

Review:

Things we (should) know about lines:

slope-intercept form

$$y = mx + b$$

point-slope equation

$$y - y_1 = m(x - x_1)$$

Slope

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

horizontal lines

$$y = k \text{ for some constant } k \text{ (0 slope)}$$

vertical lines

$$x = k \text{ (no slope)}$$

Parallel

$$m_1 = m_2$$

Perpendicular

$$m_1 = -\frac{1}{m_2}$$

Thinking ahead:

What is the difference between a function and an equation?

What is the difference between an x-intercept of a function and a zero of a function?

Homework questions?

$$\frac{1}{3} [2(x-3)]^2$$

## Section 2.1 Linear Equations, Functions, and Models

### Linear function v. Linear equation

Recall that a **function** is a relation in which each input has exactly one output.

A **linear function** takes the form  $f(x)=mx+b$ . Recall that  $f(x)$  is the same as  $y$ , so a function really has two variables.

An **equation** is a statement that two expressions are equal.

A **linear equation** takes the form  $Ax+B=0$ , where  $A$  is non-zero (otherwise there would be no  $x$ !). Note that a linear equation only has one variable of degree 1.

Rules for solving equations:

For any real numbers  $a$ ,  $b$ , and  $c$ :

If  $a=b$  is true, then  $a+c=b+c$  is true.

(you can add the same thing on both sides of an equation)

If  $a=b$  is true, then  $ac=bc$  is true.

(you can multiply the same thing on both sides of an equation)

$$24. \quad 3(2x-5)+4=2(4x+3)$$

$$6x-15+4=8x+6$$

$$-15+4-6=8x-6x$$

$$-17=2x$$

$$\boxed{\frac{-17}{2}=x}$$

**Application Problems:**Motion:

The distance  $d$  traveled by an object moving at a rate  $r$  in time  $t$  is given by

$$d = r t$$

Simple Interest:

The simple interest  $I$  on a principal of  $P$  dollars at interest rate  $r$  for  $t$  years is given by

$$I = P r t$$

48. private airplane flies east @ 180 km/h  
2 hours later, jet flies east @ 900 km/h  
how far from the airport will the jet  
overtake the private plane?

	rate	time	distance
private airplane	180 km/h	$t + 2$	$180(t + 2)$
jet	900 km/h	$t$	$900t$

$$180(t + 2) = 900t$$

$$180t + 360 = 900t$$

$$360 = 720t$$

$$\frac{1}{2} = t \leftarrow \text{time it take}$$

$$d = 900\left(\frac{1}{2}\right) = \boxed{450 \text{ km}}$$

54. total for 2 loans is \$9000

	Principal	Rate	time	Interest
5% loan	$9000 - x$	0.05	1	$0.05(9000 - x)$
6% loan	$x$	0.06	1	$0.06x$

after 1 year, Dimitri owes \$492 in interest

$$0.05(9000 - x) + 0.06x = 492$$

...

\$4800 @ 5% & \$4200 @ 6%

### Zeros of a function v. x-intercepts

A **zero** of a function is the input value for which the function's output is 0, that is,

**c is a zero of f if  $f(c)=0$ .**

**In particular, the zero of a linear function  $f(x)=mx+b$  is the solution of the linear equation  $mx+b=0$ , and is the **first coordinate of the x-intercept** of the graph of  $f(x)=mx+b$ .**

To find the zero(s) of any function, we **set  $f(x)=0$  and solve for x**.

x-intercept:  $(x, 0)$

Zero: x-value that gives you  $f(x)=0$

$$72. f(x) = -3x + 13$$

$$\text{zero: } -3x + 13 = 0 \quad x = \boxed{\frac{13}{3}}$$
$$-3x = -13$$

$$\text{x-int: } \boxed{\left(\frac{13}{3}, 0\right)}$$

$$\text{y-int: } -3(0) + 13 = 13$$
$$\boxed{(0, 13)}$$

## 2.2 - Complex # review

$$a + bi, \quad i = \sqrt{-1}$$

$a$  = real part,  $b$  = imaginary part

$$i^2 = -1$$

complex conjugate of  $a + bi$   
is  $a - bi$

$$\text{Given } ax^2 + bx + c = 0$$

Quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

If  $b^2 - 4ac = 0$ , 1 real "double root"

If  $b^2 - 4ac > 0$ , 2 real roots

If  $b^2 - 4ac < 0$ , 2 complex conjugate roots

**Homework #2** (to be turned in on Friday):

Assigned Friday 3/1:

1.5 #51-73 odd

Assigned Monday 3/4:

1.6 #23, 29, 31, 71, 75, 81

1.7 #9, 11, 39-47 odd

Assigned Wednesday 3/6:

1.7 #59-69 odd, 77-83 odd, 93-101 odd, 115-121 odd

Assigned Thursday 3/7:

2.1 #33, 47, 77-81 odd, 91-99 odd