

Equations of Lines: Application Questions

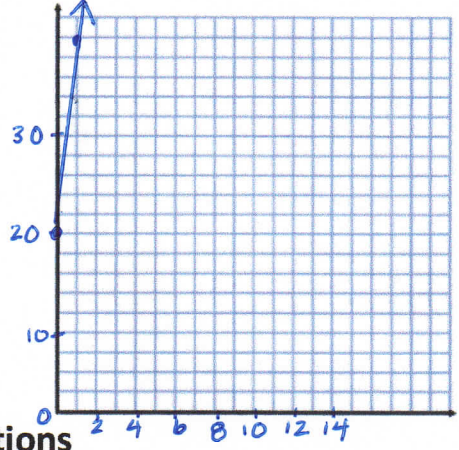
Date Notes

Warm Up

a) Write the linear equation given that the slope is 10 and the initial value is 20 in the form of $y = mx + b$.

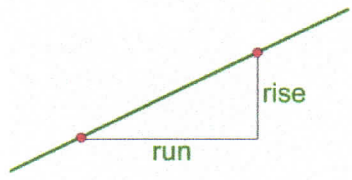
y-int $y = 10x + 20$

b) Graph the relation.



Solving Real-World Applications Involving Linear Equations

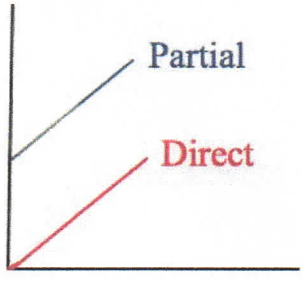
Rates of Change of a Linear Relationship



$$\text{Rate of Change} = \frac{\text{rise}}{\text{run}}$$

The **rate of change** of a linear relationship is the slope of the line.

Direct Variation vs. Partial Variation



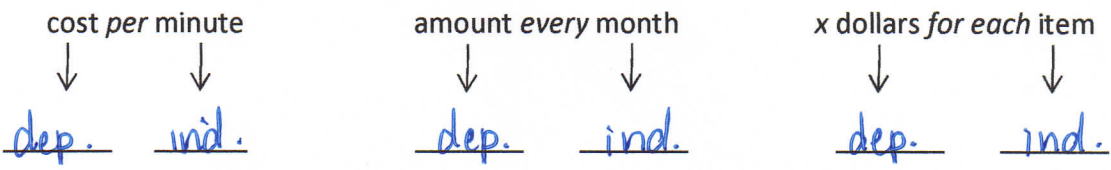
Direct Variation - no initial value
- starts at (0,0)

Partial Variation - has an initial value
- does NOT start at (0,0)

Dependent vs. Independent Variable

Most practical applications deal with money, time and the number of items as the main variables in the questions. To help identify which variable depends on the other, look for keywords within the question such as per, every, each.

Label the *dependent* and *independent* variable.



The DEPENDENT variable is always graphed on the y-axis.

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Ex. 1 A rental car costs \$50 per day plus \$0.20 for each kilometre it is driven.

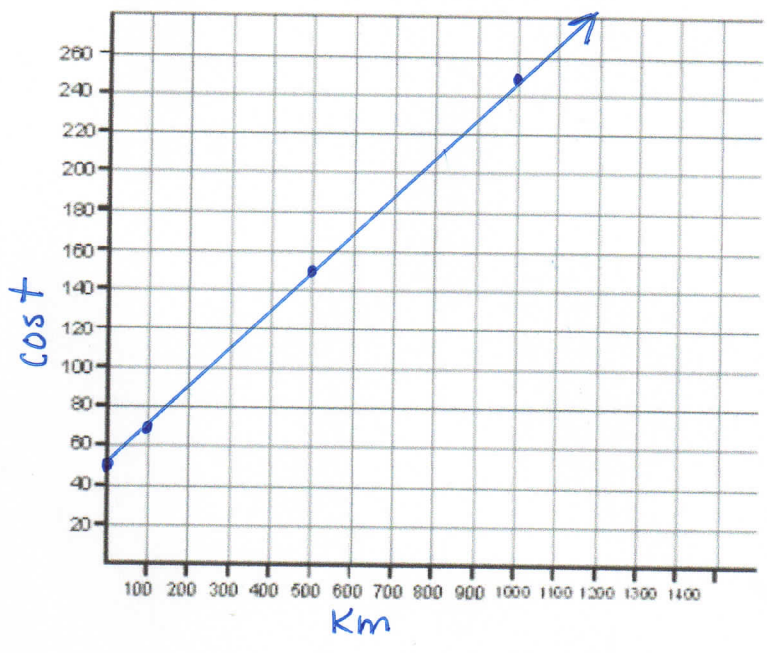
a) What is the dependent variable? cost

What is the independent variable? Km



b) Make a table of values for the rental fee up to 1000km and graph the relationship.

Km (x)	cost (y)
0	50
100	70
200	90
300	110
400	130
500	150
600	170
700	190
800	210
900	230
1000	250



c) Write an equation to model the relationship, where C is the cost and n is the number of kilometres.

$$C = 0.20n + 50$$

$b = 50$
 $m = 0.20$

d) Does this represent a partial or direct variation? Explain.

Partial - does not start at (0,0).

e) Determine the rental fee for 45km. Show your work.

$$C = 0.20n + 50$$

$$C = 0.20(45) + 50$$

$$C = 59 \quad \therefore \text{cost is } \$59 \text{ for } 45 \text{ km.}$$

f) Determine the number of kilometres driven if the bill for the rental car is \$135

$$135 = 0.20n + 50 \quad (c)$$

$$135 - 50 = 0.20n$$

$$\frac{85}{.2} = \frac{0.20n}{.2}$$

$$425 = n$$

$\therefore 425 \text{ km have been driven.}$

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Ex. 2 There is \$500 in Heather's bank account. She takes out \$50 from her account each month but does not put any back in.

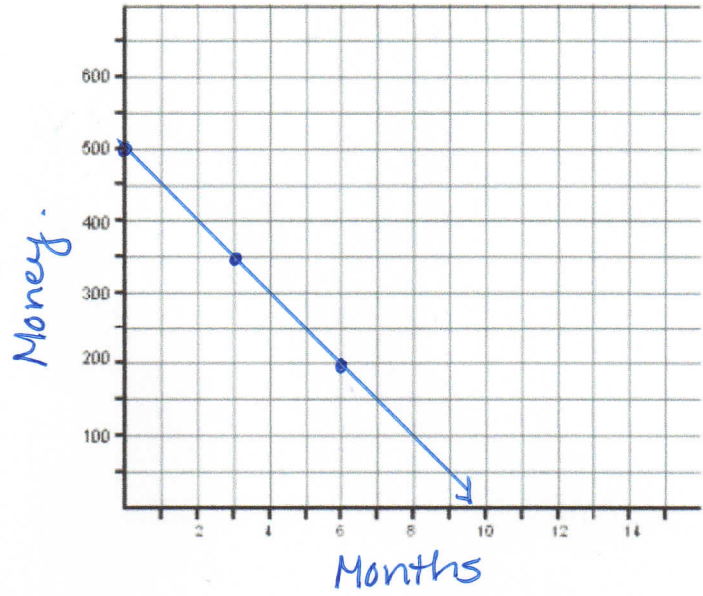
a) What is the dependent variable? *money in the bank*

What is the independent variable? *months*



b) Make a table of values for up to 6 months and graph the relationship.

months (x)	money (y)
0	500
1	450
2	400
3	350
4	300
5	250
6	200



c) Write an equation to model the relationship, where B is the bank account balance and n is the number of months $B = -50n + 500$

$b = 500$
 $m = -20$

d) Does this represent a partial or direct variation? Explain.

Partial - does not start at (0,0)

e) How much will Heather have in her account after 8 months? Show your work.

$$B = -50n + 500$$

$$B = -50(8) + 500$$

$$= 100$$

\therefore she will have \$100.

f) How many months will have passed when Heather has \$50 in her account? Show your work.

$$B = -50n + 500$$

$$50 = -50n + 500$$

$$50 - 500 = -50n$$

$$-450 = -50n$$

$$\frac{-450}{-50} = \frac{-50n}{-50}$$

$$9 = n$$

\therefore 9 months will have passed.