

Unit 8: Extended Trigonometry

Find the indicated part of  $\triangle ABC$ . Give lengths to three significant digits and the measures of the angles to the nearest tenth of a degree.

1.  $a = 6, b = 7, \angle C = 20^\circ, c =$  \_\_\_\_\_

2.  $b = 12, c = 17, \angle A = 74^\circ, a =$  \_\_\_\_\_

3.  $c = 15, a = 13, \angle B = 83^\circ, b =$  \_\_\_\_\_

4.  $b = 3, a = 4, \angle C = 40^\circ, c =$  \_\_\_\_\_

5.  $c = 15, b = 30, \angle A = 140^\circ, a =$  \_\_\_\_\_

6.  $a = 100, c = 200, \angle B = 150^\circ, b =$  \_\_\_\_\_

7.  $a = 8, b = 10, c = 12, \angle B =$  \_\_\_\_\_

8.  $a = 9, b = 10, c = 15, \angle C =$  \_\_\_\_\_

9.  $a = 13, b = 30, c = 40, \text{smallest } \angle =$  \_\_\_\_\_

10.  $a = 30, b = 20, c = 40, \text{biggest } \angle =$  \_\_\_\_\_

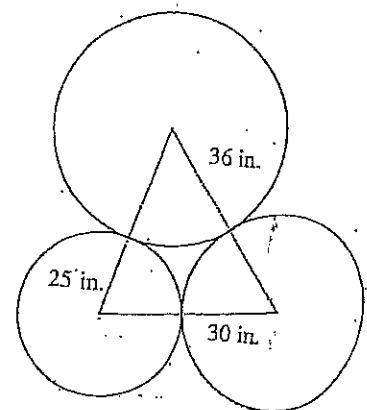
11.  $a = 1.6, b = 0.9, c = 1.8, \text{biggest } \angle =$  \_\_\_\_\_

12.  $a = 1.2, b = 2.4, c = 2.0, \text{smallest } \angle =$  \_\_\_\_\_

13. Given a circle  $\mathcal{O}$ , chord  $\overline{AB} = 10.1$ , chord  $\overline{BC} = 15.5$  and  $\angle ABC = 26^\circ 10'$ . Find the length of chord  $\overline{AC}$ .

14. A parallelogram has sides 6 cm and 8 cm and a  $65^\circ$  angle. Find the lengths of the diagonals. (Recall that adjacent angles of a parallelogram are supplementary.)

15. Three circles with radii 25 in., 36., and 30 in. are externally tangent to each other. Find the angles of the triangles formed by joining their centers.

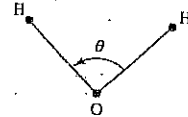


Find lengths to three significant digits and angle measures to nearest tenth of a degree.

1. A ranger in an observation tower can sight the north end of a lake 15 km away and the south end of the same lake 19 km away. The angle between these two lines of sight is  $104^\circ$ . How long is the lake?
2. Two planes leave an airport at the same time, one flying due west at 500 km/h and the other flying due southeast at 300 km/h. What is the distance between the planes two hours later?
3. A triangular-shaped lot of land has sides of length 130 m, 150 m, and 80 m. What are the measures of the angles?
4. Two streets meet an angle of  $52^\circ$ . If a triangular lot has frontages of 60 m and 65 m on the two streets, what is the perimeter of the lot?
5. Newtown is 8 mi east of Oldtown and Littleton is 10 mi northwest of Oldtown. How far is Newtown from Littleton?
6. An oil tanker and a cruise ship leave port at the same time and travel straight-line courses at 10 mi/h and 25 mi/h respectively. Two hours later they are 40 mi apart. What is the angle between their courses?

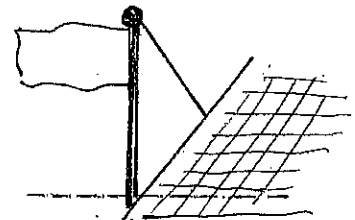
7. A baseball diamond is a square 90 ft on a side. The pitcher's mound is 60.5 ft from home plate. How far is it from the mound to first base?

8. A water molecule consists of two hydrogen atoms and one oxygen atom joined as in the diagram. The distance from the nucleus of each hydrogen atom to the nucleus of the oxygen atom is  $9.58 \times 10^{-9}$  cm, and the bond angle  $\theta$  is  $104.8^\circ$ . How far are the nuclei of the hydrogen atoms from each other?

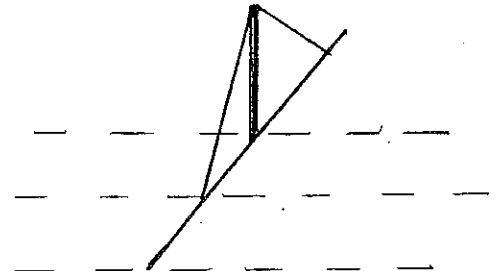


9. A large park in the shape of a parallelogram has diagonal paths that meet at a  $60^\circ$  angle. If the diagonal paths are 12 km and 20 km long, find the perimeter of the park.

10. A flagpole 4 m tall stands on a sloping roof. A support wire 5 m long joins the top of the pole to point on the roof 6 m up from the bottom of the pole. At what angle is the roof inclined to the horizontal?



11. A vertical pole 20 m tall standing on a  $15^\circ$  slope is braced by two cables extending from the top of the pole to two points on the ground, 30 m up the slope and 30 m down the slope. How long are the cables?



12. The measures of two sides of a parallelogram are 50 cm and 80 cm, and one diagonal is 90 cm long. How long is the other diagonal?