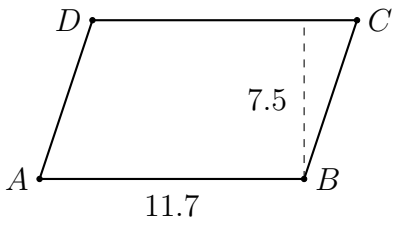
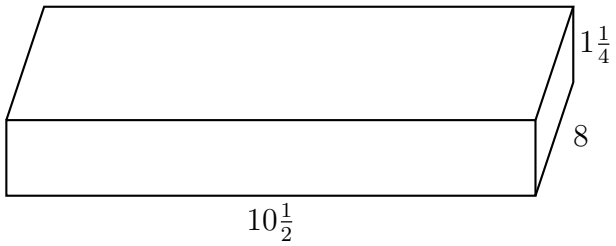
4.11 Exam: Transversals, volume; angle relationships

1. Find the area of the parallelogram $ABCD$ shown below, with $AB = 11.7$ and height $h = 7.5$.

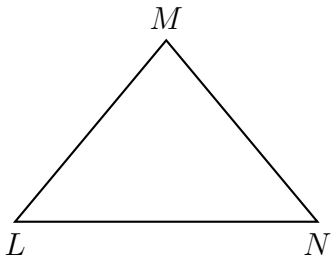


2. Find the sum of the measures of the internal angles of a hexagon. Show the formula.

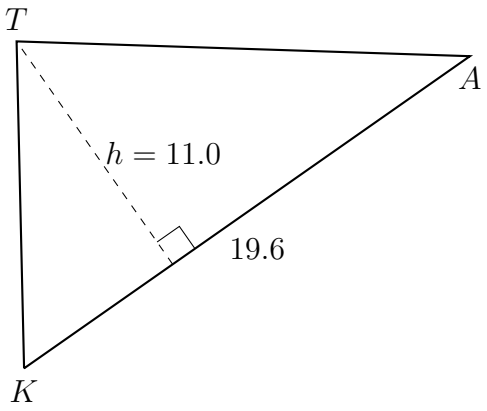
3. A wooden cutting board is $10\frac{1}{2}$ inches long, 8 inches wide, and $1\frac{1}{4}$ inches thick. Find the volume of the box. Show the calculation.



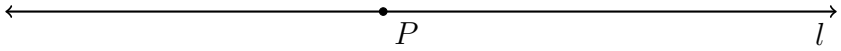
4. Given isosceles $\triangle LMN$ with $\overline{LM} \cong \overline{NM}$. If $m\angle L = 2x + 20$ and $m\angle N = 3x + 5$, find $m\angle M$.



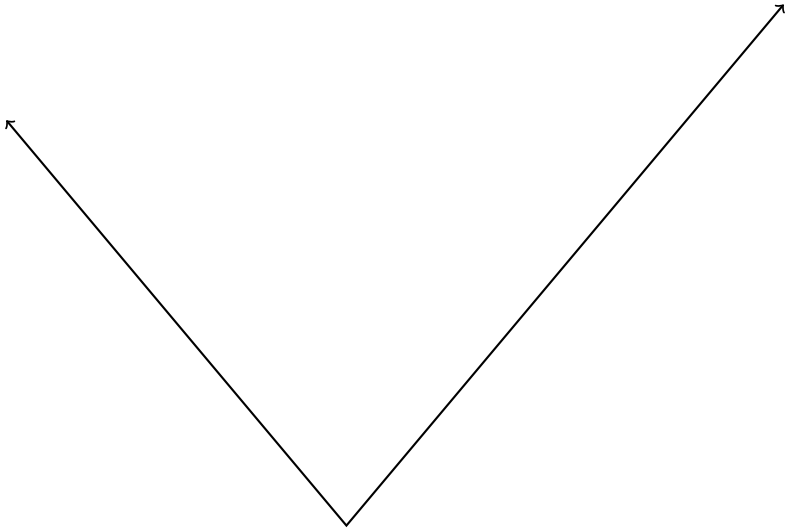
5. Find the area of $\triangle KAT$. The altitude h of the triangle is 11.0 centimeters and the base $KA = 19.6$ cm. Show work by writing an equation before making the calculation.



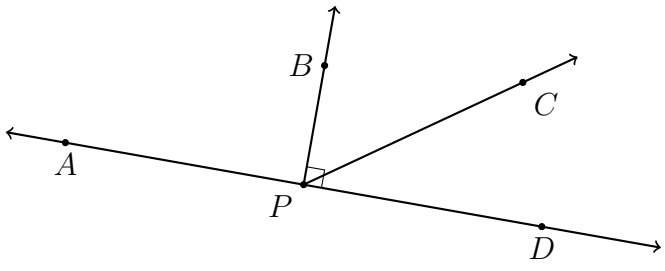
6. Construct a line perpendicular to l though P.



7. Complete the construction of the bisector of the given angle.



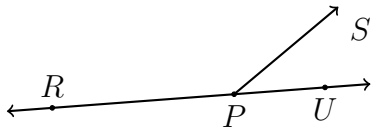
8. Angles APC and CPD form a linear pair. $m\angle APC = 10x+15$ and $m\angle CPD = 3x-4$. Find $m\angle CPD$. Check your answer for full credit.



Do Not Solve. Circle the appropriate equation, cite a justification:

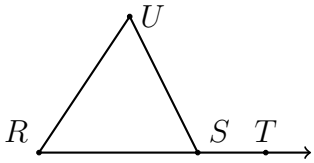
- "definition of bisector"
- "linear pairs sum to 180°"
- "vertical ∠s are ≅"
- "alternate interior ∠s are ≅"
- "corresponding ∠s of ∥ lines are ≅"
- "same-side interior ∠s are supplementary"
- "⊥ rays with complementary ∠s adding to 90°"

9. $\overleftrightarrow{RPU}$ with ray $\overrightarrow{PS}$.



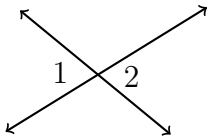
$\angle RPS \cong \angle SPU$ $m\angle RPS + m\angle SPU = 180°$ _____

10. Given $m\angle R = m\angle U = 65$, and $m\angle UST = 130$. Find $m\angle RSU$.



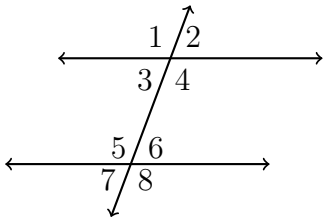
$\angle UST \cong \angle RSU$ $m\angle UST + m\angle RSU = 180$ _____

11. Given $m\angle 1 = 4x + 6$, $m\angle 2 = 6x - 32$. Find $m\angle 1$.



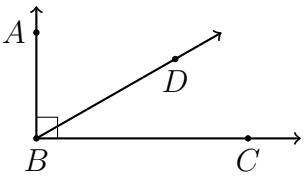
$\angle 1 \cong \angle 2$ $m\angle 1 + m\angle 2 = 180$ _____

12. Given two parallel lines and a transversal, as shown.



$\angle 4 \cong \angle 5$ $m\angle 3 + m\angle 6 = 180$ _____

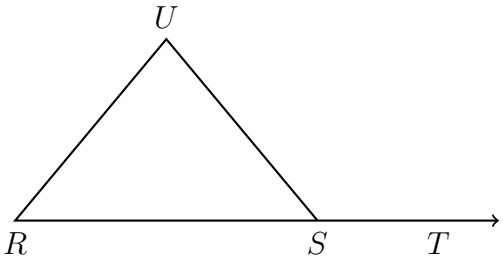
13. Given $\overrightarrow{BA} \perp \overrightarrow{BC}$, $m\angle ABD = 2x - 5$, and $m\angle DBC = x - 10$.



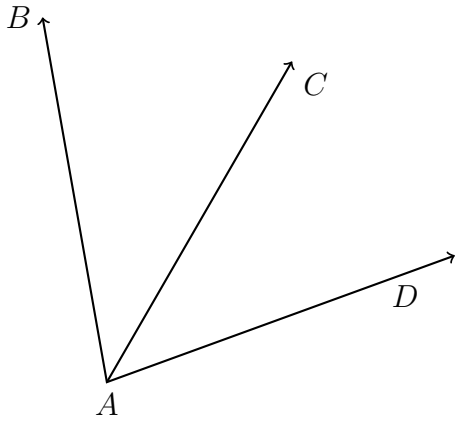
$\angle ABD \cong \angle DBC$ $m\angle ABD + m\angle DBC = 90$ _____

14. The measures in degrees of the three angles of a triangle are $3x$, $\frac{1}{2}x + 7$, and $5x - 65$. Find x.

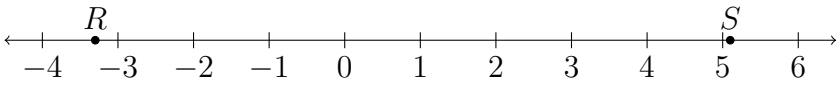
15. Given isosceles $\triangle RSU$ with $\overline{UR} \cong \overline{US}$. If $m\angle UST = x$ and $m\angle R = x - 80$, find $m\angle U$.



16. An angle bisector is shown below, with $\overrightarrow{AC}$ bisecting $\angle BAD$. Given $m\angle BAC = 3x+5$ and $m\angle BAD = 7x - 1$, find $m\angle BAD$. (Show check)



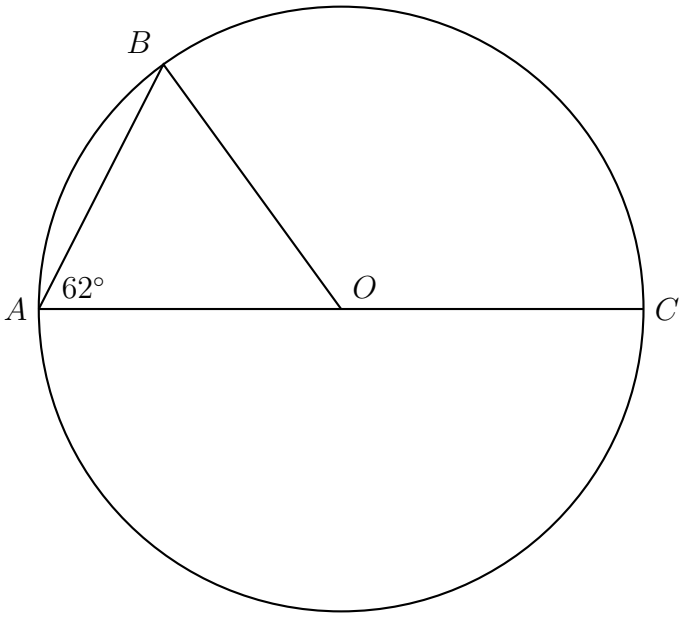
17. Given $\overleftrightarrow{RS}$ as shown on the number line, with $R = -3.3$ and $S = 5.1$.



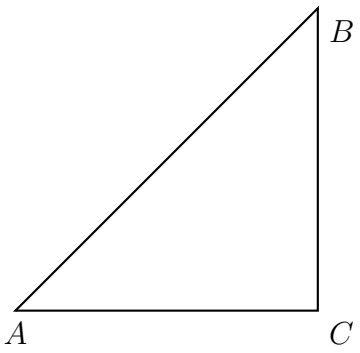
(a) What is the exact distance on the number line between the points R and S?

(b) The point T bisects $\overline{RS}$. Find the value of T, and mark and label it on the numberline $\overleftrightarrow{RS}$ shown above.

18. The circle O is shown below with diameter $\overline{AOC}$ and radius $\overline{BO}$. It is given that $m\angle BAO = 62°$. Find the measure of the central angle $\angle AOB$.

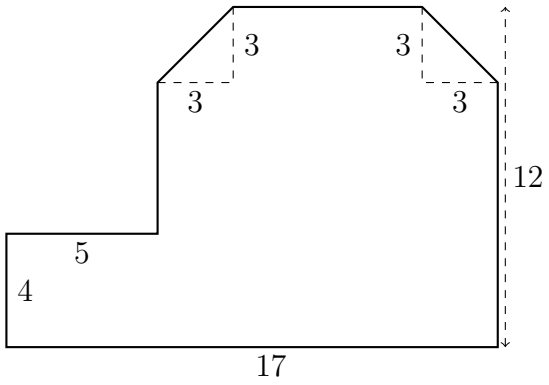


19. Given isosceles right $\triangle ABC$ with $\overline{AC} \cong \overline{BC}$ and $\overline{AC} \perp \overline{BC}$. Find $m\angle A$.



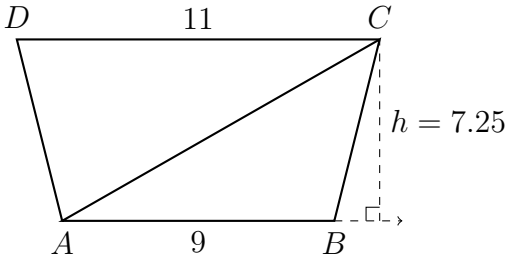
20. A sheet metal part is cut with square corners and two 45° cutouts as shown with lengths marked in centimeters.

    (a) Find the area of the figure. (the drawing is not to scale)

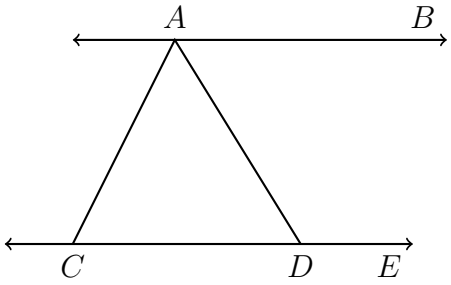


    (b) Spicy: The weight of the sheet metal is 2.25 grams per square centimeter. Find the weight of the part.

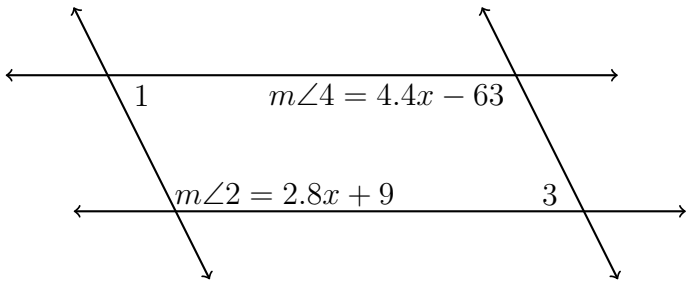
21. The trapezoid $ABCD$ has two parallel sides, $\overline{AB} \parallel \overline{CD}$ with lengths $AB = 9$ and $CD = 11$. The trapezoid's height is $h = 7.25$. Find the area of the trapezoid.



22. Given parallel lines $\overleftrightarrow{AB} \parallel \overleftrightarrow{CDE}$ with $\overline{AC} \cong \overline{CD}$. If $m\angle BAD = 63$ find $m\angle ACD$.



23. Two parallel lines intersect a second set of parallel lines. Given $m\angle 2 = 2.8x + 9$ and $m\angle 4 = 4.4x - 63$, find the measure of $\angle 1$.



Do Not Solve!
Label the drawing completely and write an equation in terms of x modeling the situation.

24. Given that O bisects $\overline{NP}$. $NO = 2x$, $NP = 3x + 10$. Find x.

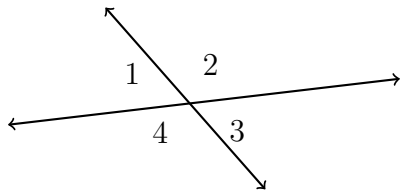
25. Given $\overline{ABC}$, with $AB = x - 1$, $BC = 3x + 3$, and $AC = 26$. Find AB.

26. The points R, S, and T are collinear, with $RS = 3x - 2$ and $ST = 12$. If $RT = 7x$, find RT.

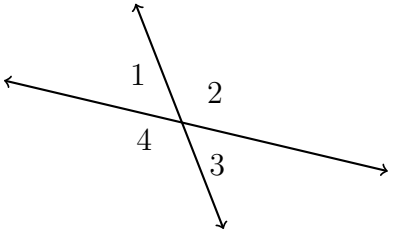
27. The point K is the midpoint of $\overline{JL}$, $JK = 10x + 15$, and $JL = 18x + 40$. Find JK.

Do Not Solve!
Model the situation with an equation in terms of x. State whether the angles are complementary, supplementary, or vertical angles.

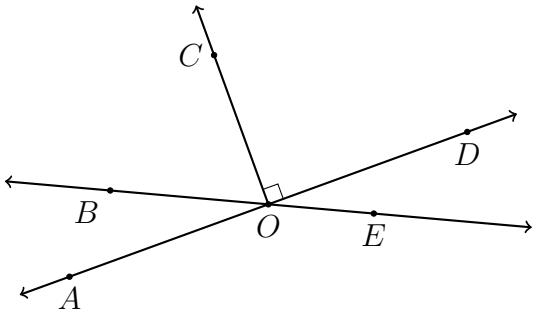
28. Two lines intersect making four angles: $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$. Given that $m\angle 3 = 2x+50$ and $m\angle 4 = 6x + 50$, find x.



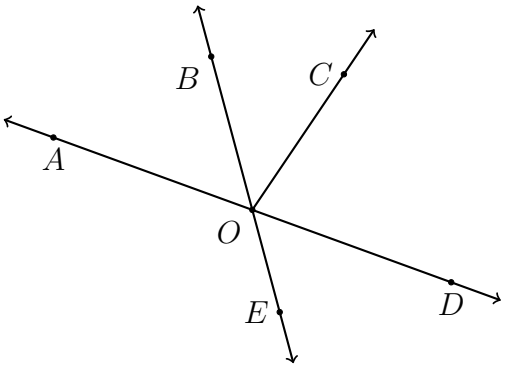
29. Given that $m\angle 1 = 5x + 22$ and $m\angle 3 = 7x + 18$ as shown in the diagram, find $m\angle 2$.



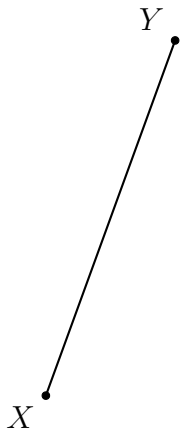
30. In the diagram below $m\angle AOB = 3x + 5$ and $m\angle COB = 4x + 15$. Find x.



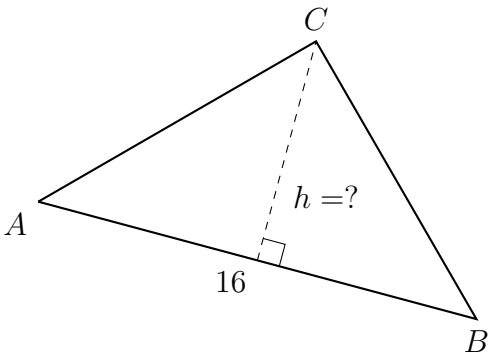
31. In the diagram below $m\angle AOB = 65$, $m\angle BOC = 4x - 10$, and $m\angle DOC = 3x + 55°$. Find $m\angle AOB$.



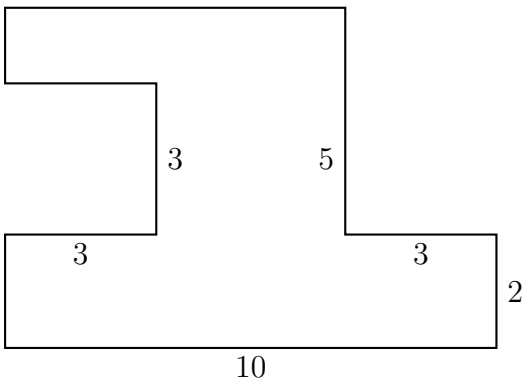
32. Complete the construction of an equilateral triangle with one side as $\overline{XY}$. Show all construction marks, but make no extra lines.



33. One side of the $\triangle ABC$ has a length $AB = 16$. The triangle's area is 96. Find the length of the altitude h of the triangle to vertex C and perpendicular to side $\overline{AB}$.

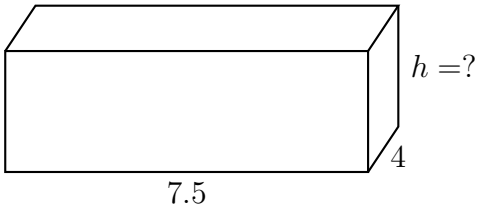


34. The shape shown below is composed of straight lines and right angles, with some lengths as marked. Find the area of the figure. (the figure is not drawn to scale)



35. Given two complementary angles, $m\angle A = 54$ and $m\angle B = 3x - 3$. Find x. Check your solution.

36. The volume of the rectanglar prism shown is 105 cubic meters. Its length is 7.5 meters and depth 4 m. Find its height h. Show the calculation. (not drawn to scale)


h =?
4
7.5

Complete all steps for full credit: the drawing to the top right, an equation and solution for x on the left, followed by the answer to the question. Write the check to the bottom right.

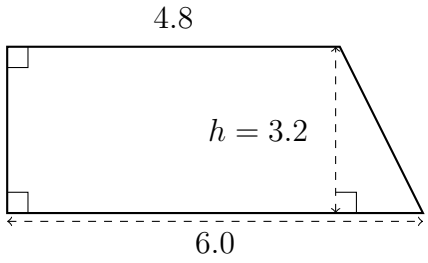
37. Given the collinear points P, Q, and R, with $PQ = 7x + 14$, $QR = 2x + 12$, and $PR = 12x - 10$. Find PQ.

38. Angles U and V are supplementary. $m\angle U = 5x + 61$ and $m\angle V = 3x - 17$. Find $m\angle V$.

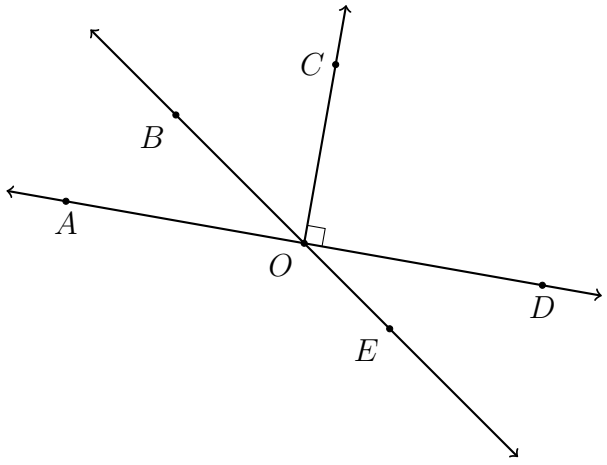
Early finishers, spicy

39. The shape shown below is a trapezoid. Its height is 3.2 cm and the longer base is 6.0 cm. The shorter side opposite the base is 4.8 cm.

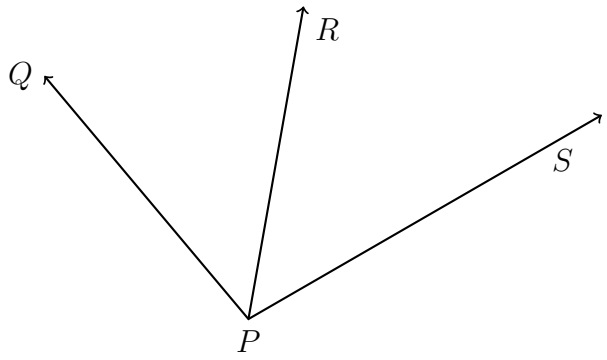
    Find the area of the figure.



40. In the diagram below $m\angle BOC = 3x + 15$ and $m\angle DOE = 6x - 6$. Find $m\angle DOE$.

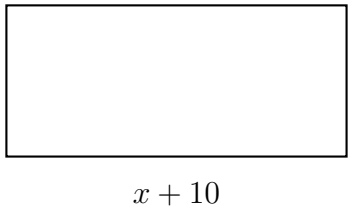


41. An angle bisector is shown below, with $\overrightarrow{PR}$ bisecting $\angle QPS$. Given $m\angle QPR = 4x+2$ and $m\angle QPS = 10x - 20$, find $m\angle QPS$.

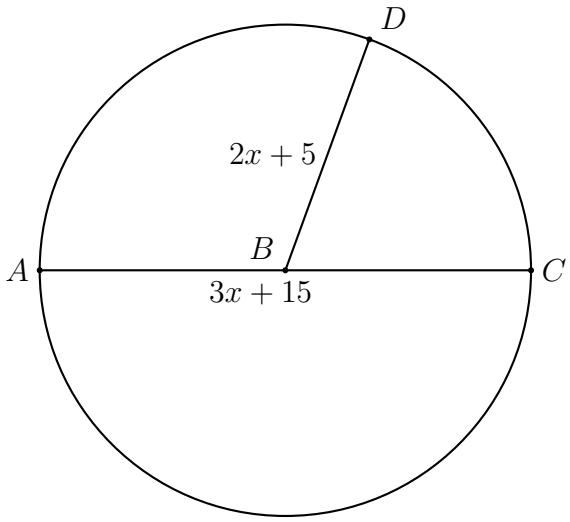


42. The length of the given rectangle is 10 more than the width. Its area is 75. Find the length and width of the rectangle using an algebraic method.

(the drawing is not to scale)



43. The circle with center B is shown below with diameter $\overline{AC}$ and radius $\overline{BD}$. Given $AC = 3x + 15$ and $BD = 2x + 5$. Find the diameter of the circle.



44. Complete the construction of a hexagon with one side the given line segment. Show all construction marks, but make no extra lines.

45. The area of a square is 20 cm. Find the perimeter of the square.