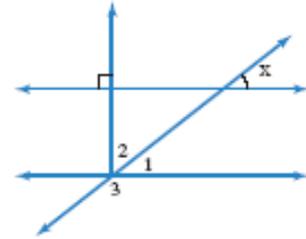


Geometry HW examples:

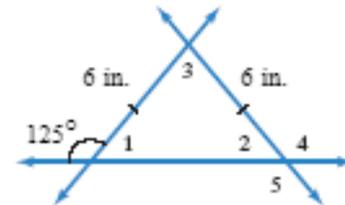
1. ANS: since  $x = 30$ , angle 1 is also  $= 30$  (corresponding angles); angles 1 and 2 are complementary, so  $2 = 60$ . Angles 1 and 3 are supplementary, therefore angle  $3 = 180 - 30 = 150$ .

The figure to the right shows two parallel lines intersected by more than one transversal. Let  $x = 30^\circ$ . Find the measure of angles 1, 2, and 3.



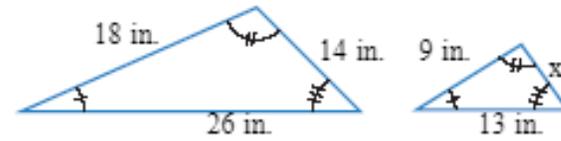
2. ANS: Angle 1  $= 180 - 125 = 55$ ; angle 2 is equal to angle 1, because opposite sides are equal (isosceles triangle, base angles have the same measure). Since angle 1 plus angle 2  $= 110$ , and the sum of the interior angles is 180, angle 3 is  $180 - 110 = 70$ . Angle 2 and 4 are supplementary, therefore angle 4  $= 125$ . Angle 4 and angle 5 are vertical angle, therefore, they have the same measure: angle 5  $= 125$  degrees.

We have seen that isosceles triangles have two sides of equal length. The angles opposite these sides have the same measure. Use the information to the right to help find the measure of angles 1 through 5.



3. ANS: Since the given triangles are similar, corresponding sides are proportional. In this particular case we realize that corresponding sides in the small triangle are half of the sides on the large triangle; therefore x is half of 14 = 7 inches.

Explain why the triangles are similar. Then find the missing length, x.



Choose the reason that the triangles are similar.

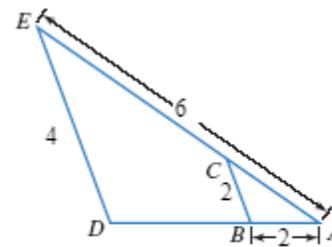
- A. Both triangles are obtuse.
- B. The angles in the small triangle are equal in measure to their corresponding angles in the large triangle.
- C. The sum of the three angles in each triangle is  $180^\circ$ .
- D. The vertical angles in the triangle are equal in measure.

Find the missing length.

$x = 7$  in.

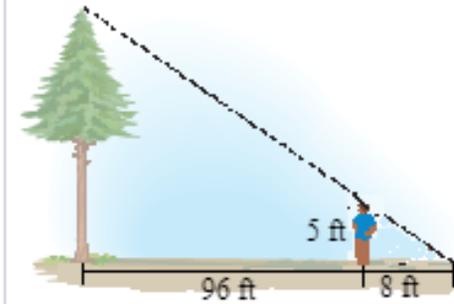
4. ANS: Given that the small triangle inside the big triangle are similar; therefore, corresponding sides are proportional. Let's establish the proportion:  $CA/EA = BC/ED$  or  $CA/6 = 2/4$  multiplying by 6 both sides  $CA = (6 * 2)/4 = 3$ .

$\triangle ABC$  and  $\triangle ADE$  are similar. Find the length of side  $\overline{CA}$ .



5. ANS: Triangles, the small one and the big one are similar. We establish the proportion between corresponding sides. Label H the height of the tree, which correspond to the man's height. The shadow of the tree is indeed  $96 + 8 = 104$  ft long. The proportion is  $H/5 = 104/8$ . Multiply by 5 both sides we have:  $H = (5 \cdot 104)/8 = 65$ .

Use similar triangles to solve. A person who is 5 feet tall is standing 96 feet from the base of a tree, and the tree casts a 104 foot shadow. The person's shadow is 8 feet in length. What is the height of the tree?



The height is 65 ft.

6. ANS: The sum of the interior angles is equal to  $(n-2) \cdot 180$  where  $n$  is the number of sides. The shape has 5 sides, so we have  $(5 - 2) \cdot 180 = 540$  degrees. Angles indicate with a small square are 90 degrees; that is, there are two 90 degrees angles. Therefore,  $A + 30 + 165 + 90 + 90 = 540$ . Which reduces to  $A + 375 = 540$ , Or  $A = 540 - 375 = 165$  degrees. Angle B and A are supplementary; then,  $A + B = 180$ ,  $B = 15$  degrees.

- Find the sum of the measures of the angles for the figure given.
- Find the measures of angle A and angle B.



- The sum of the measures of the angles for the given polygon is  $540^\circ$ .
- $m\angle A = 165^\circ$  and  $m\angle B = 15^\circ$

**7. ANS:** The square has all four sides equal, so the perimeter (distance around) is  $4 * 16 = 64$  ft. Plants are to be spaced 16 inches apart. We need to convert 64 ft into inches, multiplying by 12 (12 inches in one foot), so we have  $12 * 64 = 768$  inches perimeter. Since we have one plant every 16 inches, divide  $768/16 = 48$ .

One side of a square flower bed is 16 feet long. How many plants are needed if they are to be spaced 16 inches apart around the outside of the bed?

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48 flowers

**8. ANS:** a  $1500 \text{ ft}^2$  (area of base) \* 11 ft (height) =  $16,500 \text{ ft}^3$  which is the volume of the house. The furnace is designed to heat 20,000 cubic feet; therefore, since the volume of the house is actually less than 20, 000  $\text{ft}^3$  it would be adequate.

A furnace is designed to heat 20,000 cubic feet. Will this furnace be adequate for a 1500-square-foot house with a 11-foot ceiling?

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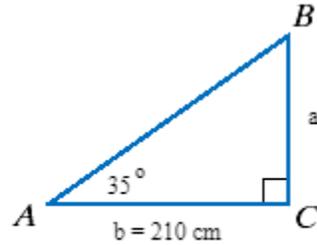
- No  
 Yes

9. ANS: This is a trigonometry question. The unknown side is the side opposite to the given angle. Side  $b = 210$  cm, given, is adjacent to the given angle. The trigonometric function that relates the opposite side and the adjacent side is called tangent:

$\tan(35^\circ) = a/210$ ; therefore, multiplying both side of the equality by 210, we get:  $a = 210 \tan(35^\circ) = 147$  cm

Note: use a calculator to find  $\tan(35^\circ)$ .

Find the measure of side a.



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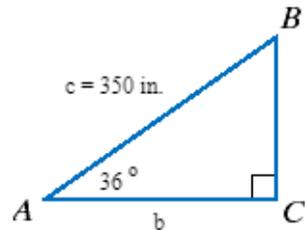
$a = 147$  cm

(Round the answer to the nearest whole number as needed.)

10. ANS: In this case the unknown is  $b$ , the adjacent side; the known side is the hypotenuse. The trig function that relates adjacent and hypotenuse is cosine.

$\cos(36^\circ) = b/350$ ; therefore,  $b = 350 * \cos(36^\circ) = 283$  in.

Find the measure of side b.



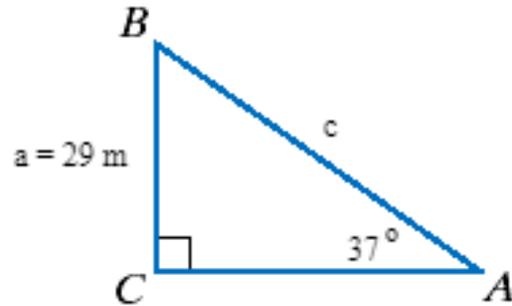
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$b = 283$  in.

(Round the answer to the nearest whole number as needed.)

11. ANS: The unknown side is the hypotenuse, the given side is the opposite side to angle A. Establish  $\sin(37^\circ) = 29/c$ ; therefore,  $c = 29 / \sin(37^\circ) = 48$  cm

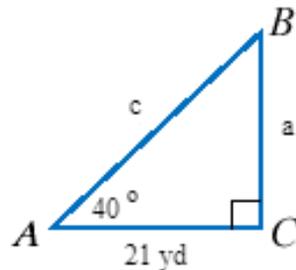
Find the measure of side c.



$c = 48$  m (Round the answer to the nearest whole number as needed.)

12. ANS: In order to find "a" (the opposite side to given angle A ) we use tangent:  $\tan(40^\circ) = a/21$ ; therefore,  $a = 21 * \tan(40^\circ) = 18$  yd. Finding "c", the hypotenuse, we use cosine:  $\cos(40^\circ) = 21/c$  ; then  $c = 21 / \cos(40^\circ) = 27$  yd. Angle B is found considering that the sum of the interior angles of a triangle is  $180^\circ$ . Angle B =  $180 - 90 - 40 = 50^\circ$

Find the measures of the parts of the right triangle that are not given.



$a = 18$  yd

$c = 27$  yd

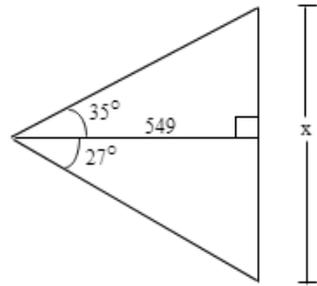
$m\angle B = 50^\circ$

(Round answers to the nearest whole number as needed.)

**13.** There are two triangles. For the top one, the opposite (unknown) is given by  $\tan(35^\circ) = x_1/549$ ; for the bottom one:  $\tan(27^\circ) = x_2/549$ ; therefore,  $x = x_1 + x_2 = 549 * \tan(35^\circ) + 549 * \tan(27^\circ) = 664$ .

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Find the length  $x$  to the nearest whole number.



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$x \approx 664$

(Round to the nearest whole number as needed.)