Precal - 4.8 Worksheet Applications and Models Name: _____

1. Upper case letters represent Angles. (for this worksheet)

2. Lower case letters represent sides.

3. A will always be opposite a.

~~4. B will always be opposite~~ b.

5. C will always be opposite c.

Easy way to check if your answers are realistic:

6. The ~~biggest~~ longest side will always be opposite the largest angle.

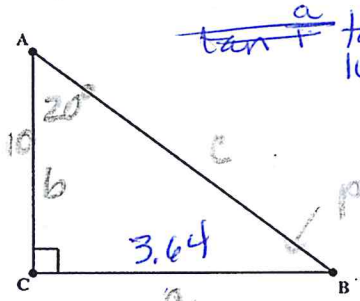
7. The ~~smallest~~ shortest side will always be opposite the smallest angle.

Solve (find all side lengths and angle measures) the right triangle shown in the figure to the right with the given information:

8. A = 20 degrees a = $10 \cdot \tan 20° = 3.64$

B = 70° b = 10

C = 90° c = 10.64



~~tan 1~~ $\tan 20° = \frac{a}{10}$

$10 \cdot \tan 20° = a$

prove this is 70° with inverse

Find a using trig function

Find c using Pythagorean trig function

B. $\tan^{-1}\left(\frac{10}{3.64}\right) = 70°$

$\cos 20° = \frac{10}{c}$

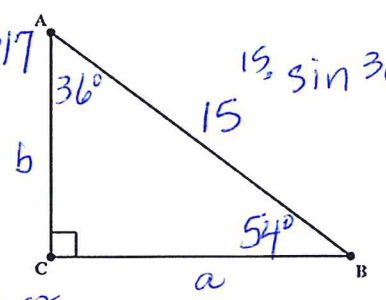
$c = \frac{10}{\cos 20}$

or $\sqrt{3.64^2 + 10^2} = \sqrt{113.25} \approx 10.64$

9. A = 36° a = $15 \cdot \sin 36 = 8.817$

B = 54 degrees b = 12.135

C = 90° c = 15



$15 \cdot \sin 36° = \frac{a}{15} \cdot 15$

A. $\cos A = \frac{12.135}{15}$

$\arccos\left(\frac{12.135}{15}\right) = A$

36°

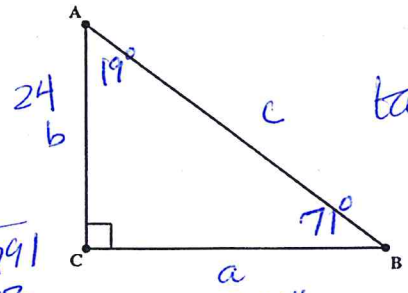
$b^2 + 8.817^2 = 15^2$

or $15 \cos 36 = \frac{b}{15} \cdot 15$

10. A = 19° a = 8.264

B = 71 degrees b = 24

C = 90° c = 25.383



$\tan 71 = \frac{24}{a}$

$a \cdot \tan 71° = 24$

$a = \frac{24}{\tan 71°}$

8.264

A $\sin A = \frac{\cancel{24}\ 8.26}{25.383}$

$\arcsin\left(\frac{\cancel{24}\ 8.26}{25.383}\right) = A$

$\sqrt{8.24^2 + 24^2} = \sqrt{644.291}$

≈ 25.383

or $\sin 71° = \frac{24}{c}$

$\frac{24}{\sin 71°} = 25.383$

11. A = $\approx 21^\circ$ a = 6

B = $\approx 69^\circ$ b = 16

C = 90° c = 17.088

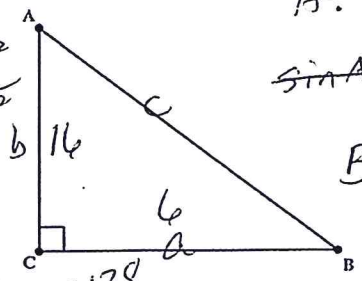
$6^2+16^2=c^2$

$36+256=c^2$

$\sqrt{292}=\sqrt{c^2}$

or $\sin 69^\circ = \frac{16}{c}$

$c = \frac{16}{\sin 69} \approx 17.138$



A. $\tan A = \frac{6}{16}$

~~sin A =~~ $\tan^{-1}\left(\frac{6}{16}\right) = A$

$\approx 21^\circ$

B. $\tan B = \frac{16}{6}$

$\arctan\left(\frac{16}{6}\right) = B$

12. A = 45.6° a = 25

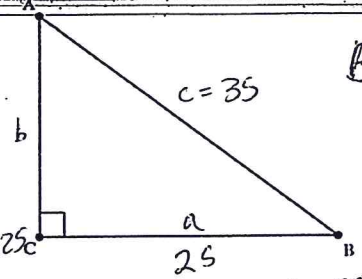
B = 44.4° b = 24.495 or 24.488

C = 90° c = 35

$25^2+b^2=35^2$

$b^2 = 1225-625$

$\sqrt{b^2}=\sqrt{600}$ $b \approx$



B. $\cos B = \frac{25}{35}$

$\arccos\left(\frac{25}{35}\right) = B$

$B \approx 44.4^\circ$

A

$\sin A = \frac{25}{35}$

$\arcsin\left(\frac{25}{35}\right) = A$

$\approx 45.6^\circ$

or $\sin 44.4^\circ = \frac{b}{35}$

$35 \cdot \sin 44.4$

≈ 24.488

13. A = 12°15′ a = 91.342

15 min = $\frac{1}{4}$ or .25 hr

12.25°

B = 77.75° or 77°45′ b = 420.698

C = 90° c = 430.5

$\cos B = \frac{91.342}{430.5}$

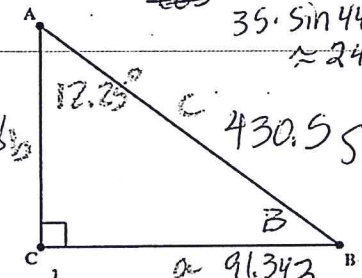
$\arccos\left(\frac{91.342}{430.5}\right) = B$

$B = 77.75$

or $\cos 12.25 = \frac{b}{430.5}$

$430.5 \cdot \cos 12.25$

420.698 b



$430.5 \sin 12.25 = \frac{a}{430.5}$

$430.5 \cdot \sin 12.25$

$91.342^2+b^2=430.5^2$

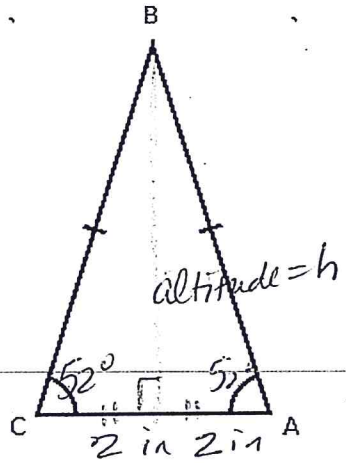
14. 2.560 in Find the altitude of the isosceles triangle.
Round your answer to the nearest thousandths.

A = 52° b = 4 inches

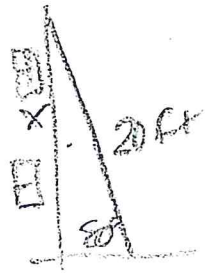
$\tan 52^\circ = \frac{h}{2}$

$2 \cdot \tan 52 = h$

$h = 2.560$ inches



15. A ladder 20 feet long leans against the side of a house. The angle of elevation of the ladder is 80 degrees. Find the height from the top of the ladder to the ground.



$20 \cdot \sin 80^\circ = \frac{x}{20} \cdot 20$

≈ 19.7 ft up the house