Answer Key For Triangle Worksheet (See Image Scans starting on Page 3)

1) 6 x 7 x 12 Using the law of cosines $6^2 = 7^2 + 12^2 - 2\cdot 7\cdot 12\cos\angle A$ $\angle A = \cos^{-1}\left(\dfrac{6^2 - 7^2 - 12^2}{-2\cdot 7\cdot 12}\right) \approx 20.85^\circ$ Using the law of sines $\dfrac{\sin 20.85^\circ}{6} = \dfrac{\sin\angle B}{7}$ $\angle B = \sin^{-1}\left(7\cdot\dfrac{\sin 20.85^\circ}{6}\right) \approx 24.53^\circ$ $\angle C \approx 180^\circ - 20.85^\circ - 24.53^\circ \approx 134.62^\circ$	2) 8 x 8 x 5 Using the law of sines $8^2 = 8^2 + 5^2 - 2\cdot 8\cdot 5\cos\angle A$ $\angle A = \cos^{-1}\left(\dfrac{8^2 - 8^2 - 5^2}{-2\cdot 8\cdot 5}\right) \approx 71.89^\circ$ The triangle is isosceles so $\angle C = \angle A \approx 71.89^\circ$ $\angle B = 180^\circ - 71.89^\circ - 71.89^\circ \approx 36.22^\circ$
3) 3 x 4 x 8 Note that 3+4 < 8 so this is not a triangle so no solution	4) 10 x 78° x 15 Using the law of cosines $c^2 = 10^2 + 15^2 - 2\cdot 10\cdot 15\cos\left(78^\circ\right)$ $c = \sqrt{10^2 + 15^2 - 2\cdot 10\cdot 15\cos\left(78^\circ\right)} \approx 16.21$ Using the law of sines $\dfrac{\sin 78^\circ}{16.21} = \dfrac{\sin\angle B}{10}$ $\angle B = \sin^{-1}\left(10\cdot\dfrac{\sin 78^\circ}{16.21}\right) \approx 37.12^\circ$ $\angle A = 180^\circ - 78^\circ - 37.12^\circ \approx 64.88^\circ$
5) 37° x 12 x 49° $\angle A = 180^\circ - 37^\circ - 49^\circ = 94^\circ$ Using the law of sines $\dfrac{\sin 94^\circ}{12} = \dfrac{\sin 37^\circ}{b}$ $b = 12\cdot\dfrac{\sin 37^\circ}{\sin 94^\circ} \approx 7.24$ $c = 12\cdot\dfrac{\sin 49^\circ}{\sin 94^\circ} \approx 9.08$	6) 13 x 12 x 90° Using the Pythagorean theorem $b^2 = 13^2 - 12^2$ $b = \sqrt{13^2 - 12^2} = 5$ $\sin\angle A = \dfrac{5}{13}$ $\angle A = \sin^{-1}\left(\dfrac{5}{13}\right) \approx 22.62^\circ$ $\angle B = 90^\circ - 22.62^\circ \approx 67.37^\circ$

<table>
<tr>
<td>
7) 45° x 8 x 7

Two solutions
Note that 7 < 8

Using the law of sines
$\frac{\sin 45^\circ}{7} = \frac{\sin \angle A}{8}$
$\angle A = \sin^{-1}\left(8 \cdot \frac{\sin 45^\circ}{7}\right) \approx 53.91^\circ$
$\angle B = 180^\circ - 45^\circ - 53.91^\circ \approx 81.09^\circ$
Using the law of sines
$\frac{\sin\left(81.09^\circ\right)}{b} = \frac{\sin\left(45^\circ\right)}{7}$
$b = 7 \cdot \frac{\sin\left(81.09^\circ\right)}{\sin\left(45^\circ\right)} \approx 9.78$
</td>
<td>
But Wait!

$\angle A \approx 180^\circ - 53.91^\circ \approx 126.09^\circ$
$\angle B = 180^\circ - 45^\circ - 126.09^\circ \approx 8.91^\circ$

Using the law of sines
$\frac{\sin\left(8.91^\circ\right)}{b} = \frac{\sin\left(45^\circ\right)}{7}$
$b = 7 \cdot \frac{\sin\left(8.91^\circ\right)}{\sin\left(45^\circ\right)} \approx 1.53$
</td>
</tr>
<tr>
<td>
8) 45° x 8 x 4

No solution

Note in the diagram below that
$\frac{h}{8} = \sin 45^\circ$
$h = 8 \sin 45^\circ \approx 5.66 > 4$
</td>
<td>
9) 45° x 8 x 12

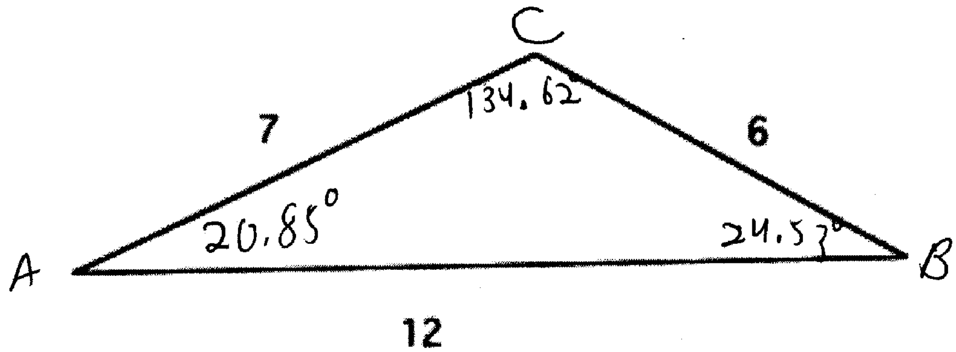
One solution
Note that 12 > 8
Using the law of sines
$\frac{\sin 45^\circ}{12} = \frac{\sin \angle A}{8}$
$\angle A = \sin^{-1}\left(8 \cdot \frac{\sin 45^\circ}{12}\right) \approx 28.13^\circ$
$\angle B = 180^\circ - 45^\circ - 28.13^\circ \approx 106.87^\circ$

$\frac{\sin\left(106.87^\circ\right)}{b} = \frac{\sin\left(45^\circ\right)}{7}$
$b = 7 \cdot \frac{\sin\left(106.87^\circ\right)}{\sin\left(45^\circ\right)} \approx 9.47$
</td>
</tr>
<tr>
<td>
10) 30° x 8 x 4

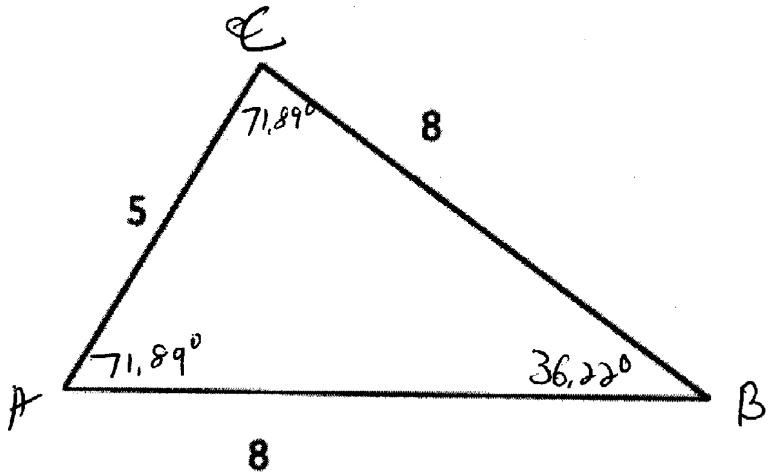
One Solution, a right triangle
Using the law of sines
$\frac{\sin 30^\circ}{4} = \frac{\sin \angle A}{8}$
</td>
<td>
$\angle A = \sin^{-1}\left(8 \cdot \frac{\sin 30^\circ}{4}\right) = \sin^{-1}\left(1\right) = 90^\circ$
$\angle B = 90^\circ - 30^\circ = 60^\circ$
$c = \sqrt{8^2 - 4^2} = 4\sqrt{3}$
</td>
</tr>
</table>

SSS

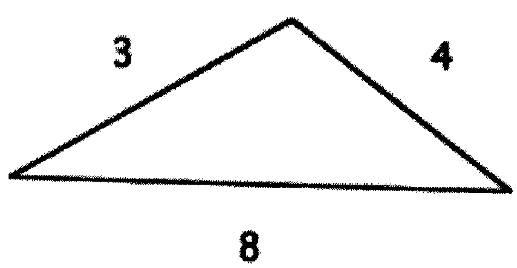
1)



2)

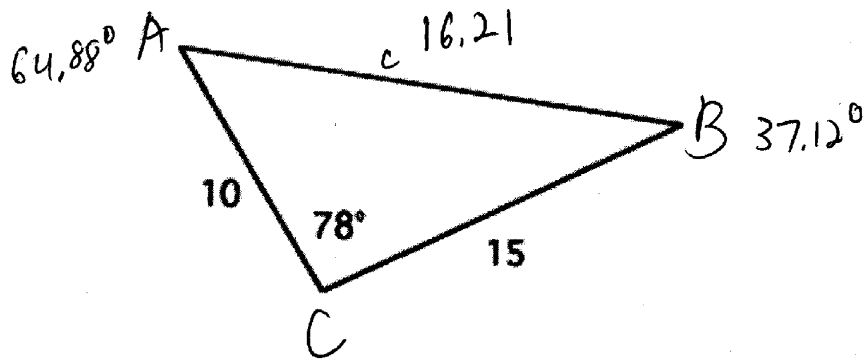


3)

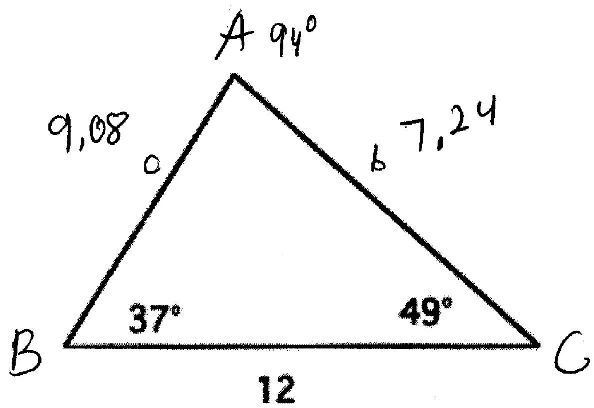


$3+4 < 8$, No Solution

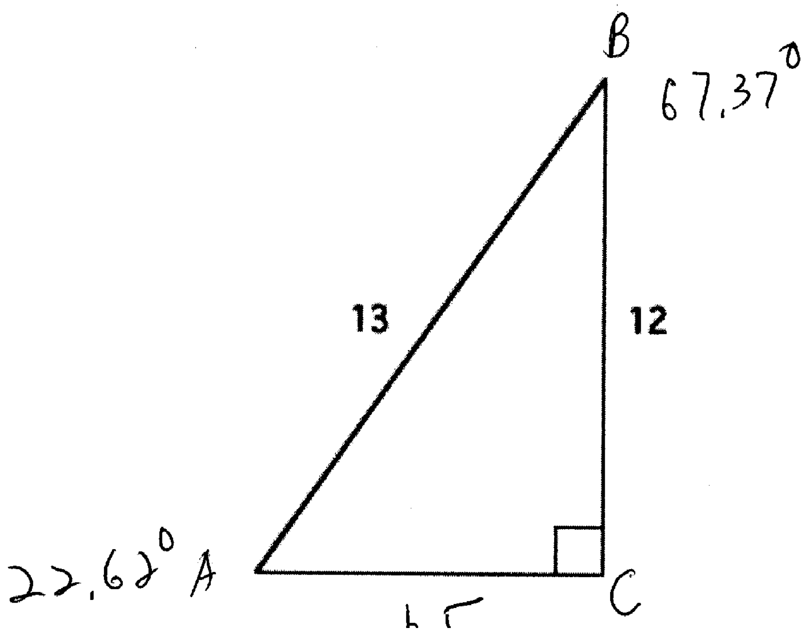
SAS
4)



ASA
5)



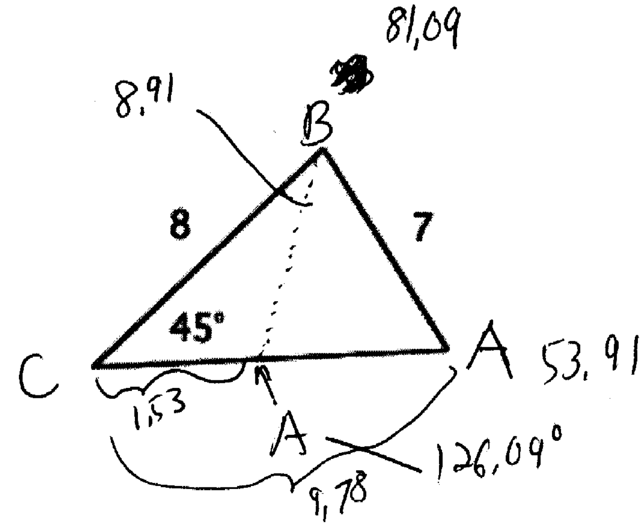
HL
6)



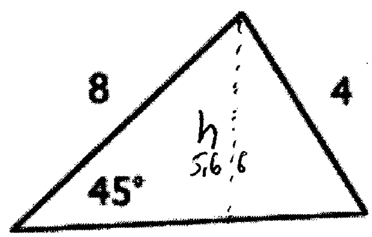
(b=5)

SSA

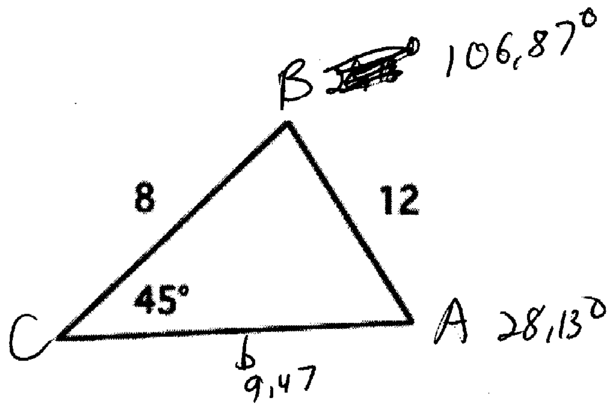
7)


81,09
8,91
B
8
7
45°
C
A
53,91
1,53
A
126,09°
9,78

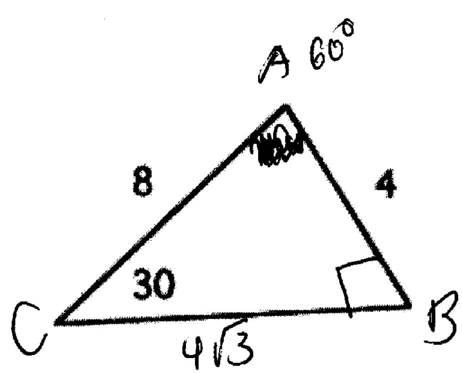
8)


8
4
h
5,66
45°

9)


B
106,87°
8
12
45°
C
A
28,13°
b
9,47

10)


A 60°
8
4
30
C
B
4√3