Solve the rational equation.

$$\frac{1}{x^2 - 6x + 8} - \frac{2}{x - 4} = 1$$

$(x-4)(x-2)$

$1-2(x-2)=(x-4)(x-2)$

$1-2x+4=x^2-6x+8$

$0=x^2-4x+3$

$(x-3)(x-1)$

$x=3 \quad x=1$

Solve the following equation.

1. $e^{2x+5} = 8$

$\ln(8) = 2x+5$

$x = \dfrac{\ln(8)-5}{2} \approx -1.4603$

Solve the following logarithms.

1. $\log_3(x^2 + 1) = 2$

$3^2 = x^2 + 1$ $\quad x = \pm 2\sqrt{2}$

$8 = x^2$

2. $\log_5(x^2 + x + 5) = 2$

$5^2 = x^2 + x + 5$

$0 = x^2 + x - 20$

$0 = (x + 5)(x - 4)$

$x = -5 \quad x = 4$

Do you remember the graphs of our 6 trig functions?

*What is the domain and range of sine, cosine, and tangent?

$\sin\theta$ $\cos\theta$

Domain $(-\infty, \infty)$

Range $[-1, 1]$

$\tan\theta$

Range $(-\infty, \infty)$

Domain: $\mathbb{R}$ except $x \neq \frac{\pi}{2} + \pi k$, k is any integer

*What characteristics do our trig graphs have?

Given the following equations, state the amplitude and period. Describe all transformations.

1. $y = 1/3\cos(+1/2x) + 4$

Amp $\frac{1}{3}$ Pd $= \frac{2\pi}{1/2} = 4\pi$ up 4

2. $y = \cos(2x - \pi) - 5$

$y = \cos(2(x - \pi/2)) - 5$ amp 1 pd $= \frac{2\pi}{2} = \pi$

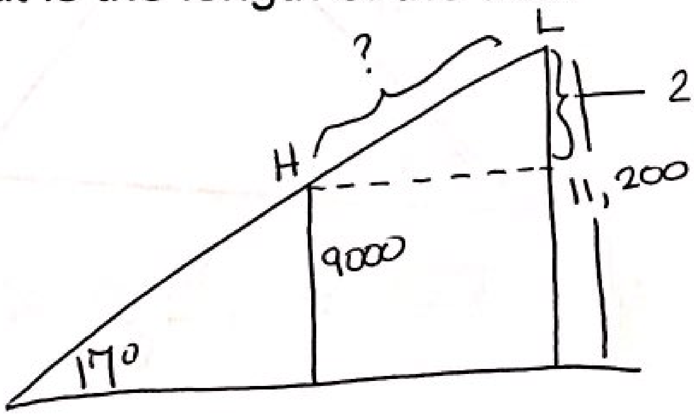
Phase S $= +\pi/2$ down 5

3. $y = 5\sin(x/3 + 6)$

$y = 5\sin(\frac{1}{3}(x + 18))$

Amp 5 pd $= \frac{2\pi}{1/3} = 6\pi$ P.S = left 18

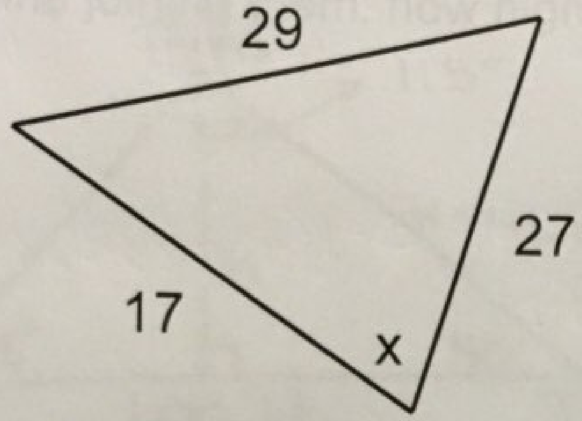
A straight trail with an inclination of 17^0 leads from a hotel at an elevation of 9000 feet to a mountain lake at an elevation of 11,200 feet. What is the length of the trail?



$\sin 17 = \frac{2200}{?}$

$h \approx 7524.64$

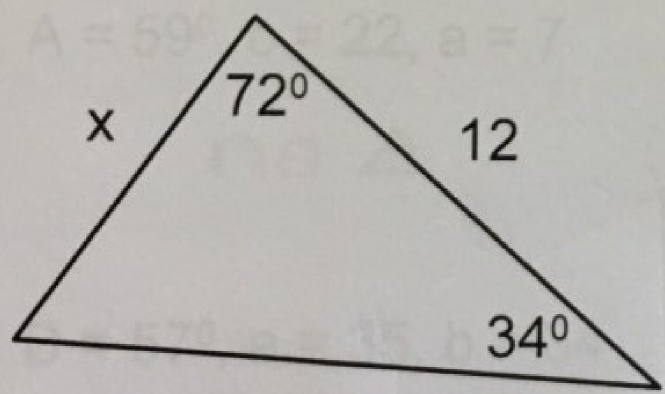
Solve for x.



$$29^2 = 17^2 + 27^2 - 2(17)(27)\cos x$$

$$x \approx 78.88^\circ$$

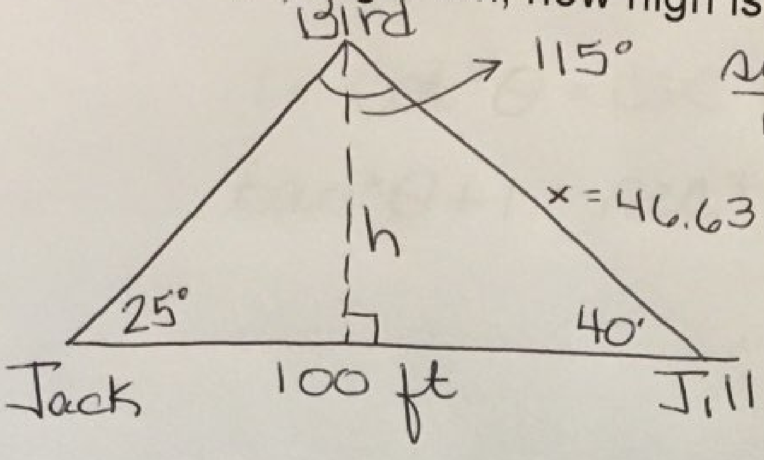
Solve for x.



$$\frac{\sin 74}{12} = \frac{\sin 34}{x}$$

$$x \approx 6.98$$

Jack and Jill measure the angle of elevation of a bird. Jack's angle measures 25^0 and Jill's angle is 40^0. If Jack and Jill are 100 feet apart and the bird is flying over the line joining them, how high is the bird?



$$\frac{\sin 115}{100} = \frac{\sin 25}{x}$$

$x = 46.63$

$$\sin 40 = \frac{h}{46.63}$$

height of bird

29.97 ft

Determine if the following have 1, 2, or no triangles.

1. $A = 59^0$, $c = 22$, $a = 7$

no △

2. $B = 57^0$, $a = 35$, $b = 34$

2 △

3. $A = 53^0$, $c = 14$, $a = 20$

1 △

What are the 3 Pythagorean Identities?

$\sin^2\theta + \cos^2\theta = 1$

$1 + \cot^2\theta = \csc^2\theta$

$\tan^2\theta + 1 = \sec^2\theta$

Simplify the following.

1. (cscθ - 1)(cscθ + 1)

$\csc^2\theta - 1 = \boxed{\cot^2\theta}$

2. sinθ(cotθ + tanθ) $= \sin\theta\left(\frac{\cos\theta}{\sin\theta}\right) + \sin\theta\left(\frac{\sin\theta}{\cos\theta}\right)$

$= \cos\theta + \frac{\sin^2\theta}{\cos\theta}$

$\frac{\cos^2\theta + \sin^2\theta}{\cos\theta} = \frac{1}{\cos\theta}$

$= \boxed{\sec\theta}$

3. $1 - \frac{\sin^2\theta}{1 + \cos\theta}$

$\frac{1 + \cos\theta - \sin^2\theta}{1 + \cos\theta}$

$\frac{\cos^2\theta + \cos\theta}{1 + \cos\theta} = \frac{\cos\theta\cancel{(1 + \cos\theta)}}{\cancel{1 + \cos\theta}} = \boxed{\cos\theta}$

What 4 equations should we think of when we discuss polar equations?

$x = r\cos\theta$

$y = r\sin\theta$

$r^2 = x^2 + y^2$

$\tan\theta = y/x$

Change the following coordinates to polar form in degree mode.

1. (5, 3)

$r^2 = 5^2 + 3^2$

$r = \sqrt{34}$

$\tan\theta = 3/5$

$(\sqrt{34}, 30.96°)$

2. (-1, -4)

$r^2 = 1 + 16$

$r = \sqrt{17}$

$\tan\theta = 4/1$

$(\sqrt{17}, 225.96°)$

Change the following coordinates to rectangular form.

1. (-2, 164°)

$x = -2\cos 164°$

$y = -2\sin 164°$

$(1.92, -.55)$

2. (4, -π/4)

$x = 4\cos \frac{7\pi}{4} = 4(\frac{\sqrt{2}}{2})$

$y = 4\sin \frac{7\pi}{4} = 4(-\frac{\sqrt{2}}{2})$

$(2\sqrt{2}, -2\sqrt{2})$

Convert the polar equations to rectangular equations. Identify the conic section.

1. $r = \dfrac{4}{2 + \cos\theta}$

$2r + \overset{x}{r\cos\theta} = 4$

$(2r)^2 = ((4-x)^2$

$4r^2 = x^2 - 8x + 16$

$4x^2 + 4y^2 = x^2 - 8x + 16$

$3x^2 + 4y^2 + 8x - 16 = 0$

Ellipse

2. $r = 3\sin\theta$

$r^2 = 3r\sin\theta$

$x^2 + y^2 = 3y$

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

Circle

Change the polar equation to rectangular form. Identify the conic section.

$r = \dfrac{3}{1 + 2\sin\theta}$

$r + 2r\sin\theta = 3$

$r^2 = (3-2y)^2$

$r^2 = 4y^2 - 12y + 9$

$x^2 + y^2 = 4y^2 - 12y + 9$

$x^2 - 3y^2 + 12y - 9 = 0$

hyperbola

$r = \dfrac{6}{2\cos\theta - 3\sin\theta}$

$2r\cos\theta - 3r\sin\theta = 6$

$2x - 3y = 6$

linear

Convert the following to polar form.

1) $(x-1)^2 + (y-1)^2 = 2$

$x^2 - 2x + 1 + y^2 - 2y + 1 = 2$

$r^2 - 2r\cos\theta - 2y\sin\theta = 0$

$r(r - 2\cos\theta - 2\sin\theta) = 0$

$\cancel{r=0}$ $r = 2\cos\theta + 2\sin\theta$

2) $(x-2)^2 + y^2 = 4$

$x^2 - 4x + 4 + y^2 = 4$

$r^2 - 4r\cos\theta = 0$

$r(r - 4\cos\theta) = 0$

$\cancel{r=0}$

$r = 4\cos\theta$

Find the rectangular equation of the parametric curve.

1. $x = t - 3$ $y = 2t^2 + 4$

$x = x + 3$

$y = 2(x+3)^2 + 4$

$y = 2x^2 + 12x + 22$

2. $x = 2 + 3\sin t$ $y = -1 + 16\cos t$

$\frac{x-2}{3} = \sin t$ $\frac{y+1}{16} = \cos t$

$\frac{(x-2)^2}{9} + \frac{(y+1)^2}{256} = 1$