Math 9 5.2 Notes 2 Name:

Graphing Linear Relations

In Section 5.1, we learned that relations can be shown as equations (2 variables) or as a table. If these ordered pairs are joined on graph paper, and the line is straight, then it is a LINEAR RELATION.

1. Complete the table and graph $y = 2x - 1$

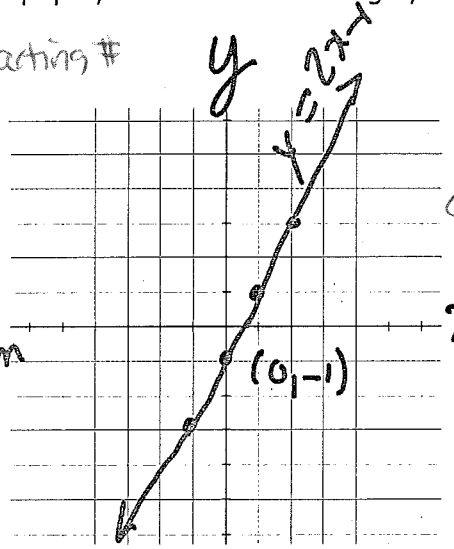
r/c

starting #

X	y
-1	-3
0	-1
1	1
2	3

$y = 2(-1) - 1 = -3$

$= 2(0) - 1 = -1$



positive rate of change - line goes up.

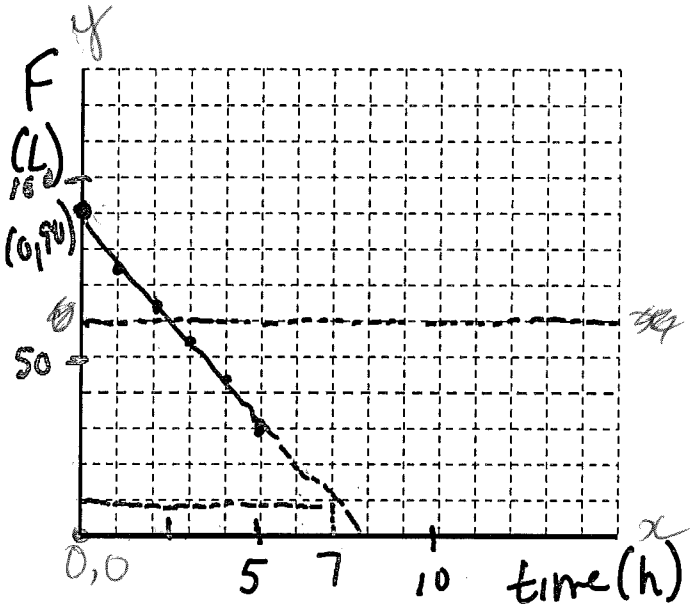
- straight line
  1) Linear relation
  2) CONSTANT rate of change

2. A car can carry a maximum of 90L of fuel. While driving, the car burns 12L/h.

T(hrs)	Fuel Remaining (L)
0	90
1	78
2	66
3	54
4	42
5	30

+1 → -12

The rate of change is CONSTANT and is -12



If the RATE OF CHANGE is constant, then the graph is a straight line and is called a Linear Relation

The graph slope down because rate of change is negative

Interpolate: FIND A VALUE inside / within the data points.

How much fuel ~~is consumed~~ remains after 2.5 h? ~60L

Extrapolate: FIND A VALUE outside / beyond the data points.

How much fuel ~~is consumed~~ remains after 7 h? ~9L

Write an equation for this linear relation: Let h = # of hours and F = Amount of fuel remaining.

Remaining Fuel = Maximum Fuel minus 12 X # of hours

$F = 90 - 12T$ or $F = -12T + 90$

→ When will the fuel tank be empty?

this means that $F = 0$

1. write equation → $F = -12T + 90$
2. insert $F = 0$ → $0 = -12T + 90$
3. solve for T

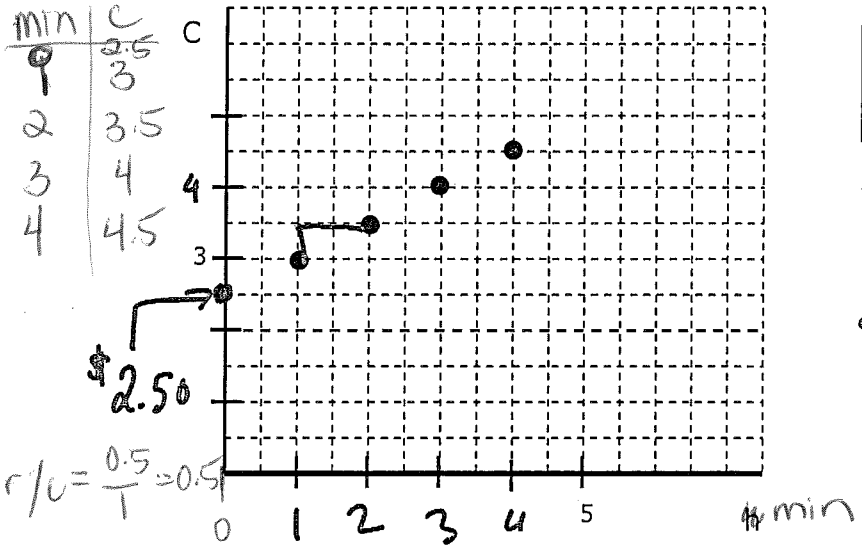
$-90 \quad -90$

$\frac{-90}{-12} = \frac{-12T}{-12}$

$7.5 \text{ hours} = T$

3. A taxi charges a start up fee and a per minute charge. Use the graph to determine the start up fee and per minute charge.

min	C
1	3
2	3.5
3	4
4	4.5



Write an equation.

$C = 0.50n + 2.50$

rate of change = $\frac{y}{x} = \frac{1}{2} = 0.50$ (rise/vertical change; horizontal change/run)

$= \$0.50$

st # $= \$2.50$

Cost for 11 minutes

$C = 0.50n + 2.50$

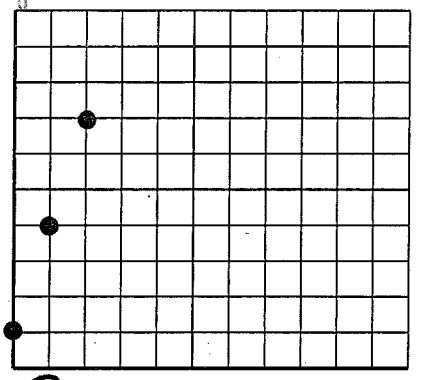
$= 0.50(11) + 2.50$

$= 5.50 + 2.50$

$= \$8$

4. Find the starting point and rate of change for the following.

a)

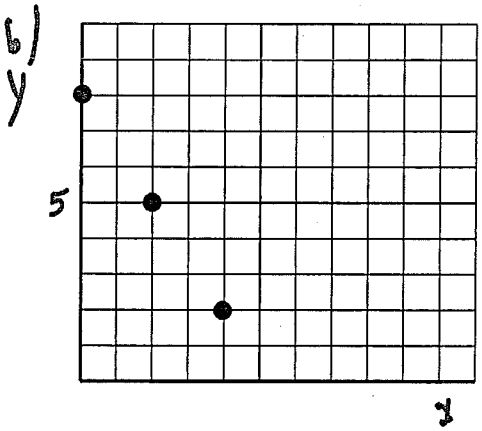


r/c = 3

st # = 1

$y = 3x + 1$

b)



r/c = $\frac{-3}{2}$ (rise v/c; run h/c)

st # = 8

$y = -\frac{3}{2}x + 8$

5. Find the Rate of Change of the line joining A(1, 3) and B(6, 4)

(x, y) (x, y)

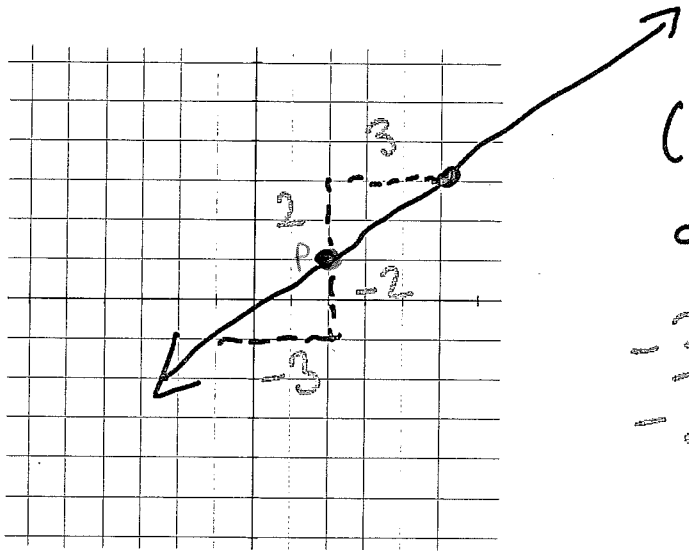
vertical change/rise = 1

horizontal change/run = 5

r/c = $\frac{1}{5}$ or 0.2

6. Use the rate of change to find another point on the line.

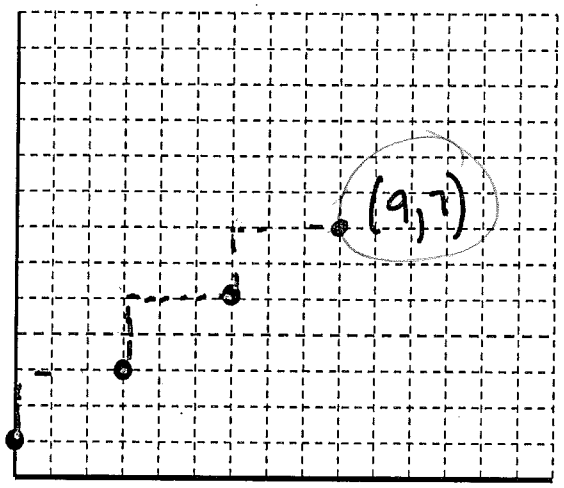
a) Draw a line with a starting point of P(2, 1) with a rate of change of $\frac{2}{3}$.



(5,3) is also on the line

$\frac{-2}{-3} = \frac{2}{3}$

b) Find another point on the following grid.



(9,7) is also on the line

vertical change/ rise = 2, horizontal change/ run = 3

$r/c = \frac{2}{3}$

up 2, over 3