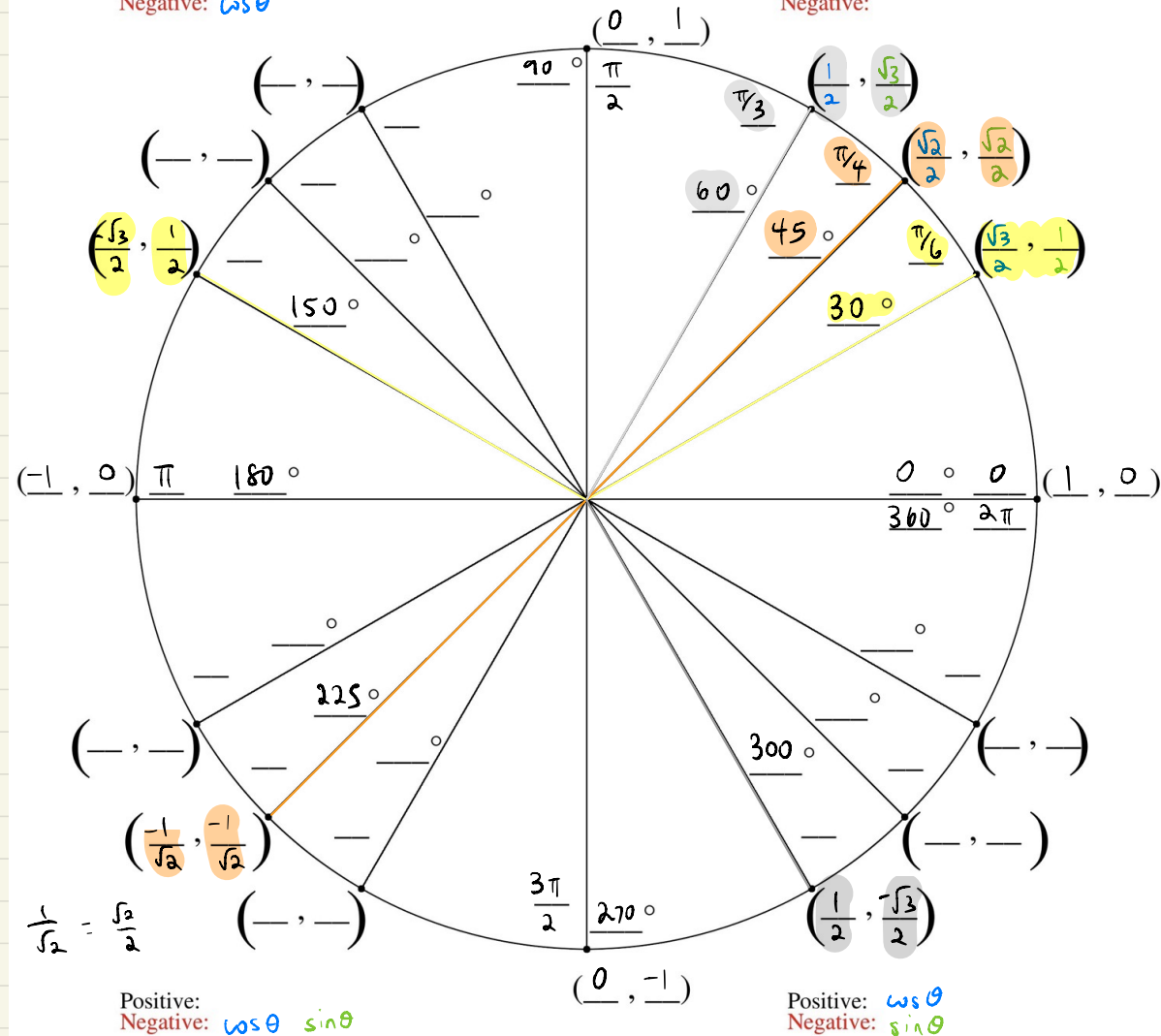


Extn topics: radian, ellipse, unit circle, contrapositive

Recall $\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{x}{r} = x$ if $r = 1$ (unit circle)
Similarly, $\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{y}{r} = y$ if $r = 1$

Positive: $\sin \theta$
Negative: $\cos \theta$

Positive: $\cos \theta$ $\sin \theta$
Negative:



$$\cos(150^\circ) = -\frac{\sqrt{3}}{2}$$

$$\sin(150^\circ) = \frac{1}{2}$$

$$\cos(225^\circ) = -\frac{1}{\sqrt{2}}$$

$$\sin(225^\circ) = -\frac{1}{\sqrt{2}}$$

$$\cos(300^\circ) = \frac{1}{2}$$

$$\sin(300^\circ) = -\frac{\sqrt{3}}{2}$$

706 Math

#60)

If it is raining, then the parade is cancelled \leftrightarrow If the parade is not cancelled, it is not raining

By intuition

If parade wasn't cancelled, must not have rained

By math

Let $p =$ "It is raining", $q =$ "Parade is cancelled"

Symbols

Symbol	meaning
\neg	not
\wedge	and
\vee	or
\rightarrow	implies

p	q	$p \wedge q$	$p \vee q$	$p \rightarrow q$	$\neg p \vee q$
F	F	F	F	T	T
F	T	F	T	T	T
T	F	F	T	F	F
T	T	T	T	T	T

p	$\neg p$
F	T
T	F

q	$\neg q$
F	T
T	F

Law

$$p \rightarrow q \equiv \neg p \vee q \quad \text{Why?}$$

By truth table

By intuition

$p =$ Duke won

$q =$ I pay you \$20

values of $p \rightarrow q$ are the same as the values of $\neg p \vee q$, hence they are logically equivalent.

Proposition

If Duke won, I pay you \$20.

If Duke didn't win ($\neg p$), my proposition is true if I pay you or not. So we use an or (\vee).

Else, if Duke won, my proposition is true only if I pay you \$20 (q).

So we or (\vee) $\neg p$, q .

Summary

If $p \rightarrow q$, $\neg q \rightarrow \neg p$ but $q \rightarrow p$ $\neg p \rightarrow \neg q$

contrapositive

converse

Proof of $p \rightarrow q \equiv \neg q \rightarrow \neg p$.

Assumptions $p \rightarrow q \equiv \neg p \vee q$ proven on previous page
 $p \vee q \equiv q \vee p$ proof by truth table & intuition

Begin $p \rightarrow q$

Contrapositive $\neg p \vee q$

Commutative $q \vee \neg p$

Contrapositive $\neg q \rightarrow \neg p$

Grade 2

key

4-17-22 Math 2020 June 02

4b) practice Law of Sines and Law of Cosines

I **promise** they aren't hard, just plugging in numbers into a formula - it'll take ~15 min.

Law of
Sines
practice

https://www.khanacademy.org/math/prec calculus/x9e81a4f98389efdf:trig/x9e81a4f98389efdf:law-of-sines/e/law_of_sines

If the link doesn't work, Google it

Law of
Cosines
practice

https://www.khanacademy.org/math/prec calculus/x9e81a4f98389efdf:trig/x9e81a4f98389efdf:law-of-cosines/e/law_of_cos

55) Friday; always confirm

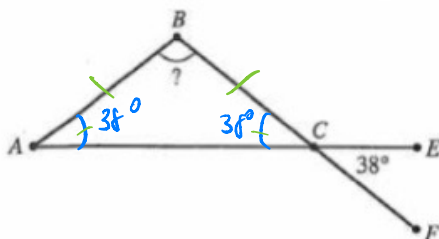
5b) fastest way to do complex number problems?

47) ellipse

<https://www.khanacademy.org/math/prec calculus/x9e81a4f98389efdf:conics/x9e81a4f98389efdf:ellipse-center-radii/v/conic-sections-intro-to-ellipses>

5)

5. In the figure below, \overline{AB} is congruent to \overline{BC} , and \overline{AE} intersects \overline{BF} at C . What is the measure of $\angle B$?



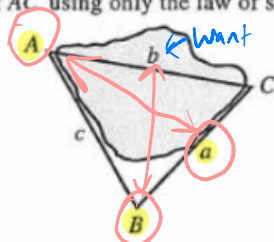
- A. 14°
 B. 38°
 C. 76°
 D. 104°
 E. 142°

$$180 - 2(38) = 104$$

46)

46. A surveyor needs to find the length from point A to point C across a lake as shown in the figure below. The measurements of which of the following angles and side lengths are sufficient for the surveyor to determine the length of \overline{AC} using only the law of sines?

Have



(Note: The law of sines says $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$.)

	angle	side length
F.	A, B	a
G.	A	c
H.	B	a, c
J.	B	c
K.	C	a

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{a \sin B}{\sin A} = b$$

→ 59) original 100
 × .9 sale 90
 × .7 clearance 63
 .63 ✓

\$100 ?
 10% off + 30% off = 40% off
 \$60 ≠
 0

0 37%

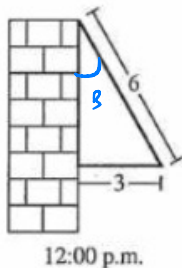
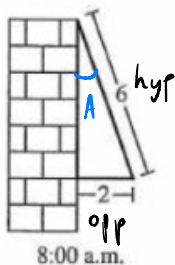
50) Misread

→ 56) Uncle Desmos

$$\sin(\theta) = \frac{\text{out}}{\text{hyp}}$$

55)

55. A 6-foot awning that extended 2 feet horizontally from a vertical building at 8:00 a.m. was adjusted to extend 3 feet horizontally from the building at 12:00 p.m., as shown below. Which of the following expressions equals the positive difference in the measures of the angle between the awning and the building at 8:00 a.m. and at 12:00 p.m.?



A. $\cos^{-1}\left(\frac{3-2}{6}\right)$

B. $\sin^{-1}\left(\frac{3-2}{6}\right)$

C. $\tan^{-1}\left(\frac{3-2}{6}\right)$

D. $\cos^{-1}\left(\frac{3}{6}\right) - \cos^{-1}\left(\frac{2}{6}\right)$

☒ E. $\sin^{-1}\left(\frac{3}{6}\right) - \sin^{-1}\left(\frac{2}{6}\right)$

2-A (positive difference)

A-B would be negative

$B = \sin^{-1}\left(\frac{3}{6}\right)$

$A = \sin^{-1}\left(\frac{2}{6}\right)$

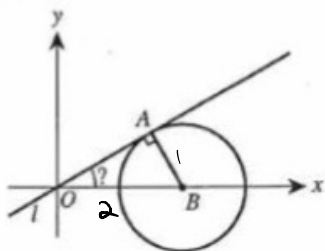
	input	output
\sin	θ	ratio
\sin^{-1}	ratio	θ
\cos	θ	ratio
\cos^{-1}	ratio	θ

ratio $[-1, 1]$

$\sin^{-1}(2) = \text{error}$
 (solvable with complex numbers)

24. Graphed in the standard (x,y) coordinate plane below is line l and the circle with equation $(x - 2)^2 + y^2 = 1$. Line l passes through $O(0,0)$ and is tangent to the circle at A , and B is the center of the circle. What is the measure of $\angle AOB$?

- F. 15°
G. 22.5°
H. 30°
J. 45°
K. 60°



$$\sin(\theta) = \frac{1}{2}$$

$$\sin^{-1}(\sin(\theta)) = \sin^{-1}\left(\frac{1}{2}\right)$$

$$\theta = \sin^{-1}\left(\frac{1}{2}\right)$$