

# Trigonometry Murder Mystery

(featuring sine, cosine, tangent, Law of Sines & Law of Cosines)

Mr. Trig is apparently the victim of foul play. Clues were mailed to the police in the form of math problems! Being a long time out of high school math class, the police are stumped, so they reach out to the local high school. There are three possible murder weapons, three possible locations, and three possible suspects.

## **Murder Weapon**

Power Shock  
A Poison M&M  
A Flying Gummi Bear

## **Murder Locations**

River in a Canyon  
Big Ben Clock Tower  
Top of a Skyscraper

## **Primary Suspect**

Herr Claude S. Lanz  
Sabrina N. Ricci  
Johnny N. Rabbit

## **Can you help the police solve this mystery?**

*Work through the clues to eliminate murder weapons, murder locations and suspects. When you think you have solved a clue, report to your instructor to receive the next clue. Try to be the first group to solve the murder!*

The list of clue packets appears below. These DO NOT need to be solved in order.

Weapon of Choice  
Who Dunit?  
Location, Location, Location  
Leathal Weapon  
The Scene at the Scene  
The Usual Suspects

# Weapon of Choice

## Pythagorean Theorem & Trig Ratios

Place the answers, rounded to three decimal places, **in numerical order** to spell out a clue by using the letter of the angle.

Find  $\sin O$  if  $\tan O = \frac{4}{3}$  .8      Find  $\tan N$  if  $\cos N = \frac{24}{25}$  .292

Find  $\sin B$  if  $\tan B = \frac{2\sqrt{14}}{13}$  .499      Find  $\cos H$  if  $\sin H = \frac{10}{11}$  .417

Find  $\cos W$  if  $\sin W = \frac{\sqrt{5}}{3}$  .667      Find  $\sin R$  if  $\cos R = \frac{10.8}{13}$  .555

Find  $\tan P$  if  $\sin P = \frac{12}{13}$  2.4      Find  $\tan R$  if  $\sin R = \frac{4}{5}$  1.33

Find  $\cos N$  if  $\tan N = \frac{8}{15}$  .882      Find  $\sin P$  if  $\tan P = \frac{3}{4}$  .6

Find  $\cos S$  if  $\tan S = \frac{2}{3}$  .832      Find  $\tan A$  if  $\cos A = \frac{15}{17}$  .533

Find  $\cos T$  if  $\sin T = \frac{12}{13}$  .385      Find  $\cos T$  if  $\sin T = \frac{23}{25}$  .392

Find  $\cos E$  if  $\tan E = \frac{2\sqrt{10}}{3}$  .428      Find  $\sin E$  if  $\cos E = \frac{\sqrt{21}}{11}$  .909

Find  $\cos E$  if  $\tan E = \sqrt{3}$  .5      Find  $\sin O$  if  $\cos O = \frac{2\sqrt{2}}{3}$  .3

A. Can you eliminate a murder weapon? If so, which one? **Gummi Bear**

B. Which weapons remain?

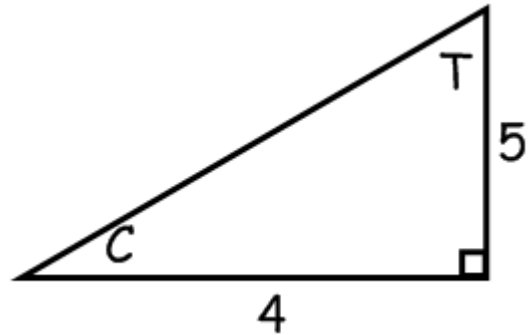
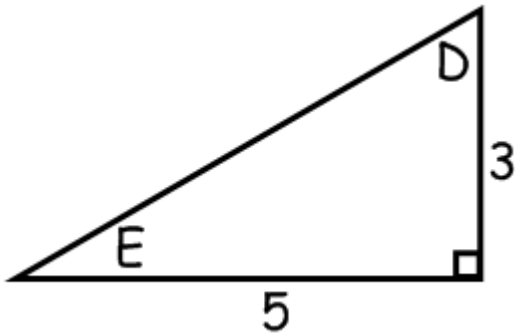
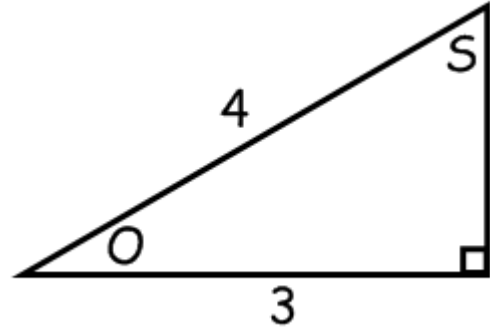
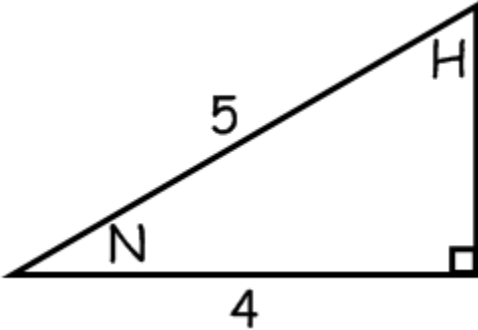
C. Which suspects still remain?

D. Which locations remain?

# Who Durnit?

## Pythagorean Theorem & Trig Ratios

Solve each triangle for the missing side.



Match the triangle to the trigonometric ration. You may use the angles more than once. You do not need to use all angles. The solutions will spell out a very important clue about the suspect.

$$\sin \text{ \_\_\_\_ } = \frac{3}{5}$$

$$\text{N} \tan \text{ \_\_\_\_ } = \frac{4}{5}$$

$$\text{T} \sin \text{ \_\_\_\_ } = \frac{4}{5} \quad \text{H}$$

$$\cos \text{ \_\_\_\_ } = \frac{3}{4}$$

$$\text{O} \tan \text{ \_\_\_\_ } = \frac{4}{3}$$

$$\text{H} \cos \text{ \_\_\_\_ } = \frac{4}{\sqrt{41}} \quad \text{C}$$

$$\sin \text{ \_\_\_\_ } = \frac{4}{\sqrt{41}}$$

$$\text{T} \tan \text{ \_\_\_\_ } = \frac{3}{5}$$

E

- Can you eliminate a suspect? If so, which one? **Herr Claude S. Lanz**
- Which suspect remain?
- Which murder weapons still remain?
- Which locations remain?

# The Usual Suspects

## Law of Sines

The police think that the murderer is exceptionally smart. Solve the triangles below. The suspect is **not linked** to the triangle with two solutions.

For  $\triangle CSL$ ,  $s = 7$ ,  $l = 5$ , and  $m\angle S = 19^\circ$ . Solve the triangle.

$$m\angle Z = 13^\circ$$

For  $\triangle SNR$ ,  $n = 27$ ,  $r = 12$ , and  $m\angle R = 37^\circ$ . Solve the triangle.

No triangle

For  $\triangle JNR$ ,  $j = 15$ ,  $n = 11$ , and  $m\angle N = 36^\circ$ . Solve the triangle.

$$m\angle C = 17^\circ \text{ or } 91^\circ$$

- Can you eliminate a suspect? If so, which one? **Johnny N. Rabbit**
- Which suspect remain?
- Which murder weapons still remain?
- Which locations remain?

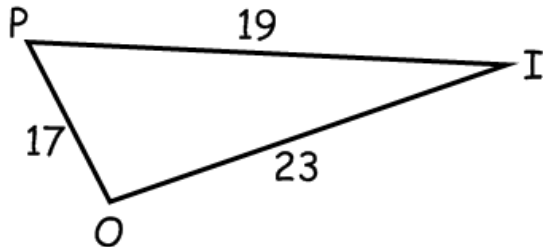
# Lethal Weapon

Law of Cosines – find angles

After doing the calculations, discard the weapon with the smallest angle.

For  $\triangle POI$  find  $m\angle P$  to the nearest tenth of a degree.

79.2

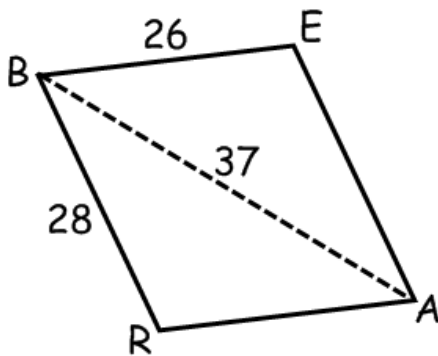


For  $\triangle PWR$  find  $m\angle R$  to the nearest tenth, given  $p = 38$ ,  $w = 42$ , and  $r = 47$ .

71.9

Find  $m\angle E$  for the parallelogram below to the tenth of a degree.

86.4



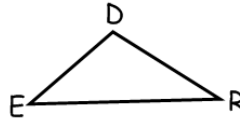
- Can you eliminate a murder weapon? If so, which one? **Power Shock**
- Which weapons remain?
- Which suspects still remain?
- Which locations remain?

# Location, Location, Location

## Law of Sines & Law of Cosines

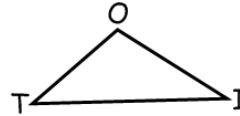
Solve for all of the angles of each triangle. Then put the angles in order **from largest to smallest** to spell out a clue. **DISPOSE OF A TOWER ...** There are extra letters after the clue.

$$m\angle D = 149^\circ, r = 9, d = 38$$



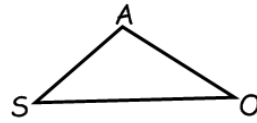
$$\angle E = 24^\circ, \angle R = 7^\circ$$

$$m\angle I = 122^\circ, o = 15, i = 28$$



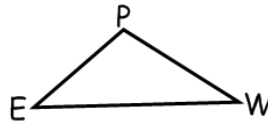
$$\angle O = 27^\circ, \angle T = 31^\circ$$

$$m\angle S = 68^\circ, m\angle O = 79^\circ$$

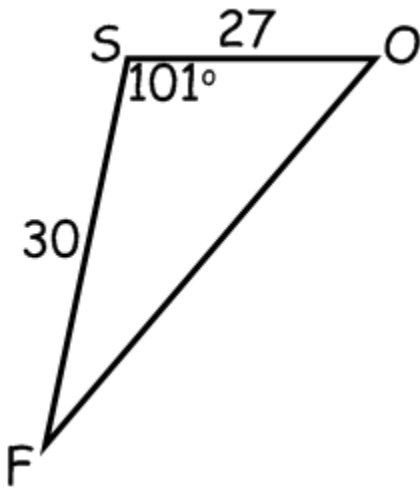


$$\angle A = 33^\circ$$

$$m\angle P = 93^\circ, p = 26, w = 11$$



$$\angle E = 62^\circ, \angle W = 25^\circ$$



$$\angle F = 37^\circ, \angle O = 42^\circ$$

- Can you eliminate a location? If so, which one? **Big Ben Clock Tower**
- Which weapons remain?
- Which suspects still remain?
- Which locations remain?

# The Scene at the Scene

## Trig Ratios Word Problems

*Eliminate the solution that is an order of magnitude different from the other locations.*

From the top of a canyon, the angle of depression to the far side of the river is  $58^\circ$ , and the angle of depression to the near side of the river is  $74^\circ$ . The depth of the canyon is 191 m. What is the width of the river at the bottom of the canyon to the nearest meter? **64 m**

A skyscraper stands between two school buildings. The two schools are 10 miles apart. From school A the angle of elevation to the top of the skyscraper is  $5^\circ$ . From school B the angle of elevation is  $2^\circ$ . What is the height of the skyscraper to the nearest meter? (Hint: 1 mile = 1609 meters) **402 m**

Susan and George stand 38 meters apart, both to the west of Big Ben. From Susan's position, the angle of elevation to the top of Big Ben is  $65^\circ$ . From George's position, the angle of elevation to the top of Big Ben is  $49.5^\circ$ . To the nearest meter, how tall is Big Ben? **92 m**

- A. Can you eliminate a location? If so, which one? **Skyscraper**
- B. Which weapons remain?
- C. Which suspects still remain?
- D. Which locations remain?

# **We Solved the Crime!**

Sabrina N. Ricci did it with A Poison M&M

at the River in the Canyon.

Group Member Names: 1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_

Date/Time Submitted: \_\_\_\_\_

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