

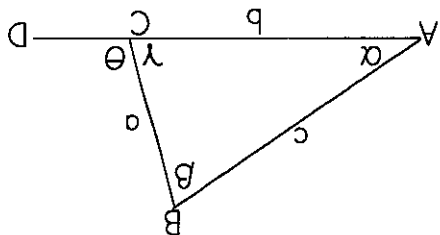
Skill Drill 9

The first problem is intended to remind you of major ideas in the preceding review. The next questions also involve abstract geometrical figures, but following that you are challenged to apply this understanding to some realistic situations.

1. Review of major points. (Fill in the blanks.)

- (a) In triangle ABC $\alpha = 35^\circ$ and $\beta = 70^\circ$.
Determine angle γ .

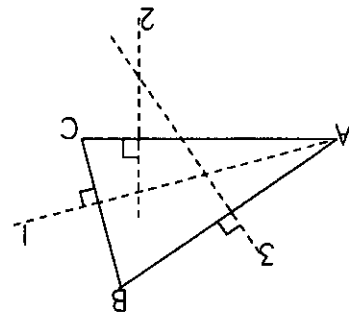
- (b) Exterior angle θ is the complement of angle γ . What is θ in degrees?



- (c) Extend line BC to a point E so that DE is parallel to AB .
Label the angles in triangle CDE which are equal to α , β , and γ .

- (d) Fill in the blanks with the sides of triangle ABC (a, b, c) which are in the same proportion as the indicated sides of triangle CDE :

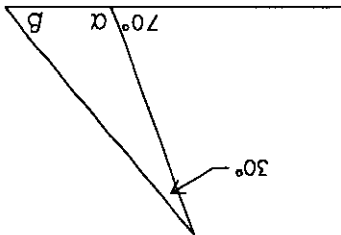
$$CD:DE:EC = \text{---}:\text{---}:\text{---}$$



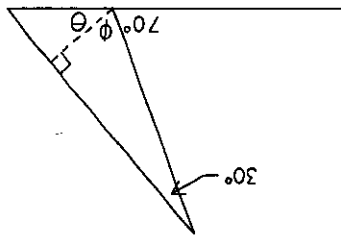
- (e) Here triangle ABC has been redrawn with the addition of dashed lines 1, 2, and 3 perpendicular to each of the sides. At the points of intersection of the dashed lines label all angles which are equal to α , β , or γ .

- (f) The distance along line 1 from vertex A to base BC is altitude h . Write down a formula for the area of triangle ABC in terms of h .

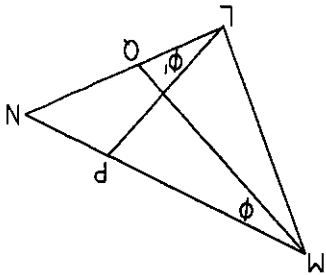
2. In the triangle shown here, find the remaining interior angles α and β :



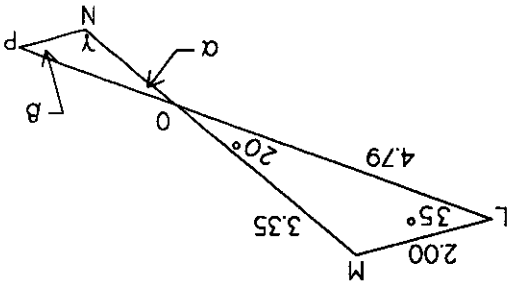
3. A perpendicular to one of the sides has been added to the previous figure. Find θ and ϕ .



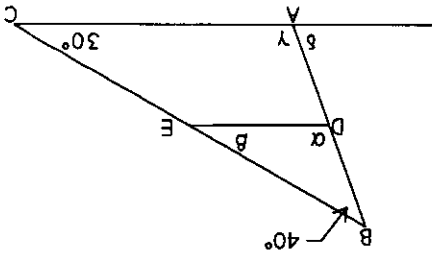
4. If $\phi = \phi'$, how do you know that triangles LNP and MNQ are similar? Given that $LN = 0.7$ m, $NP = 0.3$ m, and $MN = 1.0$ m, find NQ .



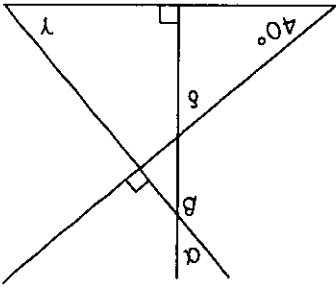
5. Side LM of triangle LMO, for which angles and side lengths are given in the figure, is parallel to side NP of triangle NOP. (a) Find values for the angles in triangle NOP. (b) If $NP = 1.00$ cm find the remaining sides of NOP.



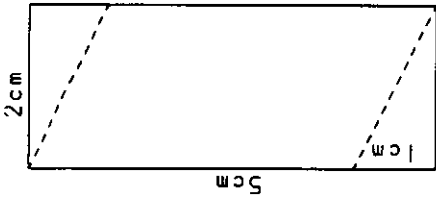
6. D is halfway between A and B, and E is halfway between C and B. (a) If $AC = 1.0$ m, how long is DE? (b) What are the angles α , β , δ , and γ shown in the figure?



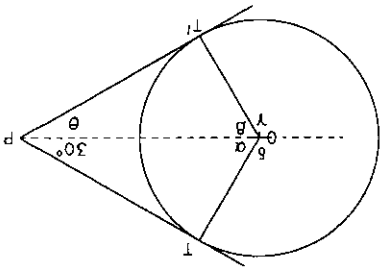
7. In the diagram at the right, find angles α , β , γ , and δ .



8. A rectangle 2 cm high and 5 cm wide has a triangular segment with sides 2 cm and 1 cm removed from one end. (a) What is the area of the remaining quadrilateral? (b) Remove another identical triangular segment from the other end. What is the area of the remaining parallelogram? (c) Check the last answer using a formula for the area of a parallelogram.

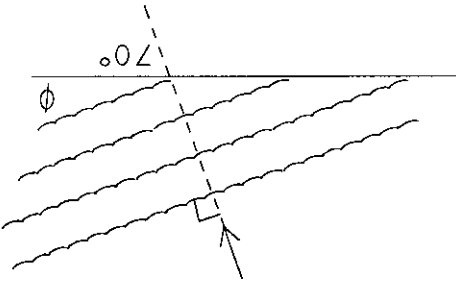


9. Two lines are drawn from point P tangent to the circle as shown. The line from the center O to point P makes an angle of 30° with tangent line PT.

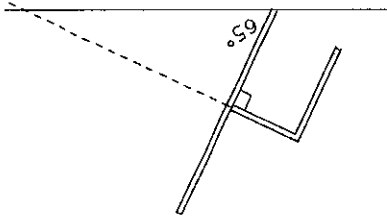


(a) What is the angle θ which the other tangent line PT' makes with the central axis?
 (b) What are the angles (α , β , γ , δ) of the pie-shaped segments formed by the radii to the tangent points?
 (c) If the radius of the circle is 1.0 cm what are areas of each pie shaped segment?

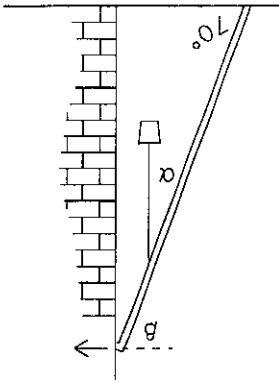
10. The drawing shows the parallel crests of a series of waves approaching a beach in the direction shown by the arrow. What is the angle ϕ which the crests make with respect to the shoreline?



11. A straight-backed chair is tipped back so that the legs make an angle of 65° with respect to the floor. What (acute) angles does the seat make with respect to the floor? to the vertical?

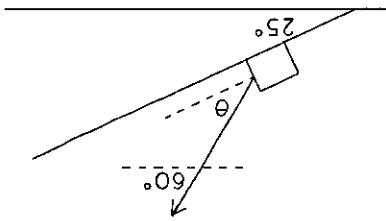


12. A bucket of paint is hanging by a piece of rope from the rung of a ladder, which is leaning at an angle of 70° as shown.

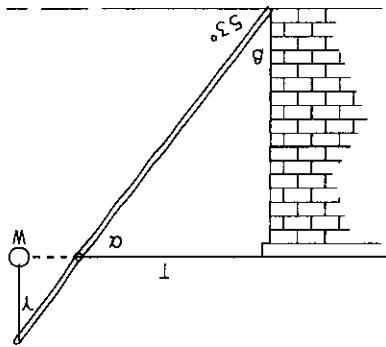


(a) What angle α does the rope make with the ladder? (b) The arrow shows the direction of the force with which the ladder presses on the wall. What angle β does this force make with respect to the ladder?

13. A box is being dragged up a 25° incline by a rope which makes an angle of 60° with respect to the horizontal. What is the angle θ which the rope makes with respect to the incline?



14. A long pole is held out at an angle from a building by a horizontal tie rope T attached to the top of the building. The point of attachment of the tie rope is $3/4$ of the way from the bottom to the top of the pole. A weight W is suspended from the top of the pole by a rope so that W is in line with the top of the building.



(a) If the pole is leaning at an angle of 53° find the angles α , β , and γ shown in the drawing. (b) If the building is 15 meters high, how long is the suspending rope? (c) If the tie rope is 12 meters long, how far out from the building is W ?

15. What is the maximum volume of water which can be held in a cylindrical water tank 15.0 feet high and 10.0 feet in diameter?

16. Water stands in a cylindrical beaker 10 cm in diameter. If a marble 1.5 cm in diameter is dropped into it, how high does the water rise?

17. What is the surface area of the earth? Assume a spherical shape with a diameter of 7.9×10^3 miles.

18. How many miles does the earth travel in its orbit in a year, assuming a circular orbit of radius 93×10^6 miles? How many miles does it travel in a day?