Simplify all answers and show your work!

1) Corresponding side lengths of similar triangles are ________________________.

2) The Pythagorean Theorem can only be used with ___________ triangles.

3) Using the terms “opposite”, “adjacent”, and “hypotenuse”, define the sin $\vartheta$. ______________________

4) The cosecant of an angle $\vartheta$ (csc $\vartheta$) is the reciprocal of what trigonometric function? ________________

5) Given the triangles below, assume that AB \parallel CD. Find the values of a and b.

   A
   \( \begin{array}{c}
   10 \\
   a \\
   \end{array} \)  
   \( \begin{array}{c}
   b \\
   12 \\
   \end{array} \)  
   \( \begin{array}{c}
   \text{C} \\
   15 \\
   \end{array} \)

6) A tree casts a shadow of 16 feet at the same time a 5-foot girl casts a shadow of 6 feet. What is the height of the tree?

   Use the right triangle to the right to answer questions 7 through 12.

7) If $a = 4$ and $b = 7$, find $c$.

8) If $a = 8$ and $c = 13$, find $b$.

9) If $m\angle B$ is 40° and $b = 8$, find $a$.

10) If $m\angle A$ is 38° and $c = 15$, find $b$.

11) If $\tan A = \frac{3}{4}$, find $a$ and $b$.

12) If $a = 4$ and $c = 13$, find $\sin A$.

13) If $a = 14$ and $b = 17$, find $\cos B$.

14) If $b = 11$ and $c = 21$, find $m\angle B$. 
15) Convert 12.65° to degrees, minutes, and seconds, if applicable.

16) Convert to decimal degree form: 36° 24’ 52”

Find the following. **Give at least 4 decimal places in rounded answers.**

17) \( \cos 176° \)  
18) \( \sec 213° \)  
19) \( \cot 42° \)  
20) Solve for \( x \): \( \sin 35° = \frac{5}{x} \)

Find the acute angle measure that satisfies the following. Round to the nearest **hundredth.**

21) \( \cot \vartheta = 2.54 \)  
22) \( \sin \vartheta = 0.6246 \)

23) From a boat on the lake, the angle of elevation to the top of a waterfront cliff is 23°. If the base of the cliff is 550 feet from the boat, how high is the cliff? (The edge of the cliff is right on the water’s edge.)

24) From fire tower A, a fire is sighted due south 20 miles away. Fire tower B is located due east of fire tower A, and the fire can be seen from B at a bearing of S35°W. How far away if fire tower B from the fire?

25) **Given the 30-60-90 triangle below, find the following:**

   a) Find \( b \).  
   b) Find \( \sin A \).  
   c) Find \( \cos A \).  
   d) Find \( \tan B \).