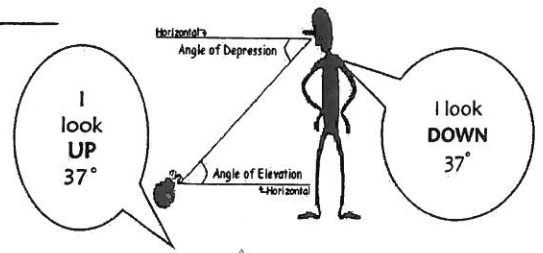


Name: Answer key Per: _____ Date: _____
 Serafino • Precalculus

IA
~~1B~~

Right Triangles & Applications

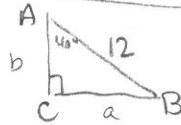
Notes / Classwork / Homework



Warmup: Solve the triangle ABC:

→ I made $m\angle C = 90^\circ$

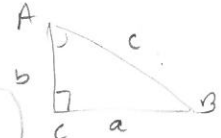
1. $A = 40^\circ$ and $c = 12$ cm.



$A = 40^\circ$ $a = 7.713$
 $B = 50^\circ$ $b = 9.1925$
 $C = 90^\circ$ $c = 12$

$\sin 40 = \frac{a}{12}$

2. $a = 2.73$ feet and $b = 3.41$ feet.



$A = 38.68^\circ$ $a = 2.73$
 $B = 51.32^\circ$ $b = 3.41$
 $C = 90^\circ$ $c = 4.3682$

$\tan A = \frac{2.73}{3.41}$

Applications:

In the real world, there is no "leg" or "hypotenuse".
 There are distances between things, and objects with length/height.

Also, the angles made by things have names.

Angle of elevation: between the horizontal line of sight and the line of sight above it.

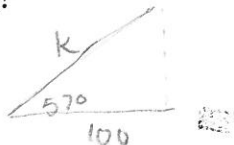
Angle of depression: between the horizontal line of sight and the line of sight below it.

WHY ARE THEY ALWAYS EQUAL?

Because they are alternate exterior angles!

Applications of Trigonometry:

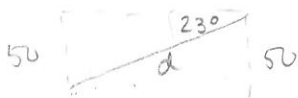
1. **Kite flying:** It's a beautiful summer day and you're flying a kite. Your friend stands directly below the kite just in case it falls. If the angle of elevation between you and the kite is 57° and your friend is standing 100 feet away, how long is your kite string?



$\cos 57 = \frac{100}{k}$
 $k = \frac{100}{\cos 57}$

$k = 183.6078 \text{ ft}$

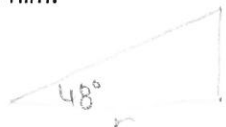
2. **Incoming!:** An airplane 50 meters above ground is attempting to land. The angle of depression to the point where it's going to touch down is 23° . What distance (through the air) will the plane travel before it lands?



$\sin 23 = \frac{50}{d}$

$d = 127.965 \text{ m}$

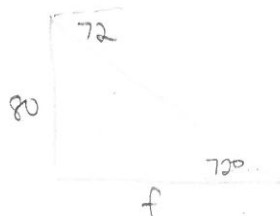
3. **Clumsy buddy:** Your friend is in a hot air balloon. When he was 300 feet in the air, he dropped his wallet and it fell to the ground below him. If you're looking up at your friend and an angle of elevation of 48° , how far do you have to run to go get it for him?



$\tan 48 = \frac{300}{r}$

$r = 270.1212 \text{ ft}$

4. **Medieval Love:** From the top of a tower, the angle of depression from a handsome prince to a fair maiden is 72° . The top of the tower is 80 feet above ground. How far from the castle is the maiden standing?



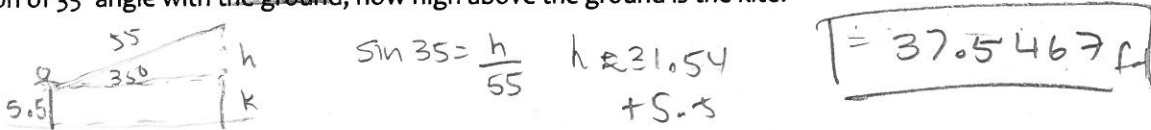
$\tan 72 = \frac{80}{f}$

$f = 25.9936 \text{ ft}$

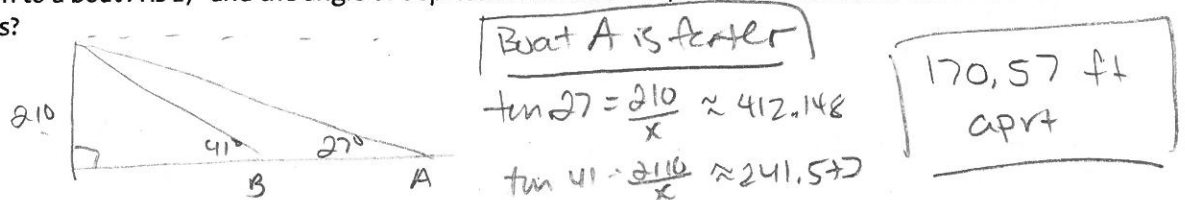
5. **Bad influence:** You're sneaking your friend out of their bedroom with a ladder. The ladder is 7 feet from the foundation of the house and makes a 60° angle with the ground. How long is the ladder?



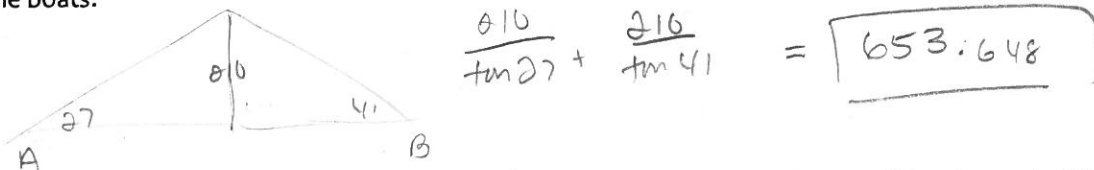
6. **Kite... with height!** Kiera, who is 5'6" tall, is flying a kite. She has let out 55 feet of string. If the string has an angle of elevation of 35° angle with the ground, how high above the ground is the kite?



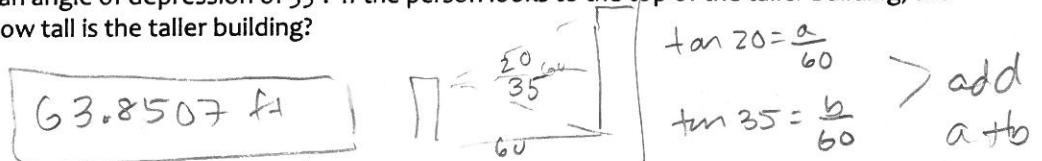
7. **Lighthouse One Direction:** Gazing out from a 210 ft tall lighthouse in one direction, you can see two boats. The angle of depression to a boat A is 27° and the angle of depression to boat B is 41° . Which boat is farther? How far apart are the boats?



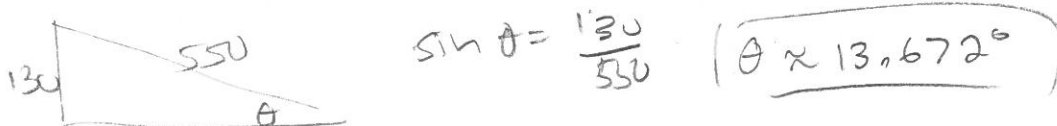
8. **Lighthouse Two Directions:** Gazing out in OPPOSITE directions from the top of a lighthouse 210 feet high, you can see two boats. The angle of depression to a boat A is 27° and the angle of depression to boat B is 41° . How far apart are the boats?



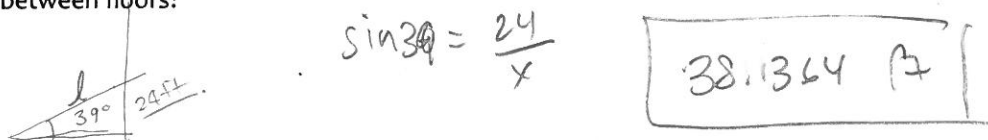
9. **Two buildings:** Two buildings are 60 feet from each other. A person at the top of the shorter building looks at the bottom of the other at an angle of depression of 35° . If the person looks to the top of the taller building, the angle of elevation is 20° . How tall is the taller building?



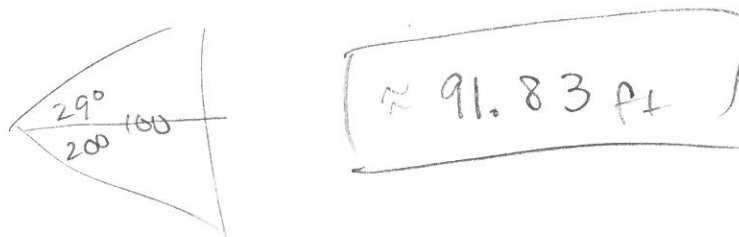
10. **Skiing:** A ski slope is 550 yards long with a vertical drop of 130 yards. Find the angle of depression of the slope.



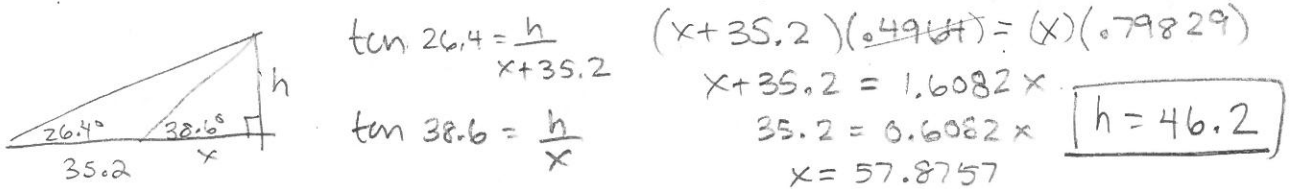
11. **Going up!:** How long should an escalator be if it is to make an angle of 39° with the floor and carry people a vertical distance of 24 feet between floors?



12. **You're So Vain...** A person standing 100 inches from a mirror notices that the angle of depression from her eyes to the bottom of the mirror is 20° , while the angle of elevation to the top of the mirror is 29° . Find the vertical height of the mirror.

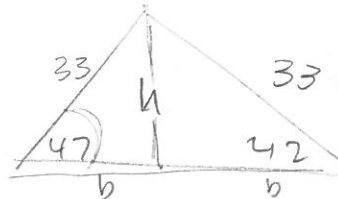


13. **Measuring Trees:** An ecologist wants to find the height of a redwood tree that is on the other side of a creek. From a point A he finds that the angle of elevation to the top of the tree is 26.4° . He then walks 35.2 feet closer towards the creek to point B, finds the angle of elevation is now 38.6° . What is the height of the tree?



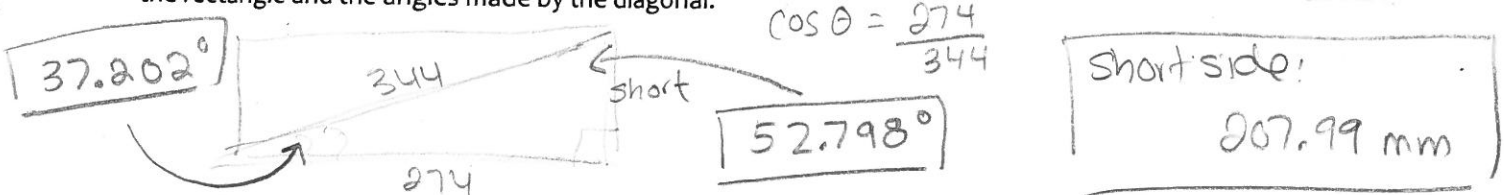
14. **Isosceles Triangle:** The two equal sides of an isosceles triangle are each 33 inches. If each of the two equal angles measures 47° , find the length of the base and the altitude.

$\cos 47 = \frac{x}{33}$ $x = 33 \cos 47$
 $\sin 47 = \frac{h}{33}$ $h = 33 \sin 47$



$h = 24.1317 \text{ in}$
 $b = 45.0119 \text{ in}$

15. **Rectangles are boring:** The diagonal of a rectangle is 344 mm and the longer side is 274 mm. Find the shorter side of the rectangle and the angles made by the diagonal.

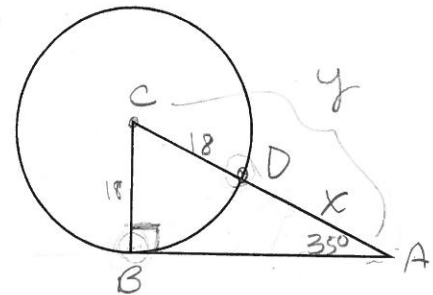


16. **Circles!!** The circle has its center at C and radius of 18 inches. D is a point on the circle. If triangle ABC is a right triangle and $A = 35^\circ$, find x, the distance from A to D.

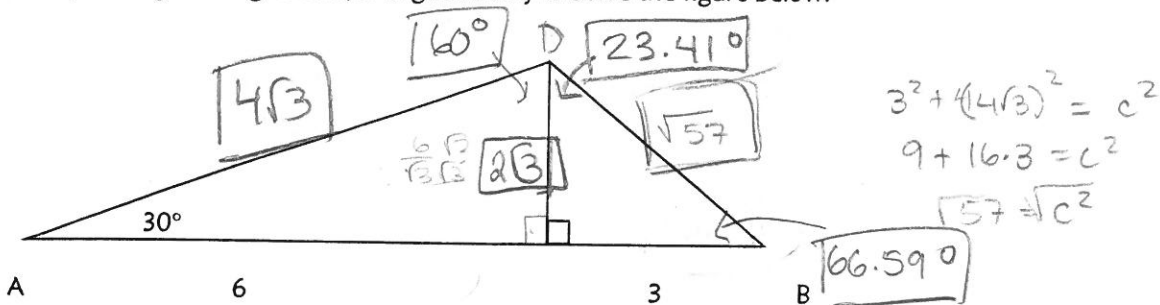
$\sin 35 = \frac{18}{y}$

$x = 13.382$

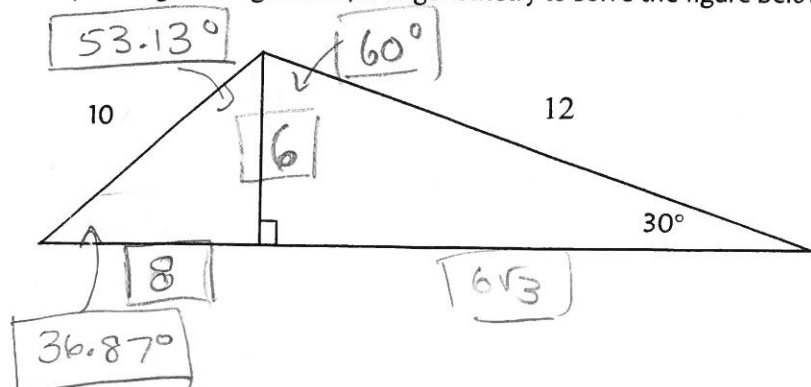
$31.382 - 10 =$



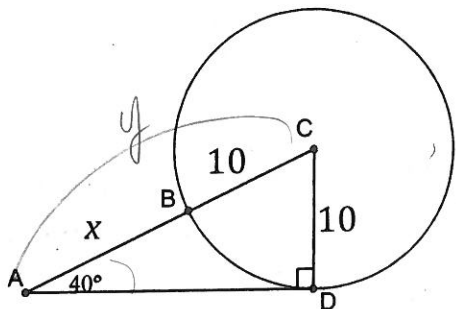
17. Use special right triangles and/or trigonometry to solve the figure below.



18. Use special right triangles and/or trigonometry to solve the figure below.



19. The circle has its center at C and a radius of 10 inches. If a triangle ADC is a right triangle and A is 40° , find x, the distance from A to B.



$$\tan 40 = \frac{10}{y}$$

$$x = 5.557$$

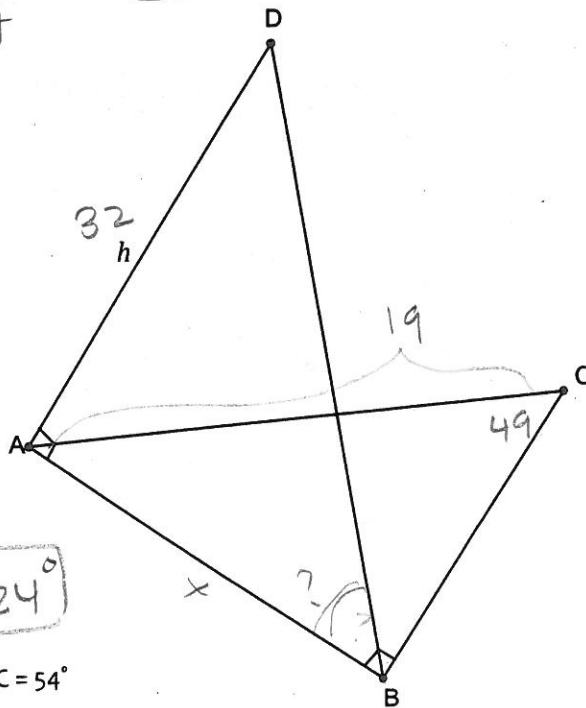
20. If $AC = 19$, $h = 32$ and $C = 49^\circ$, find $\angle ABD$.

$$\sin 49 = \frac{x}{19}$$

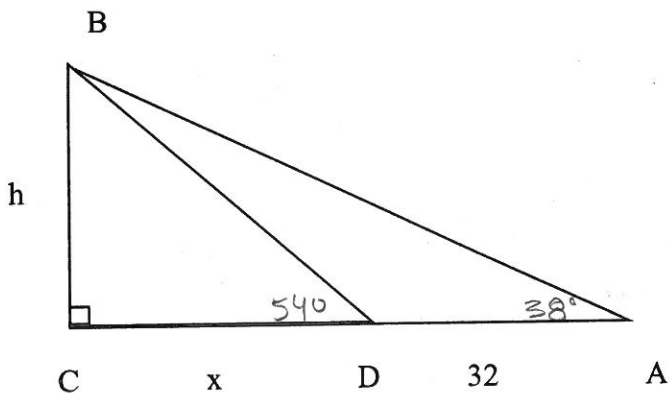
$$\tan ? = \frac{32}{14.339}$$

$$x = 14.339$$

$$m \angle ABD \approx 65.8624^\circ$$



21. Use the picture below to solve for x, given $\angle A = 38^\circ$ and $\angle BDC = 54^\circ$



$$\tan 38 = \frac{h}{32+x}$$

$$\tan 54 = \frac{h}{x}$$

$$h = \tan 38 (32+x)$$

$$h = x \tan 54$$

$$x \tan 54 = (x+32) \tan 38$$

$$1.37638x = 0.78128(x+32)$$

$$1.7617x = x + 32$$

$$0.7617x = 32$$

$$x = 42.0113$$

Need more Trig Practice?

Practice solving for one side or angle: Pg 75 (1-13 odds)

Practice solving the entire right triangle: pg 75 (15, 17, 21, 25, 27, 29, 31)

Other Trig Problems: Pg 77 (33, 35, 37, 39, 41, 43, 45, 47, 49)