Identifying Slope and y-intercept
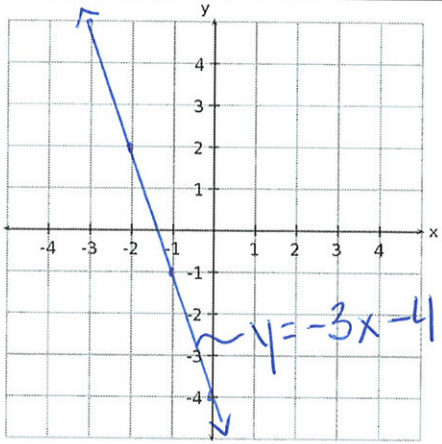
slope →

$$y = mx + b$$

← y-intercept

Practice 1 – Identifying m and b

1. For each of the following, identify the slope and y-intercept, OR use the slope and y-intercept to write an equation.
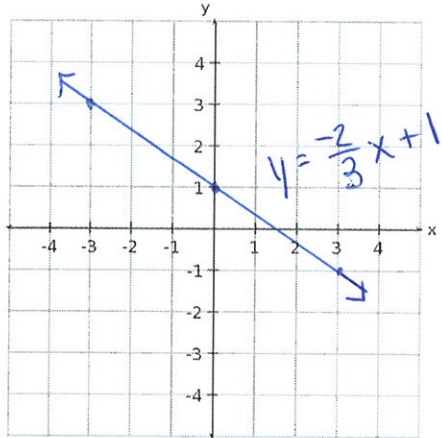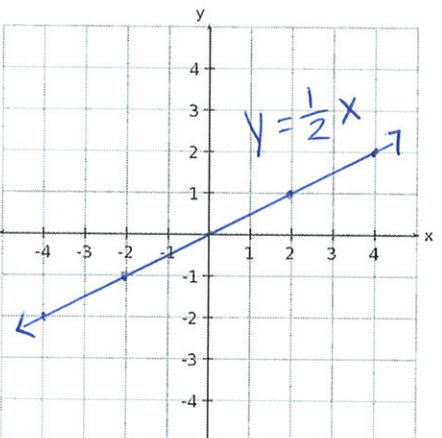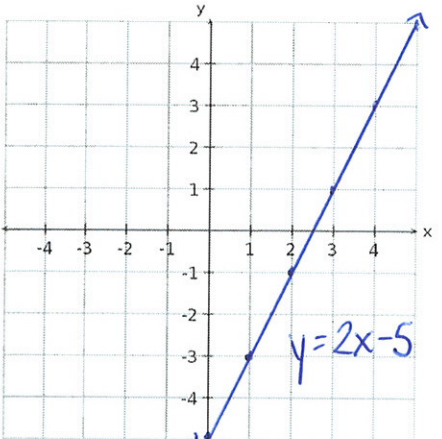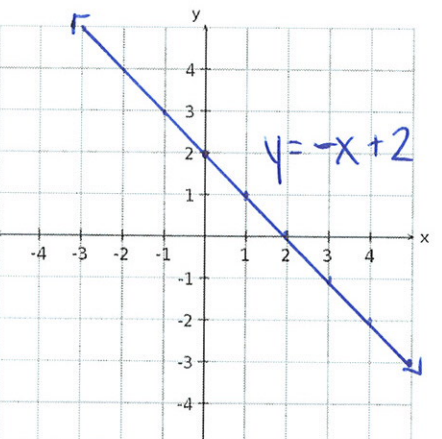
		Slope	y-intercept
a.	$y = \dfrac{9}{10}x + 5$	m = $\dfrac{9}{10}$	b = 5
b.	$y = \dfrac{-1}{3}x - 6$	$\dfrac{-1}{3}$	-6
c.	$y = 9x - \dfrac{1}{2}$	9	$-\dfrac{1}{2}$
d.	$y = -x + 3$	-1	3
e.	$y = x - \dfrac{3}{4}$	1	$-\dfrac{3}{4}$
f.	$y = \dfrac{8}{9}x$	$\dfrac{8}{9}$	0
g.	$y = 8 + 3x$	3	8
h.	$y = x$	1	0
i.	$y = \dfrac{4}{5}x + 5$	$\dfrac{4}{5}$	5
j.	$y = -3 - x$	-1	-3
k.	$y = \dfrac{2}{3}x + 5$	$\dfrac{2}{3}$	5
l.	$y = -3.4 + 2.5x$	2.5	-3.4
m.	$y = 1.3x - 2.3$	1.3	-2.3
n.	$y = -0.4x - \dfrac{3}{7}$	-0.4	$\dfrac{-3}{7}$
o.	$3x - 8 = y$	3	-8
p.	$y = \dfrac{1}{2}x + \dfrac{6}{11}$	$\dfrac{1}{2}$	$\dfrac{6}{11}$
q.	$y = 1\dfrac{3}{4}x + 4$	$1\dfrac{3}{4}$	4
r.	$y = \dfrac{3x}{4} - 7$	$\dfrac{3}{4}$	-1
s.	$y = -\dfrac{2}{3}x - 6$	$\dfrac{-2}{3}$	-6

Graphing Lines

Ex 1. Graph the following line: $y = -3x - 4$	
1	Begin at the y-intercept
2	Using the slope, count up for the rise (down if it's negative) and right for the run (left if it's negative)
3	Join your points. Put arrows at the ends. Label your line.

$y = -3x - 4$

Practice 2 – Graphing Lines

2. Graph the following line: $y = \dfrac{-2}{3}x + 1$

$y = \dfrac{-2}{3}x + 1$

3. Graph the following line: $y = \dfrac{1}{2}x$

$y = \dfrac{1}{2}x$

4. Graph the following line: $y = 2x - 5$

$y = 2x - 5$

5. Graph the following line: $y = -x + 2$

$y = -x + 2$

Determining the equation of a line

From words

Ex 2 Michael works at a clothing store. In a week, he makes a base salary of $300, plus $13 for each hour he works. Write an equation that models his total weekly earnings.

1	Identify the DEPENDENT (y) and INDEPENDENT (x) variables. Define them	let y be total earnings let x be number of hours
2	Begin with the point-slope equation of a line	$y = mx + b$
3	Identify your RATE OF CHANGE (slope). This is "m"	$m = 13$
4	Identify your INITIAL VALUE (y-intercept). This is "b"	$b = 300$
5	Put everything together	$y = 13x + 300$

Answering secondary questions:

a) One week, Michael works 40 hours. How much money does he make?

6	Determine if you need to substitute for x or y	40 hours is an x value
7	Substitute	$y = 13(40) + 300$
8	Solve	$y = 520 + 300$ $y = 820$
9	Answer in a complete sentence	∴ He makes $820

b) If Michael wants to make $700, how many hours does he have to work?

6	Determine if you need to substitute for x or y	$700 is a y value
7	Substitute	$700 = 13x + 300$
8	Solve	$700 - 300 = 13x + 300 - 300$ $\frac{400}{13} = \frac{13x}{13}$ → $30.77 = x$
9	Answer in a complete sentence	∴ He needs to work nearly 31 hours.

Practice 3 – Writing an Equation from Words

For ALL of the following questions, please DEFINE YOUR VARIABLES

6. An airplane 30,000 feet above the ground begins descending at the rate of 2000 feet per minute. Assume the plane continues at the same rate of descent. The plane's height and minutes above the ground are related.
    a. Write an equation to model the situation. $y = -2000x + 30\,000$
    b. When will the plane hit the ground? It will hit the ground after 15 minutes.

7. You are visiting Montreal, and a taxi company charges a flat fee of $3.00 for using the taxi and an additional $0.75 per kilometer.
    a. Write an equation that you could use to find the cost of a taxi ride in Montreal. $y = 0.75x + 3$
    b. What is the cost of a 60km cab ride? It will cost $48

8. A plumber charges a fee of $50 to make a house call. He also charges $25 an hour for labour.
    a. Write an equation that you could use to find the amount a plumber charges for a house call based on the number of hours of labour. $y = 25x + 50$
    b. If you paid $143.75, how many hours did the plumber work for? He worked for 3.75 hours

9. A mutual fund company charges $50 a year to hold the fund and then an additional 2% (.02) of the profits made for that year.
    a. Write an equation that could be used to determine how much one would pay to the mutual fund company in a year. $y = 0.02x + 50$
    b. If the fund made $30 000 in profits, how much would you pay to the company? You would pay $650

10. Kim and Cyndi are starting a business tutoring students in math. In one month, they rent an office that costs them $400 and charge $40 per hour per student.
    a. Write an equation relating number of hours and total earnings. $y = 40x - 400$
    b. How many hours do they have to tutor to break even (make $0 in total earnings) They have to work 10 hours.

11. Lin is tracking the progress of her plant's growth. When she purchases the plant, it is 5cm high, and it grows 1.5cm per day.
    a. Write an equation that models the plant's growth. $y = 1.5x + 5$
    b. How tall is it after 1 week? It is 15.5cm.

12. A salesperson receives a base salary of $35 000 and a commission of 10% of the total sales for the year.
    a. Write a linear model that shows the salesperson's total income. $y = 0.10x + 35\,000$
    b. If she makes a total income of $65 000, what were the total sales for the year? The total sales were $300 000.

13. A plane is taking off at a rate of 1500 feet per minute.
    a. Write a linear equation relating the plane's height to time. $y = 1500x$
    b. How long does it take the plane to reach a height of 25 000 feet? It will take 16.67 minutes.

14. A 1000ml bucket has a hole and is leaking water at a constant rate of 5ml/s.
    a. Write an equation relating time, and the amount of water left in the bucket $y = -5x + 1000$
    b. How long will it take until the bucket is empty? It will take 200 seconds, or 3.33 minutes, or 3 minutes and 20 seconds