**Linear functions** exhibit a **constant rate of change** which is the **slope**: $m = \dfrac{y_2 - y_1}{x_2 - x_1}$.

Different forms of a linear function: $\begin{cases} \text{slope-intercept: } f(x) = mx + b \\ \text{point-slope: } y - y_1 = m(x - x_1) \\ \text{standard: } Ax + By = C \end{cases}$

Special Lines: $\begin{cases} \text{Horizontal: } y = b; \ m = 0 \\ \text{Vertical: } x = a; \ m \text{ is undefined} \\ \text{Parallel: slopes are equal} \\ \text{Perpendicular: slopes are negative reciprocals} \end{cases}$

1) Write an equation for each line graphed below:
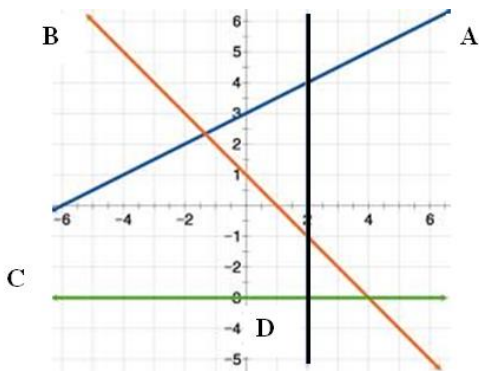
Find the equation of the line in slope-intercept form $(y = mx + b)$ and standard form $(Ax + By = C)$.

You might have to use point-slope first $(y - y_1) = m(x - x_1)$.

2) A line through points A(−3, 7) and B(1, −3).

3) A line through the point C(5, −2) and parallel to $y = -\dfrac{1}{3}x + 4$. Graph both lines on one **x-y** plane.

4) A line through the point D(−4, 2) and perpendicular to $y = -4x + 1$.
Graph both lines on one **x-y** plane.

5) A certain stock starts out at $50 per share at the opening of the market and is increasing linearly at a rate of $3 per hour.
(A) Write an equation representing the Value (V) of the stock, as a function of hours, h, that the market has been open.
(B) What is the stock's value after 5.5 hours?

6) A gym membership with two personal training sessions costs $125, while gym membership with 5 personal training sessions costs $260. What is the rate for personal training sessions?

GEOMETRY

An **angle** is the union of two rays having a common endpoint. The endpoint is called the **vertex** of the angle, and the two rays are the sides of the angle. The angle is formed from $E{\rightarrow}D$ and $E{\rightarrow}F$. Angles can be named using a point on each ray and the vertex, such as angle *DEF*, or in symbol form $\angle DEF$.	Angle *DEF*
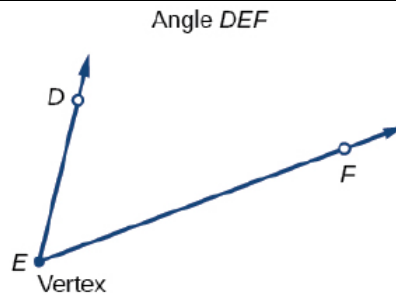
Greek letters are often used as variables for the measure of an angle. **Table 1.1** is a list of Greek letters commonly used to represent angles, and a sample angle is shown in to the right.
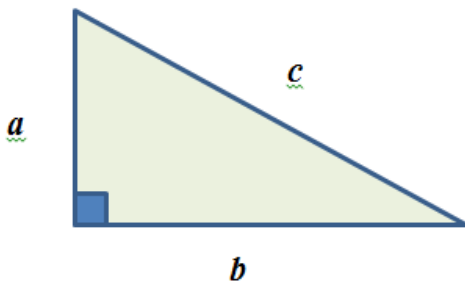
θ	φ or ϕ	α	β	γ
theta	phi	alpha	beta	gamma

Table 1.1

Angle theta, shown as $\angle\,\theta$
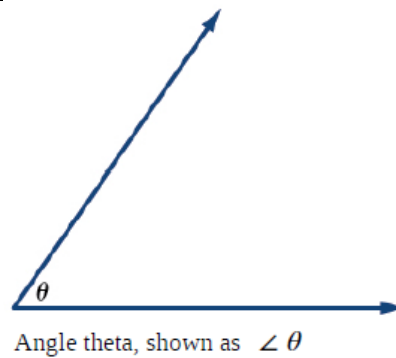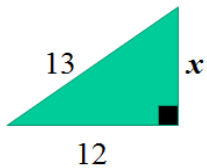
Pythagorean Theorem

In a right triangle, the sum of its legs squared = its hypotenuse squared.

$$a^2 + b^2 = c^2$$

Example: Find *x*.

$$x^2 + 12^2 = 13^2$$
$$x^2 + 144 = 169$$
$$x^2 = 25$$
$$x = 5$$

Example: Find *x*.
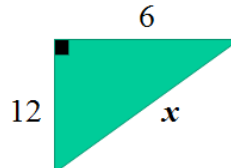
$$6^2 + 12^2 = x^2$$
$$36 + 144 = x^2$$
$$180 = x^2$$
$$x = \sqrt{180} = \sqrt{9 \times 20}$$
$$= \sqrt{9 \times 4 \times 5} = 6\sqrt{5}$$

Converse of the Pythagorean Theorem

If the sum of two legs squared = the hypotenuse squared, then the triangle is a right triangle.

Example: If a triangle's sides measure 3, 4, 5; do these measures represent a right triangle.

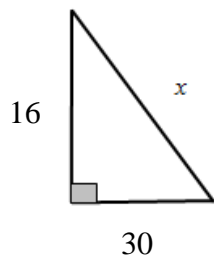Remember that the biggest side must be the hypotenuse; so $a = 3$, $b = 4$, and $c = 5$.
Is this a true statement: $3^2 + 4^2 = 5^2$?

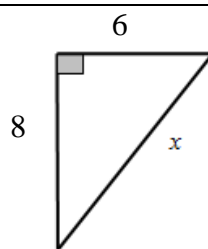**Whole numbers that make a true statement are called Pythagorean Triples.**

Common Pythagorean Triples that used in Trigonometry: (3, 4, 5), (5, 12, 13); (8, 15, 17), and (7, 24, 25).
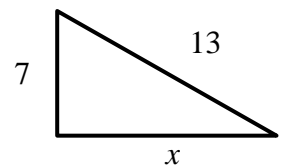
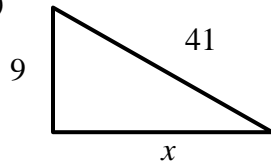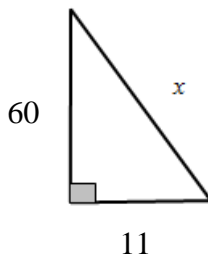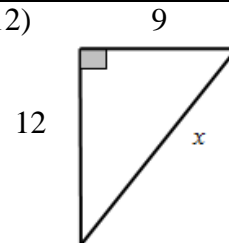---

Find the missing side.

7)

16, 30, x

8)

6, 8, x

9)

7, 13, x

10)

9, 41, x

11)

60, 11, x

12)

9, 12, x

ANSWERS:

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

B) $y = -x + 1$

C) $y = -3$

D) $x = 2$

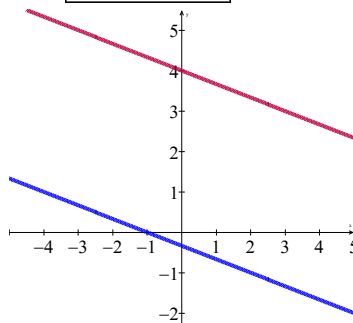2) $y - 7 = \dfrac{-5}{2}(x + 3)$

$5x + 2y = -1$

$\boxed{y = \dfrac{-5}{2}x - \dfrac{1}{2}}$
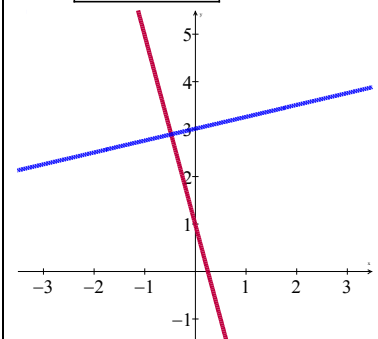
3) $y + 2 = \dfrac{-1}{3}(x - 5)$

$x + 3y = -1$

$\boxed{y = \dfrac{-1}{3}x - \dfrac{1}{3}}$

4) $y - 2 = \dfrac{1}{4}(x + 4)$

$x - 4y = -12$

$\boxed{y = \dfrac{1}{4}x + 3}$

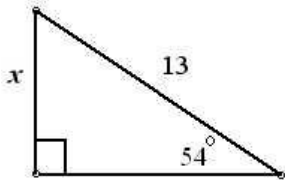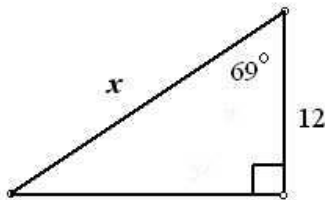| SOH-CAH-TOA		
Find the missing measurement using trig ratios. $$\sin\theta = \frac{O}{H} \qquad \cos\theta = \frac{A}{H} \qquad \tan\theta = \frac{O}{A}$$		

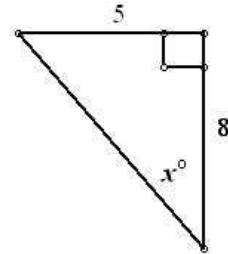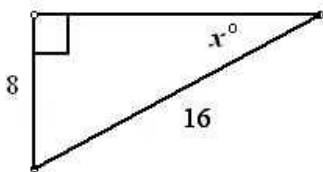**Find the missing measures. Round to the nearest tenth.**
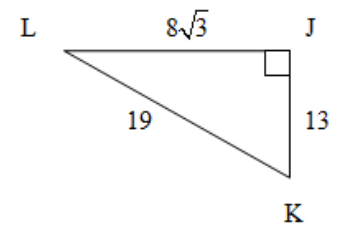
13) Find x.	14) Find x.	15) Find x.
13 54° x	69° x 12	5 8 $x°$
16) Find x.	17) Find x.	18) Find angle K.
$x°$ 8 16	39° 8 x	L $8\sqrt{3}$ J 19 13 K
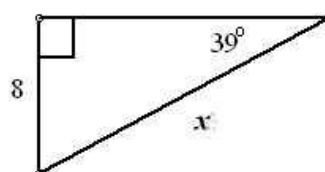
Solve each problem. Round measures of segments to the nearest tenth and measures of angles to the nearest degree.

19) Suppose the sun casts a shadow off a 35-foot building. If the angle of elevation to the sun 60°, how long is the shadow?

20) From the top of a tower, the angle of depression to a stake on the ground is 72°. The top of the tower is 80 feet above ground. How far is the stake from the foot of the tower?

21) A tree 40 feet high cast a shadow 58 feet long. Find the measure of the angle of elevation of the sun.

22) A ladder leaning against a house makes an angle of 60° with the ground. The foot of the ladder is 7 feet from the foot of the house. How long is the ladder?

23) A water slide is 400 yards long with a vertical drop of 36.5 yards. Find the angle of depression of the slide.

Answers (con't)

5A) $V(h) = 3h + 50$

B) $V(5.5) = 3(5.5) + 50 = \$66.50$

6) $x =$ personal training

$y =$ gym membership

$2x + y = 125 \rightarrow y = 125 - 2x$

$5x + y = 260 \rightarrow y = 260 - 5x$

$125 - 2x = 260 - 5x \rightarrow \boxed{x = \$45}$

7) 34

8) 10

9) $\sqrt{120}$

10) 40

11) 61

12) 15

13) $\sin 54 = \dfrac{x}{13} \rightarrow \boxed{x = 10.5}$

14) $\cos 69 = \dfrac{12}{x} \rightarrow \boxed{x = 33.5}$

15) $\tan x = \dfrac{5}{8} \rightarrow \boxed{x = 32°}$

16) $\sin x = \dfrac{8}{16} \rightarrow \boxed{x = 30°}$

17) $\sin 39 = \dfrac{8}{x} \rightarrow x = 12.7$

18) $\tan K = \dfrac{8\sqrt{3}}{13} \rightarrow K = 46.8°$

19) $\tan 60 = \dfrac{35}{x} \rightarrow x = 20.2$

20) $\tan 72 = \dfrac{80}{x} \rightarrow x = 26$

21) $\tan x = \dfrac{40}{58} \rightarrow x = 34.6°$

22) $\cos 60 = \dfrac{7}{x} \rightarrow x = 14$

23) $\sin x = \dfrac{36.5}{400} \rightarrow x = 5.2°$