy jar over time can be represented four different ways. Complete the missing sections.

Description	
Equation	$C = 150 - 10n$
Table	Days / # of Candies: 0, 2, 4, 6, 8
Graph	

Table:

Days	# of Candies
0	
2	
4	
6	
8	

Graph axes: Candies Left in Jar vs Number of Days

8. Serge repairs cars. He charges a $50.00 service fee and $75.00 for each hour of labour needed.

a) Complete the table of values.

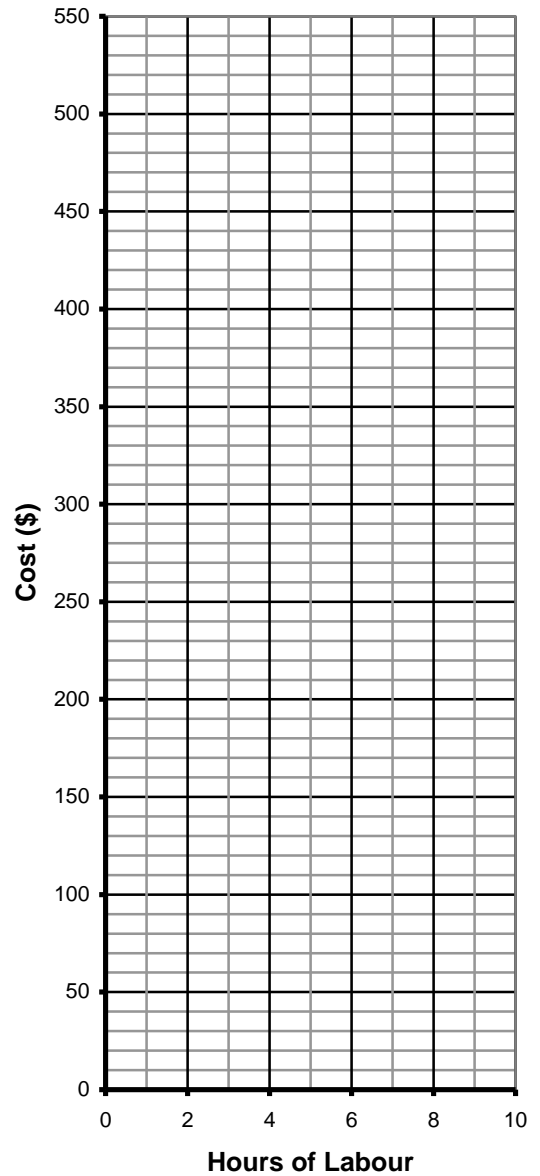| # of Hours	Cost
0	
1	
2	
3	
4	

b) Create a scatter plot. Include a line of best fit.

c) Is this graph an example of direct or partial variation? Explain.

d) Determine the initial value? What does it represent?

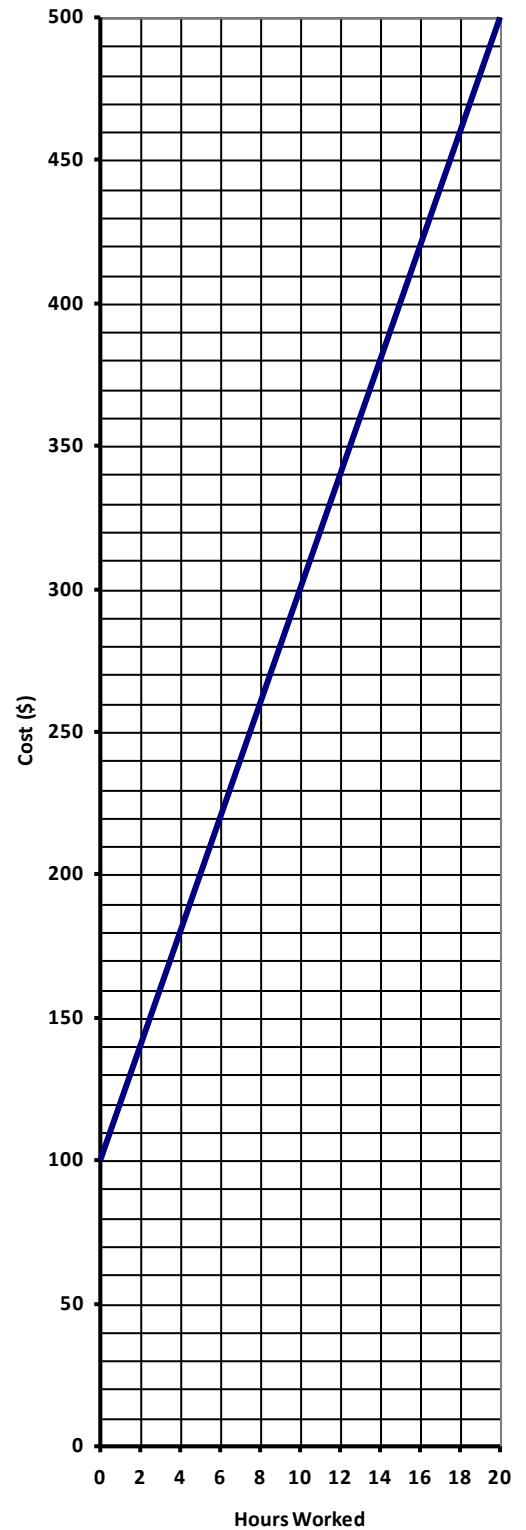e) Determine the rate of change? What does it represent?

f) Determine the equation of the graph

g) How many hours did it take to repair your car if it costs $950.00?

9. Anita wants to hire a magician for her son's birthday party. She has a choice between *Marvin the Magnificent* and *Presto Pete*. The cost of hiring *Marvin the Magnificent* is shown on the graph below. *Presto Pete*'s booking fee is **$50 more** than *Marvin the Magnificent*'s, but he charges **$5 less** per hour.

a) Create a table of values for the cost of hiring *Presto Pete*. Add him to the graph. Show your work.
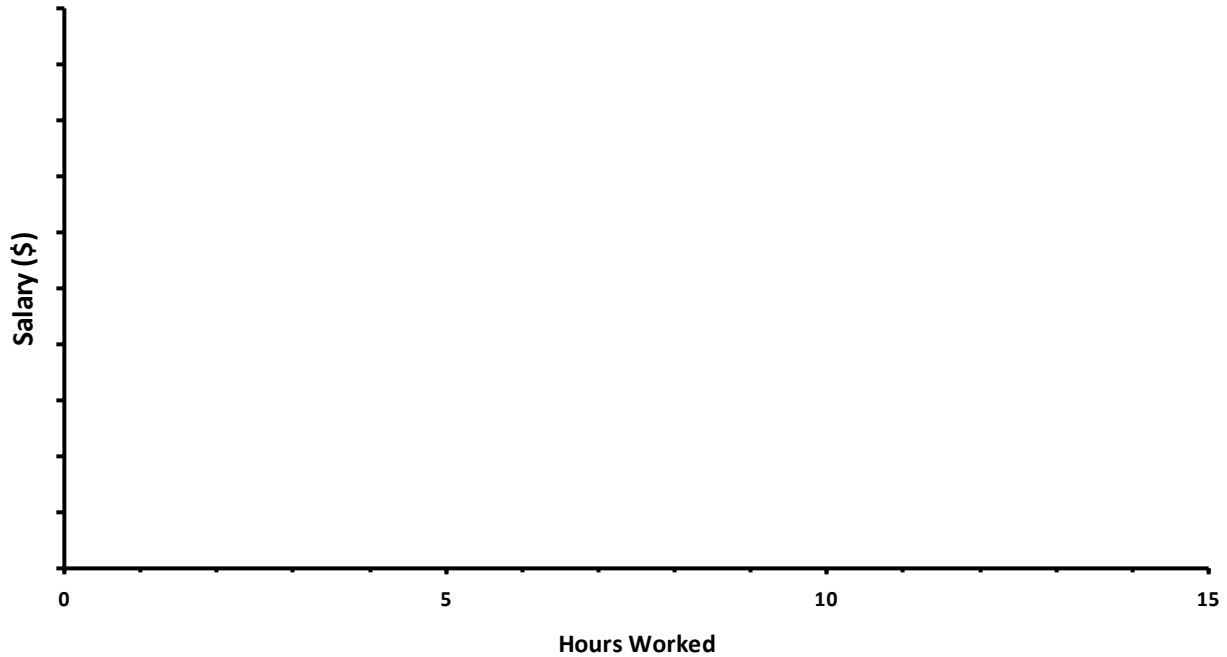
Hours Worked	Cost ($)

b) Determine when it would be cheapest to hire each magician.

Cost ($) vs Hours Worked

10. Sandra is considering three different painters to paint her living room – *Paint, Paint, Paint!*, *Joe the Painter*, and *Artistic Impressions*.

a) Use the information given about each painter to complete the following graph.

- *Joe the Painter* is cheaper than *Artistic Impressions* if your job takes less than 5 hours.
- *Paint, Paint, Paint!* is more expensive than *Artistic Impressions* if your job takes more than 8 hours.
- *Joe the Painter* is never cheaper than *Paint, Paint, Paint!*.

b) Complete the following statements:

_____ could be direct variation.

_____ and _____ must be partial variation.

_____ has the highest starting cost

_____ has the lowest starting cost

_____ charges the most per hour.
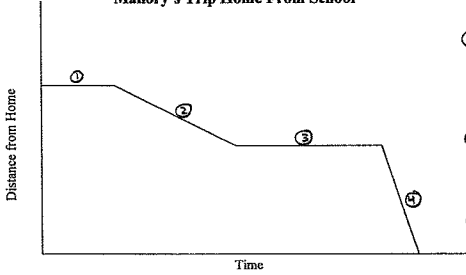
_____ charges the least per hour.

1. Draw the graph described by the following story.

Malcolm takes his dog for a walk. ① He leaves his house and slowly walks along the sidewalk. Uh Oh! His dog sees a cat and runs after it. ② Malcolm chases down his dog and catches him. ③ Malcolm takes a short break to catch his breath and then slowly walks back home.

Distance from Home vs *Time*
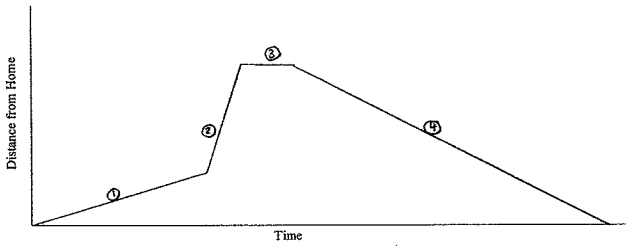
2. Write a story to describe the events in the following graph.

Mallory's Trip Home From School

① Mallory stops at school to talk to some friends.

② She slowly walks towards home

③ She stops to wait for a train to go by.

④ Now late, she runs the rest of the way home.

3. Determine the initial value, rate of change, and equation for each of the following graphs:

Initial Value: $1

Rate of Change:
$$\begin{array}{c|c} x & y \\ 0 & 1 \\ 2 & 7 \end{array}$$ +2 ( ) +6

$ROC = \dfrac{\Delta y}{\Delta x} = \dfrac{6}{2}$ = $3/hour

Equation:

$$C = 1 + 3n$$

Initial Value: $20⁰⁰

Rate of Change:
$$\begin{array}{c|c} x & y \\ 0 & 20 \\ 2 & 17 \end{array}$$ +2 ( ) −3

$ROC = \dfrac{\Delta y}{\Delta x} = \dfrac{-3}{2}$ = $-1.50/h

Equation:

$$C = 20 - 1.50n$$

4. Write the equation to represent the cost of each of the following.

a) Admission for a theme park is $10.00 and $2.00 per ride.

$$C = 10.00 + 2.00n$$

b) A plumber charges $100 to make a house call and an additional $50 per hour.

$$C = 100 + 50n$$

c) A newspaper delivery person earsn $0.25 per paper delivered.

$$C = 0.25n$$

d) A bowling alley charges $5.00 for the shoes and $10.00 per game.

$$C = 5.00 + 10.00n$$

5. Write an equation for each of the following relations.

a)

Hours	Temperature
0	25
2	22
4	19
6	16
8	13
10	10

+2 ( ) −3

IV = 25

$ROC = \dfrac{\Delta y}{\Delta x} = \dfrac{-3}{2} = -1.5$

$$T = 25 - 1.5n$$

b)

0	20
1	25
2	30

Hours Worked	Money Earned
3	35
4	40
5	45
6	50
7	55
8	60

+1 ( ) +5

IV = 20

$ROC = \dfrac{\Delta y}{\Delta x} = \dfrac{5}{1} = 5$

$$M = 20 + 5n$$

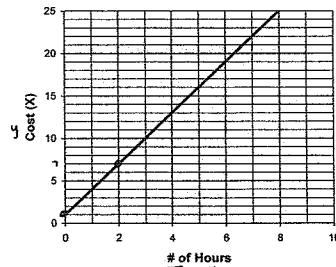6. Gretchen's salary can be represented four different ways. Complete the missing sections:

Description	Gretchen earns $6 per hour.
Equation	$S = 6n$

Hours Worked	Salary
0	0
1	6
2	12
3	18
4	24

Graph:

+6 (5 | 30) +30

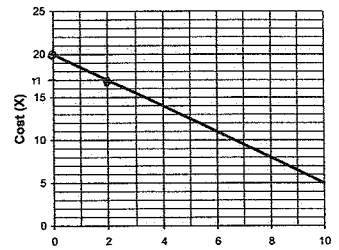IV = 0 $ROC = \dfrac{\Delta y}{\Delta x} = \dfrac{30}{5} = 6$

7. The number of candies left in a candy jar over time can be represented four different ways. Complete the missing sections.

Description	There are 150 candies in a jar to start, and 10 are eaten each day.
Equation	$C = 150 - 10n$

Days	# of Candies
0	150
2	130
4	110
6	90
8	70

Graph:

8. Serge repairs cars. He charges a $50.00 service fee and $75.00 for each hour of labour needed.

a) Complete the table of values. and graph the data.

# of Hours	Cost
0	50
1	125
2	200
3	275
4	350

+1 ( ) +75

b) Create a scatter plot. Include a line of best fit.
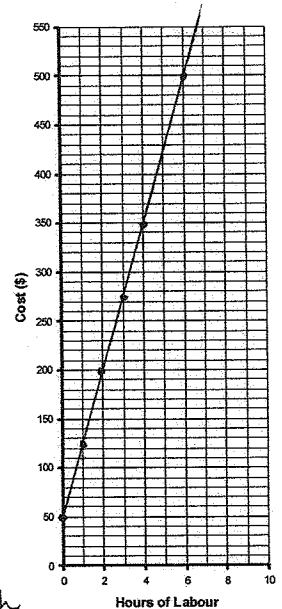
c) Is this graph an example of direct or partial variation? Explain.

Partial Variation

The graph has an initial value of $50⁰⁰

d) Determine the initial value? What does it represent?

$50⁰⁰

This is his service fee

e) Determine the rate of change? What does it represent?

$ROC = \dfrac{\Delta y}{\Delta x}$ $75⁰⁰

$= \dfrac{75}{1}$

$= $75⁰⁰   This is how much he charges per hour.

f) Determine the equation of the graph

$$C = 50 + 75n$$

g) How many hours did it take to repair your car if it costs $950.00?

$950 = 50 + 75n$ (−50, −50)

$\dfrac{900}{75} = \dfrac{75n}{75}$

$12 = n$ ∴ It took 12 hours to repair the car.

9. Anita wants to hire a magician for her son's birthday party. She has a choice between *Marvin the Magnificent* and *Presto Pete*. The cost of hiring *Marvin the Magnificent* is shown on the graph below. *Presto Pete*'s booking fee is $50 more than *Marvin the Magnificent*'s, but he charges $5 less per hour.

a) Create a table of values for the cost of hiring Presto Pete. Add him to the graph. Show your work.

Hours Worked	Cost ($)
0	150
2	180
4	210
6	240
8	270

$$+2 \left(\begin{array}{c|c} x & y \\ \hline 0 & 100 \\ 2 & 140 \end{array} \right) +40$$

$ROC = \dfrac{\Delta y}{\Delta x}$

$= \dfrac{40}{2}$

$= 20$

$IV = 100 + 50$
$= ^\$ 150$

$ROC = 20 - 5$
$= ^\$ 15$

b) Determine when it would be cheapest to hire each magician.

I would hire Marvin the Magnificent if I needed a magician for less than 10 hours.

I would hire Presto Pete if I needed a magician for more than 10 hours
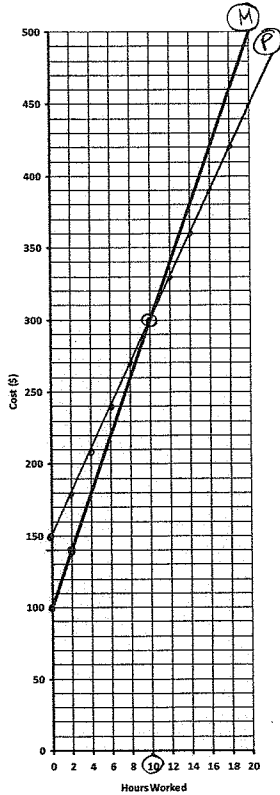
10. Sandra is considering three different painters to paint her living room – *Paint, Paint, Paint!*, *Joe the Painter*, and *Artistic Impressions*.

a) Use the information given about each painter to complete the following graph.

- *Joe the Painter* is cheaper than *Artistic Impressions* if your job takes less than 5 hours.
- *Paint, Paint, Paint!* is more expensive than *Artistic Impressions* if your job takes more than 8 hours.
- *Joe the Painter* is never cheaper than *Paint, Paint, Paint!*.
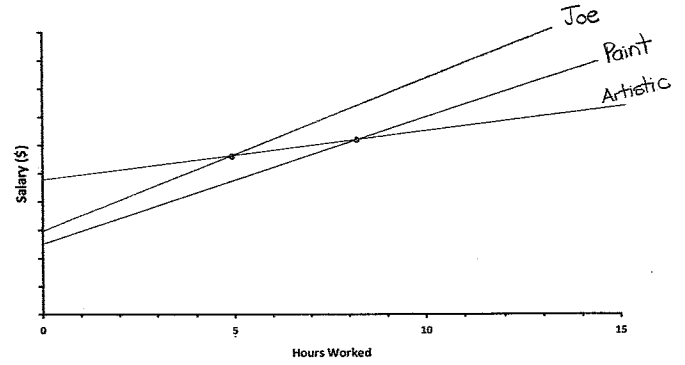
b) Complete the following statements:

Paint, Paint, Paint! could be direct variation. (it starts the lowest)

Joe the Painter and Artistic Impressions must be partial variation.

Artistic Impressions has the highest starting cost

Paint, Paint, Paint! has the lowest starting cost

Joe the Painter charges the most per hour. (steepest line)

Artistic Impressions charges the least per hour. (least steep)