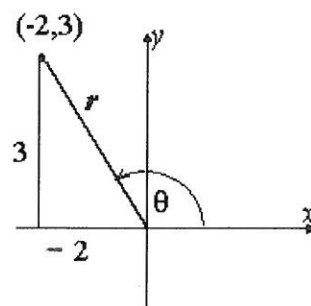


Name: _____ Per: _____ Date: _____
 Serafino · Algebra 2E

9A3 Solving Trig Functions (using Inverses and $\hat{\theta}$)

Notes / Classwork



Let's recall...

If $\theta \in \text{QII}$, sine will be _____ and cosine is _____.

If $\theta \in \text{QIV}$, sine will be _____ and cosine is _____.

If $\theta \in \text{QIII}$, tan will be _____ because sine and cosine are _____. Cool.

But....

If I said the "cosine of θ is positive"... what Quadrant is θ in? _____

If I said "tangent is -2 ", then what Quadrant is θ in? _____

If I said "the sine of θ is 0 " What is θ ? _____ ... we have a problem.

TRIG FUNCTIONS: To get the trig ratio, you evaluate at any angle (in standard position)

INVERSE TRIG FUNCTIONS: To get an angle, evaluate at a trig ratio.. so you'll need the inverse trig function.

We can take the $\tan^{-1}(-3/2)$... but you get -56.31° . That's not something you can use meaningfully. So...

By **ONLY USING POSITIVE RATIOS** in INVERSE Trig Func., you'll get \rightarrow REFERENCE ANGLE

You then place that reference angle in the correct Quadrant(s) to solve the problem.

... so instead we will take $\tan^{-1}(3/2)$ and we get $\theta' = 56.31^\circ$. Place it in QII, so $180^\circ - 56.31^\circ = 123.69^\circ$

1. For the following, find the solution(s) for $0^\circ \leq \theta < 360^\circ$

a. $\sin \theta = 2/9 \in \text{QII}$

c. θ intersects $(11, -3)$

b. $\cos \theta = -7/8 \in \text{QIII}$

d. $\sin \theta = -1/2$ (hmmm....)

1. Find the solution(s) for the special angles, $0^\circ \leq \theta < 360^\circ$.

a. $\tan \theta = \sqrt{3}$ in QIII

d. $\sin \theta = -1$

g. $\tan \theta = \text{und}$

b. $\cos \theta = -\sqrt{2}/2$ in QII

e. $\cos \theta = 1$

h. $\sin \theta = -\sqrt{3}/2$

c. $\sin \theta = 1/2$ in Q

f. $\cos \theta = 0$

i. $\tan \theta = \text{und}$, $\sin \theta < 0$

2. Find the solution(s) for the angles, $0^\circ \leq \theta < 360^\circ$

a. Terminal side of θ intersects $(\sqrt{2}, 4)$

e. $\cos \theta = -0.8541$

b. $\tan \theta = -\frac{3}{4}$ and θ lies in QIV

f. $\tan \theta = -1.6003$

c. $\sin \theta = -1/3$ and θ lies in QIII

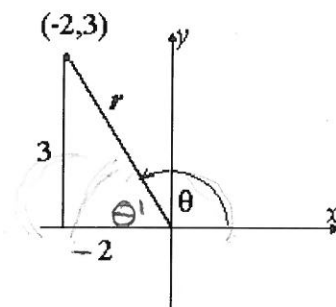
g. $\sin \theta = -0.5592$

d. $\cos \theta = 3.8637$ and $\theta \in \text{QIV}$

Name: KEY Per: _____ Date: _____
 Serafino · Algebra 2E

9A3 Solving Trig Functions (using Inverses and $\hat{\theta}$)

Notes / Classwork



Let's recall...

If $\theta \in \text{QII}$, sine will be + and cosine is -.

If $\theta \in \text{QIV}$, sine will be - and cosine is +.

If $\theta \in \text{QIII}$, tan will be + because sine and cosine are -. Cool.

But....

If I said the "cosine of θ is positive"... what Quadrant is θ in? I OR IV

If I said "tangent is -2 ", then what Quadrant is θ in? II or IV

If I said "the sine of θ is 0" What is θ ? 0 or 180 ... we have a problem.

TRIG FUNCTIONS: To get the trig ratio, you evaluate at any angle (in standard position)

INVERSE TRIG FUNCTIONS: To get an angle, evaluate at a trig ratio.. so you'll need the inverse trig function.

We can take the $\tan^{-1}(-3/2)$... but you get -56.31° . That's not something you can use meaningfully. So...

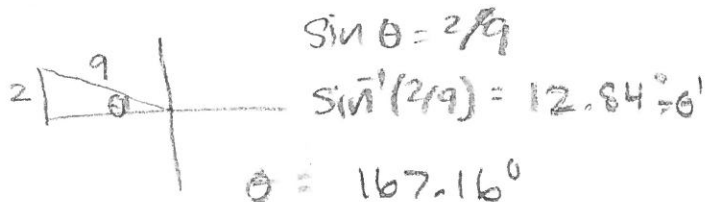
By **ONLY USING POSITIVE RATIOS** in INVERSE Trig Func., you'll get \rightarrow REFERENCE ANGLE

You then place that reference angle in the correct Quadrant(s) to solve the problem.

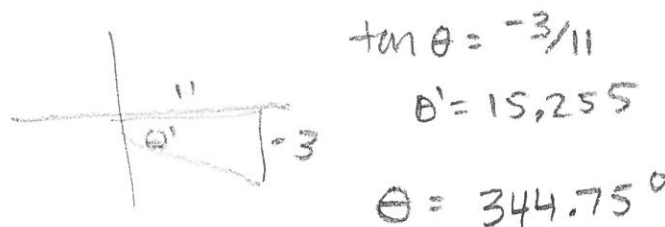
... so instead we will take $\tan^{-1}(3/2)$ and we get $\theta' = 56.31^\circ$. Place it in QII, so $180^\circ - 56.31^\circ = 123.69^\circ$

1. For the following, find the solution(s) for $0^\circ \leq \theta < 360^\circ$

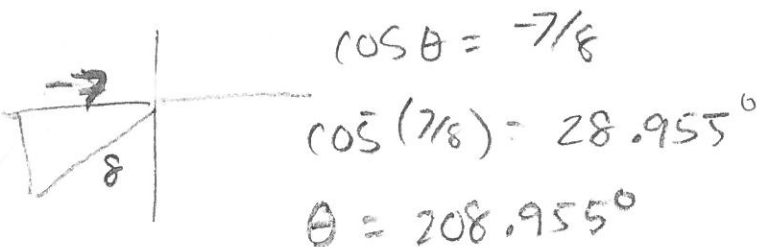
a. $\sin \theta = 2/9 \in \text{QII}$



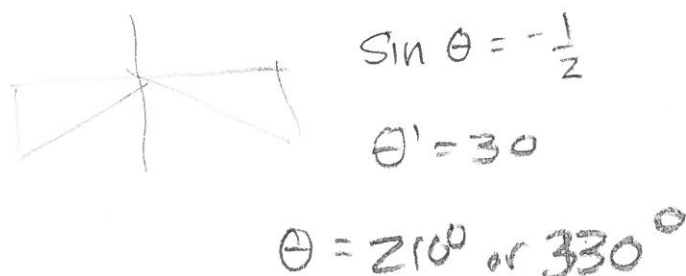
c. θ intersects $(11, -3)$



b. $\cos \theta = -7/8 \in \text{QIII}$



d. $\sin \theta = -1/2$ (hmmm....)



1. Find the solution(s) for the special angles, $0^\circ \leq \theta < 360^\circ$.

a. $\tan \theta = \sqrt{3}$ in QIII

$$\theta' = 60^\circ$$

$$\theta = 240^\circ$$

d. $\sin \theta = -1$

$$\theta = 270^\circ$$

g. $\tan \theta = \text{und}$

$$\theta = 90^\circ, 270^\circ$$

b. $\cos \theta = -\sqrt{2}/2$ in QII

$$\theta = 135^\circ$$

e. $\cos \theta = 1$

$$\theta = 0^\circ$$

h. $\sin \theta = -\sqrt{3}/2$

$$\theta = 240^\circ \text{ or } 300^\circ$$

c. $\sin \theta = 1/2$ in QII

$$\theta = 150^\circ$$

f. $\cos \theta = 0$

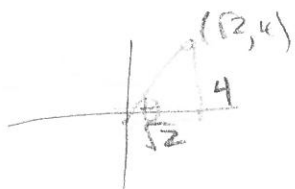
$$\theta = 90^\circ \text{ or } 270^\circ$$

i. $\tan \theta = \text{und}, \sin \theta < 0$

$$\theta = 270^\circ$$

2. Find the solution(s) for the angles, $0^\circ \leq \theta < 360^\circ$

a. Terminal side of θ intersects $(\sqrt{2}, 4)$



$$\theta = 70.528^\circ$$

e. $\cos \theta = -0.8541$

$$\theta' = 31.34^\circ$$

$$\theta = 148.66^\circ \text{ or } 211.34^\circ$$

b. $\tan \theta = -\frac{3}{4}$ and θ lies in QIV

$$\theta = 323.13^\circ$$

f. $\tan \theta = -1.6003$

$$\theta' = 58^\circ$$

$$\theta = 122^\circ \text{ or } 302^\circ$$

c. $\sin \theta = -1/3$ and θ lies in QIII

$$\theta = 199.47^\circ$$

g. $\sin \theta = -0.5592$

$$\theta' = 34^\circ$$

$$\theta = 214^\circ \text{ or } 326^\circ$$

d. $\cos \theta = 3.8637$ and $\theta \in \text{QIV}$

$$\text{No solution!}$$