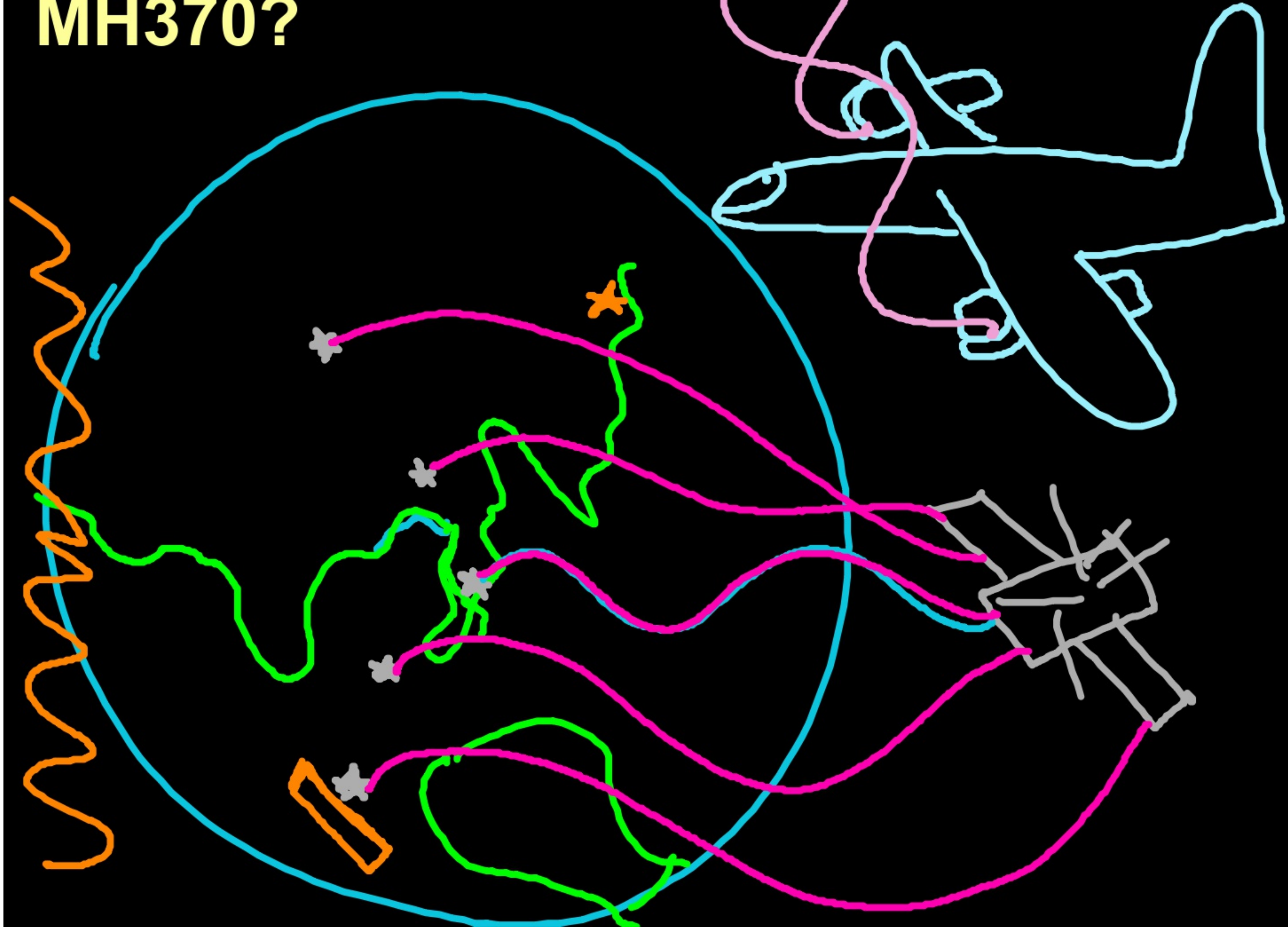
Is trigonometry still helping to find MH370?



Today's learning objective:

By the end of class, I will be able to solve trigonometric equations by utilizing the Pythagorean identity.

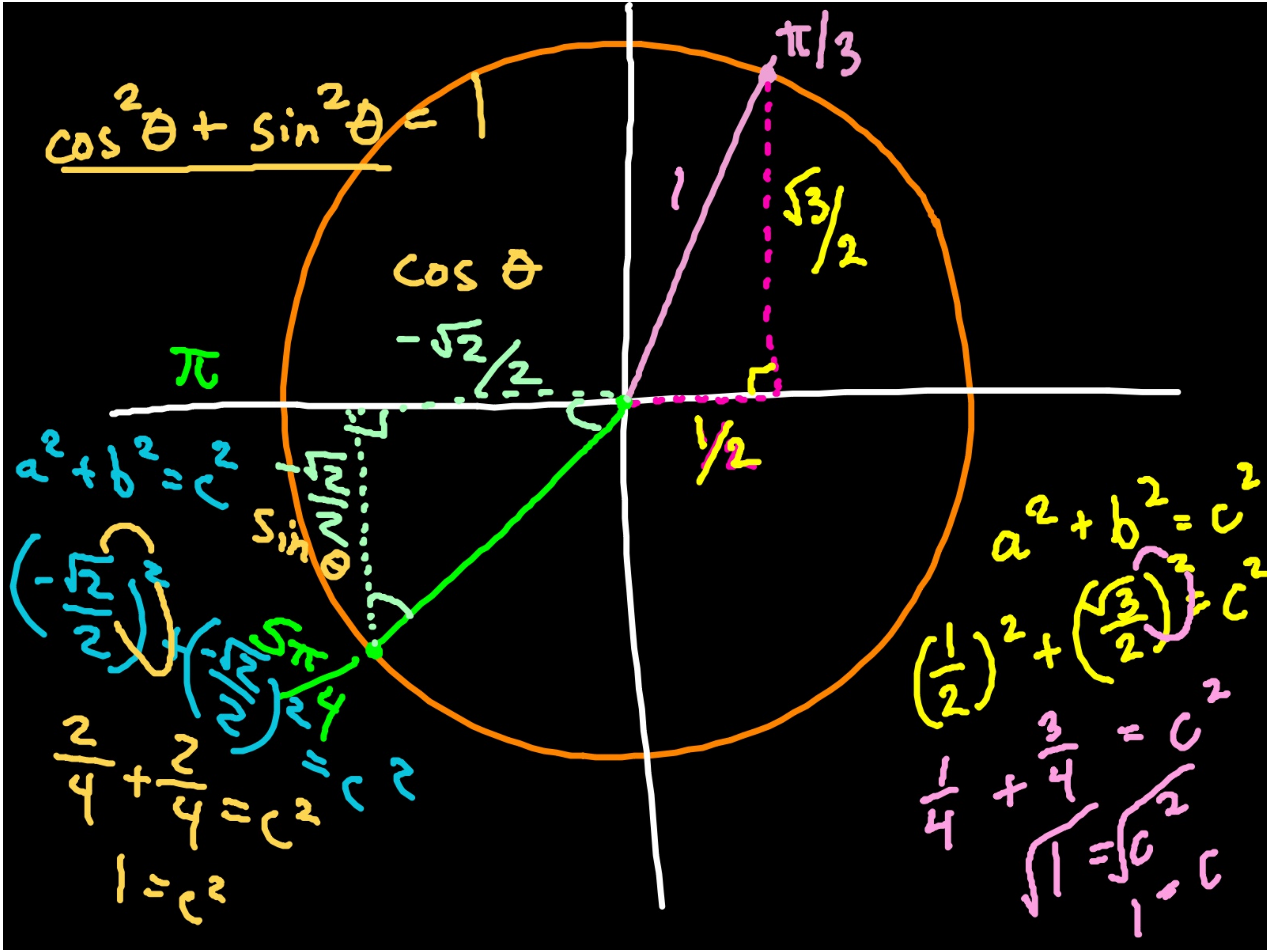
Today's language objective:

Pythagorean identity
Double angle identities

$\cos 2x$
$\sin 2x$

3.1	Length of an arc Area of a sector	$l = \theta r$ $A = \frac{1}{2}\theta r^2$
3.2	Trigonometric identity	$\tan\theta = \frac{\sin\theta}{\cos\theta}$
3.3	Pythagorean identity Double angle formulae	$\boxed{\cos^2\theta + \sin^2\theta = 1}$ 2 $\sin 2\theta = 2\sin\theta\cos\theta$ $\cos 2\theta = \cos^2\theta - \sin^2\theta = 2\cos^2\theta - 1 = 1 - 2\sin^2\theta$
3.6	Cosine rule Sine rule Area of a triangle	$c^2 = a^2 + b^2 - 2ab\cos C$; $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$ $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ $A = \frac{1}{2}ab\sin C$

[redacted]



$\cos^2\theta + \sin^2\theta = 1$
$\pi/3$
1
$\sqrt{3}/2$
$\cos\theta$
$-\sqrt{2}/2$
π
$1/2$
$a^2+b^2=c^2$
$-\sqrt{2}/2$
$\sin\theta$
$\left(-\frac{\sqrt{2}}{2}\right)^2 + \left(-\frac{\sqrt{2}}{2}\right)^2 = c^2$
$5\pi/4$
$\frac{2}{4}+\frac{2}{4}=c^2$
$1=c^2$
$a^2+b^2=c^2$
$\left(\frac{1}{2}\right)^2+\left(\frac{\sqrt{3}}{2}\right)^2=c^2$
$\frac{1}{4}+\frac{3}{4}=c^2$
$\sqrt{1}=\sqrt{c^2}$
$1=c$

Show that for $x = \pi$

$$\cancel{\cos^2 x + \sin^2 x} = -\cos x$$

$$1$$

$$-1 = +\cos x$$

$$x = \pi$$

Show that for x = 240º

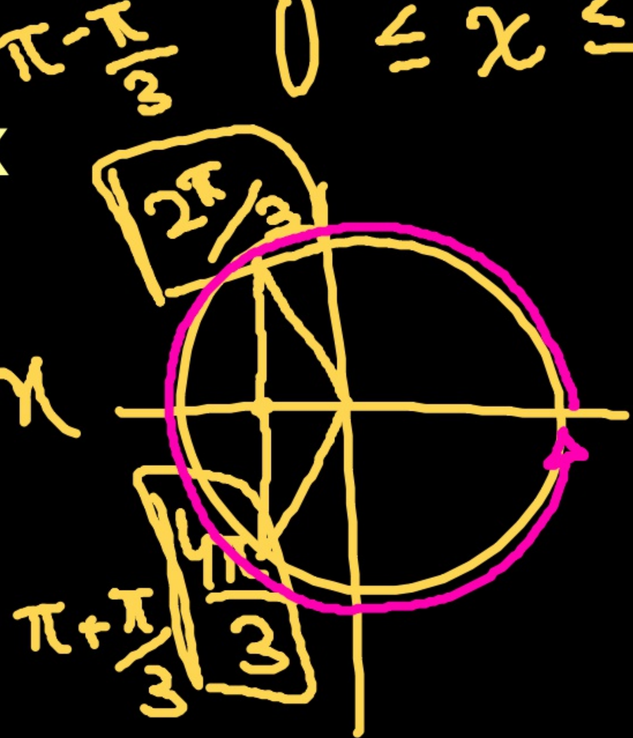
$$\frac{\cos^2 x}{2} + \frac{\sin^2 x}{2} = -\cos x$$

$0^\circ \le x \le 360^\circ$

$$\cancel{2} \times \frac{\cos^2 x + \sin^2 x}{\cancel{2}} = -2\cos x$$

$$\frac{1}{-2} = \frac{-\cancel{2}\cos x}{-\cancel{2}}$$

$$-\frac{1}{2} = \cos x$$



3.2	Trigonometric identity	$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$
3.3	Pythagorean identity Double angle formulae	$\cos^2\theta + \sin^2\theta = 1$ $\sin 2\theta = 2\sin\theta\cos\theta$ $\cos 2\theta = \cos^2\theta - \sin^2\theta = 2\cos^2\theta - 1 = 1 - 2\sin^2\theta$

Show that for x = π/2, 0

$\sin\left(2 \cdot \frac{\pi}{2}\right) - \sin(\pi/2) = 1$

$0 \quad - \quad 1$

$\sin 2x - \sin x = \cancel{\sin^2 x + \cos^2 x}$ $\quad 1$

$2\sin x\cos x - \sin x = 1$

$\sin x(2\cos x - 1) = 1$

$\sin x = 1$

-1

$\sin x - 1 = 0$

$x = \pi/2$

Solve:

Show that $\frac{7\cos x}{7} - \frac{7\cos^2 x}{7} = \frac{7\sin^2 x}{7}$ for $x = 0$

$$\cos x - \cos^2 x = \sin^2 x$$

$$+\cos^2 x \qquad +\cos^2 x$$

$$\cos x = \cos^2 x + \sin^2 x$$

$$\cos x = 1$$

Solve: $\cos 2x = \underline{\cos^2 x - \sin^2 x} = 2\cos^2 x - 1 = 1 - 2\sin^2 x$

Show that $\cos 2x + 2\sin^2 x = \sin x$ is true for $x = \pi/2$

$$\cos^2 x - 1\sin^2 x + 2\sin^2 x = \sin x$$

$$\cos^2 x + \sin^2 x = \sin x$$

$$1 = \sin x$$

$0 = 2(1)$ $\quad 2(\sin^2 x + \cos^2 x)$

Solve the following (no "show that" hints)

$0 \neq 2$ $\quad 0 = 2\sin^2 x + 2\cos^2 x$

$2\sin 2x - \sin^2 x = \sin^2 x + 2\cos^2 x + \cancel{4\sin x\cos x}$

$\cancel{2(2\sin x\cos x)}$ $\quad \cancel{-4\sin x\cos x}$

$\cancel{4\sin x\cos x}$

$\cancel{-4\sin x\cos x}$

$\cancel{-\sin^2 x} = \sin^2 x + 2\cos^2 x$

$\cancel{+\sin^2 x}$ $\quad \sin^2 x$

NO SOLUTION

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