

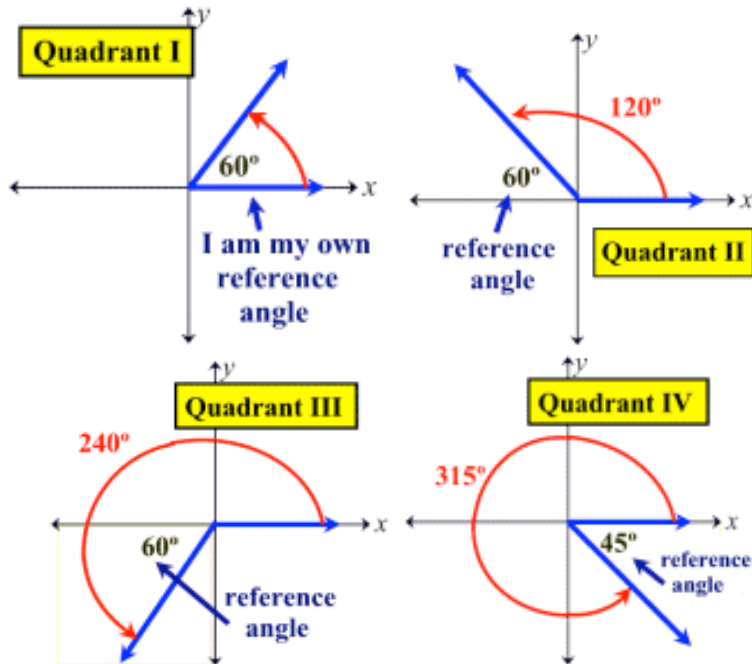
Name: _____
 PC: Reference Angles and Special Angles

Date: _____
 Ms. Loughran

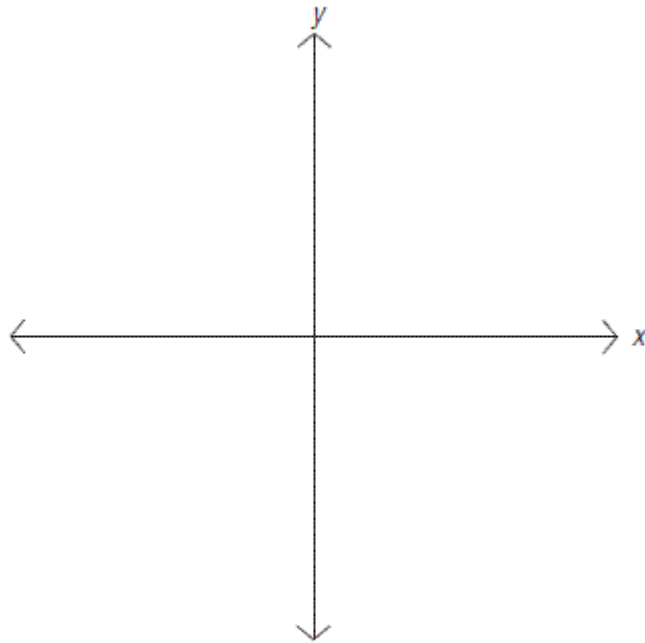
Do Now:
 1. Complete the table.

θ	0°	90°	180°	270°	360°
Radians					
$\sin \theta$					
$\cos \theta$					
$\tan \theta$					

Given an angle θ in standard position, the **reference angle** of θ , is the positive acute angle formed by the terminal side of θ and the positive or negative portion of the x -axis.



Reference angles will help you to express the sine, cosine or tangent of any angle in terms of the sine, cosine or tangent of a positive acute angle.



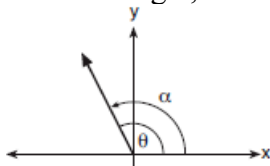
You need to memorize the following values.

θ	30°	45°	60°
Radians			
$\sin \theta$			
$\cos \theta$			
$\tan \theta$			

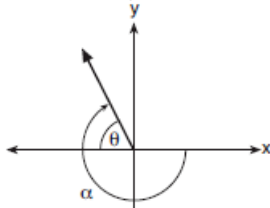
Exercise Set A

1 Which diagram represents an angle, α , measuring $\frac{13\pi}{20}$ radians drawn in standard position, and its reference angle, θ ?

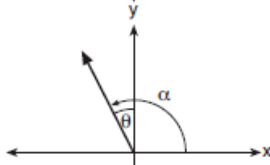
1)



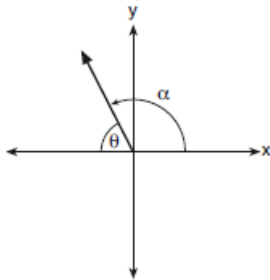
2)



3)



4)



2 $\sin 190^\circ$ is equal to

- 1) $\sin 10^\circ$
- 2) $\cos 10^\circ$
- 3) $-\sin 10^\circ$
- 4) $-\cos 10^\circ$

- 3 Which expression is equivalent to $\sin(200^\circ)$?
- 1) $-\sin 20^\circ$
 - 2) $\cos 20^\circ$
 - 3) $\cos 70^\circ$
 - 4) $-\sin 70^\circ$
- 4 Expressed as a function of a positive acute angle, $\sin 230^\circ$ is equal to
- 1) $-\sin 40^\circ$
 - 2) $-\sin 50^\circ$
 - 3) $\sin 40^\circ$
 - 4) $\sin 50^\circ$
- 5 The expression $\sin 240^\circ$ is equivalent to
- 1) $\sin 60^\circ$
 - 2) $\cos 60^\circ$
 - 3) $-\sin 60^\circ$
 - 4) $-\cos 60^\circ$
- 6 Which expression is equivalent to $\sin(-120^\circ)$?
- 1) $\sin 60^\circ$
 - 2) $-\sin 60^\circ$
 - 3) $\cos 30^\circ$
 - 4) $-\cos 60^\circ$
- 7 Expressed as a function of a positive acute angle, $\sin(-230^\circ)$ is equal to
- 1) $\sin 50^\circ$
 - 2) $-\sin 50^\circ$
 - 3) $\cos 50^\circ$
 - 4) $-\cos 50^\circ$
- 8 Which expression is *not* equivalent to $\sin 150^\circ$?
- 1) $\sin 30^\circ$
 - 2) $-\sin 210^\circ$
 - 3) $\cos 60^\circ$
 - 4) $-\cos 60^\circ$

- 9 Which expression is equivalent to $\cos 120^\circ$?
- 1) $\cos 60^\circ$
 - 2) $\cos 30^\circ$
 - 3) $-\sin 60^\circ$
 - 4) $-\sin 30^\circ$
- 10 Two straight roads intersect at an angle whose measure is 125° . Which expression is equivalent to the cosine of this angle?
- 1) $\cos 35^\circ$
 - 2) $-\cos 35^\circ$
 - 3) $\cos 55^\circ$
 - 4) $-\cos 55^\circ$
- 11 Expressed as a function of a positive acute angle, $\cos(-305^\circ)$ is equal to
- 1) $-\cos 55^\circ$
 - 2) $\cos 55^\circ$
 - 3) $-\sin 55^\circ$
 - 4) $\sin 55^\circ$
- 12 The expression $\tan(-240^\circ)$ is equivalent to
- 1) $\tan 60^\circ$
 - 2) $-\tan 30^\circ$
 - 3) $-\tan 60^\circ$
 - 4) $\tan 30^\circ$
- 13 Expressed as a function of a positive acute angle, $\cot(-120^\circ)$ is equivalent to
- 1) $-\tan 60^\circ$
 - 2) $\cot 60^\circ$
 - 3) $-\cot 30^\circ$
 - 4) $\cot 30^\circ$
- 14 The expression $\cot(-200^\circ)$ is equivalent to
- 1) $-\tan 20^\circ$
 - 2) $\tan 70^\circ$
 - 3) $-\cot 20^\circ$
 - 4) $\cot 70^\circ$

- 15 Express $\sin(-170^\circ)$ as a function of a positive acute angle.
- 16 Express $\sin(-215^\circ)$ as a function of a positive acute angle.
- 17 Express $\cos(-155^\circ)$ as a function of a positive acute angle.
- 18 Express $\cos(-220^\circ)$ as a function of a positive acute angle.
- 19 Express $\tan 230^\circ$ as a function of a positive acute angle.
- 20 Express $\tan(-140^\circ)$ as a function of a positive acute angle.
- 21 Sketch an angle of 250° in standard position and then express $\cos 250^\circ$ as a cosine function of a positive acute angle.

Exercise Set B

1 Which is the value of $\cos(-240^\circ)$?

- 1) $-\frac{1}{2}$
- 2) $\frac{3}{2}$
- 3) $\frac{1}{2}$
- 4) $-\frac{3}{2}$

2 What is the value of $\sin(-240^\circ)$?

- 1) $\frac{1}{2}$
- 2) $-\frac{1}{2}$
- 3) $\frac{\sqrt{3}}{2}$
- 4) $-\frac{\sqrt{3}}{2}$

3 What is the value of $\cos(-120^\circ)$?

- 1) $\frac{1}{2}$
- 2) $-\frac{1}{2}$
- 3) $\frac{\sqrt{3}}{2}$
- 4) $-\frac{\sqrt{3}}{2}$

4 The value of $(\sin 60^\circ)(\cos 60^\circ)$ is

- 1) $\frac{3}{4}$
- 2) $\frac{\sqrt{2}}{4}$
- 3) $\frac{\sqrt{3}}{3}$
- 4) $\frac{\sqrt{3}}{4}$

5 Which is equal in value to $\sin 180^\circ$?

- 1) $\tan 45^\circ$
- 2) $\cos 90^\circ$
- 3) $\cos 0^\circ$
- 4) $\tan 90^\circ$

6 In the interval $0^\circ \leq x < 360^\circ$, $\tan x$ is undefined when x equals

- 1) 0° and 90°
- 2) 90° and 180°
- 3) 180° and 270°
- 4) 90° and 270°

7 The value of $\tan 126^\circ 43'$ to the nearest *ten-thousandth* is

- 1) -1.3407
- 2) -1.3408
- 3) -1.3548
- 4) -1.3549

- 8 The value of $\csc 138^\circ 23'$ rounded to four decimal places is
- 1) -1.3376
 - 2) -1.3408
 - 3) 1.5012
 - 4) 1.5057
- 9 The value of $\cos 305^\circ$ is
- 1) 0.5736
 - 2) 0.8192
 - 3) -0.8192
 - 4) -0.5736
- 10 Find the value of $\sin 135^\circ$ in radical form.
- 11 Find the value of $\tan 120^\circ$.
- 12 Find the value of $\tan(-135^\circ)$.
- 13 Express the product of $\cos 30^\circ$ and $\sin 45^\circ$ in simplest radical form.
- 14 Find the value of $\tan 31^\circ 27'$ to *four decimal places*.
- 15 Find the value of $\cos 32^\circ 32'$ to *four decimal places*.
- 16 Find the value of $\tan 27^\circ 26'$ to *four decimal places*.
- 17 Find the value of $\sin 37^\circ 34'$ to *four decimal places*.
- 18 Find $\tan 27^\circ 13'$ to *four decimal place*.

