



Assumption College Ubonratchathani
English for Math 3

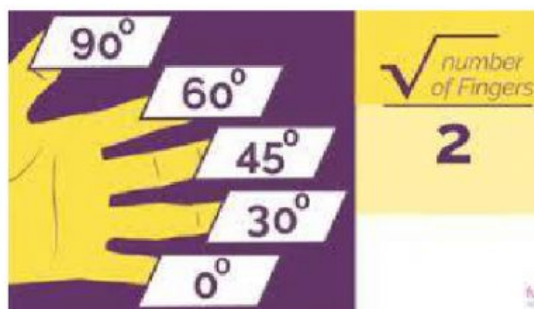
Name:..... Class:..... No.

Hand Trick to Find Trigonometric Ratios



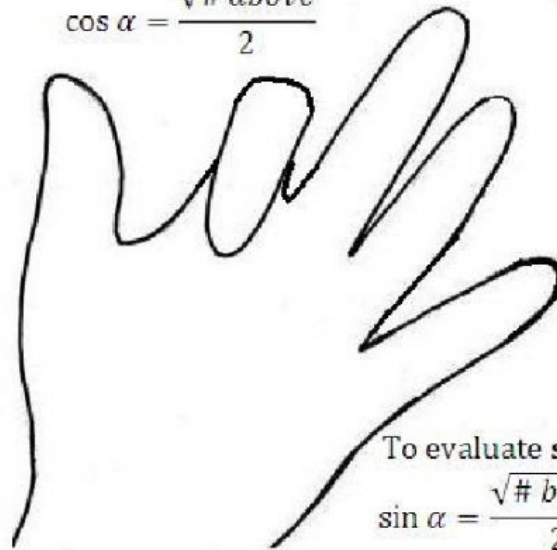
$$\sin \theta = \frac{\sqrt{\text{number of fingers below the bent finger}}}{2}$$

$$\cos \theta = \frac{\sqrt{\text{number of fingers above the bent finger}}}{2}$$



To evaluate **cosine**:

$$\cos \alpha = \frac{\sqrt{\# \text{ above}}}{2}$$



To evaluate **sine**:

$$\sin \alpha = \frac{\sqrt{\# \text{ below}}}{2}$$

Example: $\alpha = 60^\circ = \frac{\pi}{3}$ rad

1. Lower *pointer* finger.

2. Count fingers above: ① ↴

$$\text{So } \cos 60^\circ = \frac{\sqrt{1}}{2} = \frac{1}{2}$$

3. Count fingers below: ③ ↴

$$\text{So } \sin 60^\circ = \frac{\sqrt{3}}{2}$$

Example: Find $\sin 60^\circ$

Solution: **Step 1:** Bend the pointer finger.

Step 2: Count the number of fingers **below** the bent finger.

Step 3: Use the formula for $\sin \theta$.

$$\sin \theta = \frac{\sqrt{\text{number of fingers below the bent finger}}}{2}$$

$$\sin \theta = \frac{\sqrt{3}}{2} \leftarrow \text{answer}$$

Example: Find $\cos 60^\circ$

Solution: **Step 1:** Bend the pointer finger.

Step 2: Count the number of fingers **above** the bent finger.

Step 3: Use the formula for $\sin \theta$.

$$\cos 60^\circ = \frac{\sqrt{\text{number of fingers above the bent finger}}}{2}$$

$$\cos 60^\circ = \frac{\sqrt{1}}{2} = \frac{1}{2} \leftarrow \text{answer}$$



$$\tan \theta = \frac{\sqrt{\text{number of fingers below the bent finger}}}{\sqrt{\text{number of fingers above the bent finger}}}$$

Example: Find $\tan 60^\circ$

Solution: **Step 1:** Bend the pointer finger.

Step 2: Flip your hand.

Step 3: Count the number of fingers **above** the bent finger.

Fingers above = 3 (for $\sin 60^\circ$)

Step 4: Count the number of fingers **below** the bent finger.

Fingers below = 1 (for $\cos 60^\circ$)

Step 5: Use the formula for $\tan \theta$.

$$\tan \theta = \frac{\sqrt{3}}{\sqrt{1}} = \frac{\sqrt{3}}{1} = \sqrt{3} \leftarrow \text{answer}$$

Direction: Use the “Hand Trick” and fill up the table below with the correct values by ticking the correct choices.

	0^0	30^0	45^0	60^0	90^0
sin	1	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\sqrt{3}$	1
	0	$\frac{1}{2}$	$\sqrt{2}$	$\frac{\sqrt{3}}{2}$	0
	undefined	$\frac{\sqrt{3}}{2}$	1	$\frac{1}{2}$	undefined
cos	1	$\frac{\sqrt{3}}{2}$	1	$\frac{1}{2}$	1
	0	$\frac{1}{2}$	$\sqrt{2}$	$\frac{\sqrt{3}}{2}$	0
	undefined	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\sqrt{3}$	undefined
tan	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	0
	undefined	$\frac{1}{2}$	$\sqrt{2}$	$\frac{1}{2}$	undefined

"Diligence is the mother of good fortune."

("ความขยันเป็นแม่ของความโชคดี")

-- Benjamin Disraeli

