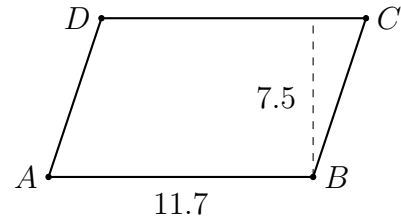


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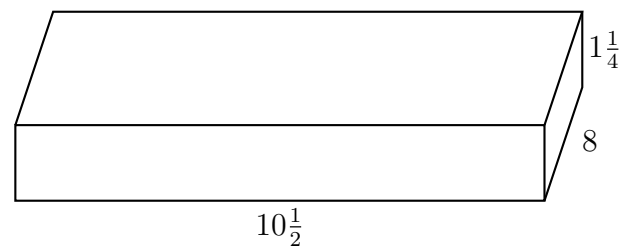
**4.11 Exam: Transversals, volume; angle relationships**

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

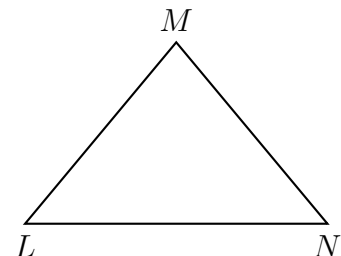


2. Find the sum of the measures of the internal angles of a hexagon. Show the formula.

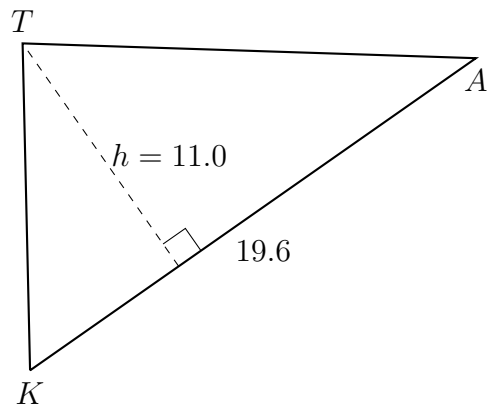
3. A wooden cutting board is  $10\frac{1}{2}$  inches long, 8 inches wide, and  $1\frac{1}{4}$  inches thick. Find the volume of the box. Show the calculation.



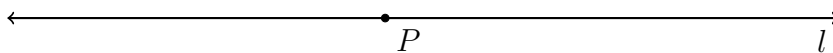
4. Given isosceles  $\triangle LMN$  with  $\overline{LM} \cong \overline{NM}$ . If  $m\angle L = 2x + 20$  and  $m\angle N = 3x + 5$ , find  $m\angle M$ .



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.

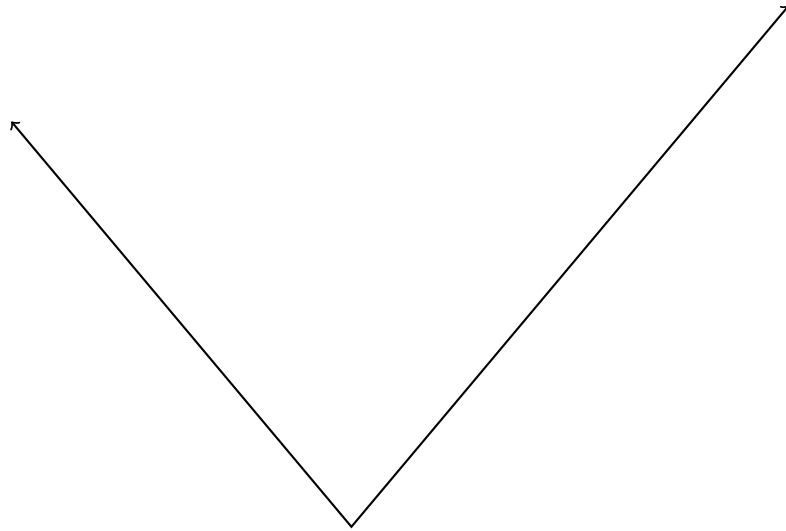


6. Construct a line perpendicular to  $l$  through  $P$ . (show construction marks, but make no extra marks)

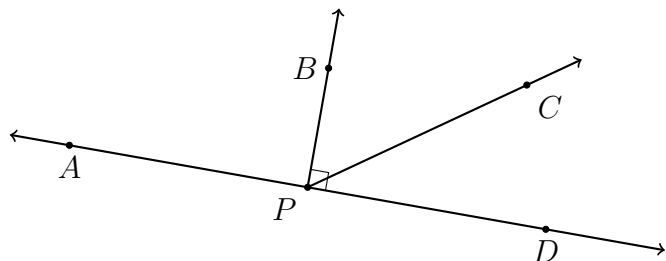


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7. Complete the construction of the bisector of the given angle. (show construction marks, but make no extra marks)



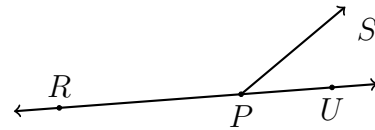
8. Angles  $APC$  and  $CPD$  form a linear pair.  $m\angle APC = 10x + 15$  and  $m\angle CPD = 3x - 4$ . Find  $m\angle CPD$ . Check your answer for full credit.



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

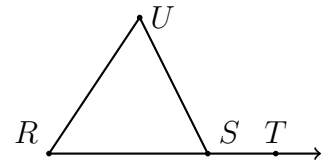
- “definition of bisector”
- “linear pairs sum to  $180^\circ$ ”
- “vertical  $\angle$ s are  $\cong$ ”
- “alternate interior  $\angle$ s are  $\cong$ ”
- “corresponding  $\angle$ s of  $\parallel$  lines are  $\cong$ ”
- “same-side interior  $\angle$ s are supplementary”
- “ $\perp$  rays with complementary  $\angle$ s adding to  $90^\circ$ ”

9.  $\overleftrightarrow{RP\bar{U}}$  with ray  $\overrightarrow{PS}$ .



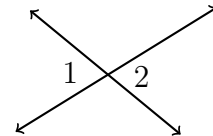
$$\angle RPS \cong \angle SPU \quad m\angle RPS + m\angle SPU = 180^\circ \quad \underline{\hspace{2cm}}$$

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



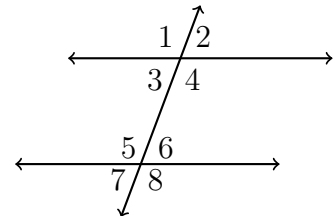
$$\angle UST \cong \angle RSU \quad m\angle UST + m\angle RSU = 180 \quad \underline{\hspace{2cm}}$$

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



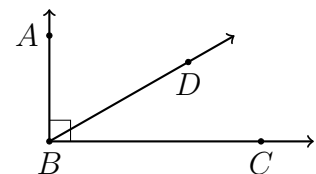
$$\angle 1 \cong \angle 2 \quad m\angle 1 + m\angle 2 = 180 \quad \underline{\hspace{2cm}}$$

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



$$\angle 4 \cong \angle 5 \quad m\angle 3 + m\angle 6 = 180 \quad \underline{\hspace{2cm}}$$

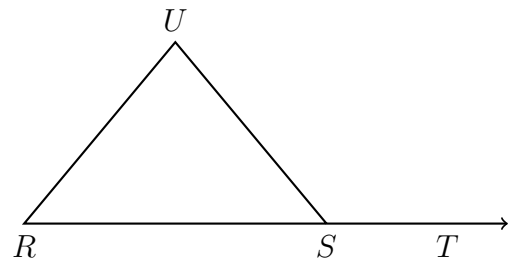
13. Given  $\overrightarrow{BA} \perp \overrightarrow{BC}$ ,  $m\angle ABD = 2x - 5$ , and  $m\angle DBC = x - 10$ .



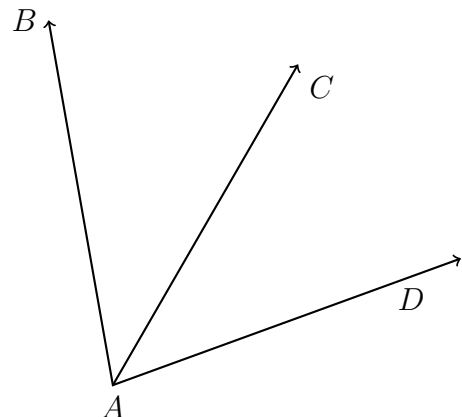
$$\angle ABD \cong \angle DBC \quad m\angle ABD + m\angle DBC = 90 \quad \underline{\hspace{2cm}}$$

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

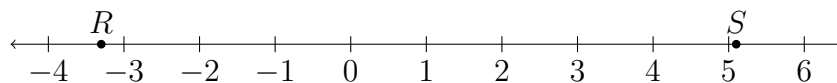
15. Given isosceles  $\triangle RSU$  with  $\overline{UR} \cong \overline{US}$ . If  $m\angle UST = x$  and  $m\angle R = x - 80$ , find  $m\angle U$ .



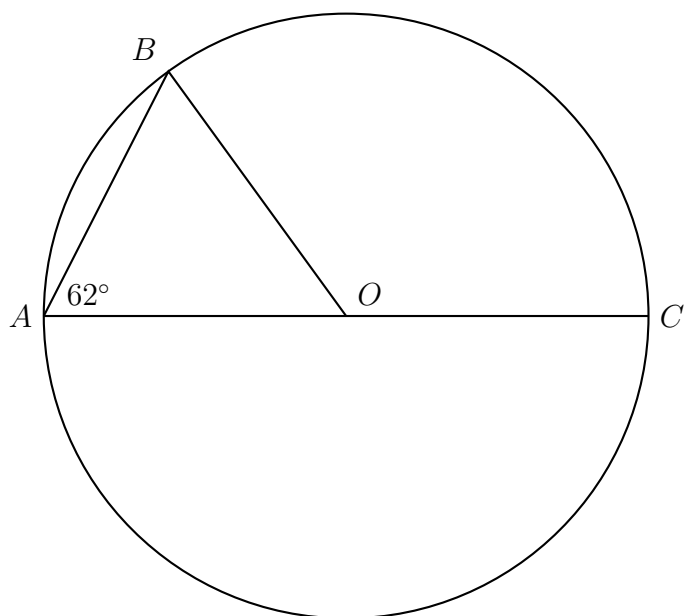
16. An angle bisector is shown below, with  $\overrightarrow{AC}$  bisecting  $\angle BAD$ . Given  $m\angle BAC = 3x + 5$  and  $m\angle BAD = 7x - 1$ , find  $m\angle BAD$ . (Show check)



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

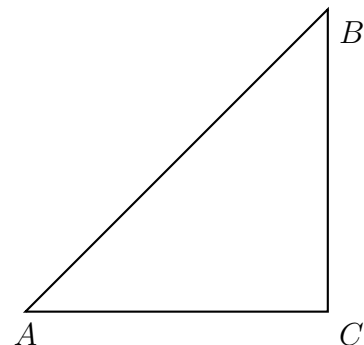


- (a) What is the exact distance on the number line between the points  $R$  and  $S$ ?
- (b) The point  $T$  bisects  $\overleftrightarrow{RS}$ . Find the value of  $T$ , and mark and label it on the numberline  $\overleftrightarrow{RS}$  shown above.
18. The circle  $O$  is shown below with diameter  $\overline{AOC}$  and radius  $\overline{BO}$ . It is given that  $m\angle BAO = 62^\circ$ . Find the measure of the central angle  $\angle AOB$ .



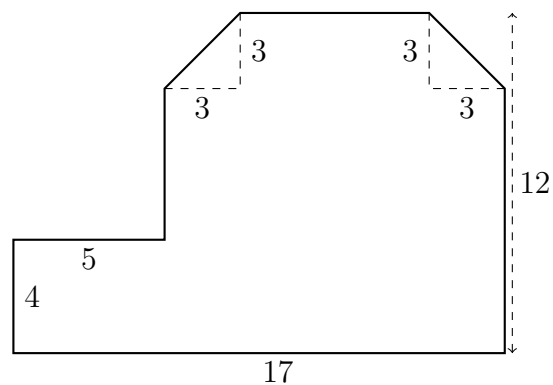
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19. Given isosceles right  $\triangle ABC$  with  $\overline{AC} \cong \overline{BC}$  and  $\overline{AC} \perp \overline{BC}$ . Find  $m\angle A$ .



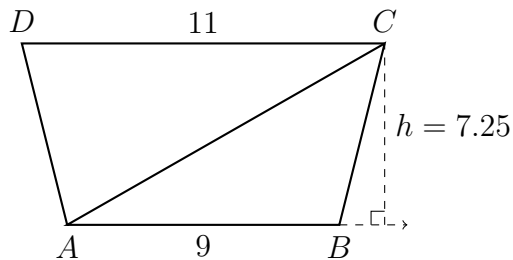
20. A sheet metal part is cut with square corners and two  $45^\circ$  cutouts as shown with lengths marked in centimeters.

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

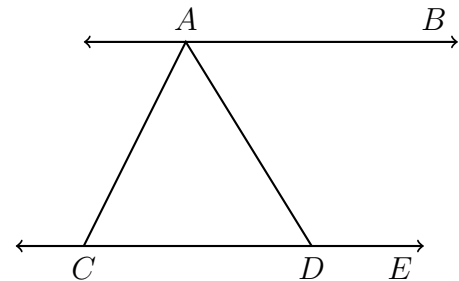


- (b) Spicy: The weight of the sheet metal is 2.25 grams per square centimeter. Find the weight of the part.

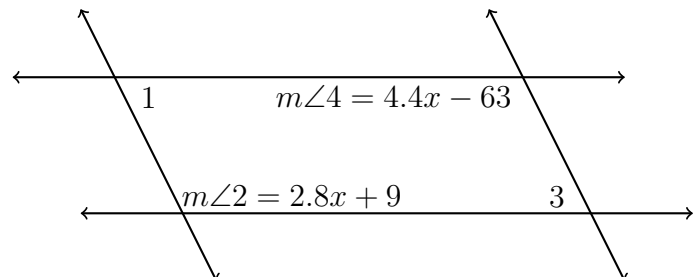
21. The trapezoid  $ABCD$  has two parallel sides,  $\overline{AB} \parallel \overline{CD}$  with lengths  $AB = 9$  and  $CD = 11$ . The trapezoid's height is  $h = 7.25$ . Find the area of the trapezoid.



22. Given parallel lines  $\overleftrightarrow{AB} \parallel \overleftrightarrow{CE}$  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  $\angle 1$ .

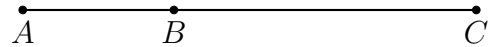




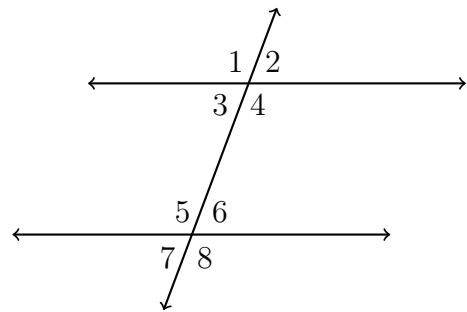
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**Do Not Solve!****Model the situation with an equation in terms of  $x$ .**

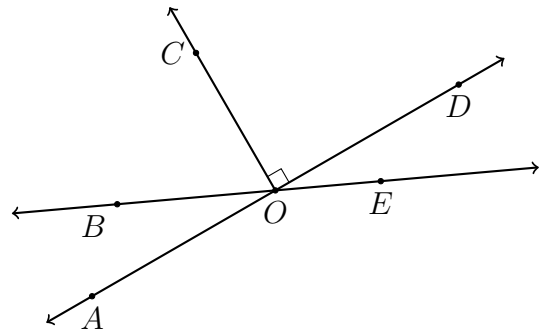
24. Given  $\overline{ABC}$ , with  $AB = 2x - 1$ ,  $BC = 3x + 7$ , and  $AC = 21$ . Find  $x$ .



25. Given  $m\angle 3 = x + 35$  and  $m\angle 5 = 4x - 25$ . Find  $x$ .



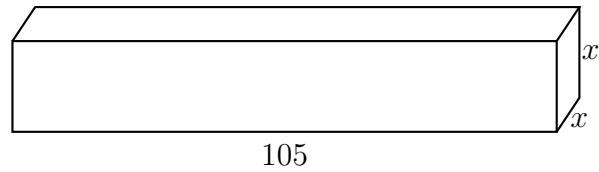
26. In the diagram below  $m\angle AOB = 6x + 5$  and  $m\angle COB = 8x + 15$ . Find  $x$ .



27. The point  $K$  is the midpoint of  $\overline{JL}$ ,  $JK = 3x + 15$ , and  $JL = 9x + 9$ . Find  $x$ .

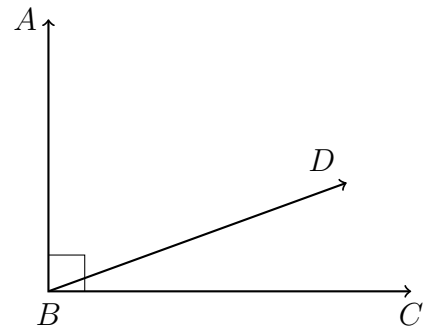


28. A feeding trough in the shape of a rectangular prism is 105 inches long. The trough's cross section is square. If its volume is 15,120 cubic inches, what is the dimension of each side of its square end,  $x$ ? (drawing not to scale)



29. Given  $\overrightarrow{BA} \perp \overrightarrow{BC}$ ,  $m\angle ABD = 2x$ , and  $m\angle DBC = x - 15$ . Find  $m\angle DBC$ .

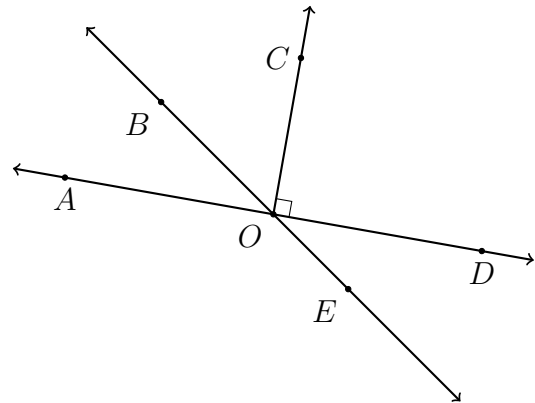
For full credit, show the check using both angle measures.



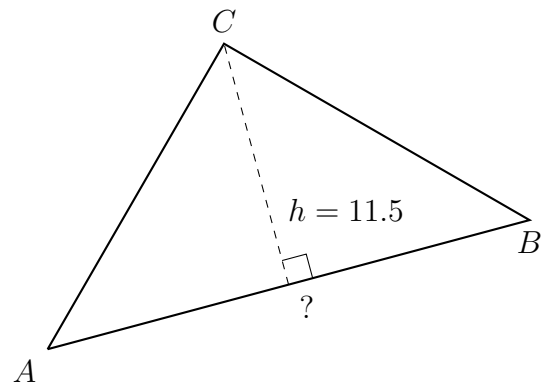
**Early finishers**

30. In the diagram below  $m\angle AOB = 3x + 11$  and  $m\angle DOE = 5x - 3$ . Find  $m\angle DOE$ .

(Calculate  $m\angle AOB$  as a check)

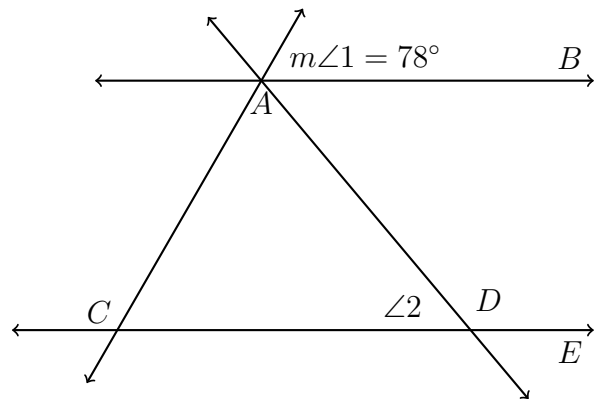


31. One side of the  $\triangle ABC$  has a height  $h = 11.5$ . The triangle's area is 103.5. Find the length of the side  $\overline{AB}$ .

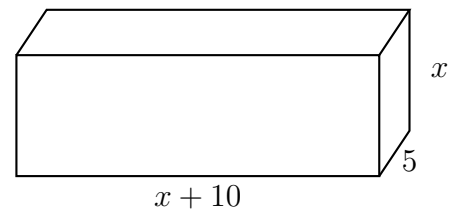


32. Of two complementary angles, the measure of  $\angle A$  is five times that of  $\angle B$ . Find  $m\angle A$ .

33. Given parallel lines  $\overleftrightarrow{AB} \parallel \overleftrightarrow{CE}$  with  $\overline{AD} \cong \overline{CD}$ . If  $m\angle 1 = 78$  find  $m\angle 2$ .



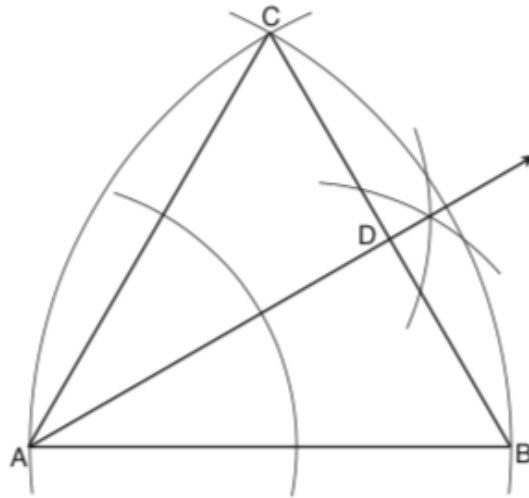
34. The volume of the rectangular prism shown is 120 cubic feet. Its length is length is ten feet longer than its height  $x$ . Its depth is 5 feet. Find the length of the prism.  
(not drawn to scale)



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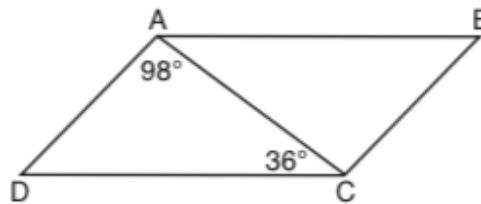
35. Regents problem 1

Using the construction below, state the degree measure of  $\angle CAD$ . Explain why.



36. Regents problem 2

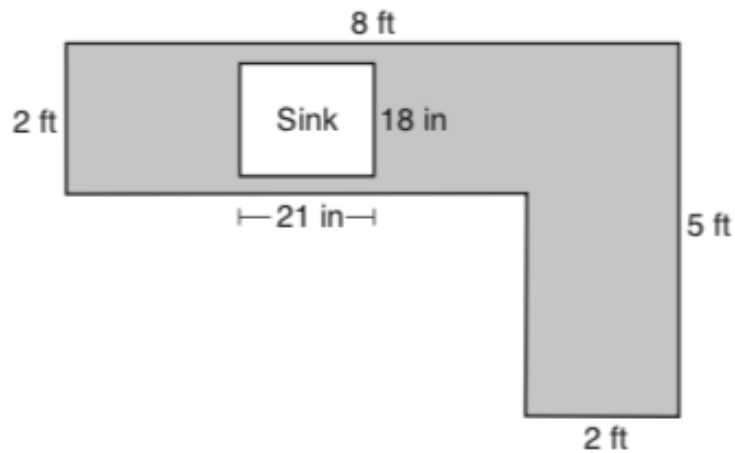
In parallelogram  $ABCD$  shown below,  $m\angle DAC = 98^\circ$  and  $m\angle ACD = 36^\circ$ .



What is the measure of angle  $B$ ? Explain why.

37. Regents problem 3

A countertop for a kitchen is modeled with the dimensions shown below. An 18-inch by 21-inch rectangle will be removed for the installation of the sink.



What is the area of the top of the installed countertop, to the *nearest square foot*?