MAAPC20S Linear Functions Lesson 5

Lesson Five – Slope-Intercept Form of the Equation

A linear equation is an equation where the graph would be an oblique line when drawn in the coordinate plane.

Slope-Intercept Form of the Equation of a Linear Function

$y = mx + b$

slope, y-intercept (where the line crosses the y-axis)

variables

Example 1

The graph of a linear function has slope $\frac{3}{5}$ and y-intercept -4. Write an equation for this function.

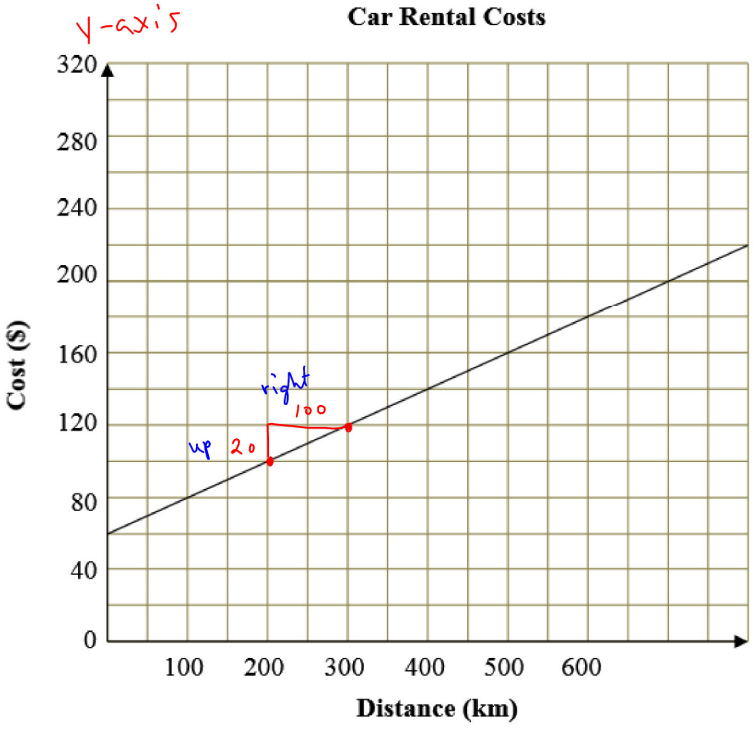
$y = mx + b$ (m, b)

$y = \frac{3}{5}x + (-4)$ sub into eqn

$y = \frac{3}{5}x - 4$

Example 2

Write an equation given the following graph.



$y = mx + b$

① Determine slope (m)

$m = \frac{rise}{run}$

choose 2 pts, make a triangle

$m = \frac{20}{100}$

$m = \frac{1}{5}$

② Determine the y-intercept (where the graph crosses the y-axis)

$b = 60$

$\therefore y = \frac{1}{5}x + 60$

$C = 0.20n + 60$

cost/km, initial cost

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Example 3

The student council sponsored a dance. A ticket cost $5 and the cost for the DJ was $300.

a) Write an equation for the profit, P dollars, on the sale of t tickets.
b) Suppose 123 bought tickets. What was the profit?
c) Suppose the profit was $350! How many people bought tickets?
d) Could the profit be exactly $146? Justify the answer.

↑ rate of change (m) ↑ initial cost (b)
↳ Solve for t

a) $P = 5t - 300$
$5/ticket ↑ pay the DJ

b) $P(t) = 5t - 300$
$P(123) = 5(123) - 300$ ← functional notation
$= \$315$

c) $P = 350$ $P(t) = 5t - 300$
$350 = 5t - 300$
$\frac{650}{5} = \frac{5t}{5}$
$130 = t$ ∴ 130 ppl

The profit is $350 when 130 ppl buy tix.

d) has to be a multiple of 5 since $5/ticket and $300 are both multiples of 5 which $146 isn't so no.

or

$146 + 300 = 5t - 300 + 300$
$\frac{446}{5} = \frac{\$t}{\$}$
$89.2 = t$
↑ not logical
can't sell 0.2 of a ticket or have 89.2 ppl.

Prove a point is on a given line

We can prove whether or not a given point P (x, y) is on a line by substituting the x and y-coordinates into the equation and solving for the Left Hand Side (LHS) and the Right Hand Side (RHS). If both sides are ***equal***, the point is on the line.

Example 4

x y
Determine whether P (4, 3) is on the line $3x - 2y - 6 = 0$

LHS	RHS
$3x - 2y - 6$	0
$3(4) - 2(3) - 6$	0
$12 - 6 - 6$	
0	0
LHS =	RHS

Sub (4, 3) in for (x, y)

∴ (4, 3) is on the line

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