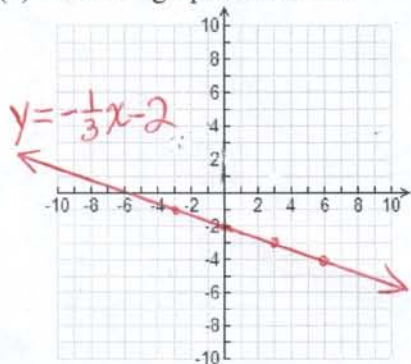# REVIEW: EQUATIONS OF LINEAR RELATIONS

1. A line has a slope of $-\dfrac{1}{3}$ and a y-intercept of -2.

(a) Sketch a graph of the line.

$y=-\frac{1}{3}x-2$

(b) Write the equation of the line in slope-y-intercept form.

$m=-\frac{1}{3}, b=-2$

$\therefore$ the slope-y-intercept equation of the line is

$y=-\frac{1}{3}x-2$

(c) Now write the equation in standard form.

$y=-\frac{1}{3}x-2$

$\therefore 3y=\frac{3}{1}(-\frac{1}{3}x)-3(2)$

$\therefore 3y=-x-6$

$\therefore 3y+x+6=-x-6+x+6$

$\therefore \boxed{x+3y+6=0}$ standard form

2. Given the following equations of linear relations, state the slope and y-intercept.

(a) $y=x-6$

$m=\underline{\ 1\ }$

$b=\underline{\ -6\ }$

(b) $y=-x+10$

$m=\underline{\ -1\ }$

$b=\underline{\ 10\ }$

(c) $x=-7$

$m=\underline{\text{undefined}}$

$b=\underline{\text{undefined}}$

(d) $y=-7$

$m=\underline{\ 0\ }$

$b=\underline{\ -7\ }$

(e) $5x-2y-10=0$

$m=\underline{\ \frac{5}{2}\ }$ add $2y$ to B.S.

$b=\underline{\ -5\ }$

$5x-10=2y$

$\therefore \frac{5x}{2}-\frac{10}{2}=\frac{2y}{2}$

$\therefore y=\frac{5}{2}x-5$

3. Using the grid provided below, graph each of the relations in question 2.
   (Graph 2(e) using the intercepts method.)
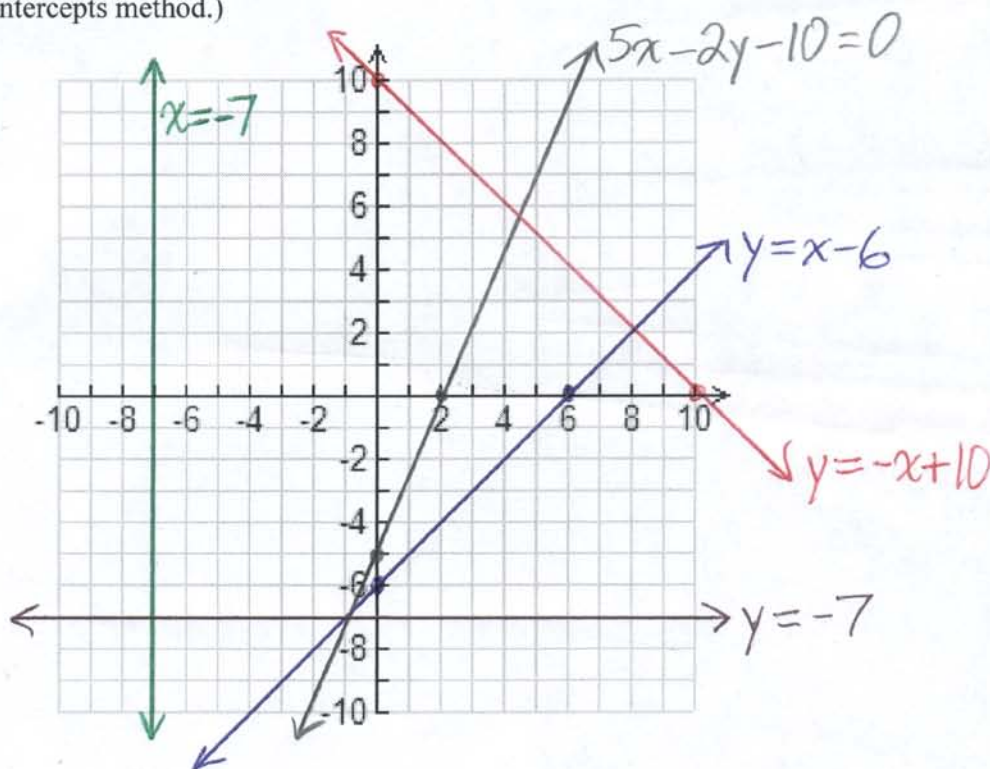
4. Hannah's total pay includes a base salary and a percent of her sales.

This means that the relation must be linear!

The following table shows her total pay for three different sales levels.

Sales ($) S	Total pay ($) P
15 000	1700
17 500	1825
28 000	2350

The relation is linear because the base salary is the initial or fixed value and a percentage of her sales has a constant rate of change.

Determine Hannah's total pay when her sales are $47 000.

Show your work.

$$\therefore m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{1825 - 1700}{17500 - 15000}$$

$$= \frac{125}{2500}$$

$$= \frac{1}{20}$$

Therefore, the equation must take the form

$$P = \frac{1}{20}S + b$$

$$\therefore 1700 = \frac{1}{20}(15000) + b$$
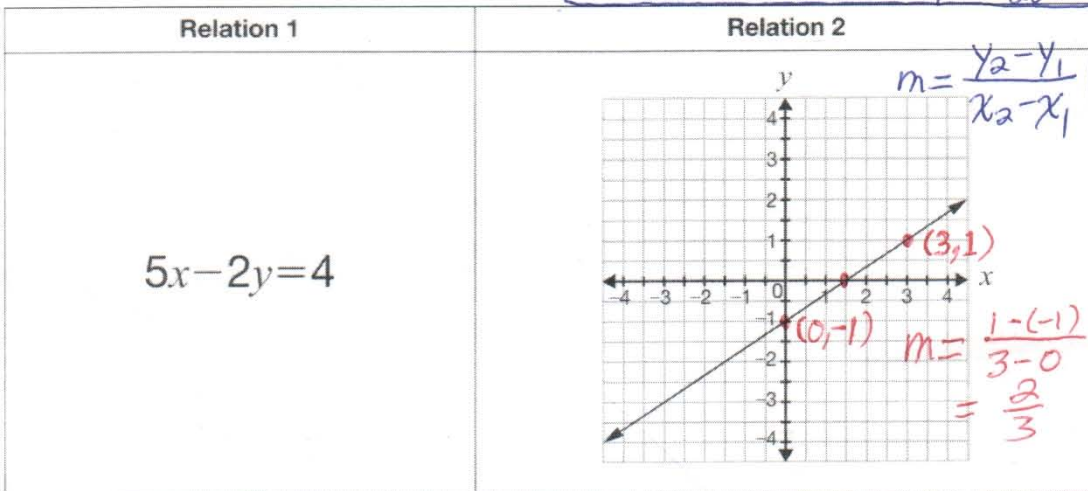
$$\therefore 1700 = 750 + b$$

$$\therefore b = 950$$

$$\therefore P = \frac{1}{20}S + 950$$

5. Consider the two relations represented below.

For $s = 47000$

$$P = \frac{1}{20}(47000) + 950$$

$$\therefore P = 2350 + 950$$

$$\therefore P = 3300$$

Relation 1	Relation 2
$5x - 2y = 4$	

Relation 2:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

points $(3, 1)$ and $(0, -1)$

$$m = \frac{1 - (-1)}{3 - 0} = \frac{2}{3}$$

Hannah is paid $3300 for sales of $47000.

Determine the slope of the line representing each relation.

Show your work.

Relation 1

$$5x - 2y = 4$$

$$\therefore 5x - 2y - 5x = 4 - 5x$$

$$\therefore -2y = -5x + 4$$

$$\therefore \frac{-2y}{-2} = \frac{-5x}{-2} + \left(\frac{4}{-2}\right)$$

$$\therefore y = \frac{5}{2}x - 2$$

$\therefore$ the slope of relation 1 is $\frac{5}{2}$

Relation 2

$$m = \frac{1 - (-1)}{3 - 0} \quad \text{(see graph)}$$

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

The slope of relation 2 is $\frac{2}{3}$.