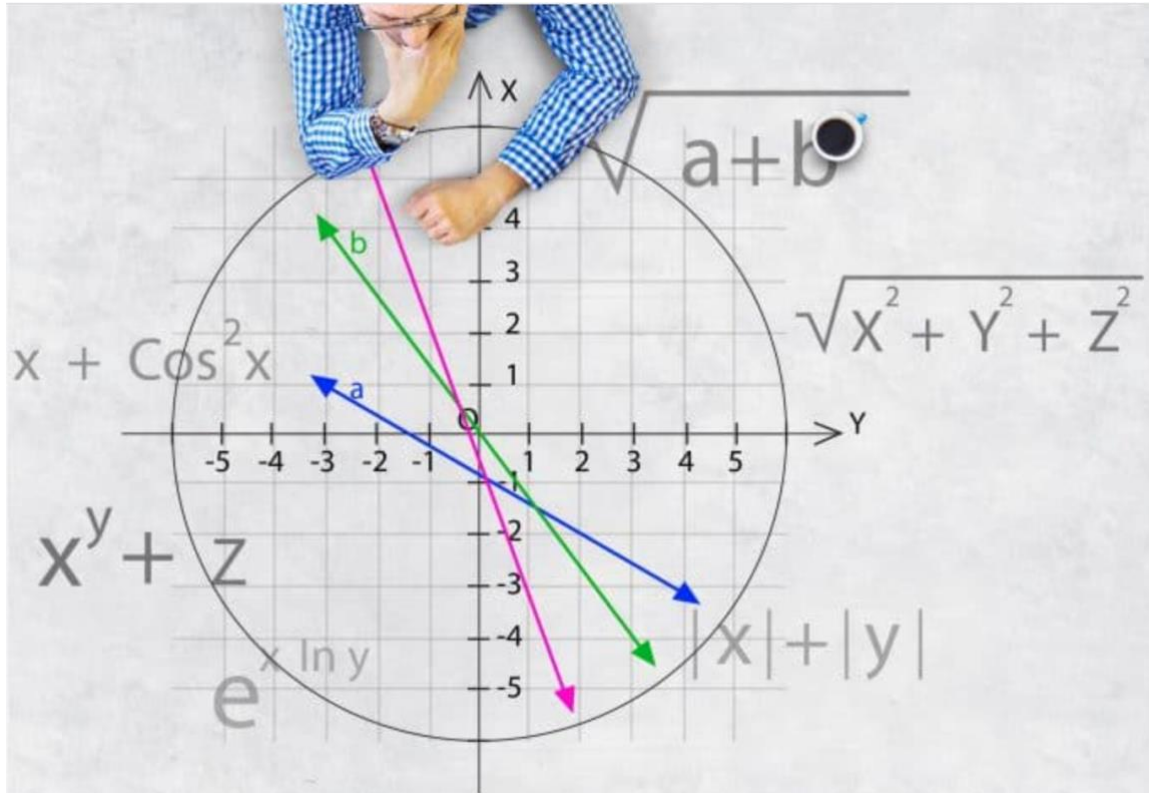


AP PRECALCULUS

SUMMER PACKET

CONWELL-EGAN CATHOLIC HIGH SCHOOL



This summer assignment is a review and exploration of key skills that are necessary for success in your mathematics course as well as future high school mathematics courses.

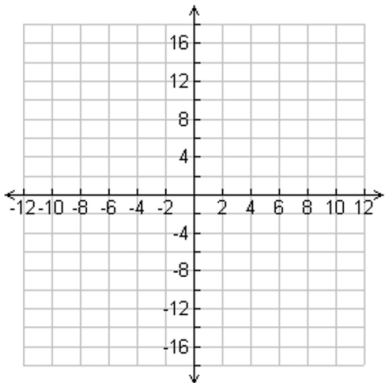
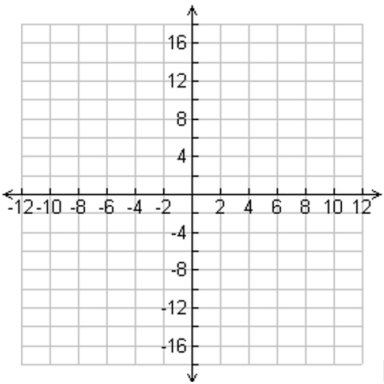
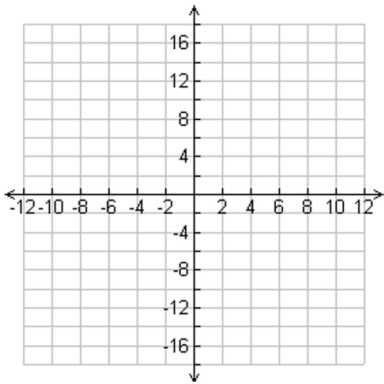
All summer packets are due on the Friday of the first full week of school.

A DIGITAL COPY OF THIS PACKET WITH EXAMPLES CAN BE FOUND ON THE SCHOOL'S WEBSITE UNDER THE ACADEMIC'S TAB.

Use the linear equation: $5x - 4y = 8$

Rewrite the equation in slope-intercept form.	State the slope and y-intercept.	Find the x-intercept.
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A line passes through $(7,4)$ and $(3,-4)$. Find the equation for the line in all three forms for linear equations.		
Slope-intercept Form $y = mx + b$	Point-slope Form $y - y_1 = m(x - x_1)$	Standard Form $Ax + By = C$

Sketch the graph of each line.		
a. $y = \frac{2}{3}x - 2$ 	b. $-4x + 3y = -24$ 	c. $y = -2$ 

A recording studio charges a base fee for use for their facility plus a constant fee per hour of use. The table compares the number of hours the studio is used with the total cost c , for use of the studio. Use the table to answer each question below.

Hours of studio use (h)	2	4	6	8
Total cost to use the studio (C).	\$450	\$600	\$750	\$900

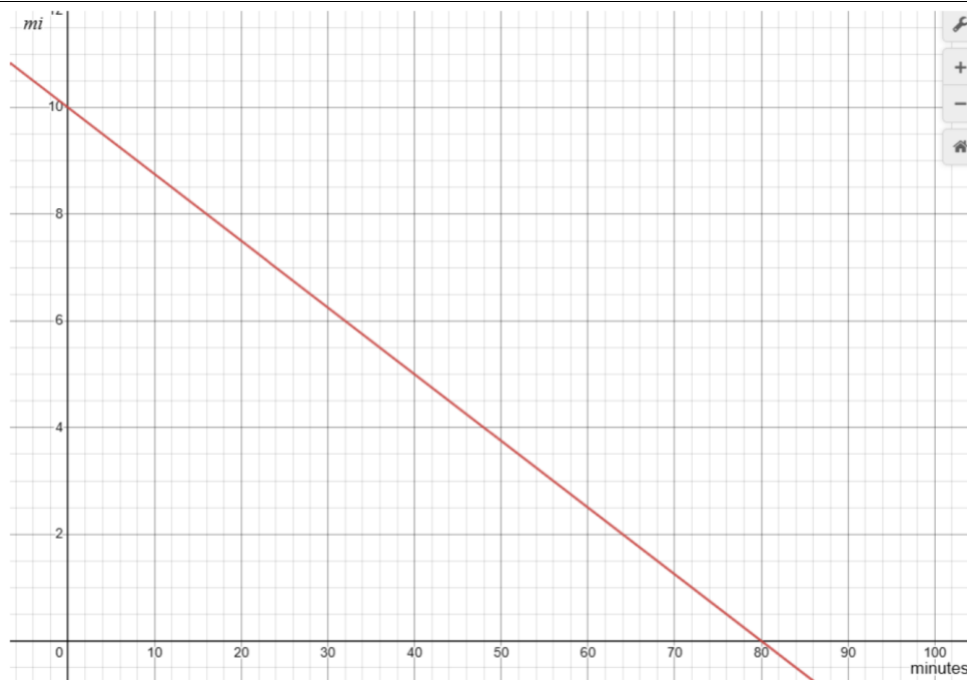
a. What is the fee charged per hour for the use of the studio?

b. What is the base fee for the rental of the studio?

c. Write a linear equation to model this situation.

d. Identify the domain and range for this function.

Jaden completes in a race, running at a constant pace from start to finish. The distance remaining in the race (in miles) as a function of time (in minutes) is shown in the graph. Use the graph to answer the following questions.



a. How long did It take Jaden to reach the finish line? Explain.

b. How long (distance) was the race? Explain your reasoning.

Write an equation of the line described. Express your answer in slope-intercept form.

Passes through the point $(-2,3)$ and is perpendicular to the line $3x + 4y = -7$.

Two values of a linear function $f(x)$ are $f(4) = 2$ and $f(-5) = -1$.

For several mammals, the gestation period, in days, and the average life span, in years, is recorded below:

Animal	Gestation (days)	Average Life Span (years)
Rabbit	31	7
Dog	60	11.4
Squirrel	44	9
Wolf	62	11.6

a. Using your calculator's regression capabilities, find $L(G)$, the linear function of best fit for this data. Write decimal values correct to three decimal places.

b. Use $L(G)$ to predict the average life span of a kangaroo with a gestational period of 35 days. Give your answers correct to three decimal places and include units of measure.

c. What are the units of the L intercept? What is the meaning of the L intercept? Could this situation occur?

d. What are the units of the slope? What is the meaning of the slope in the context of this problem?

e. What is the meaning of $(38,8)$ in the context of this problem?

f. Use $L(G)$ to predict the average gestation of wild horse with an average life span of 20 years. Give your answer correct to three decimal places and include units of measure.

Solve using substitution method.

How much of a 10% saline solution should be mixed with a 20% saline solution to obtain 1000 milliliters of a 12% saline solution?

Let s = the number of milliliters of 10% saline solution.

Let t = the number of milliliters of 20% saline solution.

	10% saline	20% saline	12% saline
Total milliliters	s	t	1000
Milliliters of saline	$0.10s$	$0.20t$	$0.12(1000)$

Write an equation for the Total milliliters.

Write an equation for the milliliters of saline.

Solve the system.

Solve using the elimination method.

During a canoeing trip, it takes Raymond 4 hours to paddle 12 miles upstream. It take him 3 hours to make the return trip paddling downstream. Find the speed of the canoe in still water.

Let c = the rate of the canoe in still water.

Let w = the rate of the water current.

	r	t	d
Against the Current	$c - w$	4	12
With the Current	$c + w$	3	12

Write an equation for the trip upstream.

Write an equation for the trip downstream.

Solve the system.

Evaluate each function for the given value.			
$f(x) = x^2 - 6x + 2$ $f(3) =$	$g(x) = 6x - 7$ $g(x + h) =$	$h(x) = 3x^2 - 4$ $5[h(x + 2)] =$	
For the piecewise function, $p(x) = \begin{cases} \sqrt{x + 4}, & x \leq 5 \\ (x - 5)^2, & x > 5 \end{cases}$, find each of the following:			
$p(-3) =$	$p(0) =$	$p(5) =$	$p(10) =$

If $f(x) = 3x - 2x^2$ and $g(x) = x^2 - 1$, find each of the following:

$$(f + g)(x) =$$

$$(g - f)(-1) =$$

$$(fg)\left(\frac{1}{2}\right) =$$

$$\frac{f(x)}{g(x)} =$$

$$f[g(x)]$$

$$(g \circ f)(x)$$

State the domain:

State the domain:

Find the inverse of each of the following:

$$f(x) = 4x - 3$$

$$g(x) = \frac{2x+3}{x-4}$$

$$h(x) = x^3 + 1$$

Simplify the following expressions. Write your answer with positive exponents only.

$$1. 2^3 \cdot 2^m$$

$$2. c^{-3}(c^7)^4$$

$$3. (x^n y^m)(x^m y^n)$$

$$4. (w^0 x^5)^{-2}$$

$$5. (c^2)^{hk}$$

$$6. 5a^0$$

$$7. \frac{(n^3 p^{-1})^2}{(np)^{-2}}$$

$$8. \frac{x^3 y^4}{w^7 z^{-2}} \cdot \frac{w^4 y^{-2}}{x^5 z^2}$$

$$9. \frac{12x^3}{4x^n}$$

Simplify.

$$3x^3 + 9 + 7x^2 - x^3$$

$$7m - 6 - (2m + 5)$$

$$-x^3 + x^3$$

Multiply.

$$(ab^2 - a^2b)(3a^n + 4b^n)$$

$$(x - 5)^2$$

$$(3x + 1)(x - 2)$$

$$3(x + 1) + 2(x - 5) - 4(x - 7)$$

$$5x(x - 2) + (2x + 3)(x + 4)$$

$$(x + y)^2 - (x + y)(x - y)$$

Factor completely.

$$x^2 + 4x - 12$$

$$6 - 5x - x^2$$

$$2x^2 + 2x - 60$$

$$-10x^4 - 15x^2$$

$$9x^2 + 30x + 25$$

$$9x^2 - 4$$

$27x^3 - 8$	$2mn - 2mv - 2sn + 2sv$	$x^5 - 7x^4 + 12x^3$
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Perform the indicated operation. Express all solutions as a simplified fraction.		
$\frac{m^2 - 25}{m^2 + 5}$	$\frac{a^2 - 5a + 6}{a + 4} \cdot \frac{3a + 12}{a - 2}$	$\frac{6d - 9}{5d + 1} \div \frac{6 - 13d + 6d^2}{15d^2 - 7d - 2}$

Perform the indicated operation. Express all solutions as a simplified fraction.		
$\frac{2x}{5} - \frac{x}{3}$	$\frac{b - a}{a^2b} + \frac{a + b}{ab^2}$	$\frac{2 - a^2}{a^2 + a} + \frac{3a + 4}{3a + 3}$

Perform the indicated operation. Express all solutions as a simplified fraction.		
$\frac{1 - \frac{1}{2}}{2 + \frac{1}{4}}$	$\frac{1 + \frac{1}{z}}{z + 1}$	$\frac{5 + \frac{1}{m} - \frac{6}{m^2}}{\frac{2}{m} - \frac{2}{m^2}}$

Solve each problem by factoring. Round answers to the nearest hundredth as needed.

$$x^2 - 9x = 0$$

$$6 = -5x + x^2$$

$$3x^2 - 5x - 9 = x^2 + 3$$

A footbridge is suspended from a parabolic support. The function $h(x) = -\frac{1}{25}x^2 + 9$ represents the height in feet of the support above the walkway, where $x = 0$ represents the midpoint of the bridge. What is the length of the walkway between the two supports?

A child uses 36 legs to build the rectangular frame for the base of her Lego castle. Write a quadratic function to model this situation and determine the length of the side of the castle and the largest possible area covered by the castle's base.

Find the value of the discriminant and describe the nature of the roots.

$$x^2 - 9x + 14 = 0$$

$$5x^2 - 2x + 4 = 0$$

Solve each problem by using the quadratic formula. Round answers to the nearest hundredth as needed.

$$x^2 - 3x + 2 = 0$$

$$6 = -5x + x^2$$

$$3x^2 - 13x - 10 = 0$$

A ball is catapulted upward from the top of a building at a speed of 30 feet per second. The ball's height above the ground can be modeled as $H(t) = -16t^2 + 30t + 40$. How long does it take for the ball to reach a height of 50 feet?

Solve each equation. Check your solutions.

$$\frac{12}{x} + \frac{3}{4} = \frac{3}{2}$$

$$\frac{x+10}{x^2-2} = \frac{4}{x}$$

$$\frac{5}{x-5} = \frac{x}{x-5} - 1$$

Solve each equation by completing the square. Round to three decimal places if necessary.

$$x^2 + 10x = -9$$

$$4x^2 = 24 + 4x$$

A ball is launched straight up with a velocity of 40 feet per second. The ball's height above the ground can be modeled by $H(t) = -16t^2 + 40t + 5$. Use this information to answer the following questions.

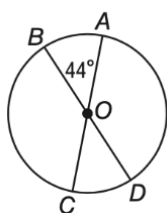
Complete the Square on $H(t)$ to rewrite the function in Vertex Form, $H(t) = (x - h)^2 + k$.

How long does it take the ball to reach its maximum height?	What is the maximum height the ball reaches?
How long is the ball in the air? Explain your answer.	How high is the ball when it is released? Explain your answer.

Divide by Polynomial Long Division. $\frac{c^3 - 3c^2 + 18c - 16}{c^2 + 3c - 2}$	Divide by Synthetic Division $\frac{x^4 - 2x^2 - x + 2}{x + 2}$
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Simplify each of the following.			
$\sqrt{32}$	$\sqrt{(2x)^8}$	$\sqrt{49m^2n^8}$	$\sqrt{60} \cdot \sqrt{105}$
$\sqrt{\frac{11}{9}}$	$\frac{2}{\sqrt{3}}$	$\frac{3}{2 - \sqrt{5}}$	$(\sqrt{5} - \sqrt{6})(\sqrt{5} + \sqrt{2})$

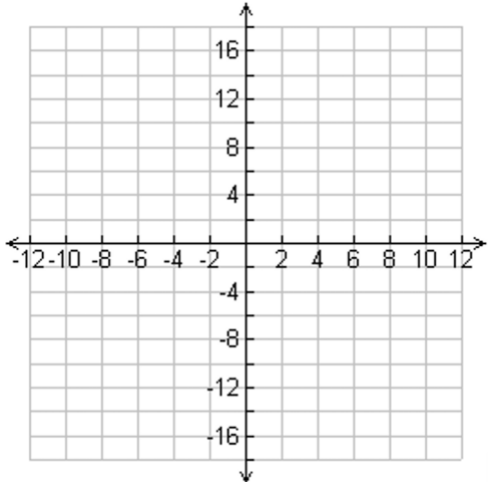
Simplify the following expressions and rationalize denominators as needed.	
1. $(3 + 7i) + (4 - 9i)$	2. $(3 + 7i) - (4 - 9i)$
3. $(3 + 7i)(4 - 9i)$	4. $\frac{10-2i}{3+4i}$

Use the diagram at the right to find each measure.		
$\widehat{CD} =$	Name all diameters.	
$\widehat{ADB} =$	Name all radii.	
$m\angle AOD =$	Name the circle.	
Find the length of $\widehat{AB}$ and $\widehat{ABD}$. Express your solution in terms of π and as a decimal accurate to 3 decimal places.		

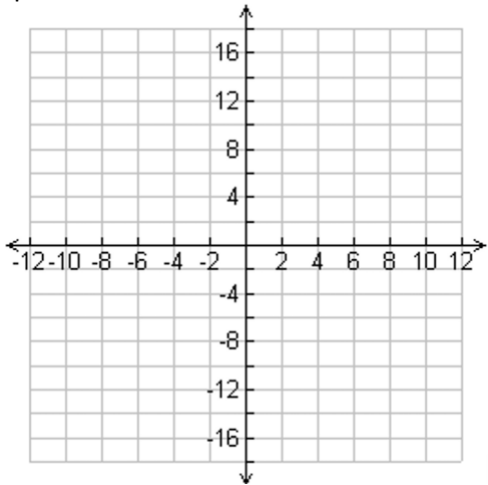
Find each value.	
The circumference of a circle with a diameter of 22.9 cm.	Find the radius of a circle with a circumference of 32π .
Find the exact area of a circle with a diameter of 32 mm.	A square has a perimeter of 12 cm. Find the length of the diagonal.

Use the distance and/or midpoint formulas to answer each exercise.
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Circle Q has a diameter $\overline{AB}$. If A is at $(-3, -5)$ and B is at $(7, 11)$, find the coordinates of the center of the circle? Then find the exact circumference and exact area of the circle.



Quadrilateral $RSTV$ has vertices $R(-4, 6)$, $S(4, 5)$, $T(6, 3)$, and $V(5, -8)$. Find the perimeter of the quadrilateral.



Use the rules for complementary and supplementary angles to complete each exercise.

Angles E and F are complementary. If $m\angle E = x - 10$ and $m\angle F = x + 2$, find the measure of each angle.

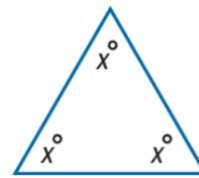
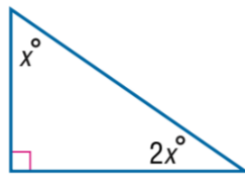
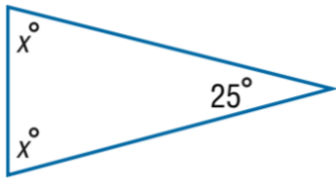
What is the measure of $\angle J$ if $\angle J$ and $\angle K$ are supplementary and the measure of $\angle K$ is 12 degrees more than twice $\angle J$.

Find the missing measure in each triangle with the given angle measures.

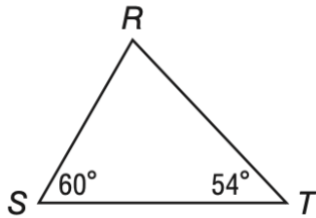
The measures of the three angles of a triangle are x° , 80° , 20.5° .

In $\triangle ABC$, $\angle A$ is 5.6° more than $\angle B$ and $\angle C$ is 25.4° less than twice $m\angle B$. What is the measure of $\angle B$?

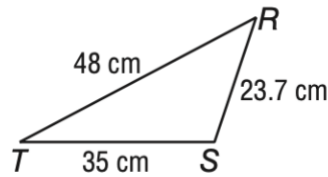
Find the missing measure in each triangle with the given angle measures.



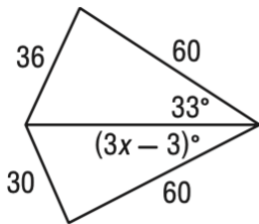
List the sides from largest to smallest.



List the angles from smallest to largest.



Find the value of x .



Draw and label $\triangle ABC$ with an exterior angle at $\angle C$. If $m\angle A + m\angle B = 8.72 - 2.15x$ and the exterior angle measures $1.03x - 4$, what is the value of x ?

Is it possible to form a triangle with the given side lengths?

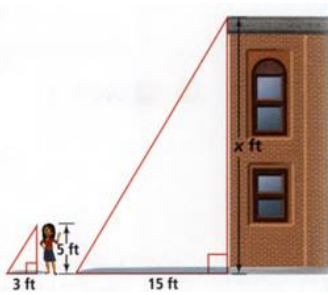
3, 4, 6

6, 9, 15

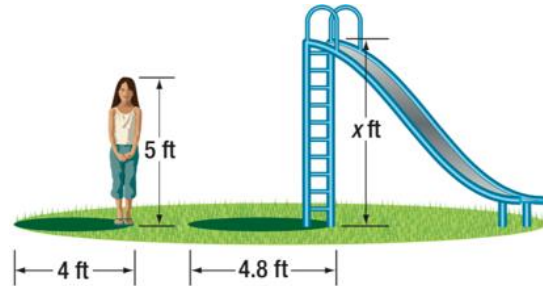
0.5, 2.6, 3.2

Write a proportion and solve for each missing value.

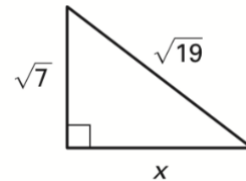
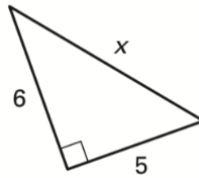
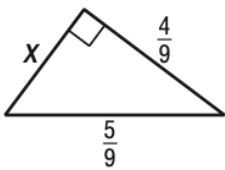
The sun's rays strike the building and the woman at the same angle, forming the two similar triangles shown. How tall is the building?



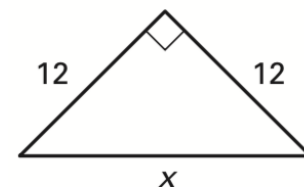
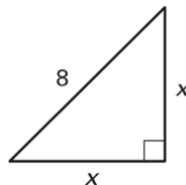
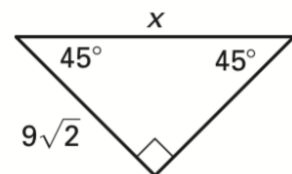
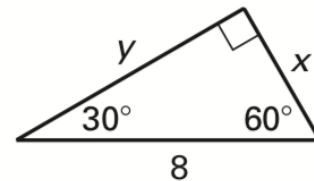
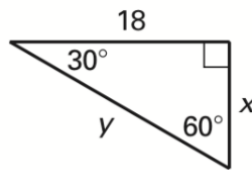
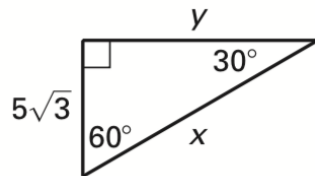
Ruth is at the park standing next to a slide. Ruth is 5 feet tall, and her shadow is 4 feet long. If the shadow of the slide is 4.8 feet long, what is the height of the slide. Assume the triangles are similar.



Use the Pythagorean Theorem to find the value of x .

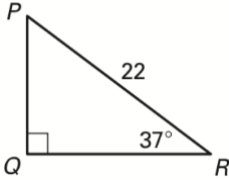
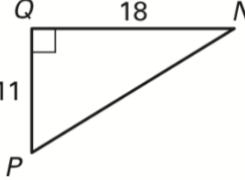


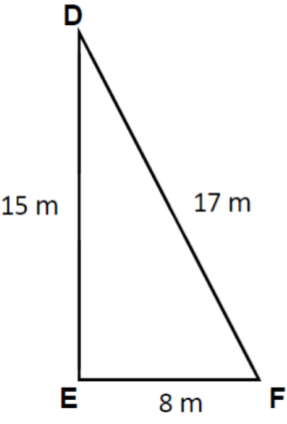
Find the value of x and y .



Find QR .

Find $m\angle P$.

	
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Use the diagram to identify each ratio. 	$\sin F =$	$\sin D =$
	$\cos F =$	$\cos D =$
	$\tan F =$	$\tan D =$