Can You Find the Missing Number?

Triangle 1: 2, 2, ⑥, 1, 3, 3

Triangle 2: 4, 4, ⑧, 1, 2, 2

Triangle 3: 6, 3, 12, 2, 1, 2

Triangle 4: 8, 4, 32, 2, 2
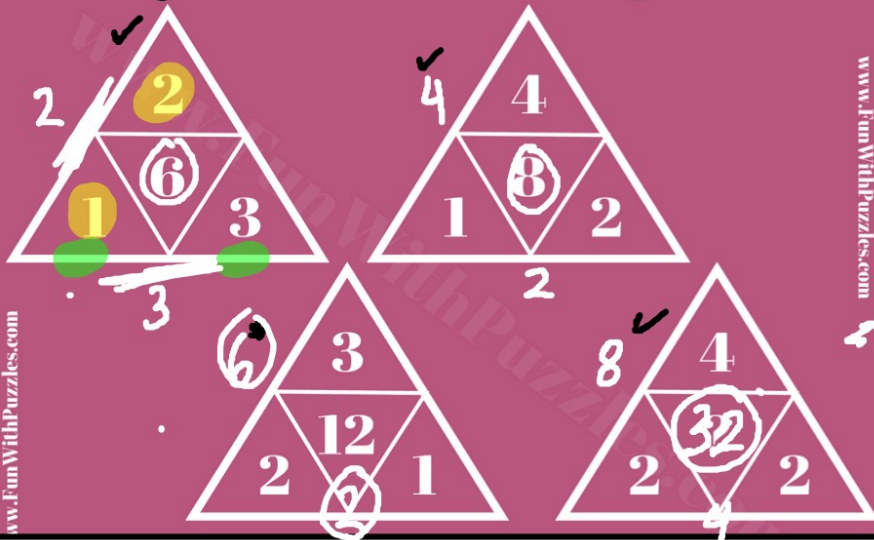
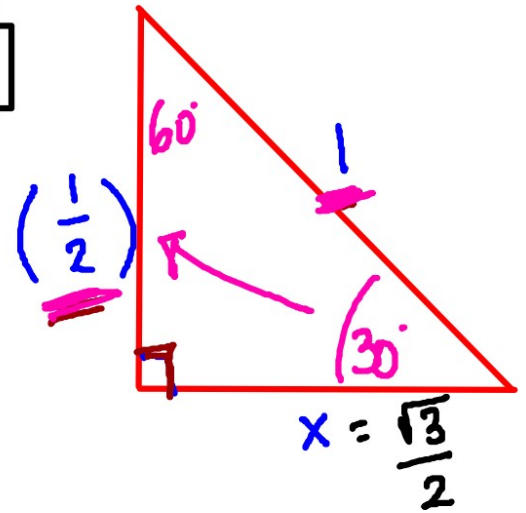
Pythagorean Thm
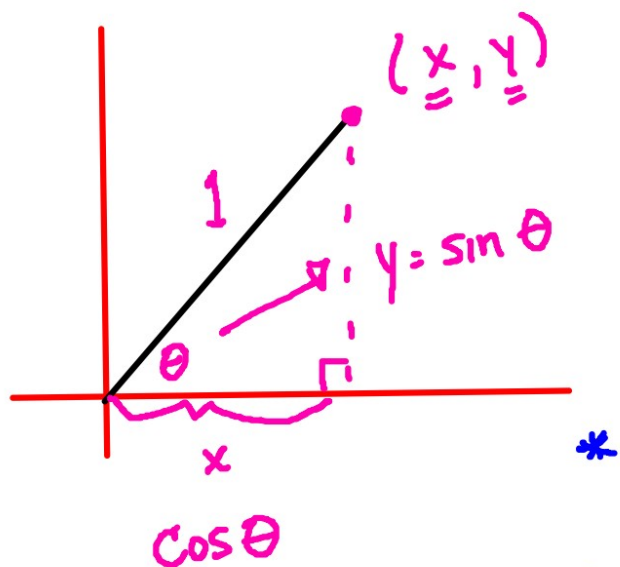
$$\left(\tfrac{1}{2}\right)^2 + x^2 = 1^2$$

$$\tfrac{1}{4} + x^2 = 1$$

$$\sqrt{x^2} = \sqrt{\tfrac{3}{4}} = \frac{\sqrt{3}}{2}$$

② Solve for x:

60°

$\left(\tfrac{1}{2}\right)$

1

30°

$$x = \frac{\sqrt{3}}{2}$$

$\cos \theta = x\text{-coordinate}$

$\sin \theta = y\text{-coordinate}$

Pythagorean Identity

* $\cos^2 \theta + \sin^2 \theta = 1$

* $1 - \sin^2 \theta = \cos^2 \theta$

* $1 - \cos^2 \theta = \sin^2 \theta$

Quotient Identities		
✓ $\tan(\theta) = \dfrac{\sin(\theta)}{\cos(\theta)}$	✓ $\cot(\theta) = \dfrac{\cos(\theta)}{\sin(\theta)}$	✳

Reciprocal Identities		
✓ $\csc(\theta) = \dfrac{1}{\sin(\theta)}$	✓ $\sec(\theta) = \dfrac{1}{\cos(\theta)}$	✓ $\cot(\theta) = \dfrac{1}{\tan(\theta)}$

Pythagorean Identities		
✳ $\sin^2(\theta) + \cos^2(\theta) = 1$ ✓ $\sin^2(\theta) = 1 - \cos^2(\theta)$ $\cos^2(\theta) = 1 - \sin^2(\theta)$	● $1 + \cot^2(\theta) = \csc^2(\theta)$ $1 = \csc^2(\theta) - \cot^2(\theta)$ $\cot^2(\theta) = \csc^2(\theta) - 1$	✳ $\tan^2(\theta) + 1 = \sec^2(\theta)$ $\tan^2(\theta) = \sec^2(\theta) - 1$ $1 = \sec^2(\theta) - \tan^2(\theta)$

$$1 + \cot^2\theta = \csc^2\theta$$

$$1 + \frac{\cos^2\theta}{\sin^2\theta} = \csc^2\theta$$

$$\frac{\sin^2\theta}{\sin^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} = \csc^2\theta$$

$$\frac{\sin^2\theta + \cos^2\theta}{\sin^2\theta} = \csc^2\theta$$

$$\frac{1}{\sin^2\theta} = \csc^2\theta$$

$$\csc^2\theta = \csc^2\theta \checkmark$$

$$\cdot \quad \tan^2 \theta + 1 = \sec^2 \theta$$

$$\frac{\sin^2 \theta}{\cos^2 \theta} + 1 = \sec^2 \theta$$

$$\frac{\sin^2 \theta}{\cos^2 \theta} + \frac{\cos^2 \theta}{\cos^2 \theta} = \sec^2 \theta$$

$$\frac{1}{\cos^2 \theta} = \sec^2 \theta$$

$$\sec^2 \theta = \sec^2 \theta \quad \checkmark$$

$$\csc\theta = \sin\theta + \sin\theta\cot^2\theta$$
$$= \sin\theta\left(1 + \cot^2\theta\right)$$
$$= \sin\theta\,\csc^2\theta$$
$$= \sin\theta \cdot \frac{1}{\sin^2\theta}$$
$$= \frac{\sin\theta}{\sin^2\theta}$$
$$= \frac{1}{\sin\theta}$$

$$\csc\theta = \csc\theta$$

Quotient Identities		
$\tan(\theta) = \dfrac{\sin(\theta)}{\cos(\theta)}$		$\cot(\theta$
Reciprocal Identities		
❤ $\csc(\theta) = \dfrac{1}{\sin(\theta)}$	$\sec(\theta) = \dfrac{1}{\cos(\theta)}$	
Pythagorean Identities		
$\sin^2(\theta) + \cos^2(\theta) = 1$	$1 + \cot^2(\theta) = \csc^2(\theta)$	t
$\sin^2(\theta) = 1 - \cos^2(\theta)$	$1 = \csc^2(\theta) - \cot^2(\theta)$	t
$\cos^2(\theta) = 1 - \sin^2(\theta)$	$\cot^2(\theta) = \csc^2(\theta) - 1$	

$$1 = (1 - \cos^2\theta)(1 + \cot^2\theta)$$

$$1 = \sin^2\theta \cdot \csc^2\theta$$

$$1 = \frac{\sin^2\theta}{1} \cdot \frac{1}{\sin^2\theta}$$

$$1 = \frac{\sin^2\theta}{\sin^2\theta}$$

$$1 = 1 \quad \checkmark$$

Quotient Identities		
$\tan(\theta) = \dfrac{\sin(\theta)}{\cos(\theta)}$		$\cot($
Reciprocal Identities		
✳ $\csc(\theta) = \dfrac{1}{\sin(\theta)}$	$\sec(\theta) = \dfrac{1}{\cos(\theta)}$	
Pythagorean Identities		
$\sin^2(\theta) + \cos^2(\theta) = 1$	$1 + \cot^2(\theta) = \csc^2(\theta)$	
$\sin^2(\theta) = 1 - \cos^2(\theta)$	$1 = \csc^2(\theta) - \cot^2(\theta)$	
$\cos^2(\theta) = 1 - \sin^2(\theta)$	$\cot^2(\theta) = \csc^2(\theta) - 1$	

$$\frac{csc^2\theta}{cot\,\theta} = csc\,\theta\,sec\,\theta$$

$$\frac{\left(\frac{1}{sin^2\theta}\right)}{\left(\frac{cos\theta}{sin\theta}\right)} = csc\,\theta\,sec\,\theta$$

$$\frac{1}{sin^2\theta} \cdot \frac{sin\theta}{cos\theta} =$$

$$\frac{1}{sin\theta} \cdot \frac{1}{cos\theta} =$$

$$csc\,\theta\,sec\theta = csc\theta\,sec\theta \checkmark$$

Quotient Identities		
$\tan(\theta) = \dfrac{\sin(\theta)}{\cos(\theta)}$	✱	$\cot(\theta)$
Reciprocal Identities		
✱ $\csc(\theta) = \dfrac{1}{\sin(\theta)}$	$\sec(\theta) = \dfrac{1}{\cos(\theta)}$	
Pythagorean Identities		
$\sin^2(\theta) + \cos^2(\theta) = 1$	$1 + \cot^2(\theta) = \csc^2(\theta)$	ta
$\sin^2(\theta) = 1 - \cos^2(\theta)$	$1 = \csc^2(\theta) - \cot^2(\theta)$	ta
$\cos^2(\theta) = 1 - \sin^2(\theta)$	$\cot^2(\theta) = \csc^2(\theta) - 1$	1