Name: ANSWER KEY
Period:____

Date:_____
Mr. Valentino

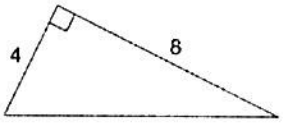
Unit 8 Review Sheet

Pythagorean Theorem

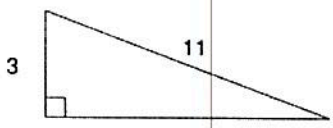
1. What is the Pythagorean theorem? $a^2+b^2=c^2$

2. When can you use the Pythagorean theorem? right Δ ONLY, solving for a side length

3. Find the missing side of each of the triangles below in simplest radical form:



$a^2+b^2=c^2$
$(4)^2+(8)^2=c^2$
$80=c^2$
$c=\sqrt{80}$
$c=\sqrt{16}\sqrt{5}$
$\boxed{c=4\sqrt{5}}$

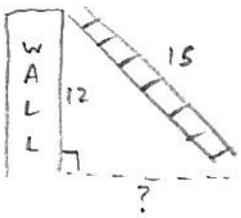


$a^2+b^2=c^2$
$(3)^2+b^2=(11)^2$
$9+b^2=121$
$b^2=112$
$b=\sqrt{112}$
$b=\sqrt{16}\sqrt{7}$
$\boxed{b=4\sqrt{7}}$

4. A soccer field is a rectangle 90 meters wide and 120 meters long. The coach asks players to run from one corner to the corner diagonally across the field. How far do the players run?

$a^2+b^2=c^2$
$90^2+120^2=c^2$
$\sqrt{22500}=\sqrt{c^2}$
$c=150$
$\boxed{150\text{ m}}$

5. How far from the base of the house do you need to place a 15' ladder so that it exactly reaches the top of a 12' wall?



$a^2+b^2=c^2$
$12^2+b^2=15^2$
$144+b^2=225$
$\sqrt{b^2}=\sqrt{81}$
$b=9$
$\boxed{9\text{ ft}}$

How can the Pythagorean theorem be used to determine if a triangle is acute, obtuse, or right?

If $a^2+b^2>c^2$ then it's acute

If $a^2+b^2<c^2$ then it's obtuse

If $a^2+b^2=c^2$ then it's right

Determine if the following sides lengths form an acute, obtuse or right triangle:

3. {5, 10, 12}

$5^2+10^2 \bigcirc 12^2$
$125 \ (<) \ 144$
OBTUSE

4. {8, 15, 17}

$8^2+15^2 \bigcirc 17^2$
$289 \ (=) \ 289$
RIGHT

5. {10, 11, 13}

$10^2+11^2 \bigcirc 13^2$
$221 \ (>) \ 169$
ACUTE

What makes a set of sides of a triangle form a Pythagorean triple?

When $a^2+b^2=c^2$

↑
must equal!

Trigonometry

1. What are the trig ratios (that's a theta):

$\sin(\Theta) = \frac{opp}{hyp}$ $\cos(\Theta) = \frac{adj}{hyp}$ $\tan(\Theta) = \frac{opp}{adj}$

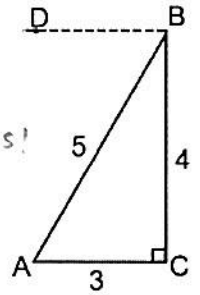
2. Complete the following trig ratios using the diagram below:

$\sin(A) = \frac{4}{5}$ $\sin(B) = \frac{3}{5}$

$\cos(A) = \frac{3}{5}$ $\cos(B) = \frac{4}{5}$

$\tan(A) = \frac{4}{3}$ $\tan(B) = \frac{3}{4}$

remember COFUNCTIONS!



3. Which angle is the angle of elevation? ∠BAC

4. Which angle is the angle of depression? ∠DBA

5. Why can't a sine or cosine ratio be greater than 1?

Because the larger value (the hypotenuse) must always be in the denominator.

6. In ΔABC with right angle at C, if $\sin(A) = 5x - 0.1$ and $\cos(B) = 3x + .4$, what is the value of x?

$5x - .1 = 3x + .4$

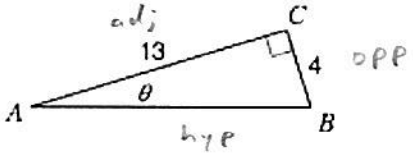
$2x = .5$

$\boxed{x = .25}$

7. When finding a side of a triangle, I use sin, cos, or tan.

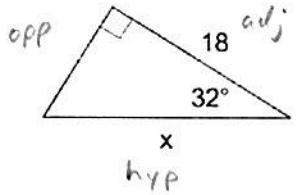
8. When finding an angle of a triangle, I use $\sin^{-1}$, $\cos^{-1}$, or $\tan^{-1}$.

9. Find the missing side or angle. Round all answers to the nearest tenth. SOH CAH TOA



$\tan\theta = \frac{4}{13}$

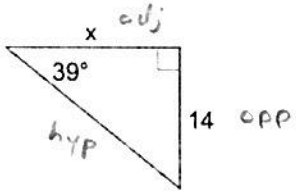
$\tan^{-1}\left(\frac{4}{13}\right) = 17.1°$



$\cos 32 = \frac{18}{x}$

$x \cos 32 = 18$

$x = \frac{18}{\cos 32} = 21.2$

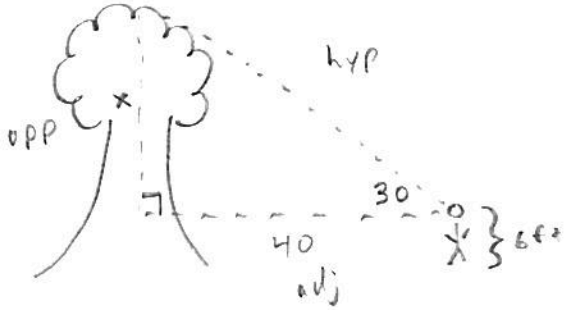


$\tan 39 = \frac{14}{x}$

$x \tan 39 = 14$

$x = \frac{14}{\tan 39} = 17.3$

10. A boy, 6ft tall, looks up at the top of a tree at an angle of elevation of 30°. If the boy stands 40 feet from the tree, what is the height of the tree to the nearest foot?



$\tan 30 = \frac{x}{40}$

$x = 40 \tan 30$

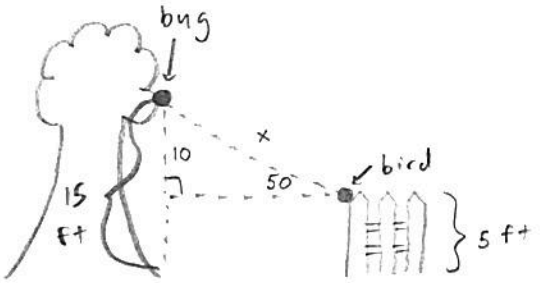
$x = 23$ ft

height of the boy

$23 + 6$

$\boxed{29 \text{ ft}}$

11. A bird sits on a fence 5ft tall. The bird spots a bug on a tree 15 ft from the ground. If the bird looks up at the bug at an angle of 50°, how far is the bird from the bug to the nearest foot?



$\sin 50 = \frac{10}{x}$

$x \sin 50 = 10$

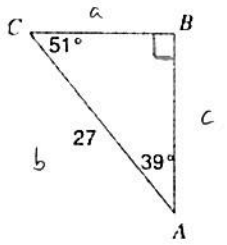
$x = \frac{10}{\sin 50}$

$x = 13$ ft

Law of Sines

Round to the nearest whole number

1. **Find BC**

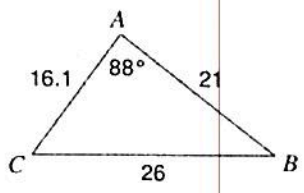


$\frac{\sin 90}{27} = \frac{\sin 39}{a}$

$\frac{a \sin 90}{\sin 90} = \frac{27 \sin 39}{\sin 90}$

$a = 17$

2. **Find $m\angle C$**



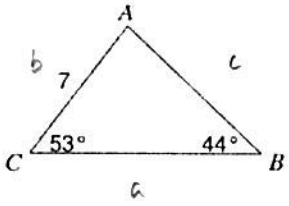
$\frac{\sin 88}{26} = \frac{\sin C}{21}$

$\frac{21 \sin 88}{26} = \frac{26 \sin C}{26}$

$\sin C = .807200283$

$C = 54°$

3. Find AB

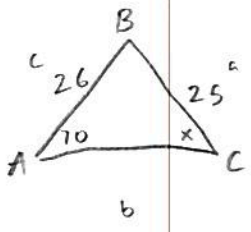


$\frac{\sin 44}{7} = \frac{\sin 53}{c}$

$\frac{c \sin 44}{\sin 44} = \frac{7 \sin 53}{\sin 44}$

$c = 8$

4. Find m<C if $m\angle A = 70°, c = 26, a = 25$



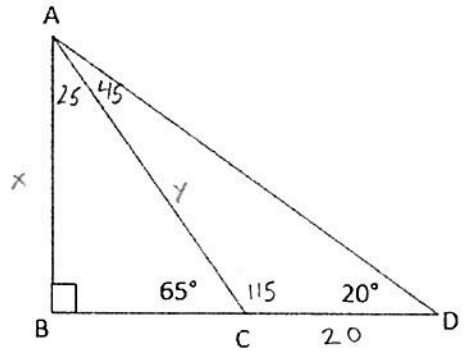
$\frac{\sin 70}{25} = \frac{\sin C}{26}$

$\frac{26 \sin 70}{25} = \frac{25 \sin C}{25}$

$\sin C = .977280325$

$C = 78°$

5. For the figure below, find AB to the nearest whole number if CD = 20



Step 1 to find y

$\frac{\sin 45}{20} = \frac{\sin 20}{y}$

$\frac{y \sin 45}{\sin 45} = \frac{20 \sin 20}{\sin 45}$

$y = 9.673790506$

Step 2 to find x

$\frac{\sin 90}{9.673790506} = \frac{\sin 65}{x}$

$\frac{x \sin 90}{\sin 90} = \frac{9.673790506 \sin 65}{\sin 90}$

$x = 8.767$

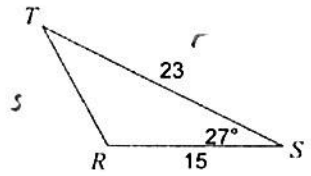
$\Downarrow$

9

Law of Cosines

Round all answers to the nearest whole number

1) Find RT



t

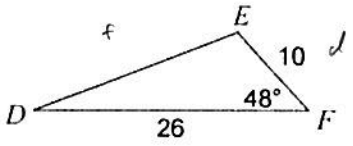
$s^2 = r^2 + t^2 - 2rt\cos(S)$

$s^2 = (23)^2 + (15)^2 - 2(23)(15)\cos(27)$

$\sqrt{s^2} = \sqrt{139.20549\,83}$

$s = 11.79 \Rightarrow$ (12)

2) Find DE



e

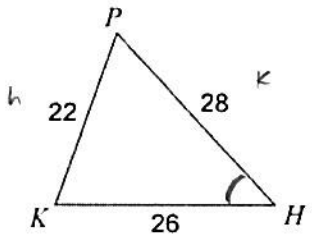
$f^2 = d^2 + e^2 - 2de\cos F$

$f^2 = (10)^2 + (26)^2 - 2(10)(26)\cos(48)$

$\sqrt{f^2} = \sqrt{428.05208\,47}$

$f = 20.689 \Rightarrow$ (21)

3) Find $m\angle H$



P

$h^2 = p^2 + k^2 - 2pk\cos H$

$(22)^2 = (26)^2 + (28)^2 - 2(26)(28)\cos H$

$484 = 1460 - 1456\cos H$

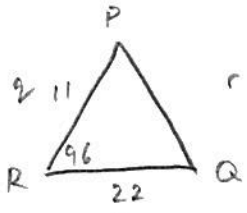
$-976 = -1456\cos H$

$.670329\,6703 = \cos H$

$H = 47.907$

(48°)

4) Find r if $\text{In } \triangle RPQ,\ q = 11,\ p = 22,\ m\angle R = 96°$



P

$r^2 = p^2 + q^2 - 2pq\cos R$

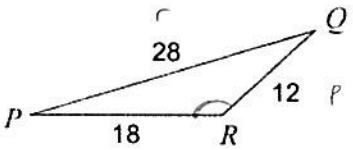
$r^2 = (22)^2 + (11)^2 - 2(22)(11)\cos(96$

$\sqrt{r^2} = \sqrt{655.59\,17762}$

$r = 25.6045$

(26)

5) Find $m\angle R$



q

$r^2 = p^2 + q^2 - 2pq\cos R$

$(28)^2 = (12)^2 + (18)^2 - 2(12)(18)\cos R$

$784 = 468 - 432\cos R$

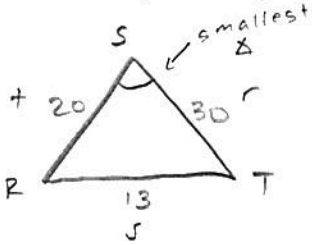
$316 = -432\cos R$

$-.731481481\,5 = \cos R$

$R =$ (137°)

6) What is the measure of the smallest angle if

$\text{In } \triangle RST,\ s = 13,\ r = 30,\ t = 20$



s

$s^2 = r^2 + t^2 - 2rt\cos S$

$13^2 = (30)^2 + (20)^2 - 2(30)(20)\cos S$

$169 = 1300 - 1200\cos S$

$-1131 = -1200\cos S$

$.9425 = \cos S$

$S = 19.524 \Rightarrow$ (20°)