Key

Unit 5 Day 1 AFM Notes: Trigonometric Ratios

Trig Ratios

Sine: sin A = $\frac{opp}{hyp}$

Cosine: cos A = $\frac{adj}{hyp}$

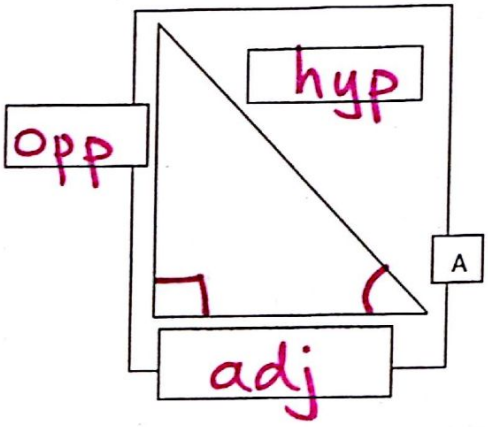
Tangent: tan A = $\frac{opp}{adj}$

Reciprocal ~~Inverse~~ Trig Ratios

Cosecant: csc A = $\frac{1}{\sin A}$ = $\frac{hyp}{opp}$

Secant: sec A = $\frac{1}{\cos A}$ = $\frac{hyp}{adj}$

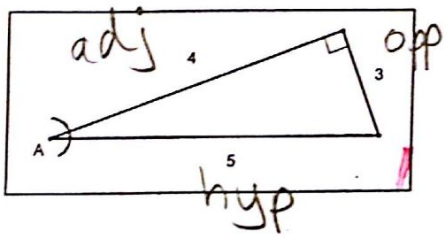
Cotangent: cot A = $\frac{1}{\tan A}$ = $\frac{adj}{opp}$



192
16·12
4·4 4·3
2·2 2·2 2·2
$8\sqrt{3}$

EX.

1. Find all 6 trigonometric ratios of the following:



sin A = 3/5 csc A = 5/3

cos A = 4/5 sec A = 5/4

tan A = 3/4 cot A = 4/3

104
2·52
26·2
$2\sqrt{26}$

If only 2 sides of the triangle are given, use the Pythagorean Theorem to solve for the missing side

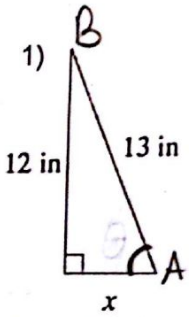
$a^2 + b^2 = c^2$

on Day 3

a and b: legs c: hypotenuse

- To solve a triangle means to find the lengths of all the sides and the measures of all the angles.
  - If only 2 sides of the triangle are given, use the Pythagorean Theorem to solve for the third side.
  - If one side and an angle are given, use trig ratios and the calculator to solve for the missing sides.

1)



$x = 5$

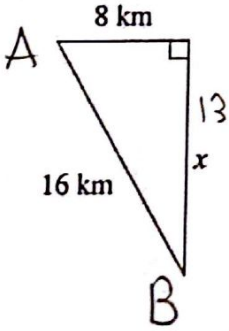
2)

$\sin A = \frac{12}{13}$

$A = 67°$

$B = 23°$

3)



13.9 $\sqrt{192}$

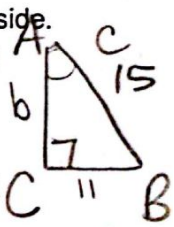
$8^2 + x^2 = 16^2$

$x = 13.9$

$\sin B = \frac{8}{16}$

$B = 30°, A = 60°$

$a = 11$ m, $c = 15$ m



$11^2 + b^2 = 15^2$

$b = 10.2$

$\sqrt{104}$

$\sin A = \frac{11}{15}$

$A = 47°$

$B = 43°$

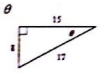
Kuta Software - Infinite Algebra 2 Name_____

Right Triangle Trig. - Evaluating Trig. Ratios

Date_____ Period____

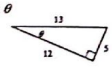
Find the value of the trig function indicated.

1) sec θ



$\frac{17}{15}$

2) sec θ

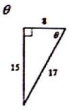


$\frac{13}{12}$

3) cot θ

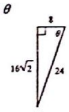
$\frac{4}{3}$

4) csc θ



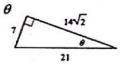
$\frac{17}{15}$

5) csc θ



$\frac{3\sqrt{2}}{4}$

6) cos θ

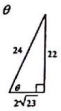


$\frac{2\sqrt{2}}{3}$

7) cot θ

$\frac{4}{3}$

8) tan θ



$\frac{11\sqrt{23}}{23}$

9) tan θ

$\frac{3}{4}$

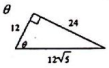
10) cot θ

$\frac{\sqrt{5}}{2}$

11) tan θ

$\frac{3}{4}$

12) cot θ

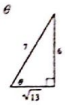


$\frac{1}{2}$

13) tan θ

$\frac{7}{24}$

14) sin θ



$\frac{6}{7}$

Find the value of each. Round your answers to the nearest ten-thousandth.

15) cos 10° .9848

16) sin 60° .8660

17) csc 21° 2.7904

18) cos 60° .5000

19) tan 40° .8391

20) csc 59° 1.1666

21) csc 56° 1.2062

22) cot 65° 0.4663

23) tan 10° 0.1763

24) tan 25° 0.4663

Find the value of the trig function indicated.

25) Find csc θ if tan $\theta = \frac{3}{4}$ $\frac{5}{3}$

26) Find cot θ if sec $\theta = 2$ $\frac{\sqrt{3}}{3}$

27) Find tan θ if sin $\theta = \frac{4}{5}$ $\frac{4}{3}$

28) Find cot θ if sec $\theta = \frac{5}{4}$ $\frac{4}{3}$

29) Find sec θ if sin $\theta = \frac{3\sqrt{13}}{13}$ $\frac{\sqrt{13}}{2}$

30) Find cot θ if sin $\theta = \frac{12}{13}$ $\frac{5}{12}$

Critical think questions:

31) Draw a right triangle that has an angle with a tangent of 1.

Isosceles Right

32) What is the slope of the hypotenuse for #9? How does that compare to tan θ? Why?

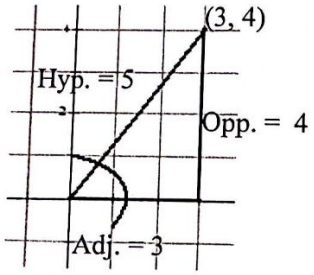
$\frac{3}{4} = \tan\theta$

$\frac{\text{rise}}{\text{run}} = \frac{\text{opp}}{\text{adj}}$

AFM Notes: Drawing Triangles in the Coordinate Plane

Key

Given a point P in the coordinate plane, let P be on the terminal side of an angle θ. Let $P = (3, 4)$.



To draw the triangle:

Use the x-coord as the base of the triangle and the y-coord as the height of the triangle.

Use the pyth thm to find the length of the hypotenuse.

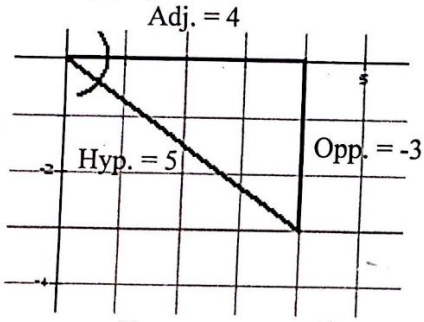
Find the 6 trigonometric ratios of the indicated angle in the resulting triangle.

$\sin\theta = \frac{4}{5}$ $\cos\theta = \frac{3}{5}$ $\tan\theta = \frac{4}{3}$

$\csc\theta = \frac{5}{4}$ $\sec\theta = \frac{5}{3}$ $\cot\theta = \frac{3}{4}$

EX. A point on the terminal side of θ is given. Find the exact values of the six trigonometric ratios of the indicated angle.

1. $P = (4, -3)$



If one of the coordinates is negative that just means that the triangle will be reflected.

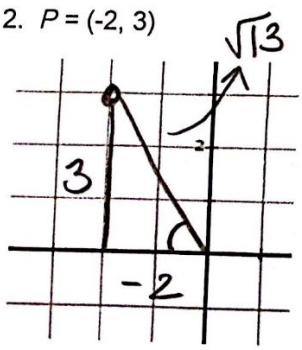
Draw a right triangle using the x-coord as the base of the triangle.

Use the pyth thm to find the length of the hypotenuse.

Find the 6 trigonometric ratios of the indicated angle in the resulting triangle.

$\sin\theta = \frac{-3}{5}$ $\cos\theta = \frac{4}{5}$ $\tan\theta = \frac{-3}{4}$ $\csc\theta = \frac{-5}{3}$ $\sec\theta = \frac{5}{4}$ $\cot\theta = \frac{-4}{3}$

2. $P = (-2, 3)$



$(-2)^2 + 3^2 = c^2$

$c = \sqrt{13}$

$\sin\theta = \frac{3}{\sqrt{13}} = \frac{3\sqrt{13}}{13}$

$\cos\theta = \frac{-2}{\sqrt{13}} = \frac{-2\sqrt{13}}{13}$

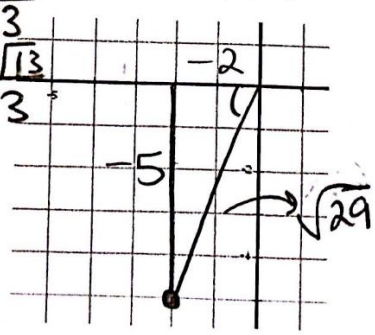
$\tan\theta = \frac{-3}{2}$

$\csc\theta = \frac{\sqrt{13}}{3}$

$\sec\theta = \frac{\sqrt{13}}{-2}$

$\cot\theta = \frac{-2}{3}$

3. $P = (-2, -5)$



$5^2 + 2^2 = c^2$

$29 = c^2$

$c = \sqrt{29}$

$\sin\theta = \frac{-5}{\sqrt{29}} = \frac{-5\sqrt{29}}{29}$

$\cos\theta = \frac{-2}{\sqrt{29}} = \frac{-2\sqrt{29}}{29}$

$\tan\theta = \frac{5}{2}$

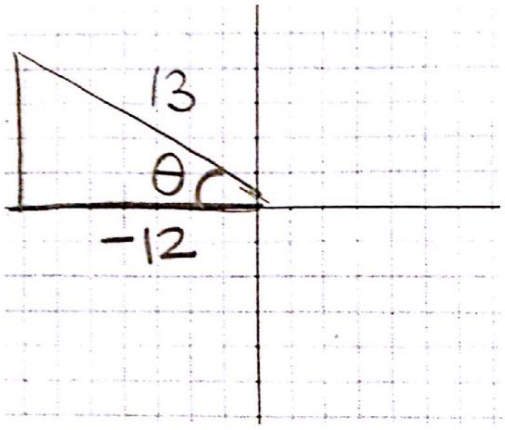
$\csc\theta = \frac{-\sqrt{29}}{5}$

$\sec\theta = \frac{-\sqrt{29}}{2}$

$\cot\theta = \frac{2}{5}$

Find all 6 trigonometric ratios of the following by drawing the point in the coordinate plane:

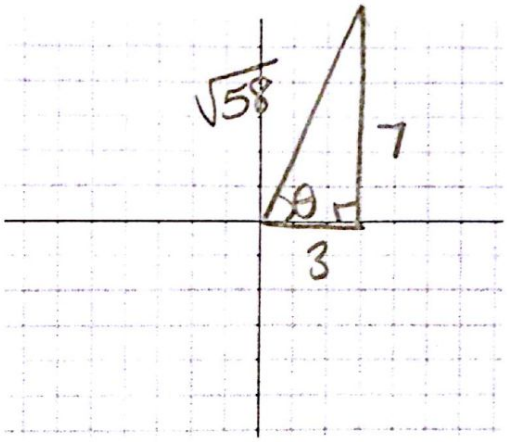
1. (-12, 5)



$\sin\theta = \frac{5}{13}$ $\cos\theta = \frac{-12}{13}$ $\tan\theta = \frac{-5}{12}$

$\csc\theta = \frac{13}{5}$ $\sec\theta = -\frac{13}{12}$ $\cot\theta = -\frac{12}{5}$

2. (3, 7)



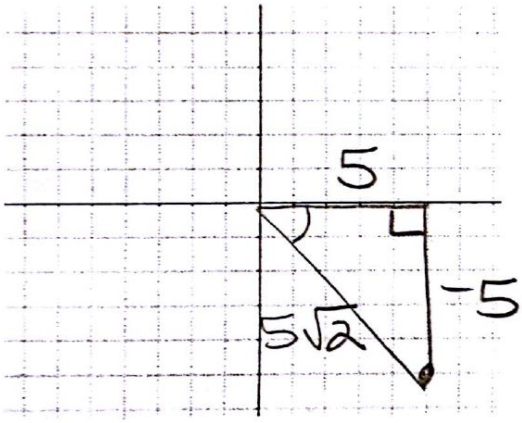
$7^2 + 3^2 = c^2$ $c = \sqrt{58}$

$49 + 9 = c^2$

$\sin\theta = \frac{7}{\sqrt{58}} = \frac{7\sqrt{58}}{58}$ $\cos\theta = \frac{3}{\sqrt{58}} = \frac{3\sqrt{58}}{58}$ $\tan\theta = \frac{7}{3}$

$\csc\theta = \frac{\sqrt{58}}{7}$ $\sec\theta = \frac{\sqrt{58}}{3}$ $\cot\theta = \frac{3}{7}$

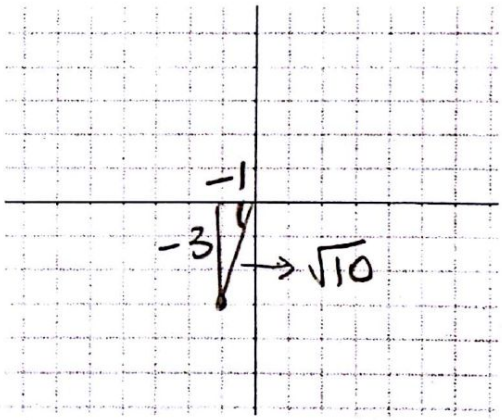
3. (5, -5)



$\sin\theta = \frac{-5}{5\sqrt{2}} = \frac{-\sqrt{2}}{2}$ $\cos\theta = \frac{5}{5\sqrt{2}} = \frac{\sqrt{2}}{2}$ $\tan\theta = -1$

$\csc\theta = -\sqrt{2}$ $\sec\theta = \frac{2}{\sqrt{2}} = \sqrt{2}$ $\cot\theta = -1$

4. (-1, -3)



$\sin\theta = \frac{-3}{\sqrt{10}} = \frac{-3\sqrt{10}}{10}$ $\cos\theta = \frac{-1}{\sqrt{10}} = \frac{-\sqrt{10}}{10}$ $\tan\theta = 3$

$\csc\theta = -\frac{\sqrt{10}}{3}$ $\sec\theta = -\sqrt{10}$ $\cot\theta = \frac{1}{3}$

$c = \sqrt{50} = 5\sqrt{2}$

$3^2 + 1^2 = c^2$

$c = \sqrt{10}$