Where is the best place to play "hide and seek?"

Solve for the missing sides. Make sure your answer is both exact and simplified. To figure out the joke, place the letter of each problem above the answer on the line(s) below. Some blanks will go unfilled.

\[2\sqrt{13} = \sqrt{52} = N\]

\[7^2 + a^2 + 15^2 = 41 = 14^2 + 5\]

\[A = 144 = 2\sqrt{11}\]

\[L = 6\sqrt{2} = 1\]

\[y^2 + 8^2 = 14^2\]

\[y = \sqrt{132} = 2\sqrt{33}\]

\[T = \begin{array}{c}6\sqrt{2} \quad n \quad H \quad Y \quad D \quad E \quad P \quad A \quad B \quad K \quad P = \sqrt{74}\end{array}\]

1. Trig Jokes

Geo Joke Worksheets © 2002 NASCO
What did the cannibal get when he was late for dinner?

Find the missing variables and trigonometric ratios. The answer to each problem will match a letter that will allow you to figure out the joke.

1. \( x = \frac{\sqrt{2}}{2} \) \( L \)
2. \( \sin \angle A = \frac{4}{5} \) \( O \)
3. \( \cos \angle A = \frac{3}{5} \) \( T \)
4. \( \tan \angle B = \frac{2}{3} \) \( E \)
5. \( \tan \angle A = \frac{2}{3} \) \( H \)
6. \( x = \frac{17}{8} \) \( O \)
7. \( \cos \angle D = \frac{15}{17} \) \( L \)
8. \( \tan \angle F = \frac{15}{18} \) \( R \)
9. \( \cos \angle F = \frac{8}{17} \) \( E \)
10. \( \tan \angle D = \frac{8}{15} \) \( D \)
11. \( x = \frac{4\sqrt{3}}{3} \) \( S \)
12. \( \tan \angle J = \frac{\sqrt{3}}{4} \) \( D \)
13. \( \sin \angle J = \frac{\sqrt{3}}{2} \) \( T \)
14. \( \tan \angle H = \frac{\sqrt{3}}{3} \) \( C \)
15. \( \sin \angle H = \frac{1}{2} \) \( U \)

\[ \tan H = \frac{4}{3} \]

**THE COLD SHOULDER**

13 5 9 14 2 7 10 11 3 6 15 1 12 4 8

Triangles — Trigonometric Ratios

Joke #19

Geo Joke Worksheets © 2002 NASCO

25
What do you get if you cross an insect with the Easter rabbit?

Find the missing variables. Round your answers to the nearest tenth. To figure out the joke, place the letter of each problem above the answer on the line(s) below. Some blanks will go unfilled.

\[
\begin{align*}
\sin 61^\circ &= \frac{N}{12} \\
\sin 42^\circ &= \frac{4}{10} \\
\tan 17^\circ &= \frac{13}{3} \\
\tan 50^\circ &= \frac{6}{V} \\
\tan 26^\circ &= \frac{U}{7} \\
\sin 36^\circ &= \frac{8}{B} \\
\cos 40^\circ &= \frac{4}{N} \\
\cos 13^\circ &= \frac{U}{15} \\
\cos 8^\circ &= \frac{12}{B} \\
\end{align*}
\]

\[
\begin{align*}
B &= 11.4 \\
U &= 12.1 \\
A &= 3.4 \\
S &= 7.2 \\
5 &= 42.5 \\
6.6 &= 8.6 \\
B &= 4.2 \\
V &= 13.6 \\
N &= 6.8 \\
Y &= 10.5 \\
N &= 5.2 \\
V &= 6.7 \\
\end{align*}
\]

Triangles — Trigonometry - Finding Missing Sides

Joke #20
What has one horn and gives milk?

Find the missing angles. Round your answers to the nearest tenth. To figure out the joke, place the letter of each problem above the answer on the line(s) below. Some blanks will go unfilled.

\[
\begin{align*}
\sin L &= \frac{7}{13} \\
\tan V &= \frac{9}{8} \\
\cos K &= \frac{6}{11} \\
\sin C &= \frac{22}{27} \\
\tan I &= \frac{4}{6} \\
\cos R &= \frac{17}{20} \\
\sin K &= \frac{3}{7} \\
\tan T &= \frac{12}{19} \\
\cos M &= \frac{12}{15}
\end{align*}
\]
**What's green and loud?**

Solve the following word problems. Round your answers to the nearest tenth. To figure out the joke, place the letter of each problem above the answer on the line(s) below. Some blanks will go unfilled.

O: An ant is looking up at you with an angle of elevation of 24°. You are 5 feet tall. How far is the ant from your foot?

\[ \tan 24° = \frac{5}{x} \]

\[ x = 11.2 \text{ ft} \]

H: Bob is looking at a helicopter that is flying 1,000 feet above the ground. Bob is 1,500 feet from the helicopter. What angle of elevation is Bob looking at the helicopter?

\[ \sin x = \frac{1500}{x} \]

\[ x = 41.8° \]

G: A building 50 feet high casts a shadow 68 feet long. Find the measure of the angle of elevation of the sun.

\[ \tan x = \frac{50}{68} \]

\[ x = 36.3° \]

A: A dog chased a cat up a tree. The cat is 14 feet up the tree. If the dog is standing 3 feet from the tree, what is the distance from the cat to the dog?

\[ 3^2 + 14^2 = x^2 \]

\[ x = 14.3 \text{ ft} \]

R: From the top of a tower, the angle of depression to a flower on the ground is 74°. The top of the tower is 90 feet above ground. How far is the flower from the foot of the tower?

\[ \tan 74° = \frac{90}{x} \]

\[ x = 25.8° \]

O: A fireman’s ladder leaning against a house makes an angle of 50° with the ground. How long is the ladder if the ladder is 8 feet from the foot of the house?

\[ \cos 50° = \frac{8}{x} \]

\[ x = 12.4 \text{ ft} \]

R: You are standing on a cliff that is 400 feet tall. You throw your geometry book off the cliff. The book lands 300 feet from the base of the cliff. How far is the book now from you?

\[ 300^2 + 400^2 = x^2 \]

\[ x = 500 \text{ ft} \]

F: Cathy is flying a kite. The kite has an angle of depression of 47° and is flying on 35 feet of string. If Cathy is holding the end of the string 5 feet off the ground, how high above the ground is the kite?

\[ \sin 47° = \frac{x}{35} \]

\[ x = 30.6 \text{ ft} \]

N: A bird is flying above a tree. You are standing 40 feet away from the tree. The angle of elevation to the top of the tree is 32°, and the angle of elevation to the bird is 42°. What is the distance from the bird to the top of the tree?

\[ x = 11.0 \]

<table>
<thead>
<tr>
<th>A</th>
<th>F</th>
<th>R</th>
<th>O</th>
<th>G</th>
<th>E</th>
<th>H</th>
<th>O</th>
<th>B</th>
<th>N</th>
</tr>
</thead>
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<tr>
<td>14.3</td>
<td>22.8</td>
<td>15.9</td>
<td>30.6</td>
<td>25.8</td>
<td>11.2</td>
<td>36.3</td>
<td>125</td>
<td>12.2</td>
<td>41.8</td>
</tr>
</tbody>
</table>

**Triangles — Trigonometry and Pythagorean Theorem — Word Problems**

\[ \tan 32° = \frac{x}{40} \]

\[ \tan 42° = \frac{x}{40} \]

Joke #22
Trigonometry

The area of any triangle is given by one-half the product of two adjacent edges and the angle between them.

\[ \text{Area of Triangle } \triangle ABC = \frac{1}{2} \ ab \ \sin \ C \]

1. \( \text{Area } 10.6 \text{ cm}^2 \)
2. \( \text{Find the area of triangle } \triangle ABC \text{ when } a = 8.4 \text{ cm}, \ b = 3.7 \text{ cm} \)
3. \( \text{Find the area of triangle } \triangle ABC \text{ when } b = 5.9 \text{ cm}, \ c = 7.2 \text{ cm} \)
4. \( \text{Find the area of triangle } \triangle ABC \text{ when } AB = 6.7 \text{ cm}, \ AC = 9.3 \text{ cm} \)
5. \( \text{Find the area of triangle } \triangle ABC \text{ when } BC = 3.1 \text{ cm}, \ AC = 5.4 \text{ cm} \)
6. \( \text{Find the area of triangle } \triangle ABC \text{ when } AB = 14.5 \text{ cm}, \ BC = 9.6 \text{ cm} \)
7. \( \text{Find the area of triangle } \triangle ABC \text{ when } a = 2.8 \text{ cm}, \ c = 4.1 \text{ cm} \)
8. \( \text{Find the area of triangle } \triangle ABC \text{ when } XY = 4.3 \text{ cm}, \ XZ = 3.2 \text{ cm} \)
9. \( \text{Find the area of triangle } \triangle ABC \text{ when } y = 8.8 \text{ cm}, \ x = 5.7 \text{ cm} \)
10. \( \text{Find the area of triangle } \triangle ABC \text{ when } QR = 12.4 \text{ cm}, \ PR = 17.6 \text{ cm} \)
11. \( \text{Find the area of triangle } \triangle ABC \text{ when } LN = 12.1 \text{ cm}, \ MN = 10.6 \text{ cm} \)

11. A triangle of area 21.4 cm\(^2\) has two edges measuring 9.8 and 5.9 cm respectively. Find the angle between those two edges.
\[ \text{Area } = \frac{1}{2} \times 9.8 \times 5.9 \times \sin \theta \]
\[ 21.4 = \frac{1}{2} \times 9.8 \times 5.9 \times \sin \theta \]
\[ \theta = \arcsin \left( \frac{21.4}{\frac{1}{2} \times 9.8 \times 5.9} \right) \approx 47.8^\circ \]

12. A triangle \(\triangle ABC\) has an area of 17.3 cm\(^2\). \(AB = 6.3\) cm and \(\angle BAC = 31.4^\circ\). What is the length of the edge \(AC\)?
\[ 17.3 = \frac{1}{2} \times 6.3 \times AC \times \sin 31.4^\circ \]
\[ AC = \frac{2 \times 17.3}{6.3 \times \sin 31.4^\circ} \approx 10.5 \text{ cm} \]
Use the Law of Sines to solve the following non-right triangles. Round all decimals to the nearest 10th.

1. \[ \frac{\sin 48°}{19} = \frac{\sin 85°}{b} = \frac{\sin 47°}{c} \]
   \[ \angle A = 48° \quad b = 25.5 \quad c = 18.7 \]

2. \[ \frac{\sin 104°}{25} = \frac{\sin B}{16} = \frac{\sin A}{a} \]
   \[ \angle A = 37.6° \quad \angle B = 38.4° \quad a = 15.7 \]

3. \[ \frac{\sin 33°}{a} = \frac{\sin 66°}{b} = \frac{\sin 81°}{c} \]
   \[ \angle B = 160° \quad a = 14.3 \quad b = 24.0 \]

4. \[ \frac{\sin 42°}{a} = \frac{\sin 65°}{b} = \frac{\sin 73°}{c} \]
   \[ \angle B = 105° \quad a = 23.8 \quad b = 32.2 \]

5. \[ \sin A = \frac{\sin 56°}{17} = \frac{\sin 14°}{14} \]
   \[ \angle A = 80.9° \quad \angle C = 43.1° \quad a = 20.2 \]

6. \[ \frac{\sin 24°}{a} = \frac{\sin 90°}{b} = \frac{\sin 95°}{c} \]
   \[ \angle C = 95° \quad a = 17.6 \quad b = 37.8 \]
Now draw your own triangles and solve using the Law of Sines. Round all decimals to the nearest 10th.

7. $\angle A = 73^\circ$, $a = 18$, $b = 11$

\[
\frac{\sin 73}{18} = \frac{\sin B}{11} = \frac{\sin C}{c}
\]

$\angle B = 35.8$, $\angle C = 71.2$, $c = 17.8$

8. $\angle A = 26^\circ$, $\angle C = 35^\circ$, $b = 13$

\[
\frac{\sin 26}{a} = \frac{\sin 119}{b} = \frac{\sin 35}{c}
\]

$\angle B = 119$, $a = 10.5$, $c = 8.5$

9. $\angle B = 102^\circ$, $\angle C = 43^\circ$, $b = 21$

\[
\frac{\sin 35}{a} = \frac{\sin 102}{21} = \frac{\sin 43}{c}
\]

$\angle A = 35$, $a = 12.3$, $c = 14.6$

10. $\angle A = 55^\circ$, $\angle B = 64^\circ$, $c = 34$

\[
\frac{\sin 55}{a} = \frac{\sin 64}{b} = \frac{\sin 43}{c}
\]

$\angle C = 61$, $a = 31.8$, $b = 34.9$

Answers:
1. 48, 25.5, 18.7
2. 37.6, 38.4, 15.7
3. 66, 14.3, 24.0
4. 65, 23.8, 32.2
5. 80.9, 43.1, 20.2
6. 95, 17.6, 37.8
7. 35.8, 71.2, 17.8
8. 119, 6.5, 8.5
9. 35, 12.3, 14.6
10. 61, 31.8, 34.9
Use the Law of Cosines to solve the following non-right triangles. Round all decimals to the nearest 10°.

1. \( \triangle ABC \)
   \[ a^2 = 7^2 + 9^2 - 2(7)(9) \cos 35 \]
   \[ b^2 = 15.0^2 + 9^2 - 2(15.0)(9) \cos B \]
   \[ \angle B = 11.3^\circ \quad \angle C = 133.7^\circ \quad a = 15.0 \]

2. \( \triangle ABC \)
   \[ a^2 = 23^2 + 26^2 - 2(23)(26) \cos 114 \]
   \[ b^2 = 41.1^2 + 26^2 - 2(41.1)(26) \cos B \]
   \[ \angle B = 30.7^\circ \quad \angle C = 35.3^\circ \quad a = 41.1 \]

3. \( \triangle ABC \)
   \[ b^2 = 15^2 + 11^2 - 2(15)(11) \cos 110 \]
   \[ c^2 = 11^2 + 22.2^2 - 2(11)(22.2) \cos C \]
   \[ \angle A = 20.5^\circ \quad \angle C = 31.5^\circ \quad b = 22.2 \]

4. \( \triangle ABC \)
   \[ 25^2 = 14^2 + 23^2 - 2(14)(23) \cos A \]
   \[ 23^2 = 14^2 + 25^2 - 2(14)(25) \cos B \]
   \[ \angle A = 81.1^\circ \quad \angle B = 65.3^\circ \quad \angle C = 33.6^\circ \]

5. \( \triangle ABC \)
   \[ 18^2 = 30^2 + 29^2 - 2(30)(29) \cos A \]
   \[ 29^2 = 30^2 + 18^2 - 2(30)(18) \cos B \]
   \[ \angle A = 35.5^\circ \quad \angle B = 92.2^\circ \quad \angle C = 75.3^\circ \]

6. \( \triangle ABC \)
   \[ 13^2 = 10^2 + 15^2 - 2(10)(15) \cos A \]
   \[ 15^2 = 13^2 + 10^2 - 2(13)(10) \cos B \]
   \[ \angle A = 41.1^\circ \quad \angle B = 80.3^\circ \quad \angle C = 58.6^\circ \]
Now draw your own triangles and solve using the Law of Cosines and the Law of Sines. Round all decimals to the nearest 10th.

7. \( \angle B = 63^\circ, a = 29, c = 38 \)

\[
b^2 = 29^2 + 38^2 - 2(38)(29) \cos 63^\circ
\]
\[
38^2 = 29^2 + 35.8^2 - 2(29)(35.8) \cos C
\]

\( \angle A = 46.1^\circ \quad \angle C = 70.9^\circ \quad b = 36.8 \)

8. \( \angle A = 103^\circ, b = 15, c = 24 \)

\[
a^2 = 24^2 + 15^2 - 2(15)(24) \cos 103^\circ
\]
\[
15^2 = 24^2 + 31^2 - 2(24)(31) \cos B
\]

\( \angle B = 51.5^\circ \quad \angle C = 25.5^\circ \quad a = 31.0 \)

9. \( \angle C = 48^\circ, a = 17, b = 20 \)

\[
c^2 = 20^2 + 17^2 - 2(20)(17) \cos 48^\circ
\]
\[
20^2 = 17^2 + 15.3^2 - 2(17)(15.3) \cos B
\]

\( \angle A = 55.7^\circ \quad \angle B = 70.3^\circ \quad c = 15.3 \)

10. \( a = 38, b = 31, c = 35 \)

\[
31^2 = 35^2 + 38^2 - 2(35)(38) \cos B
\]
\[
35^2 = 31^2 + 38^2 - 2(31)(38) \cos C
\]

\( \angle A = 70^\circ \quad \angle B = 50.1^\circ \quad \angle C = 59.9^\circ \)