



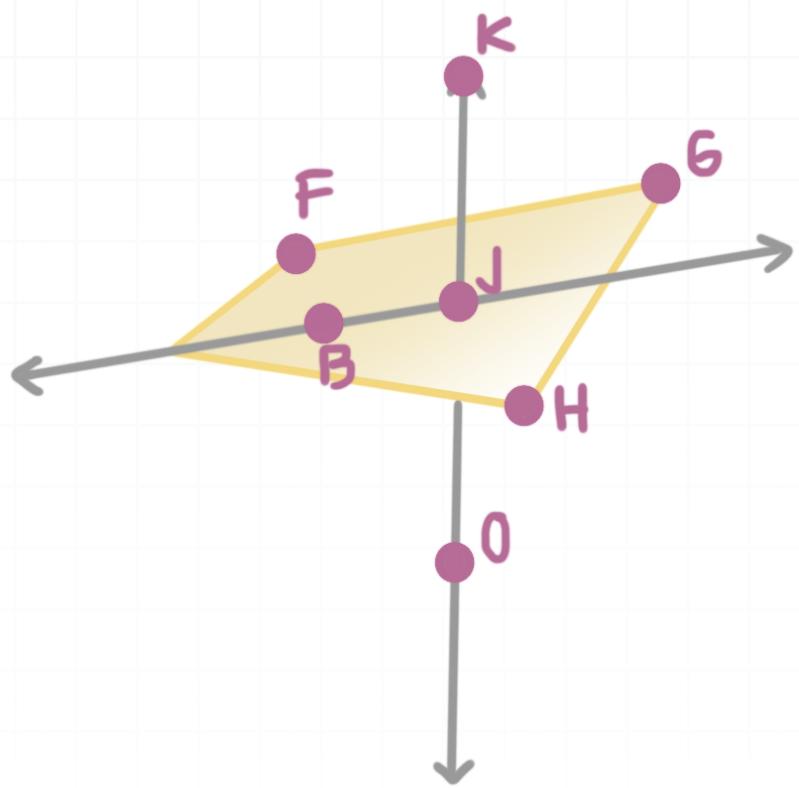
# Geometry Workbook

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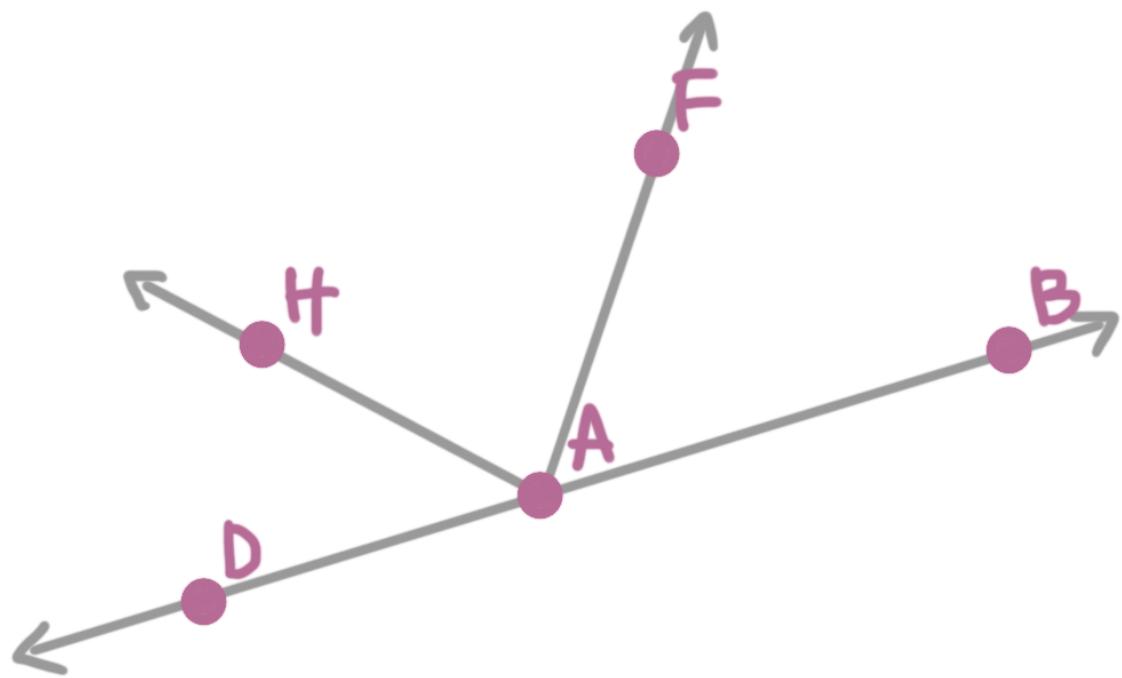
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MATH

## NAMING SIMPLE GEOMETRIC FIGURES

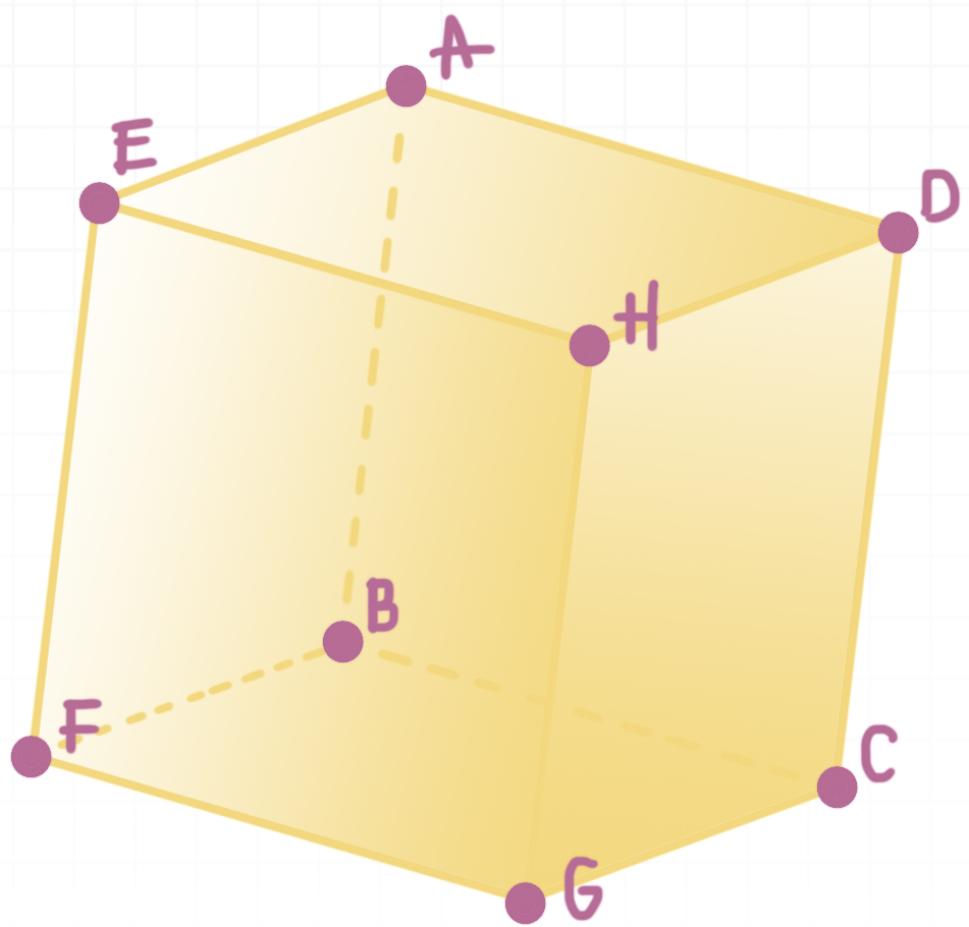
- 1. Name the intersection of  $\overline{BJ}$  and  $\overline{KO}$ .



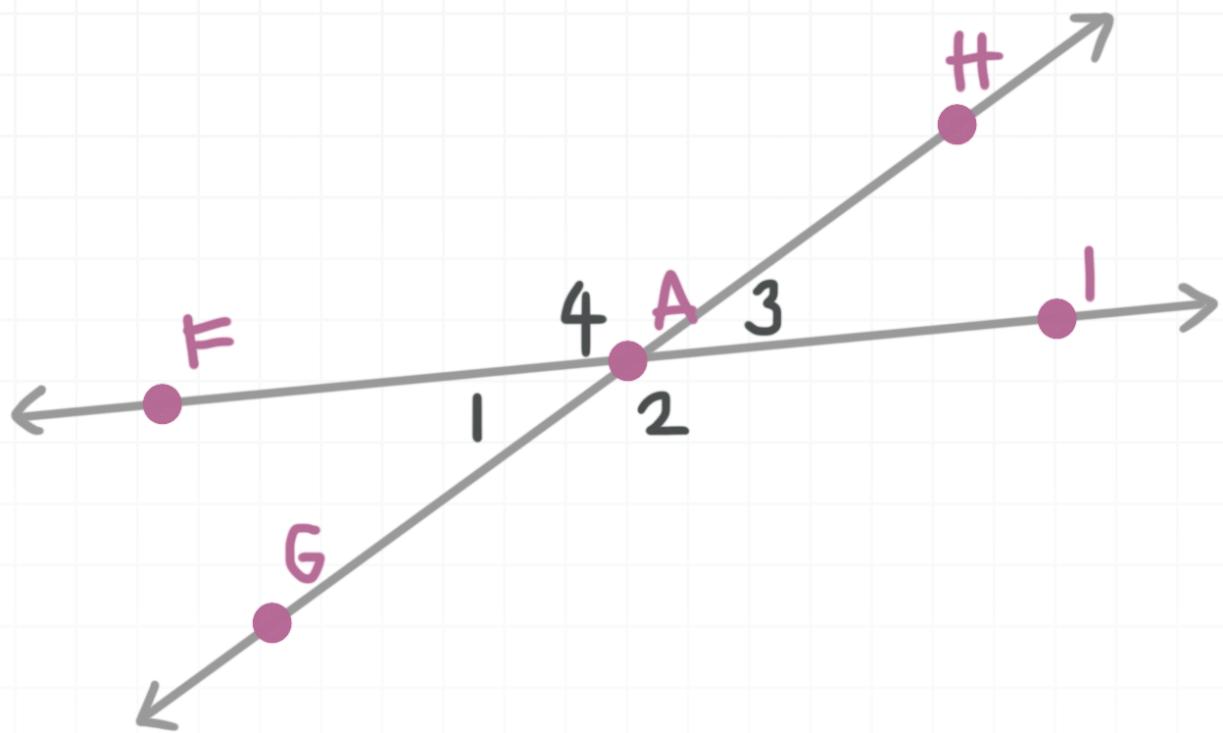
- 2. Name the angle that forms a linear pair with  $\angle DAF$ .



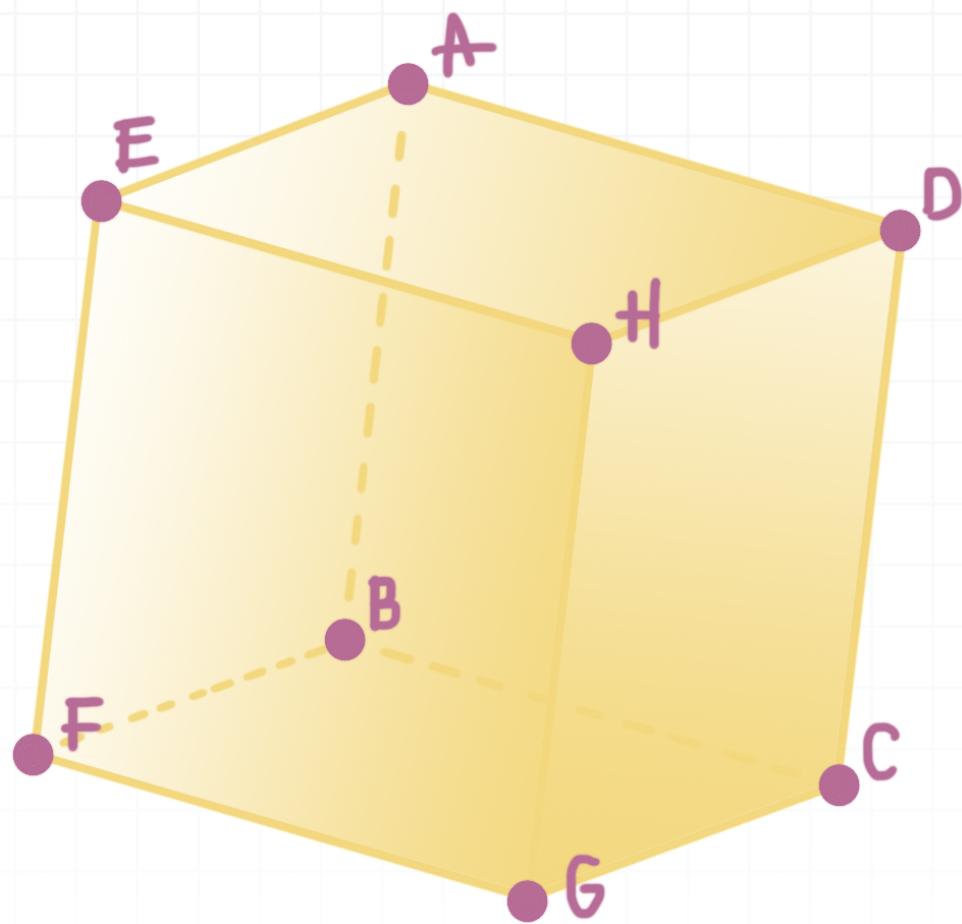
■ 3. Name three non-collinear points.



■ 4. Name a pair of vertical angles.



- 5.  $\overline{XY}$  is an angle bisector of  $\angle WXZ$ . Write the congruence statement that follows.
- 6. Name the intersection of plane  $AEH$  and plane  $GCD$ .



- 7.  $\overline{AB} \perp \overline{CD}$  and they intersect at  $E$ . Draw a sketch of this and include all necessary labels on your diagram.
  
- 8. Sketch the following:  $\overline{AB}$  lies on plane  $DEF$  and  $C$  is contained in  $\overline{AB}$ .

## LENGTH OF A LINE SEGMENT

- 1. In the line segment,  $AB = 14$  and  $BC = 10$ . Find  $AC$ .



- 2.  $R$  lies between  $S$  and  $T$ .  $ST = 30$  and  $SR = 17$ . Find  $RT$ .

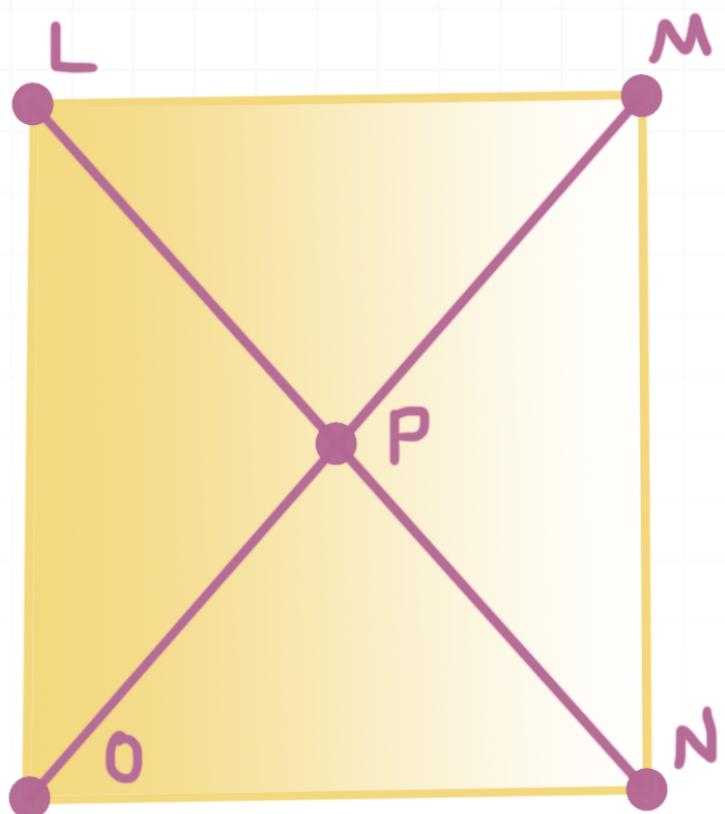


- 4.  $B$  lies between  $L$  and  $N$ .  $LB = x$ ,  $BN = 2x + 5$ , and  $LN = 17$ . Write an equation that can be used to find the value of  $x$ . Then find  $x$ .

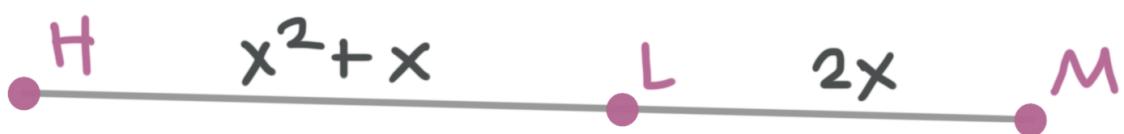
- 5.  $\overline{AB}$  bisects  $\overline{DC}$  at  $E$ .  $DC = 8$  cm,  $AB = 10$  cm, and  $AE = 4$  cm. Find  $DE$  and  $EB$ .

- 6.  $P$  lies between  $M$  and  $O$ .  $MP = 3x - 4$ ,  $PO = 2x + 2$ , and  $MO = 3x + 12$ . Find  $x$  and  $MO$ .

- 7. The diagonals of a square bisect each other and are also congruent. The diagram below shows diagonals  $\overline{LN}$  and  $\overline{MO}$  intersecting at  $P$ . Because they are bisectors,  $P$  is the midpoint of each segment. If  $LP = 4.5$  inches, find  $MO$ .

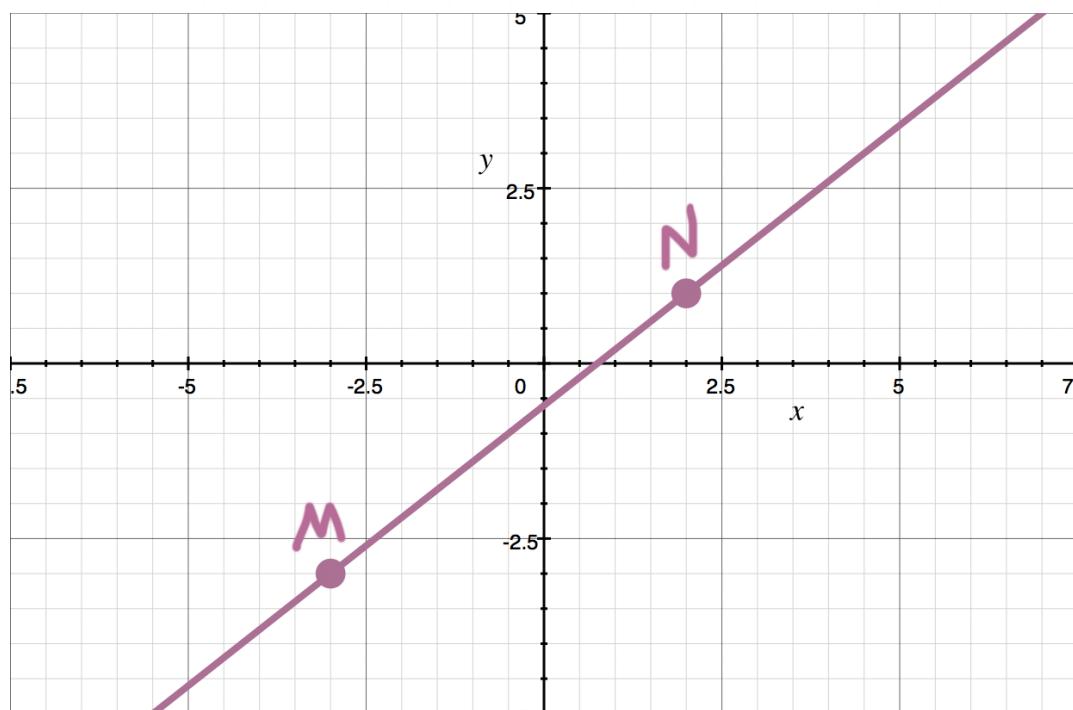


- 8.  $HM = 10$ . Use the diagram to find  $x$  and  $HL$ .



## SLOPE AND MIDPOINT OF A LINE SEGMENT

- 1. Find the length of  $\overline{AB}$  given  $A(-2,3)$  and  $B(4,3)$ .
- 2. Find the length of  $\overline{EF}$  given  $E(-3, -2)$  and  $F(1,1)$ .
- 3. Find the length of  $\overline{JK}$  given  $J(0,6)$  and  $K(2, -4)$ .
- 4. Find the slope of line  $MN$ .



- 5. Find the slope of the line passing through  $S(-6,6)$  and  $T(2, -4)$ .

- 6.  $J$  is the midpoint of  $\overline{RF}$ . Find the coordinates of  $J$  if  $R(-4,6)$  and  $F(0, -2)$ .
- 7.  $P$  is the midpoint of  $\overline{XY}$ . Find the coordinates of  $X$  if  $P(-3,6)$  and  $Y(0,2)$ .
- 8.  $E$  is a midpoint of  $\overline{LM}$ .  $LE = 2x + 3$  and  $LM = 6x - 4$ . Find  $x$  and  $LM$ .

## PARALLEL, PERPENDICULAR, OR NEITHER

- 1.  $\overline{AB} \perp \overline{CD}$ . The slope of  $\overline{AB}$  is  $\frac{2}{3}$ . Find the slope of  $\overline{CD}$ .
- 2.  $\overline{MN} \parallel \overline{ST}$ , and the slope of  $\overline{MN}$  is  $-2$ . Find the slope of  $\overline{ST}$ .
- 3. Are  $\overline{XY}$  and  $\overline{AB}$  parallel, perpendicular, or neither?  $X(4, -3)$ ,  $Y(-2, 1)$ ,  $A(1, 3)$ , and  $B(3, 6)$ . Use the slopes of the lines to justify your answer.
- 4. Are  $\overline{EF}$  and  $\overline{GH}$  parallel, perpendicular, or neither?  $E(-1, 4)$ ,  $F(0, 2)$ ,  $G(-1, 0)$ , and  $H(1, 4)$ . Use the slope of the lines to justify your answer.
- 5. Write the equation of a line in slope-intercept form that's perpendicular to the given line and passes through  $(2, 3)$ .  
 $y = \frac{1}{2}x + 2$
- 6. Write the equation of a line parallel to  $y = 3x - 2$  that passes through  $(0, 3)$ .



■ 7. A square has opposite sides parallel and consecutive sides perpendicular and all sides are congruent. Quadrilateral  $SQRE$  has coordinates  $S(0,3)$ ,  $Q(4,0)$ ,  $R(1, -4)$ , and  $E(-3, -1)$ . Determine whether or not  $SQRE$  is a square by showing that the opposite sides are parallel and consecutive sides are perpendicular and that all sides are congruent.

■ 8. A square has opposite sides parallel and consecutive sides perpendicular and all sides are congruent. Quadrilateral  $SQRE$  has coordinates  $S(0,3)$ ,  $Q(4,0)$ ,  $R(1, -4)$ , and  $E(-3, -1)$ . Determine if the diagonals of the square are perpendicular. Determine if the diagonals are congruent.



## DISTANCE BETWEEN TWO POINTS IN TWO DIMENSIONS

- 1. Find the length of  $\overline{GH}$  given  $G(-2,1)$  and  $H(4,1)$ .
- 2. Find the length of  $\overline{XY}$  given  $X(-4,1)$  and  $Y(0,2)$ .
- 3. Find the perimeter of  $\triangle EFG$  if  $E(1,1)$ ,  $F(1,6)$ , and  $G(5,4)$ .
- 4. Find the area of square  $ABCD$  given  $A(-8,0)$ ,  $B(0,6)$ ,  $C(6, - 2)$ , and  $D(-2, - 8)$ .



## DISTANCE BETWEEN TWO POINTS IN THREE DIMENSIONS

- 1. Find the distance between points with coordinates  $(3,8,0)$  and  $(3,8,6)$ .
- 2. Find the distance between points with coordinates  $(2,5, - 3)$  and  $(2,8,1)$ .
- 3. Find the distance between points with coordinates  $(1,1,1)$  and  $(5,5,5)$ .
- 4. Find the distance between points with coordinates  $(9,6,3)$  and  $(-9, - 6, - 3)$ .



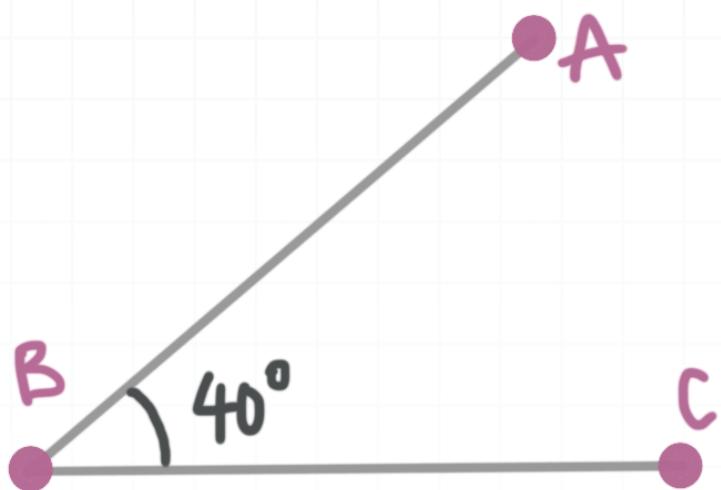
## MIDPOINT OF A LINE SEGMENT IN THREE DIMENSIONS

- 1. Find the midpoint between points with coordinates  $(3,8,0)$  and  $(3,8,6)$ .
- 2. Find the midpoint between points with coordinates  $(2,5, - 3)$  and  $(2,8,1)$ .
- 3. Find the midpoint between points with coordinates  $(1,1,1)$  and  $(5,5,5)$ .
- 4. Find the midpoint between points with coordinates  $(9,6,3)$  and  $(-9, - 6, - 3)$ .

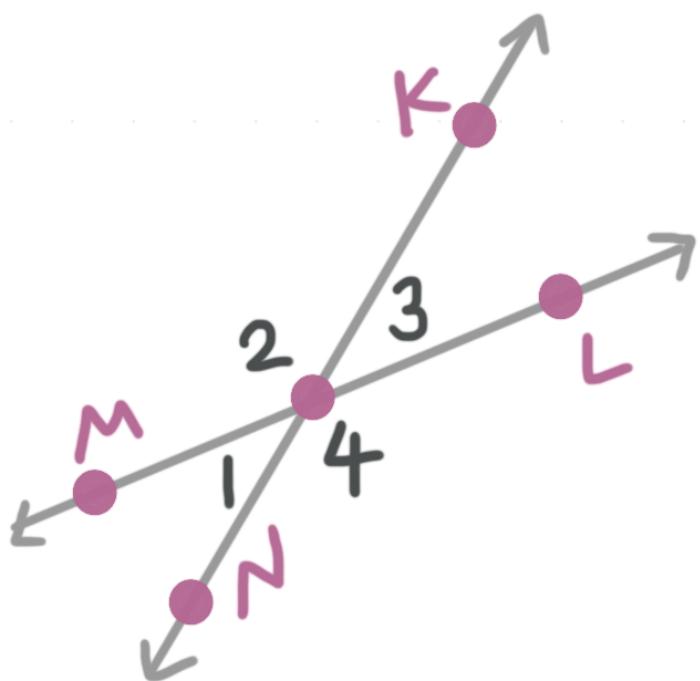


## MEASURES OF ANGLES

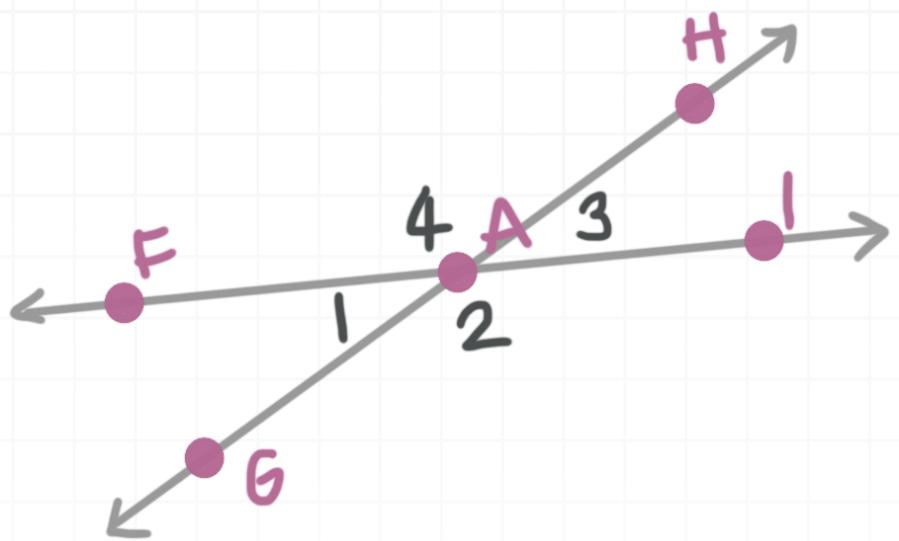
- 1. Determine whether  $\angle ABC$  is obtuse, acute, or right. Then find its supplement.



- 2.  $m\angle 1 = 35$ . Find  $m\angle 2$ ,  $m\angle 3$ , and  $m\angle 4$ .



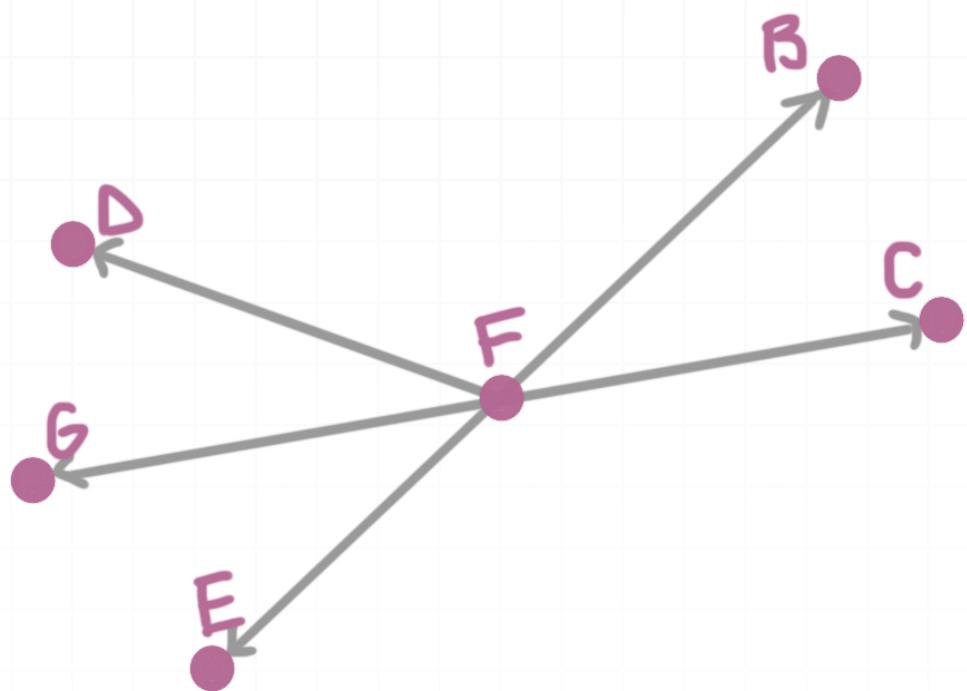
- 3. Find  $x$ ,  $y$ , and  $z$  if  $m\angle 1 = 3x - 2$ ,  $m\angle 2 = 2y$ ,  $m\angle 3 = 2x + 8$ , and  $m\angle 4 = 4z$ .



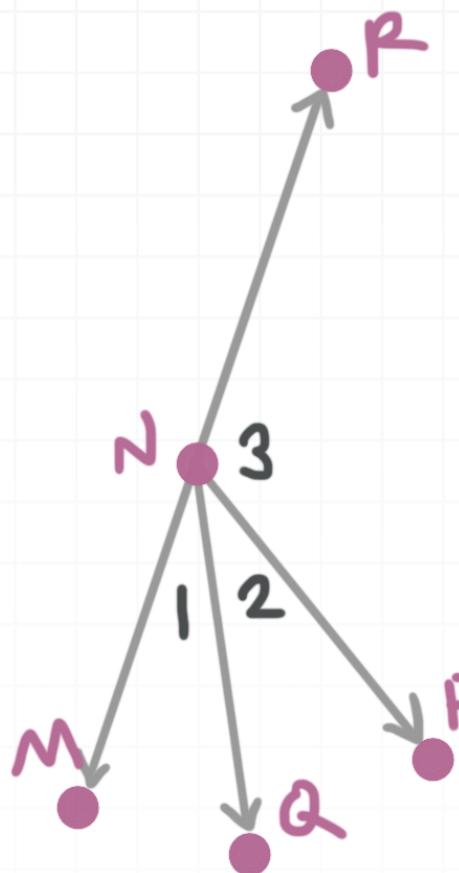
- 4.  $\angle 5$  and  $\angle 6$  are complementary angles.  $m\angle 5 = 3x - 6$  and  $m\angle 6 = 2x - 14$ . Find the measures of  $\angle 5$  and  $\angle 6$ .

## ADJACENT AND NONADJACENT ANGLES

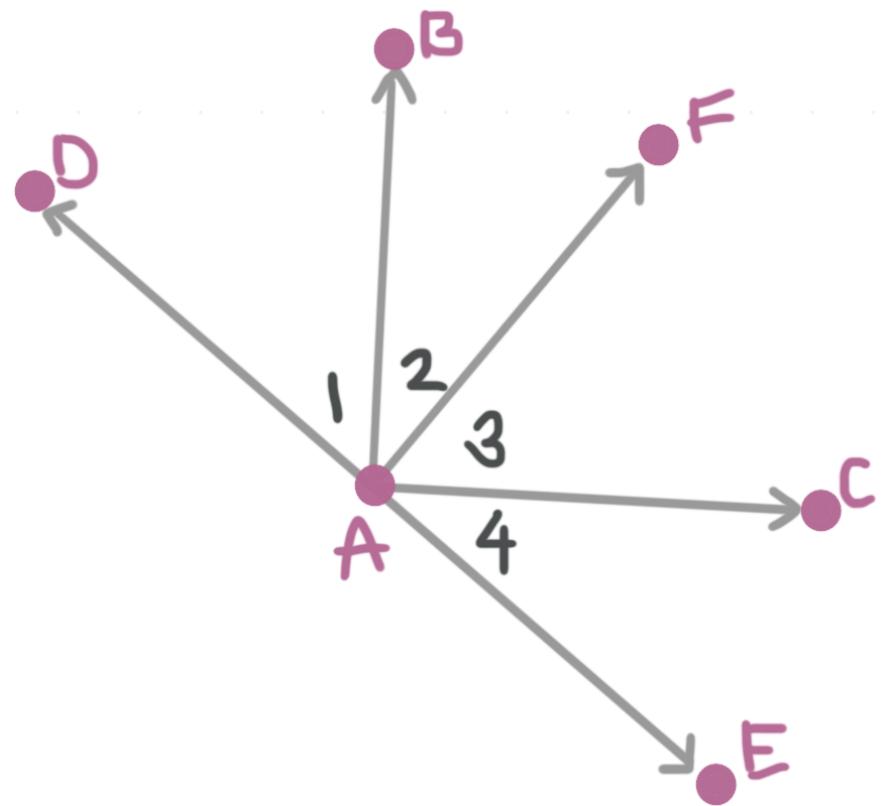
- 1. Name the angle adjacent to  $\angle EFG$ .



- 2.  $m\angle 1 = 3x - 10$ ,  $m\angle 2 = 2x - 20$ , and  $m\angle MNP = 60$ . Find the value of  $x$  and  $m\angle 1$ ,  $m\angle 2$ , and  $m\angle 3$ , given that  $\overline{NR}$  and  $\overline{NM}$  are opposite rays.



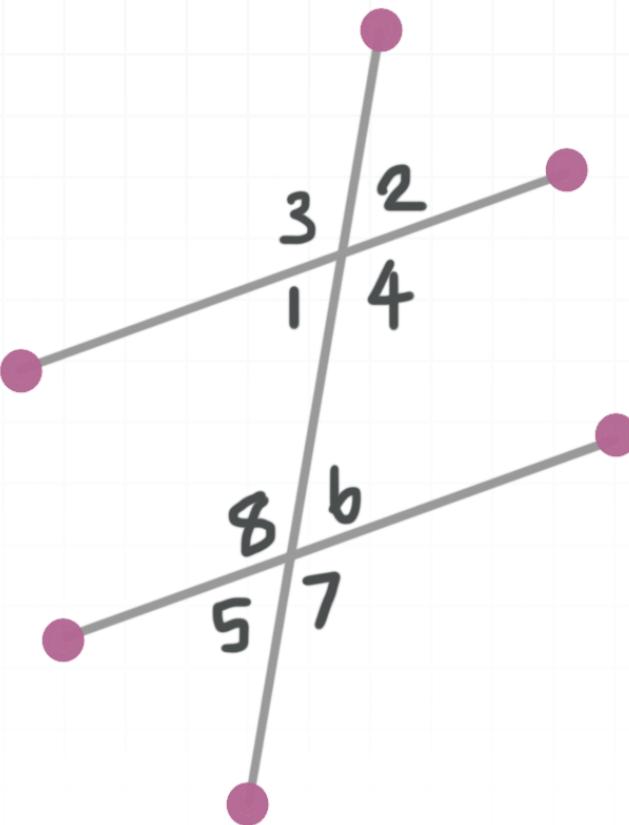
- 3.  $m\angle 2 = 42$ ,  $\angle 3 \cong \angle 4$ ,  $\angle FAE$  is a right angle, and  $\angle DAE$  is a straight angle.  
Find  $m\angle 1$ ,  $m\angle 3$ , and  $m\angle 4$ .



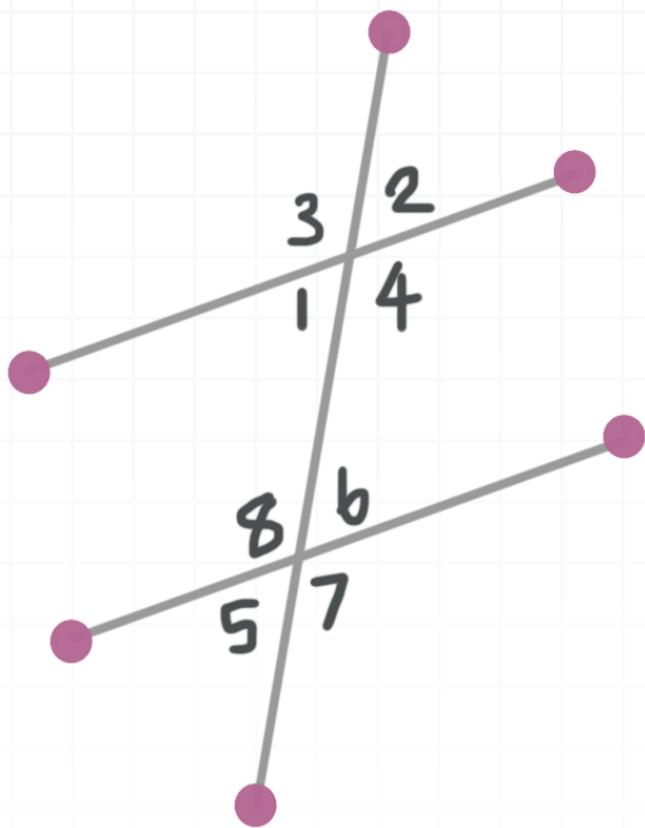
- 4.  $\angle JVC$  and  $\angle EVC$  are adjacent and complementary. Further, suppose  $m\angle JVC = 2m\angle EVC$ . Sketch a diagram of this situation and find the measure of each angle.

## ANGLES AND TRANSVERSALS

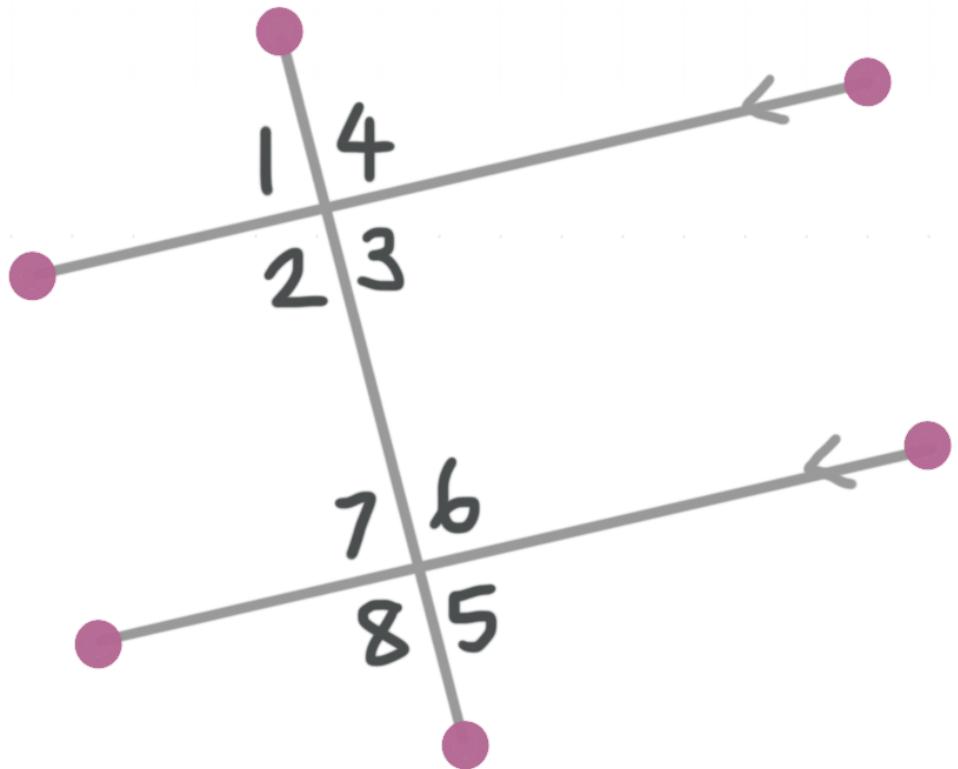
- 1. Name a pair of corresponding angles.



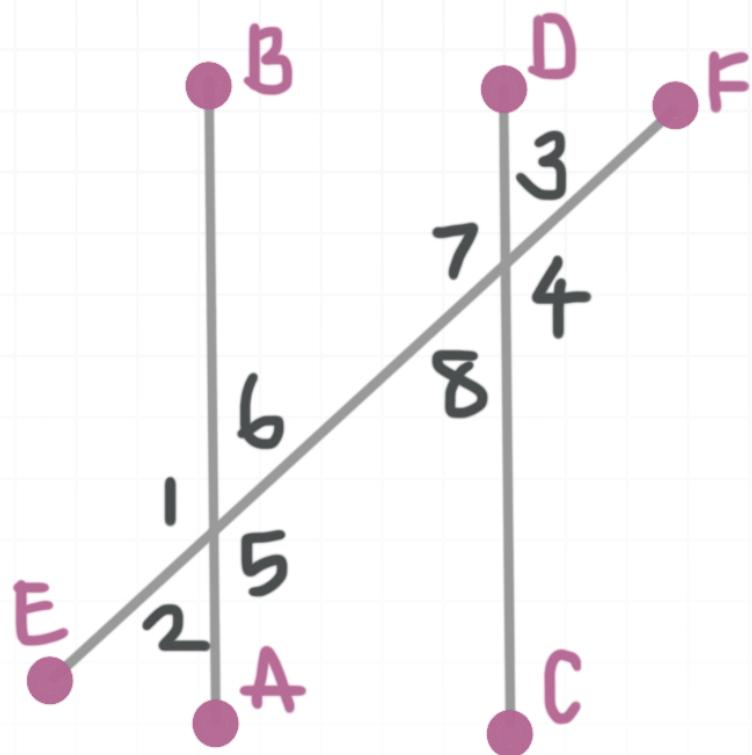
- 2. Find  $m\angle 2$ ,  $m\angle 6$ , and  $m\angle 5$  if  $m\angle 3 = 105$ .



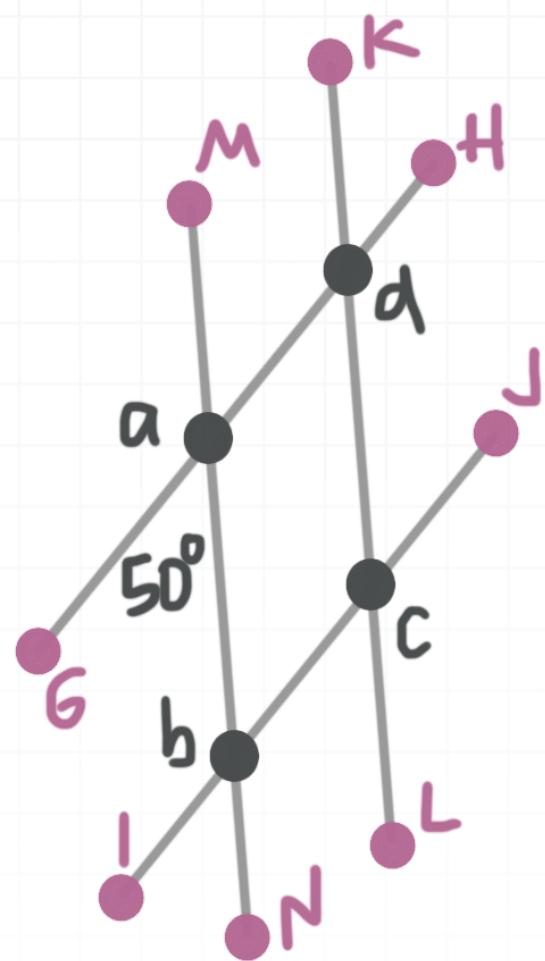
- 3. Find  $x$  and  $m\angle 3$  if  $m\angle 2 = 5x + 2$  and  $m\angle 7 = 3x + 14$ .



- 4. Find the values of  $x$  and  $y$  if  $\overline{AB}$  and  $\overline{DC}$  are parallel lines, and if  $m\angle 1 = 2x + y$ ,  $m\angle 2 = 28$ , and  $m\angle 3 = x + 10$ .

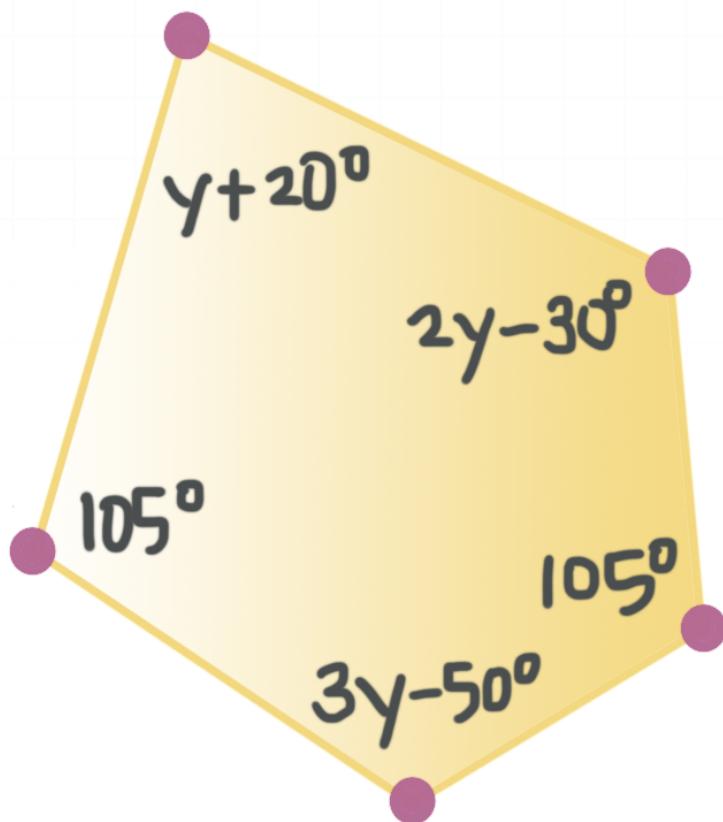


- 5.  $\overline{MN}$  and  $\overline{KL}$  are parallel.  $\overline{GH}$  and  $\overline{IJ}$  are parallel. Find the values of  $a$ ,  $b$ ,  $c$ , and  $d$ .



## INTERIOR ANGLES OF POLYGONS

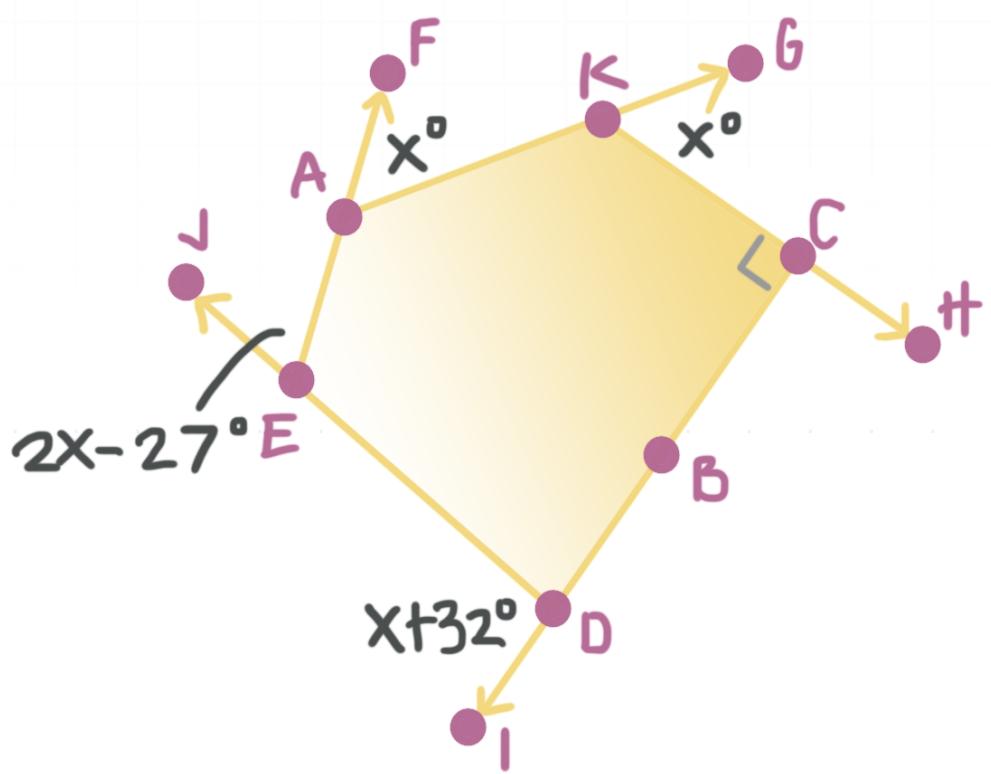
- 1. Find the sum of the interior angles of a hexagon.
- 2. Find the measure of each interior angle of a regular 15-gon.
- 3. Find the value of  $y$ . Then determine whether this is a regular polygon.



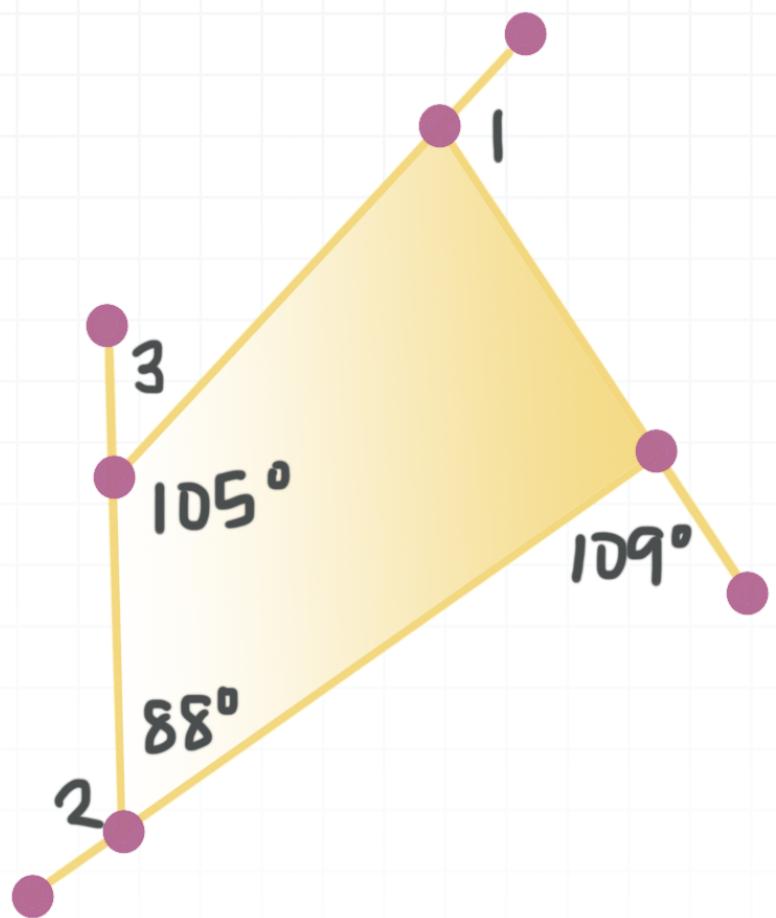
- 4. Each interior angle measure of a regular polygon is  $160^\circ$ . Find the number of sides of this polygon.

## EXTERIOR ANGLES OF POLYGONS

- 1. Find the sum of the exterior angles of a decagon.
  
  
  
  
  
- 2. Each exterior angle of a regular polygon has measure of  $30^\circ$ . Find the number of sides of this polygon.
  
  
  
  
  
- 3. Find the value of  $x$ .

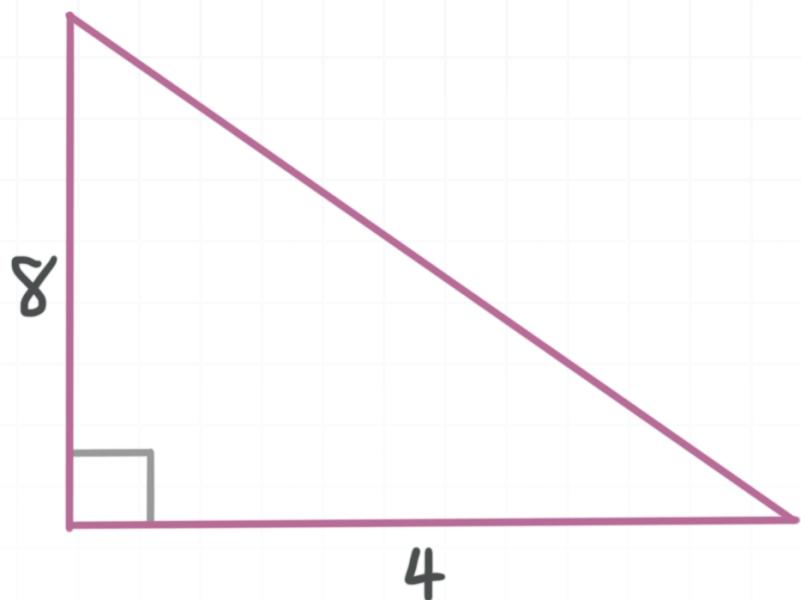


- 4. Find  $m\angle 1$ ,  $m\angle 2$ , and  $m\angle 3$  based on the figure.

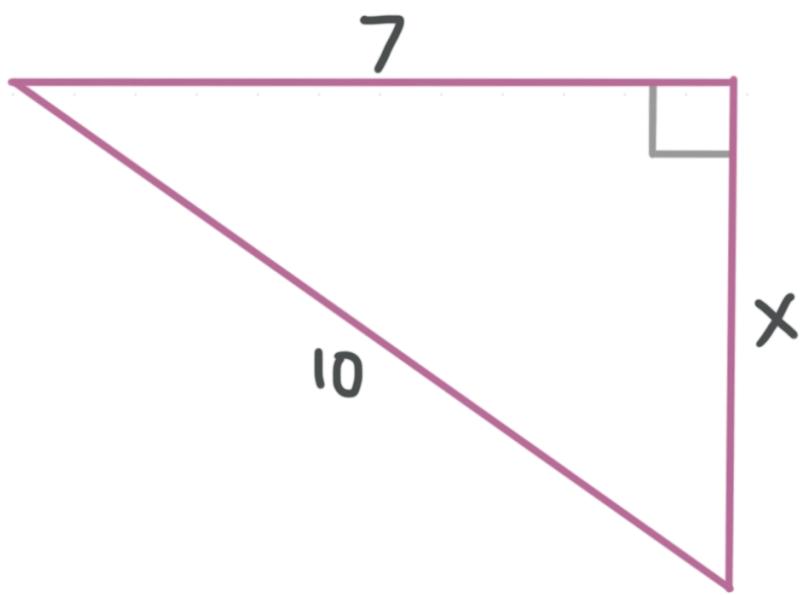


## PYTHAGOREAN THEOREM

- 1. Find the exact length of the hypotenuse.

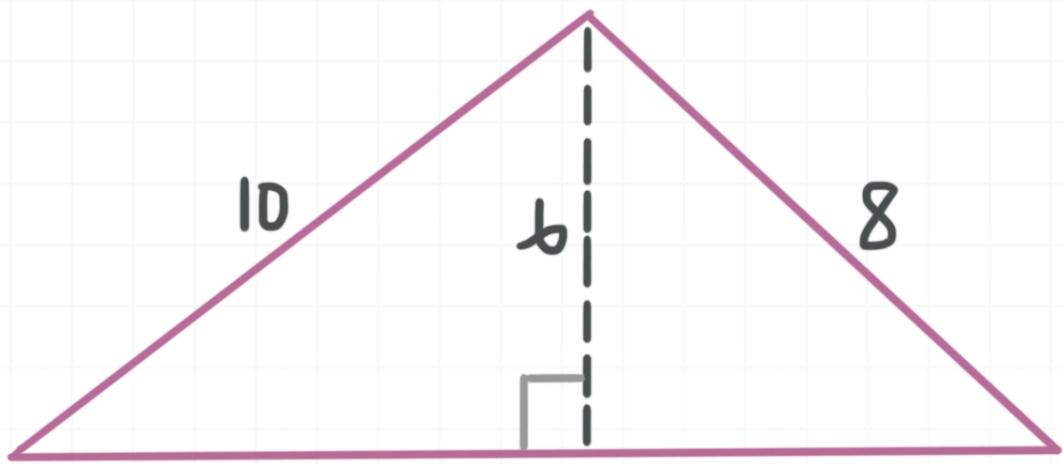


- 2. Find the exact length of the missing leg.



- 3. Find the length of the diagonal of a rectangle with length 14 and width 8.

- 4. Find the perimeter of the triangle to the nearest tenth.



## PYTHAGOREAN INEQUALITIES

- 1. The side lengths of a triangle are 10, 14, and 15. Determine whether the triangle is obtuse, acute, or right.
  
- 2. The side lengths of a triangle are 7, 18, and 12. Determine whether this triangle is obtuse, acute, or right.
  
- 3. A triangle's two shortest sides have lengths 8 and 6. Let  $x$  be the length of the third side. Give a compound inequality that represents all possible lengths of the third side, ensuring that the triangle is acute.
  
- 4. The side lengths of a triangle in ascending order are  $x$ ,  $x + 2$ , and 10. Find the value of  $x$  such that this is a right triangle.



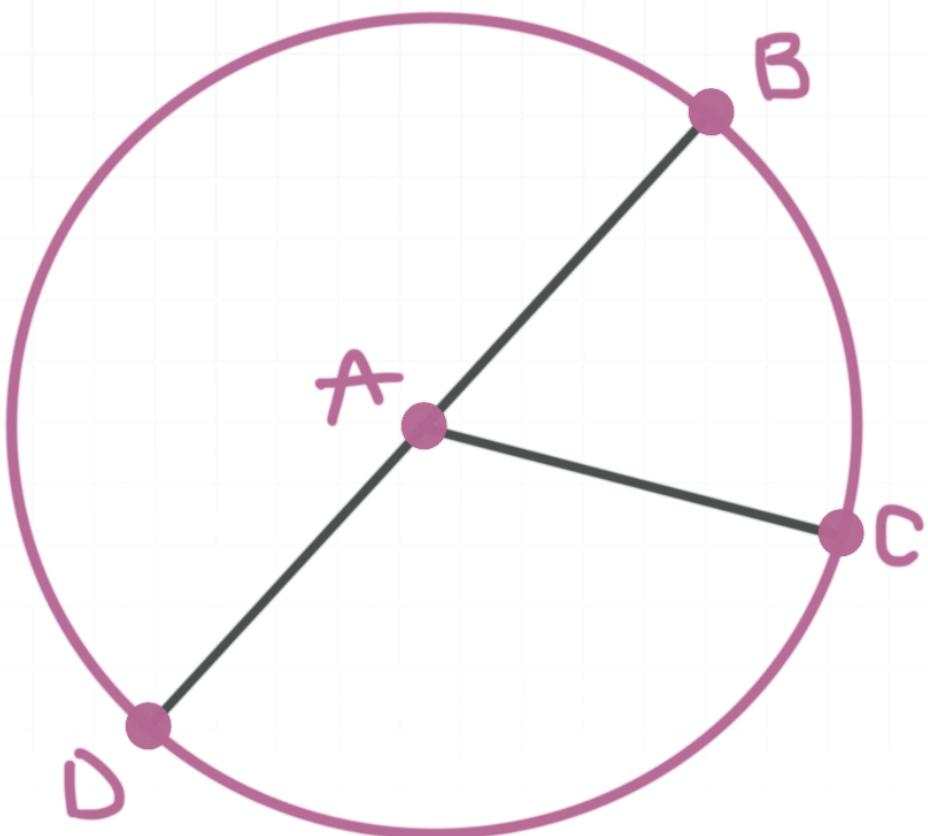
## EQUATION OF A CIRCLE

- 1. A circle has a radius of 4 and center at  $(-2,5)$ . Write the equation for this circle.
  
- 2. Find the center and diameter of the circle given by  
$$(x - 3)^2 + (y + 2)^2 = 9.$$
  
- 3. A circle has a diameter with endpoints at  $(-3, -1)$  and  $(3,7)$ . Find the equation of the circle.
  
- 4. A cellphone tower services a 17 mile radius. A rest stop on the highway is 6 miles east and 8 miles north of the tower. If you continue to travel due east from the rest stop, for how many more miles will you be in range of the tower?

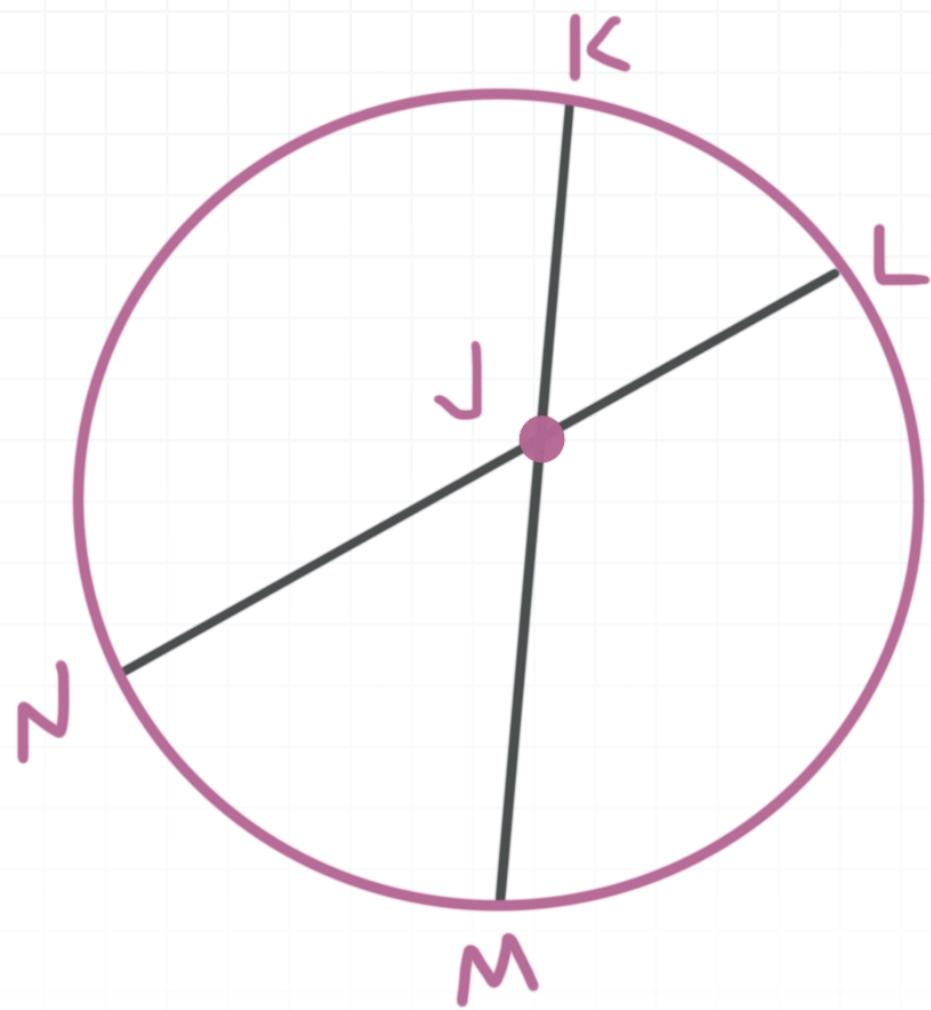


## DEGREE MEASURE OF AN ARC

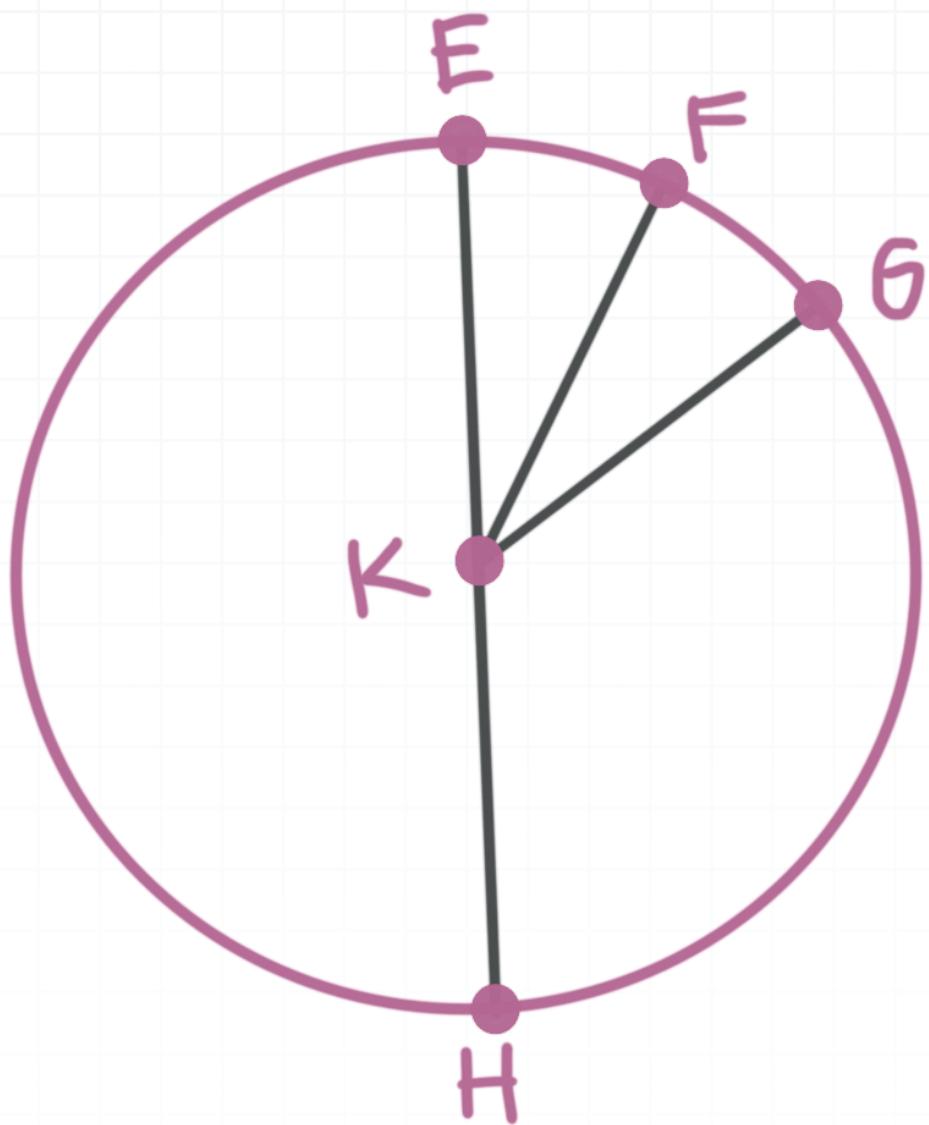
- 1. In  $\odot A$ ,  $m\angle BAC = 65^\circ$  and  $\overline{BD}$  is a diameter. Find the measure of arc  $DC$ .



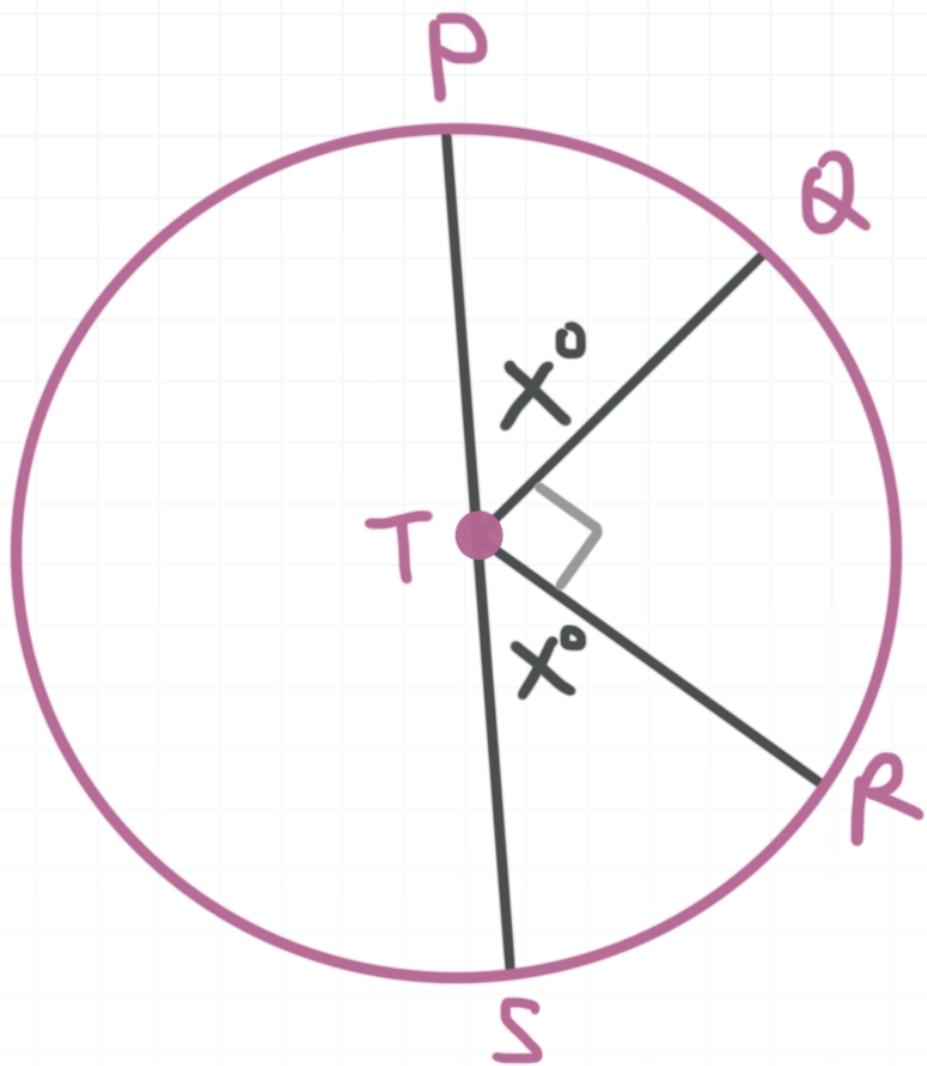
- 2. In  $\odot J$ ,  $m\angle KJL = 54^\circ$  and  $\overline{KM}$  and  $\overline{LN}$  are diameters. Find the measure of arc  $MN$ .



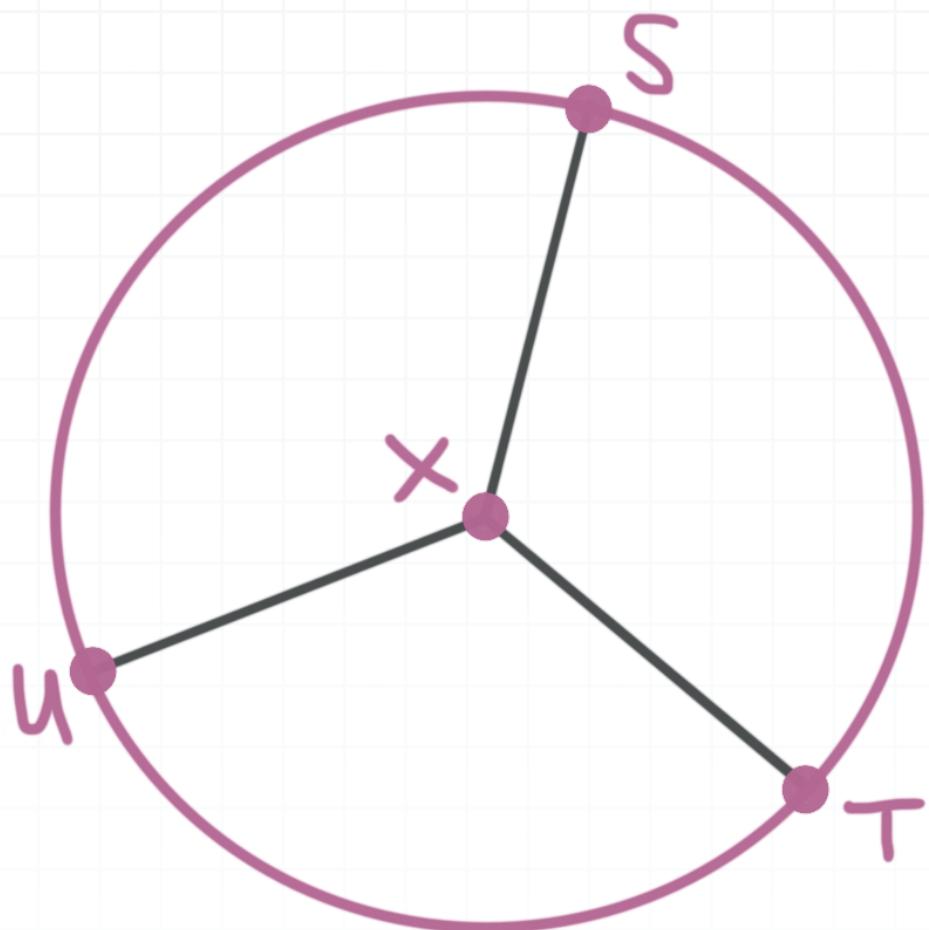
- 3. In  $\odot K$ ,  $m\angle EKG = 70^\circ$ ,  $\overline{EH}$  is a diameter, and  $\overline{KF}$  bisects  $\angle EKG$ . Find the measure of arc  $FEH$ .



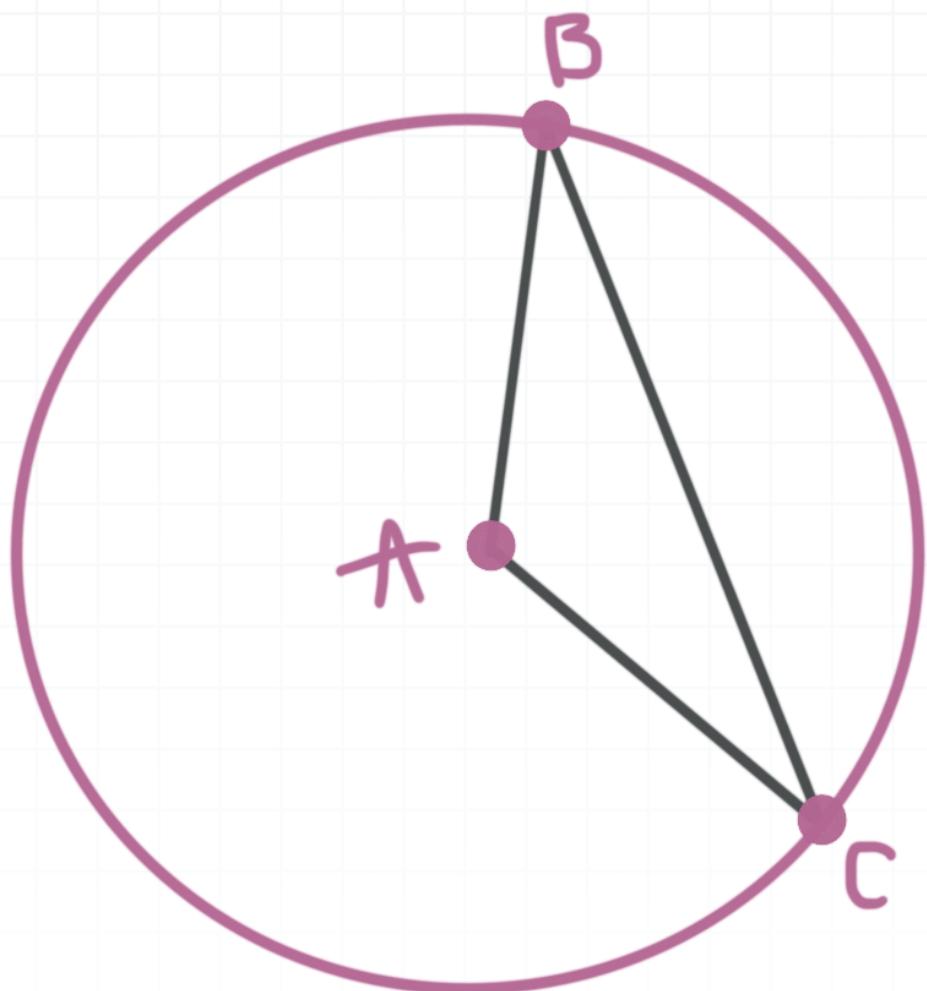
- 4. Find the measure of arc  $PR$ , if  $\overline{PS}$  is the diameter of  $\odot T$ .



- 5. In  $\odot X$ ,  $\angle UXS \cong \angle SXT \cong \angle UXT$ . Find the measure of arc  $STU$ .

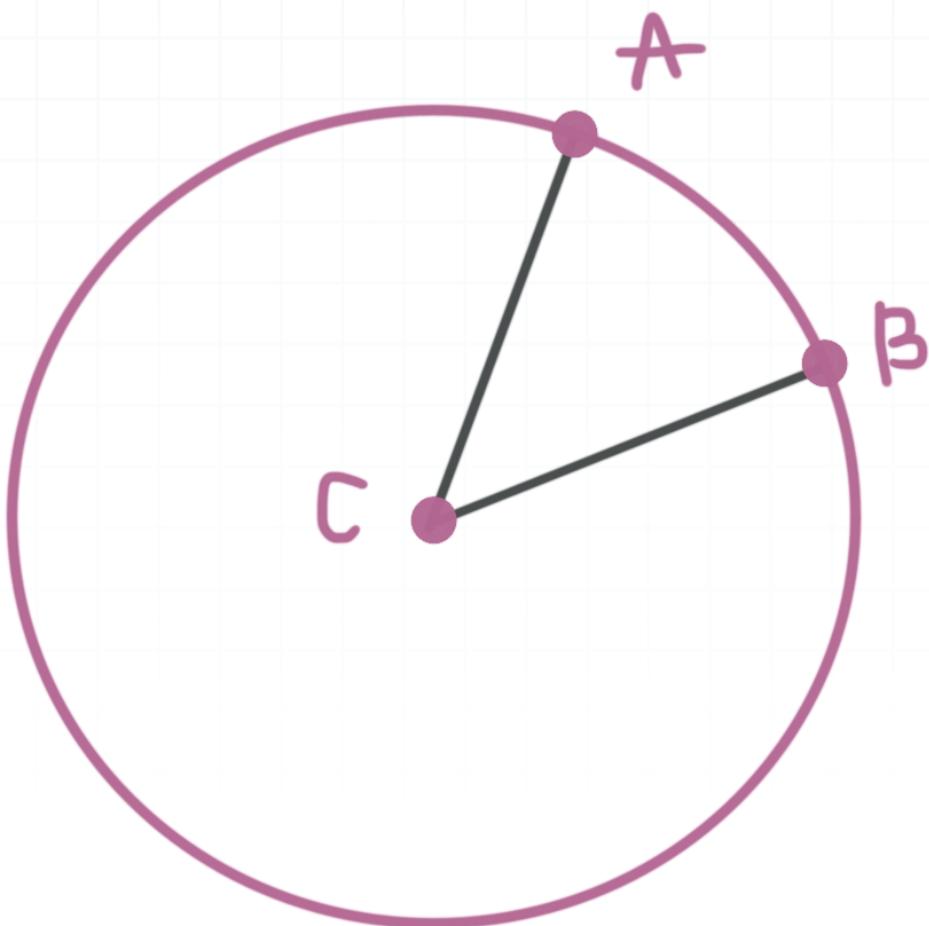


- 6. In  $\odot A$ ,  $m\angle ABC = 15^\circ$ . Find the measure of arc  $BC$ .

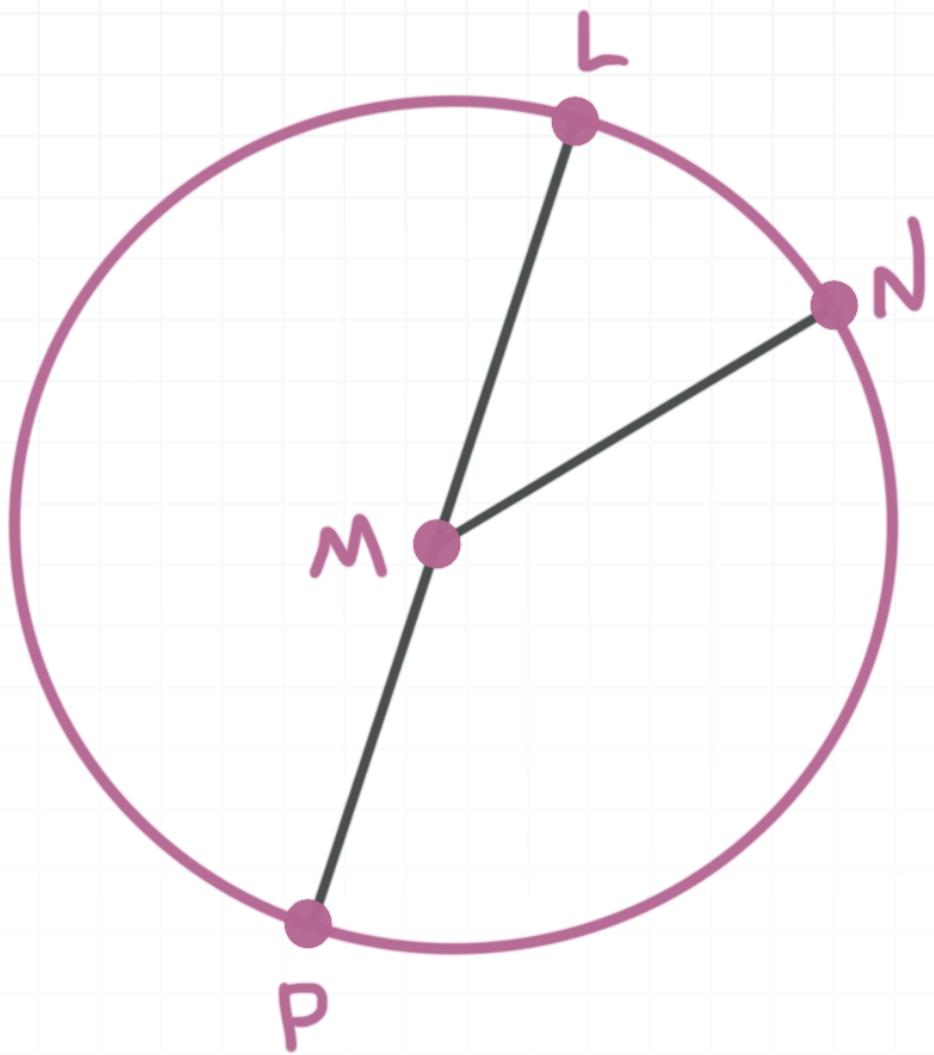


## ARC LENGTH

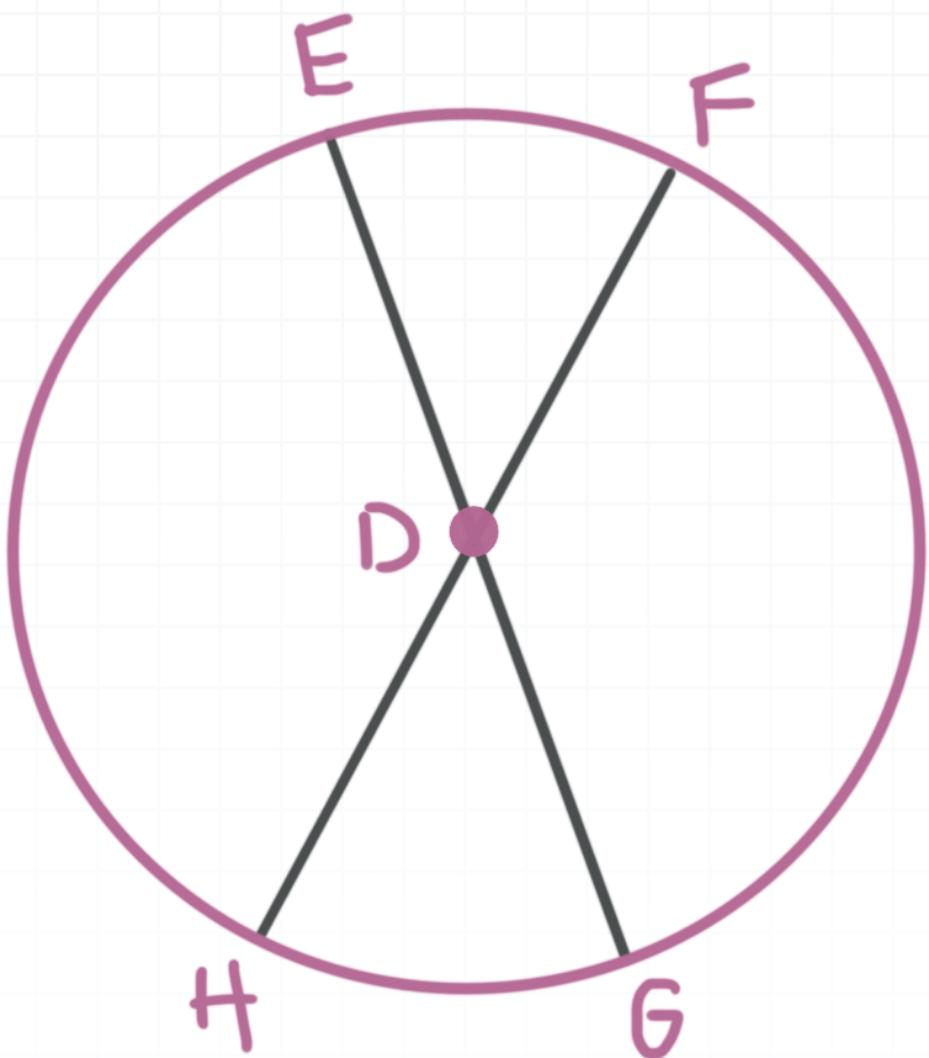
- 1. In  $\odot C$ ,  $m\angle ACB = 50^\circ$ . Find the length of arc  $AB$  if  $CA = 14$ . Round your answer to the nearest hundredth.



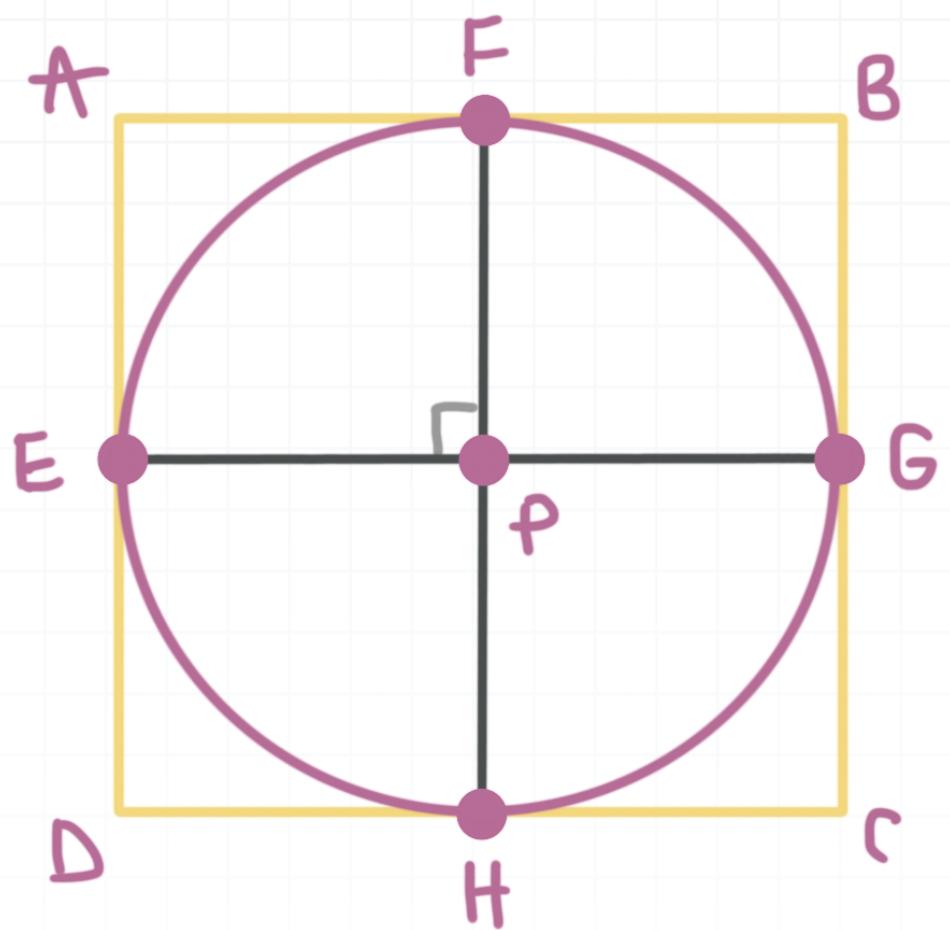
- 2. In  $\odot M$ ,  $m\angle LMN = 60^\circ$  and  $\overline{LP}$  is a diameter. Find the length of arc  $LPN$  if  $LP = 24$ . Round your answer to the nearest hundredth.



- 3.  $\overline{EG}$  and  $\overline{FH}$  are diameters of  $\odot D$ . Find the length of arc  $HG$  if  $m\angle EDF = 45^\circ$  and  $ED = 16$ . Write the exact value.

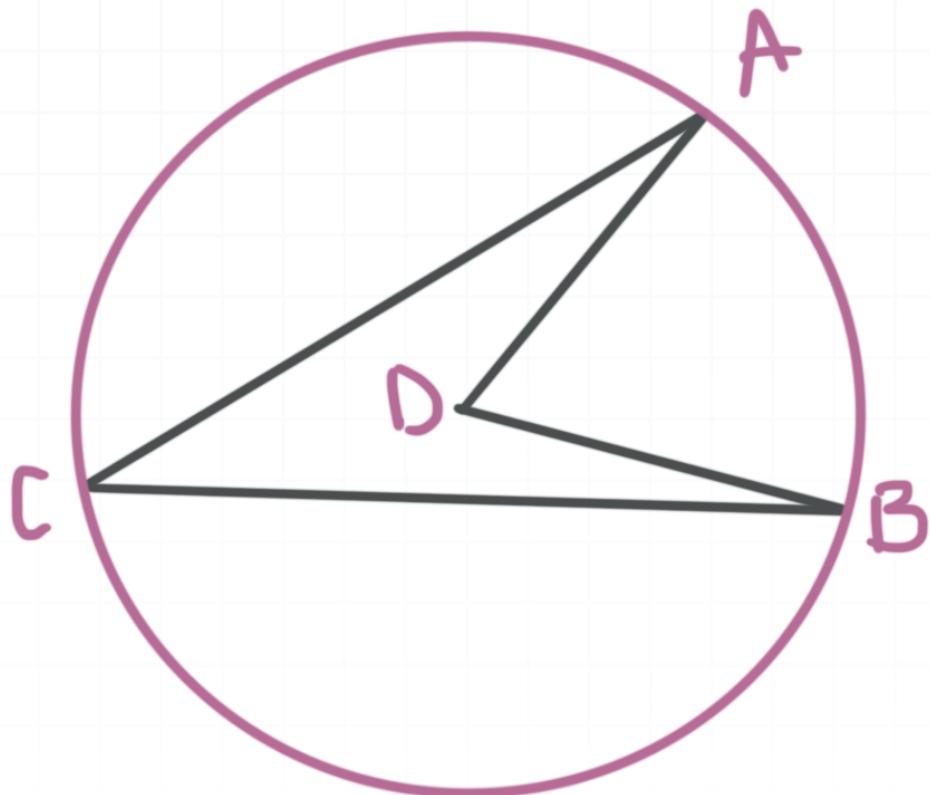


- 4. The area of square  $ABCD$  is  $144 \text{ cm}^2$  and circle  $P$  is inscribed in the square.  $\overline{EG}$  and  $\overline{FH}$  are perpendicular to one another, and both are diameters of  $\odot P$ .  $E, F, G$ , and  $H$  are midpoints of each side of the square. Find the length of arc  $EF$ , rounded to the nearest hundredth.

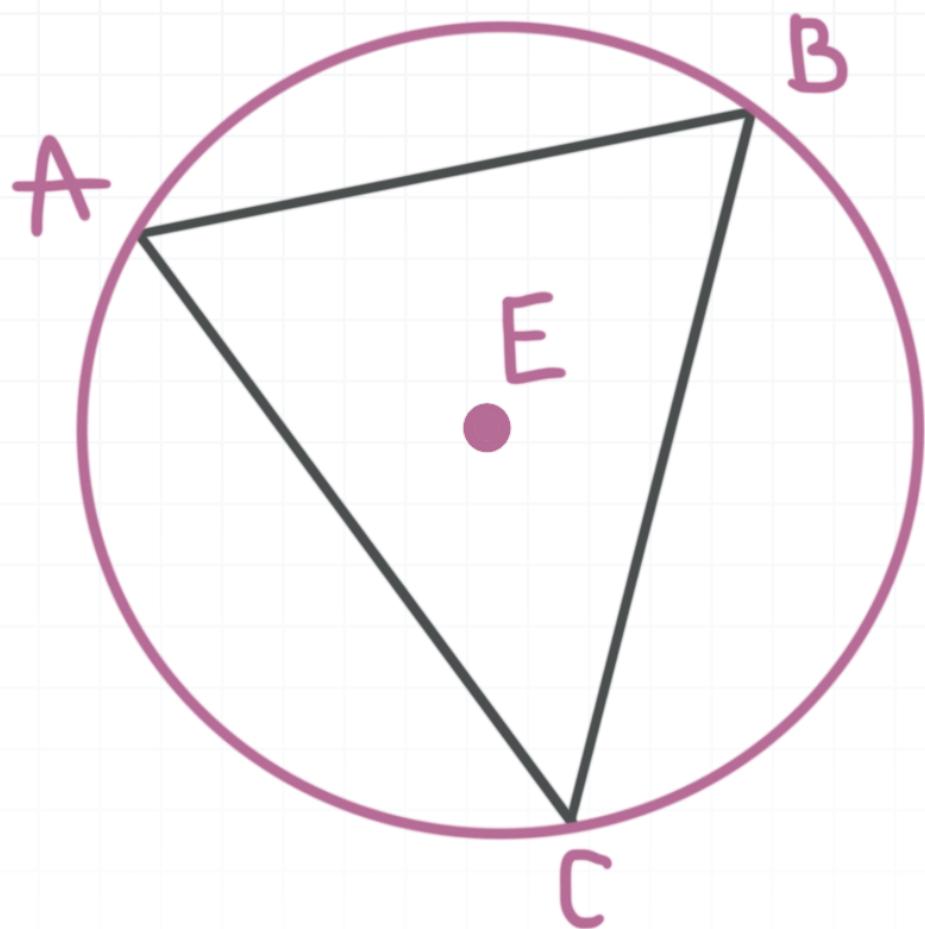


## INSCRIBED ANGLES OF CIRCLES

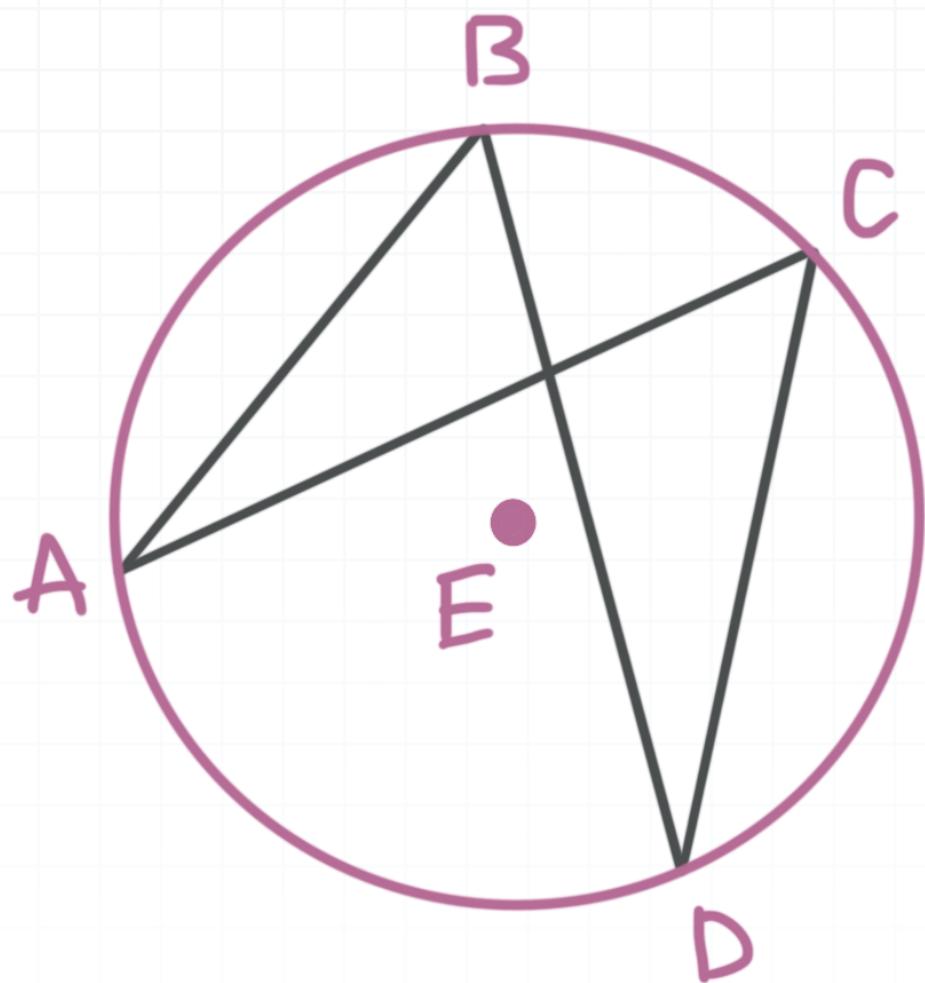
- 1. In  $\odot D$ ,  $m\angle ADB = 88^\circ$ . Find  $m\angle ACB$ .



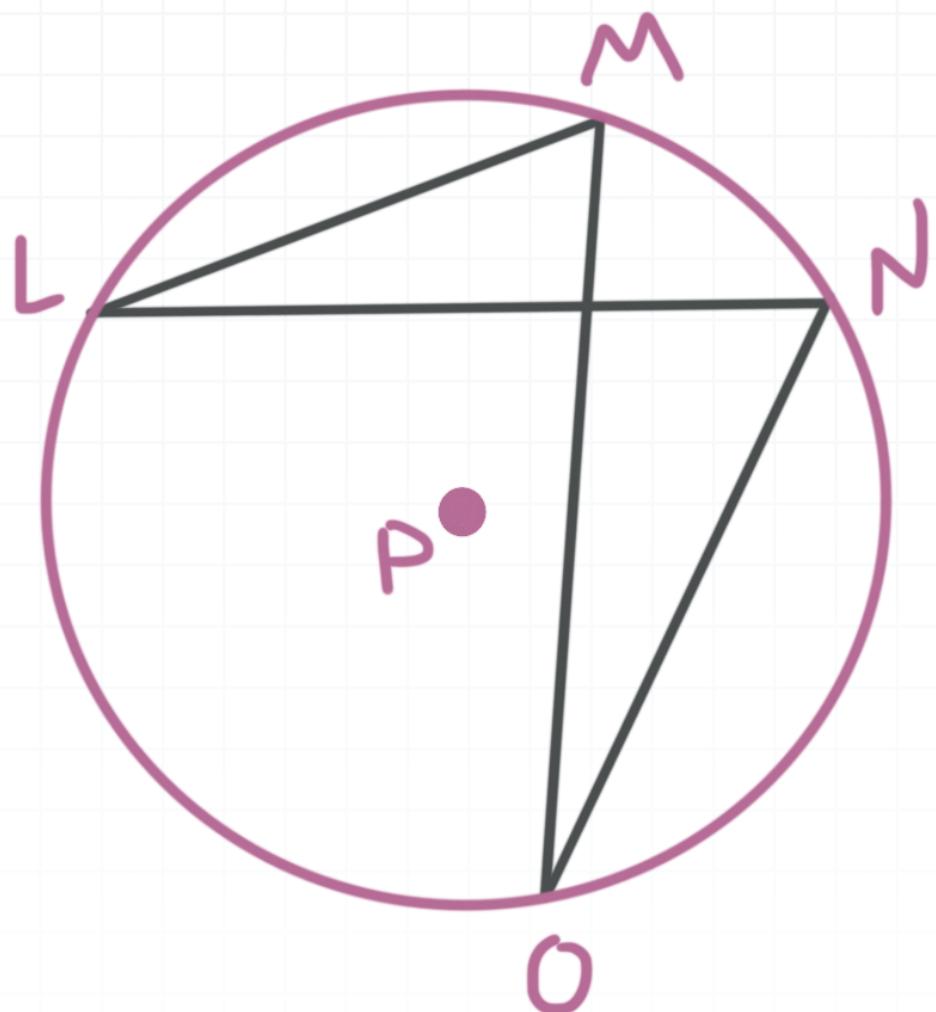
- 2. In  $\odot E$ ,  $\overline{AC} \cong \overline{CB}$  and  $m\angle ABC = 55^\circ$ . Find the measure of arc  $AB$ .



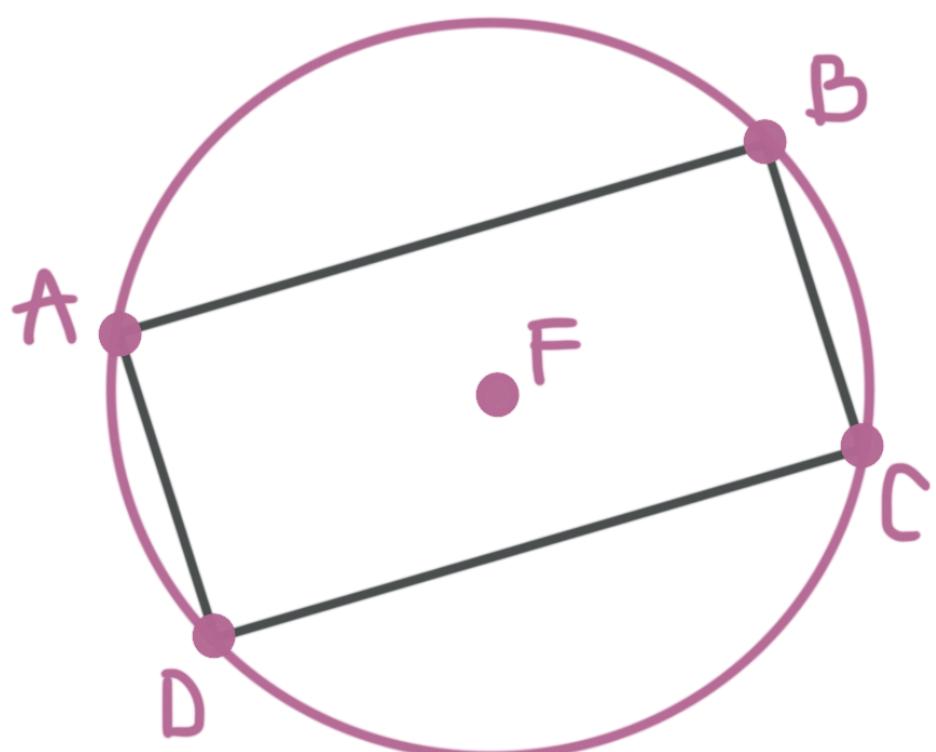
- 3. In  $\odot E$  the measure of arc  $AB$  is  $100^\circ$ , the measure of arc  $BC$  is  $40^\circ$ , and the measure of  $CD$  is  $110^\circ$ . Find  $m\angle ABD$ .



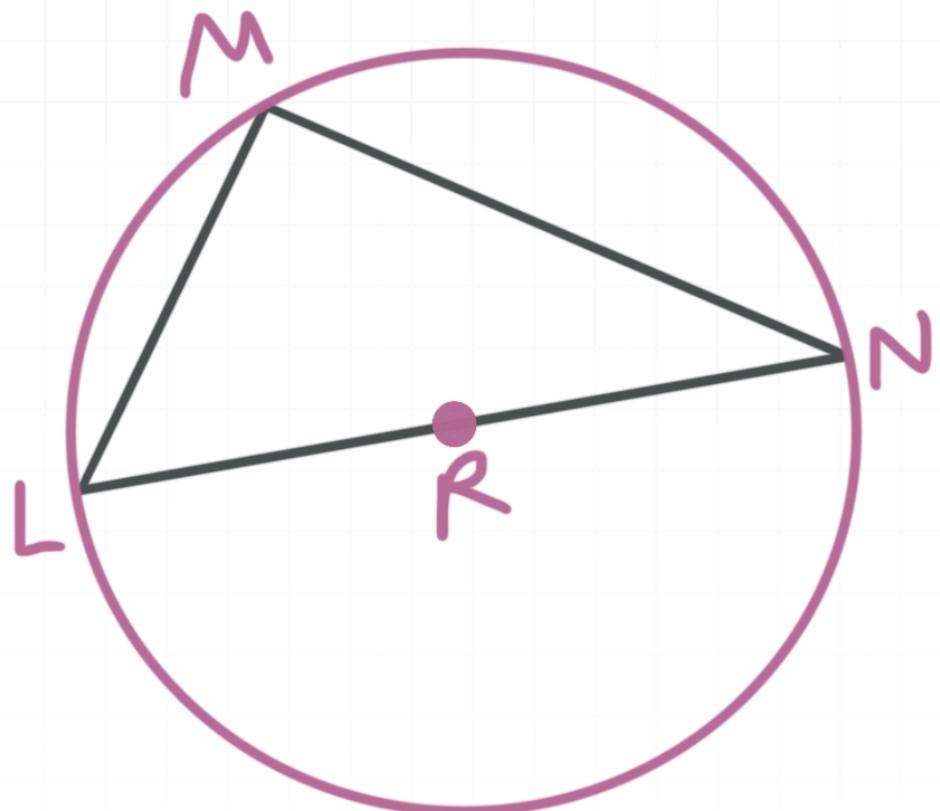
- 4. In  $\odot P$ ,  $m\angle LMO = 2x - 18$  and the measure of arc  $LO = 88^\circ$ . Find  $x$ .



- 5. Rectangle  $ABCD$  is inscribed in  $\odot F$  and the measure of arc  $DAC$  is  $230^\circ$ . Find the measure of arc  $AB$ .

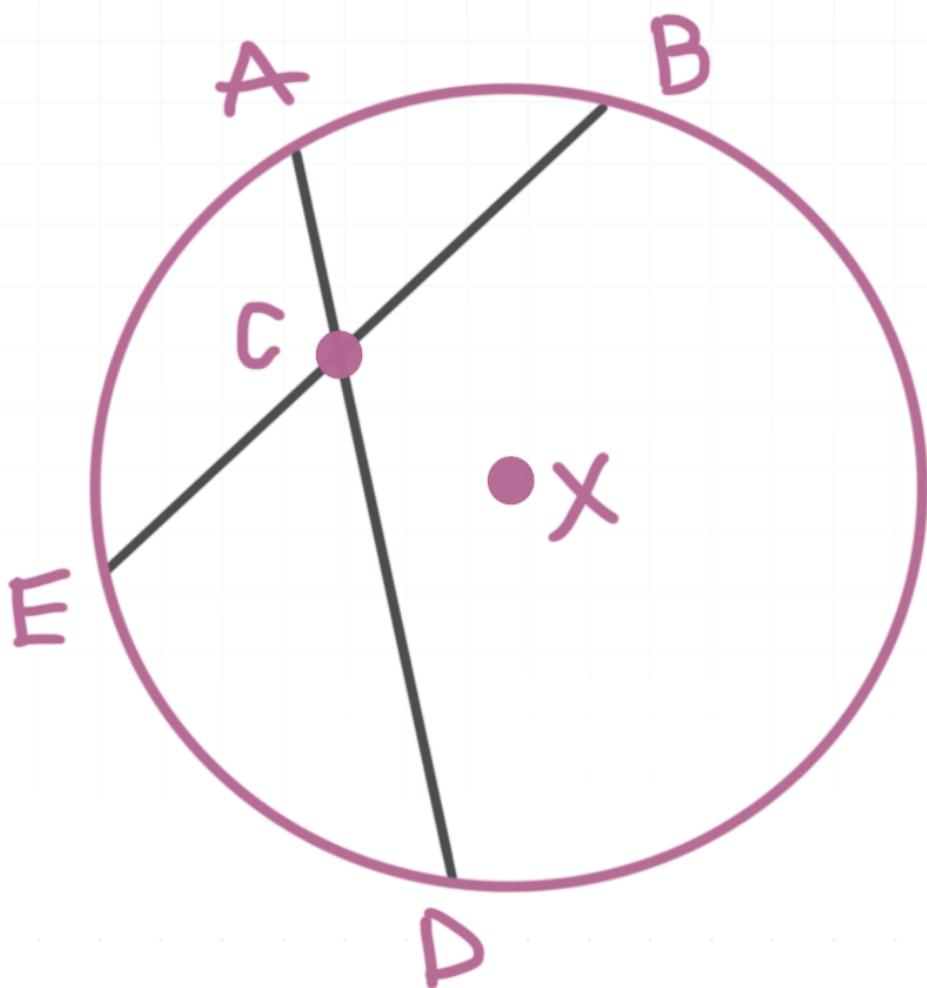


- 6. In  $\odot R$ ,  $\overline{LN}$  is a diameter,  $m\angle MLN = 4x + 20$ , and  $m\angle LNM = 5x - 38$ . Find the measure of arc  $LM$ .

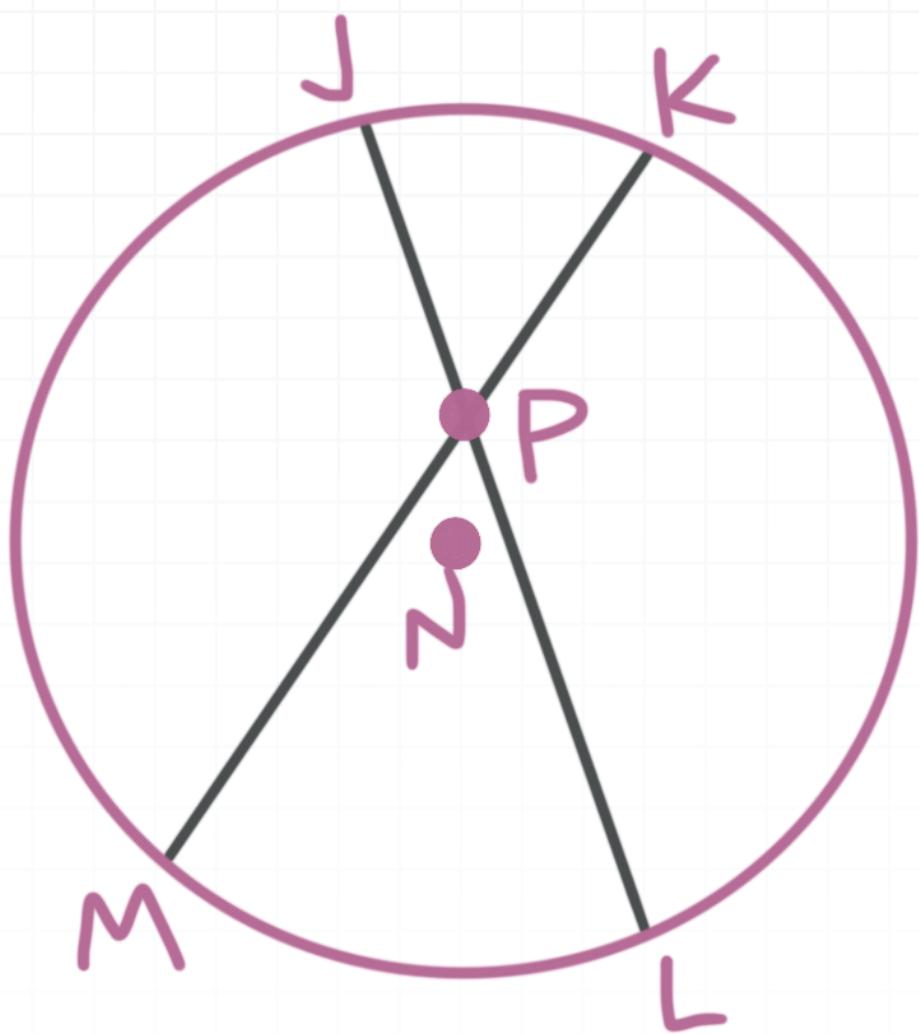


**VERTEX ON, INSIDE AND OUTSIDE THE CIRCLE**

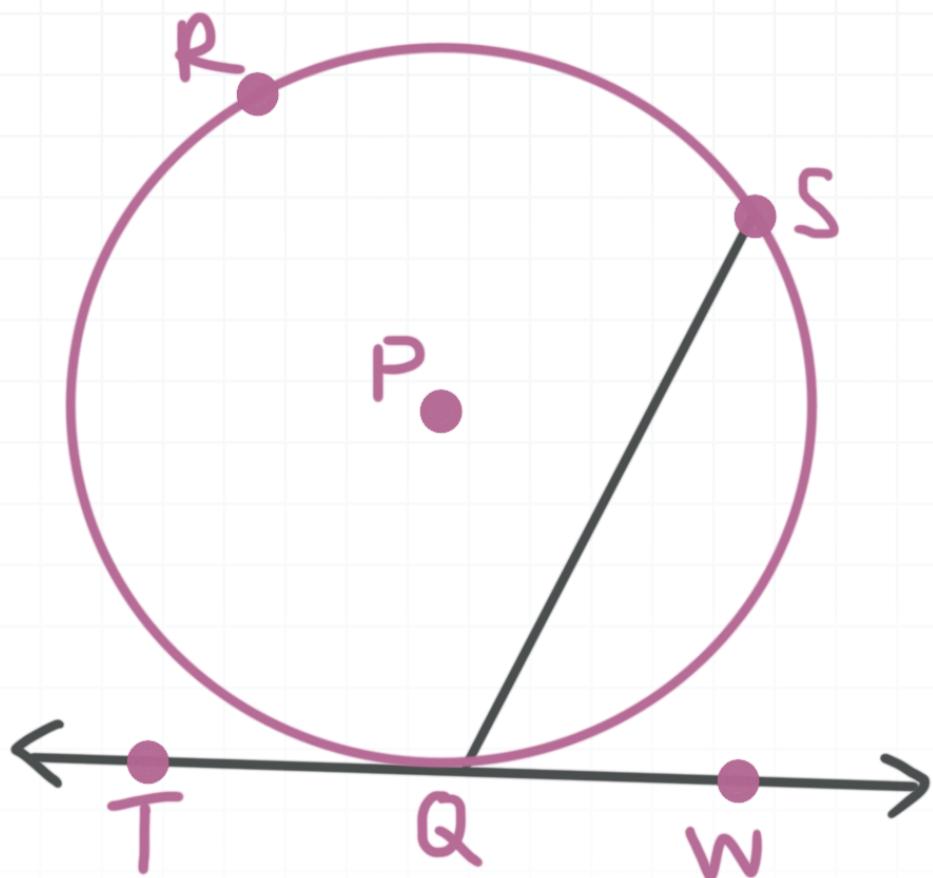
- 1.  $\overline{AD}$  and  $\overline{EB}$  are chords of  $\odot X$ . The measure of arc  $AB$  is  $35^\circ$  and the measure of arc  $ED$  is  $85^\circ$ . Find  $m\angle ECD$ .



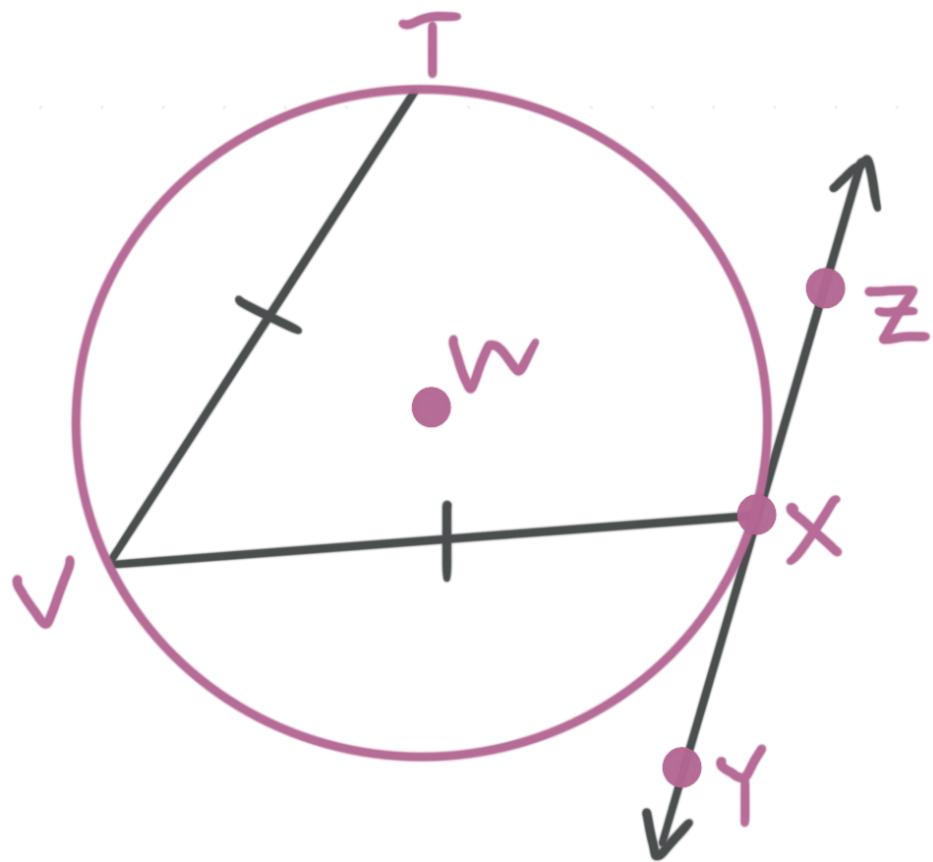
- 2.  $\overline{JL}$  and  $\overline{KM}$  are chords of  $\odot N$ . The measure of arc  $JK$  is  $25^\circ$  and  $m\angle JPK = 40^\circ$ . Find the measure of arc  $ML$ .



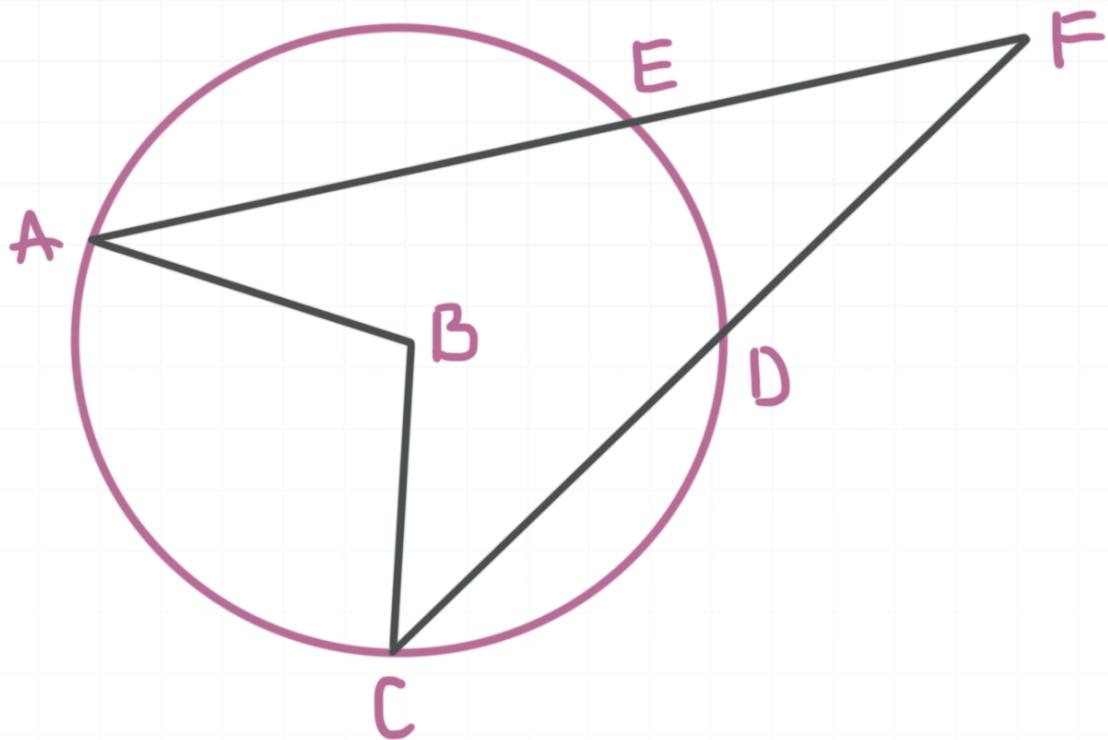
- 3.  $\overline{SQ}$  is a chord and  $\overline{TW}$  is a tangent line of  $\odot P$ . The measure of arc  $SRQ$  is  $194^\circ$ . Find  $m\angle SQW$ .



- 4.  $\overline{TV}$  and  $\overline{VX}$  are congruent chords, and  $\overline{ZY}$  is a tangent line of  $\odot W$ . If  $m\angle TVX = 48^\circ$ , find  $m\angle VXY$ .

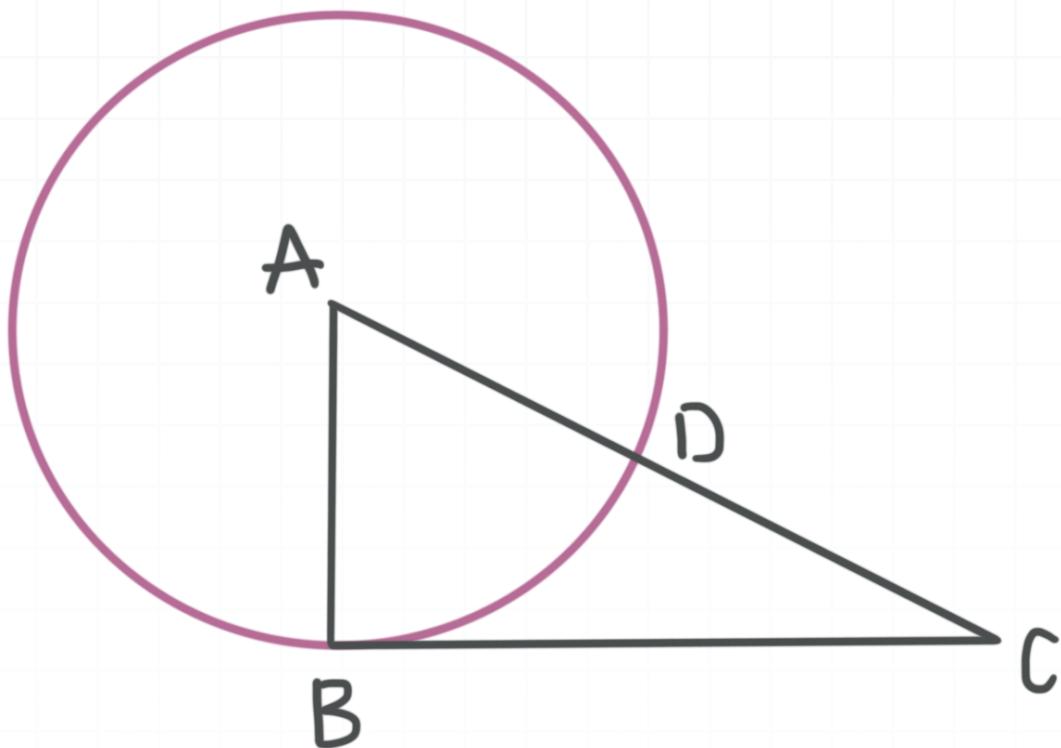


- 5.  $\text{arc } AC = 98^\circ$  and  $\text{arc } ED = 54^\circ$  in  $\odot B$ . Find  $m\angle AFC$ .

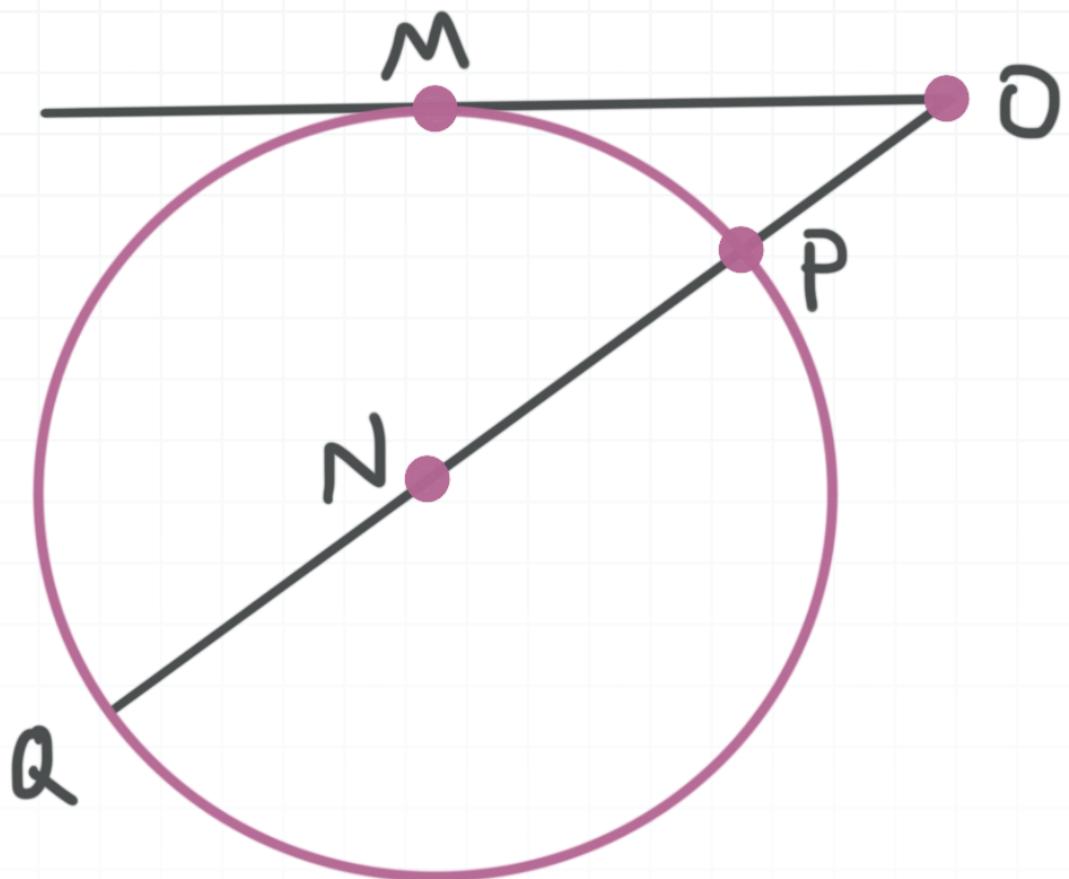


## TANGENT LINES OF CIRCLES

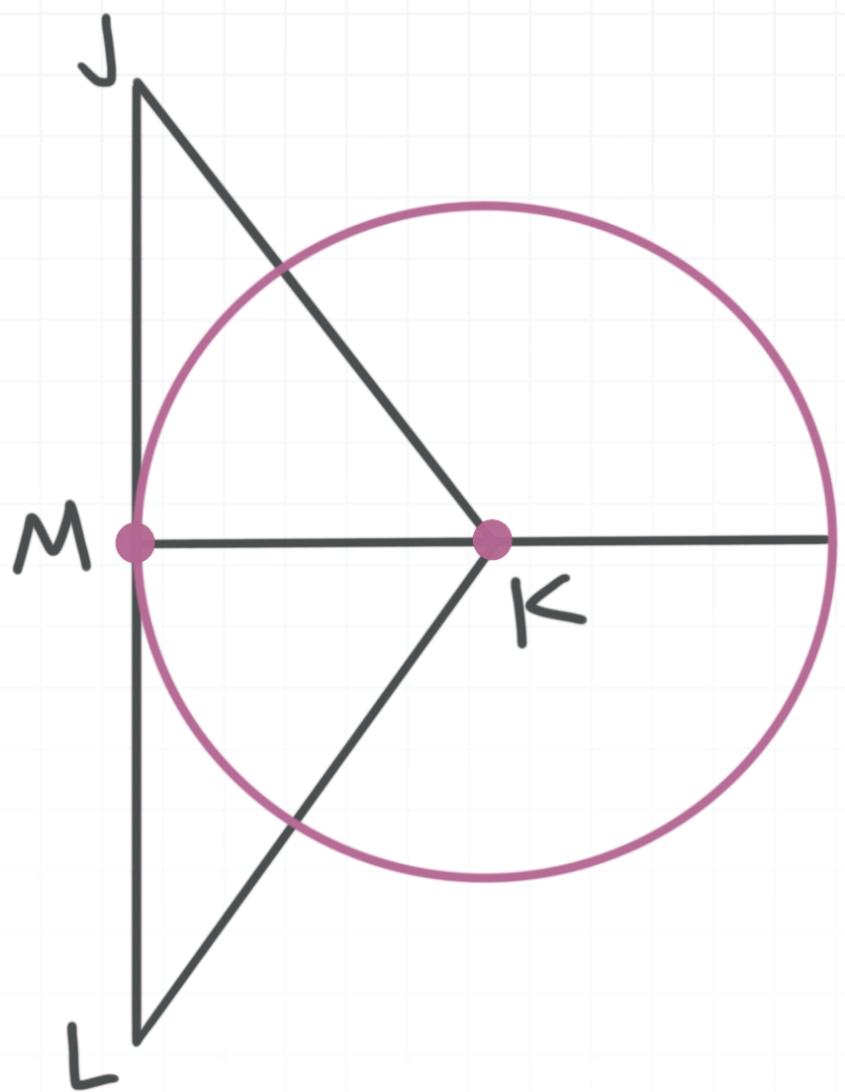
- 1.  $\odot A$  has radius  $AB$  and tangent line  $\overline{BC}$ . If  $AB = 6$  and  $BC = 8$ , find  $DC$ .



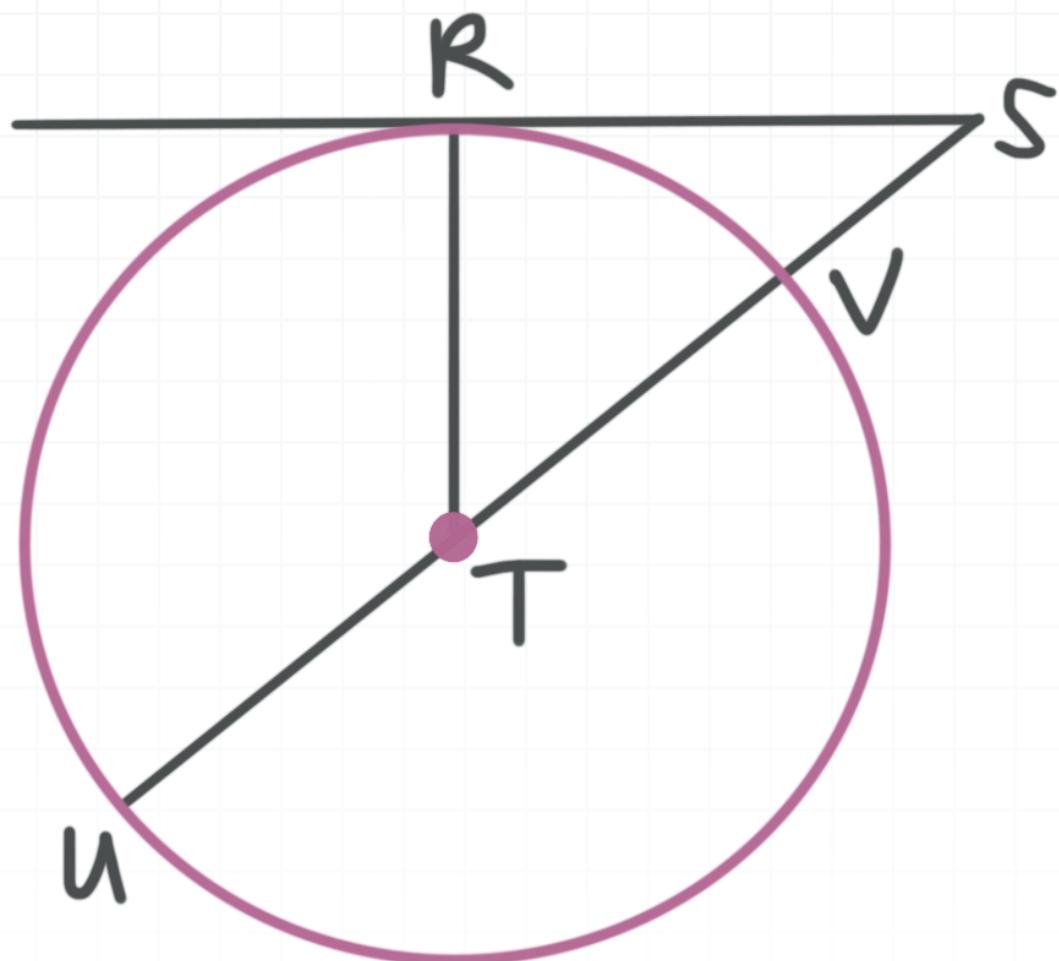
- 2.  $\overline{MO}$  is a tangent line of  $\odot N$ . If  $MO = 12$  and  $PO = 8$ , find the length of the radius.



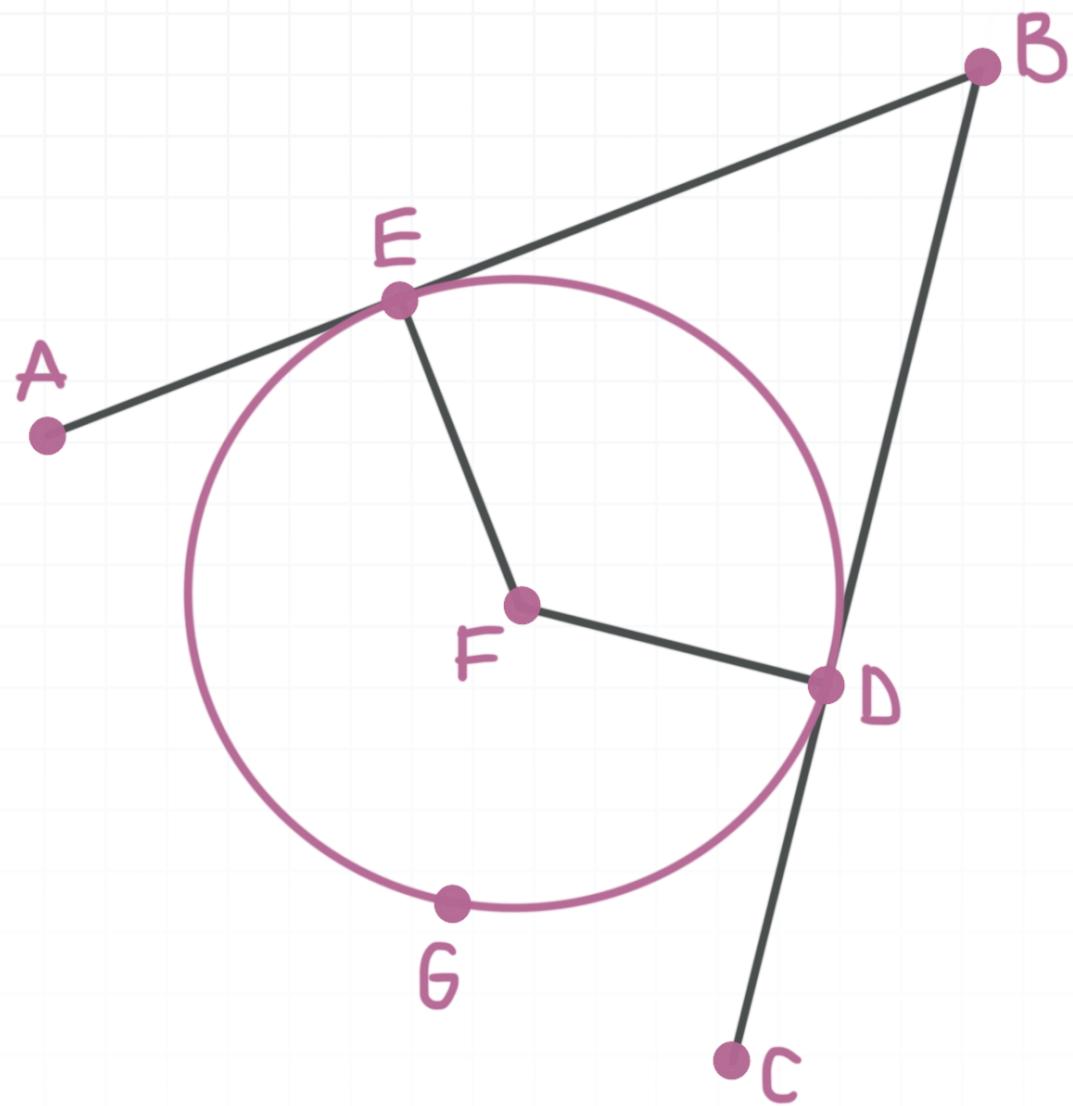
- 3.  $\triangle JKL$  is isosceles,  $\overline{JL}$  is a tangent line,  $JM = LM$  and  $m\angle JKL = 120^\circ$ . If  $MK = 8$ , find  $JL$ .



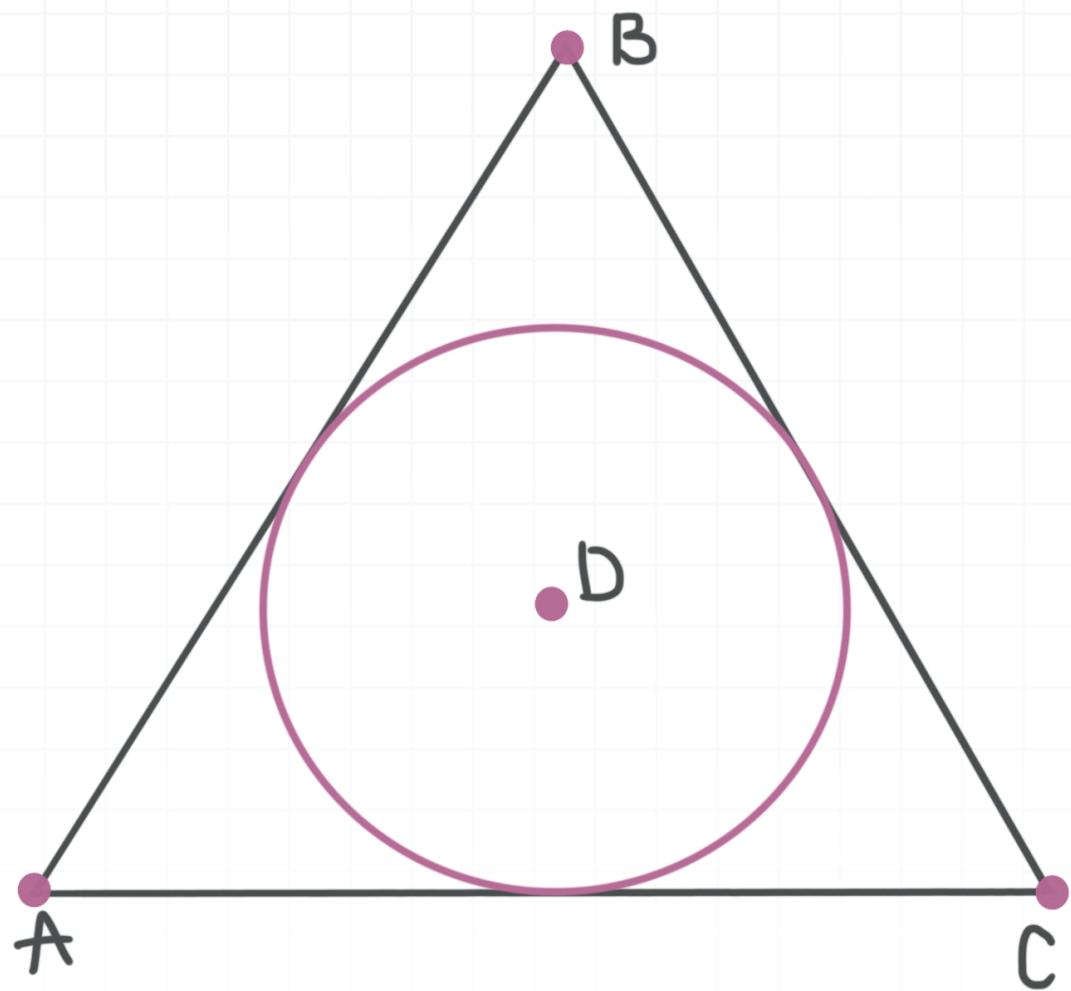
- 4. In  $\odot T$ ,  $\overline{RS}$  is a tangent line and the diameter  $\overline{UV}$  has length of 6. Find  $VS$  if  $RS = 4$ .



- 5.  $\text{arc } EGD = 240^\circ$  and  $\overline{BF}$  bisects  $\angle EFD$ . Find the length of the radius of  $\odot F$  if  $FB = 14$ .

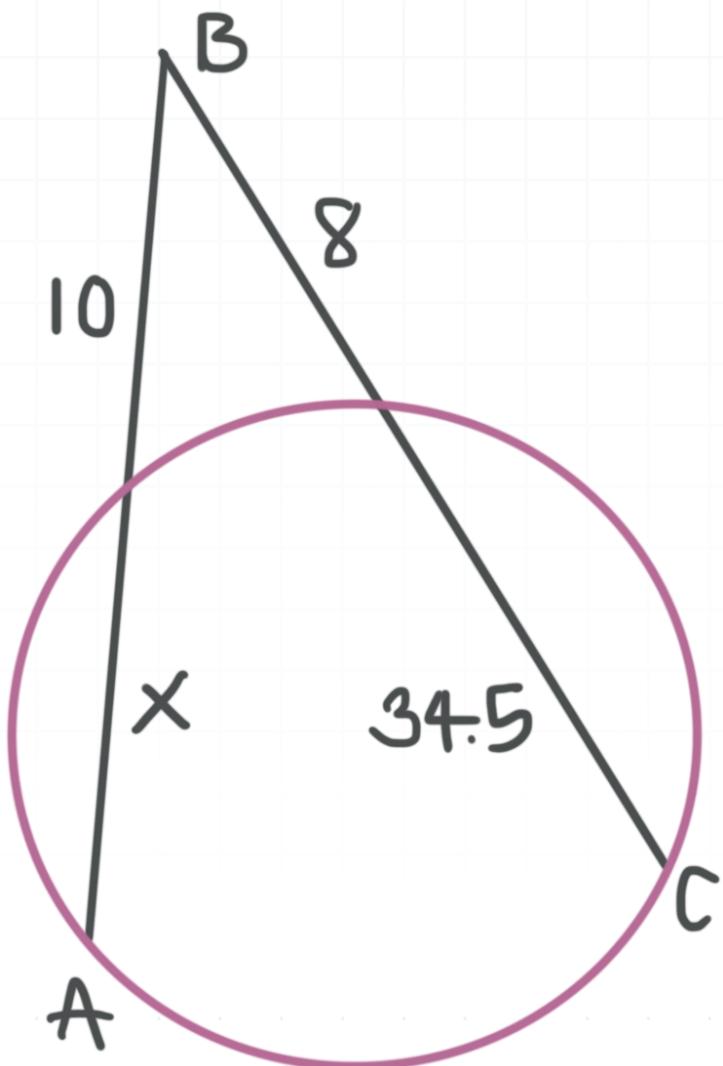


- 6. Find the perimeter of  $\triangle ABC$  if the radius of  $\odot D$  is 10 feet and  $\triangle ABC$  is equilateral.

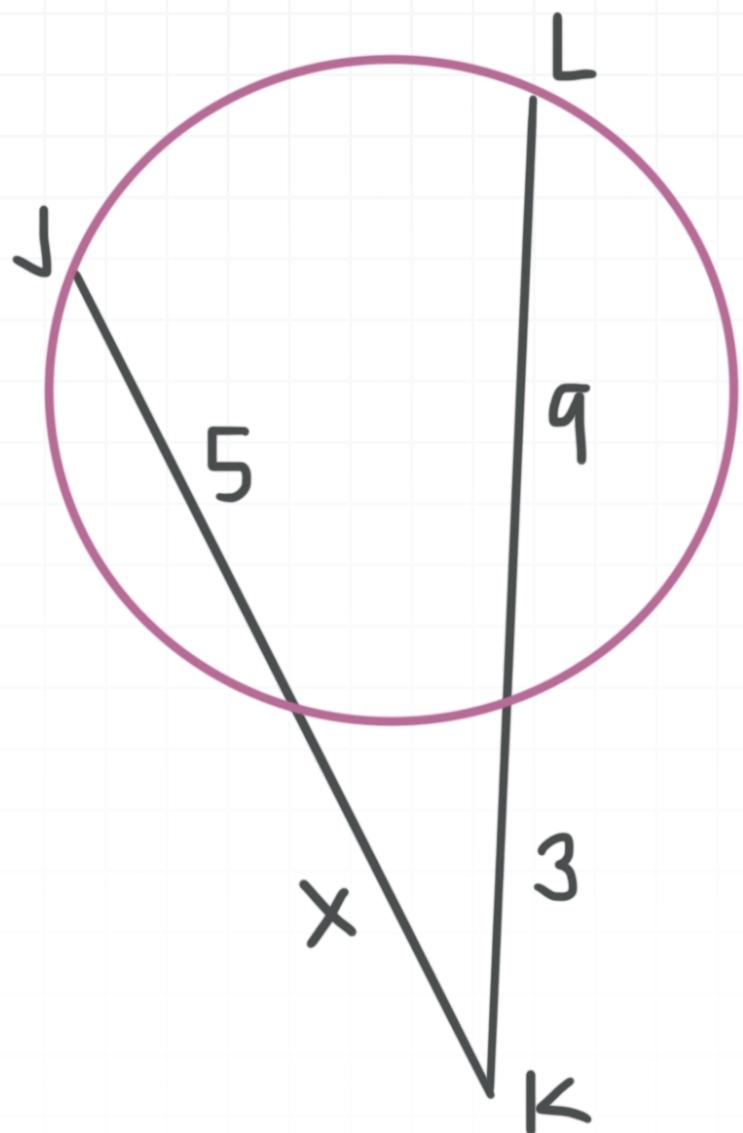


## INTERSECTING TANGENTS AND SECANTS

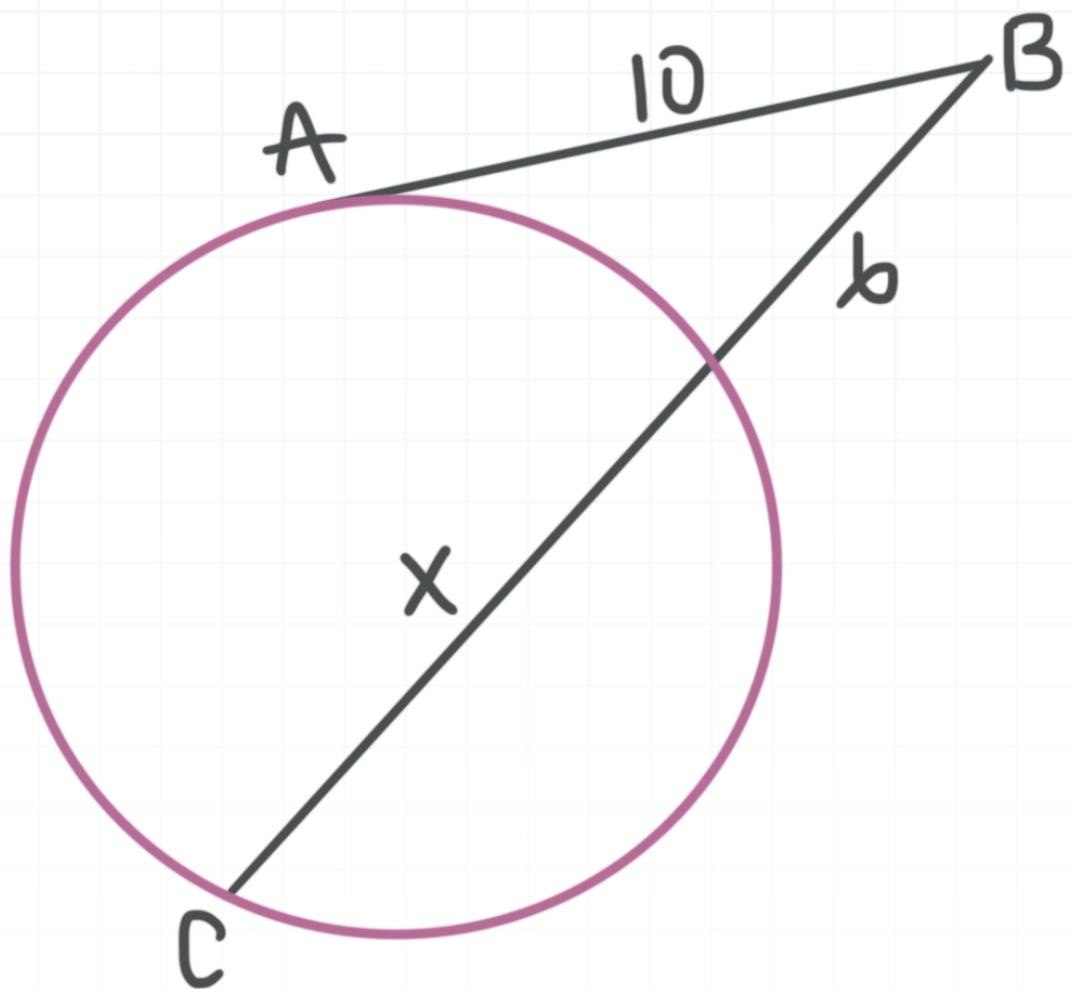
- 1.  $\overline{AB}$  and  $\overline{CB}$  are secants and intersect at  $B$ . Find the value of  $x$ .



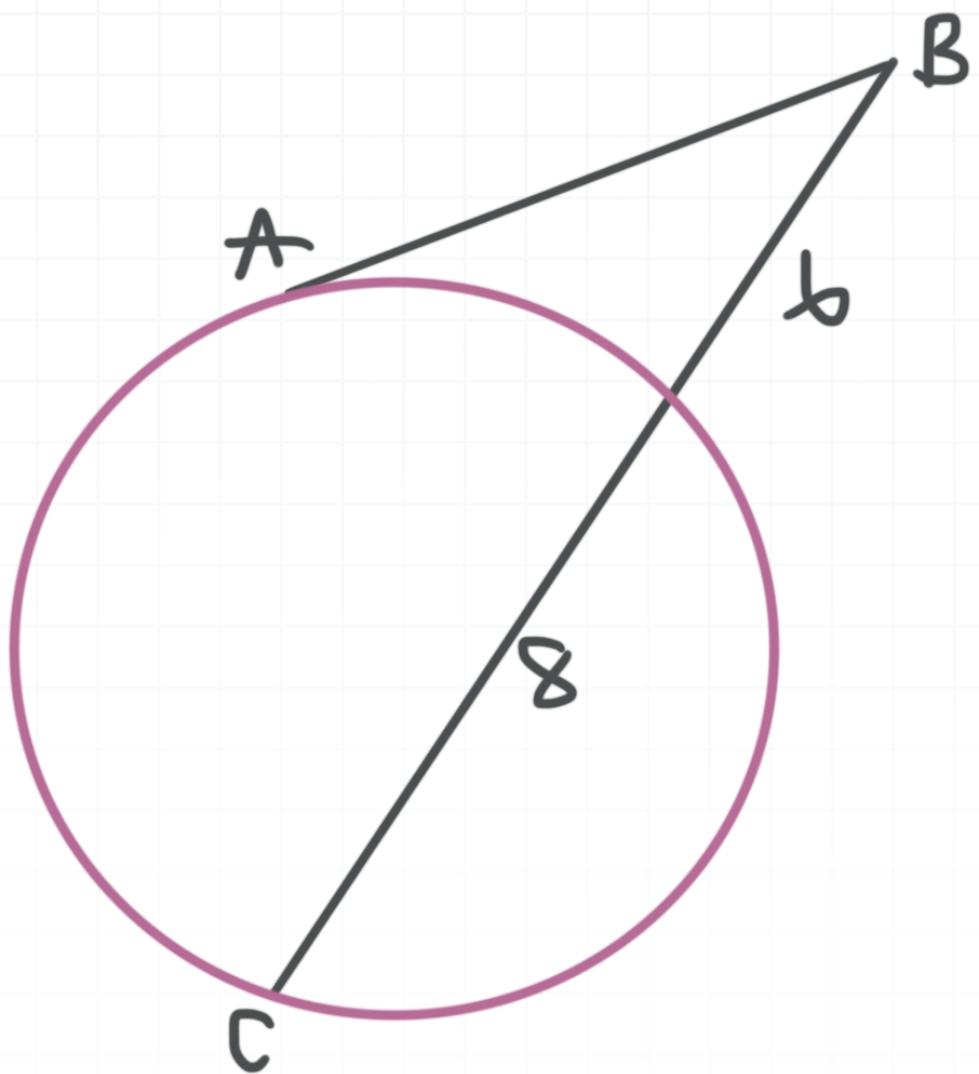
- 2.  $\overline{JK}$  and  $\overline{LK}$  are secants and intersect at  $K$ . Find the value of  $x$ .



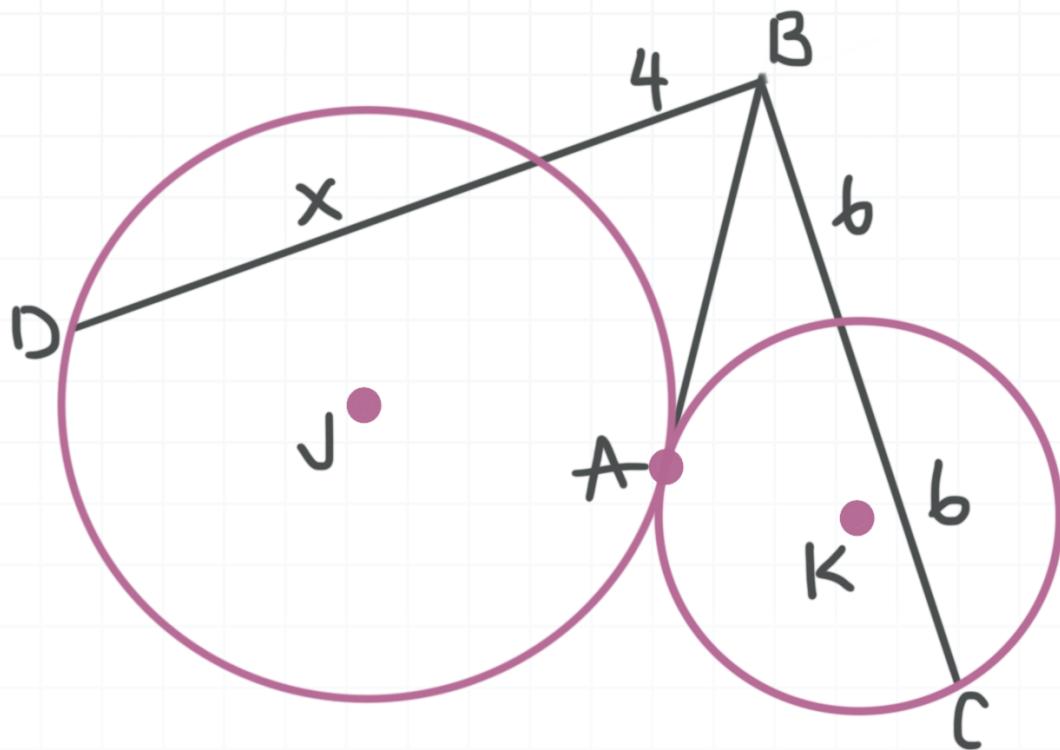
- 3.  $\overline{AB}$  is a tangent line and  $\overline{BC}$  is a secant of the circle. Find the value of  $x$ .



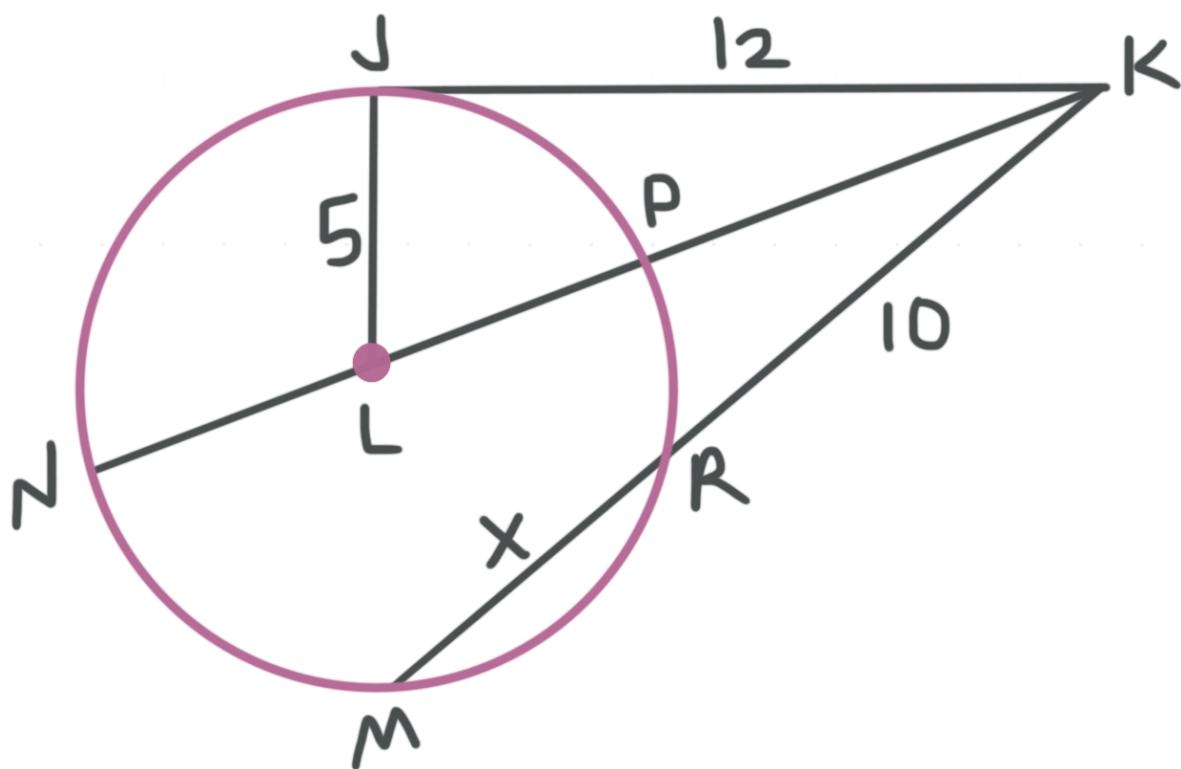
- 4.  $\overline{AB}$  is a tangent line and  $\overline{CB}$  is a secant of the circle. Find the length of  $AB$ .



- 5.  $\overline{DB}$  is a secant of  $\odot J$  and  $\overline{CB}$  is a secant of  $\odot K$ .  $\overline{AB}$  is a tangent for both circles. Find  $x$ .

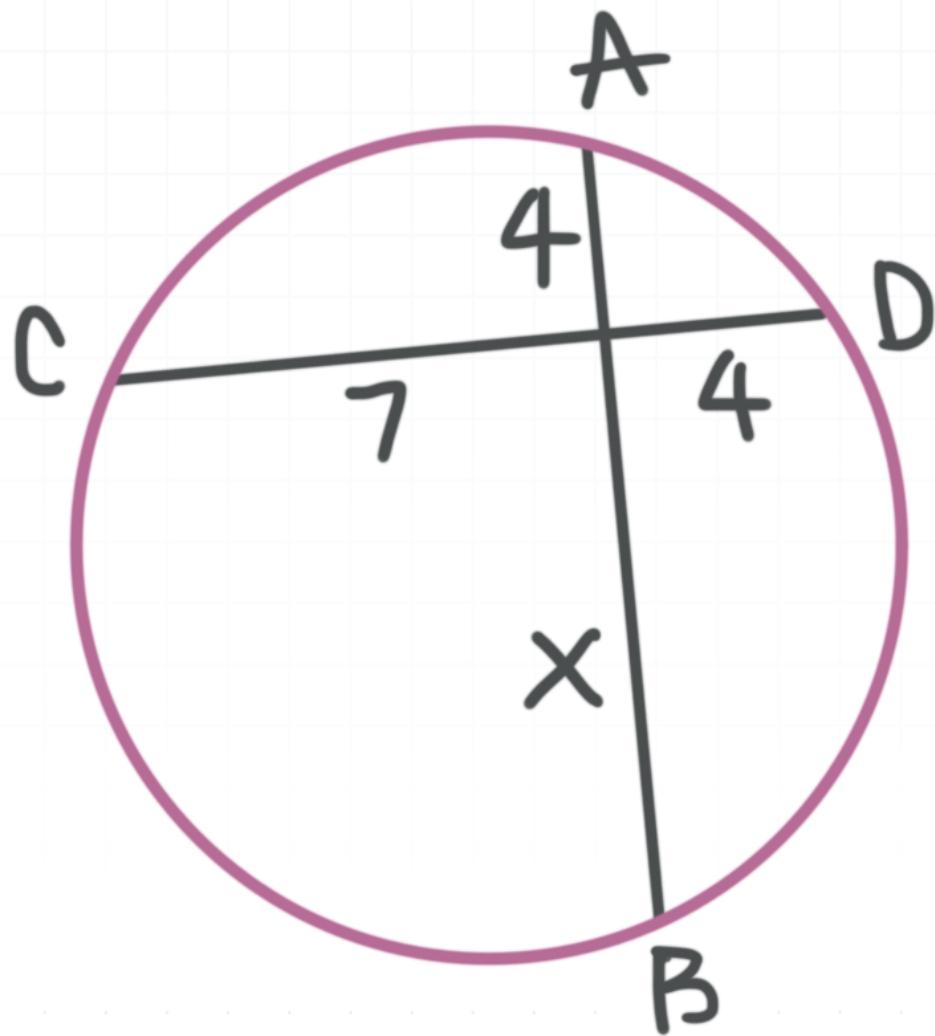


- 6.  $\overline{JK}$  is a tangent line,  $\overline{KN}$  and  $\overline{KM}$  are secants, and  $\overline{LJ}$  and  $\overline{LP}$  are radii of  $\odot L$ . Find  $x$ .

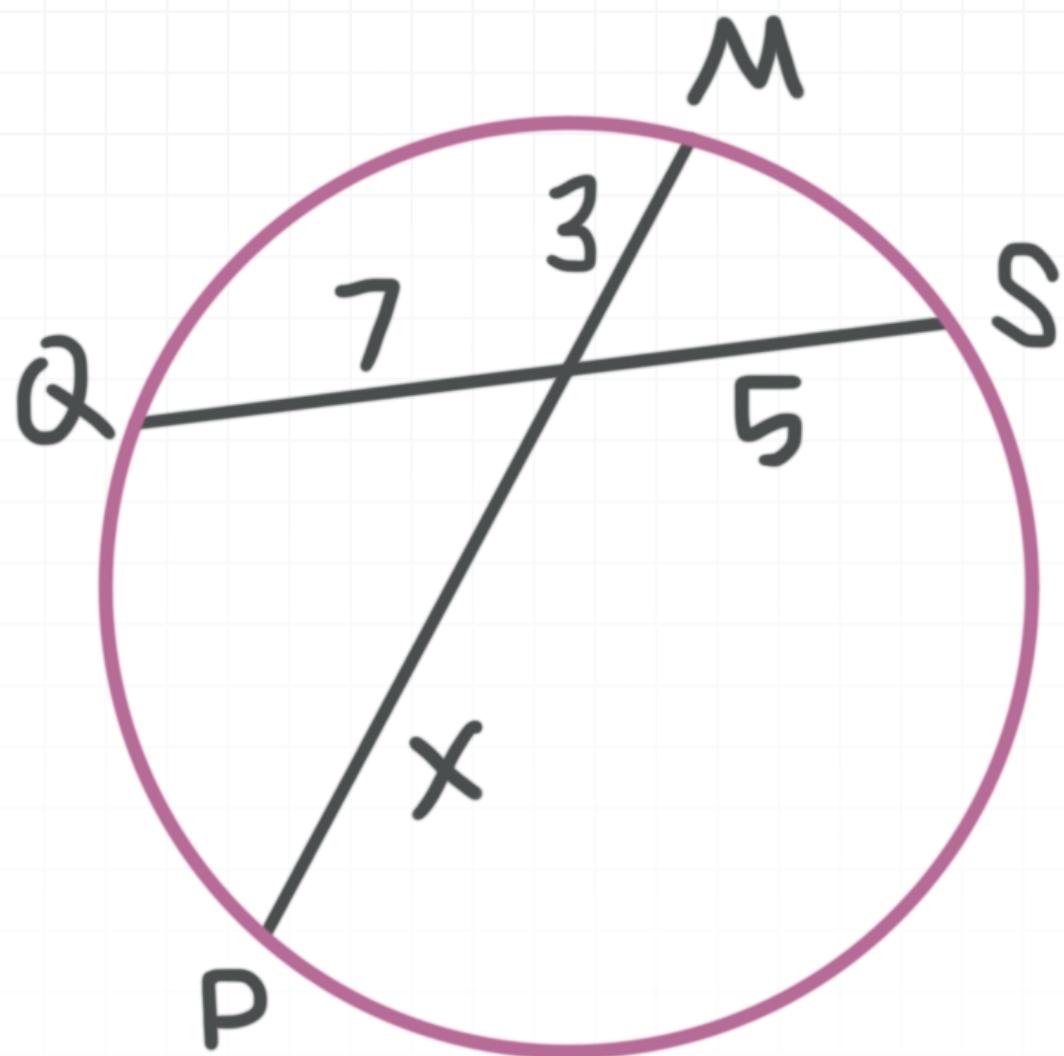


## INTERSECTING CHORDS

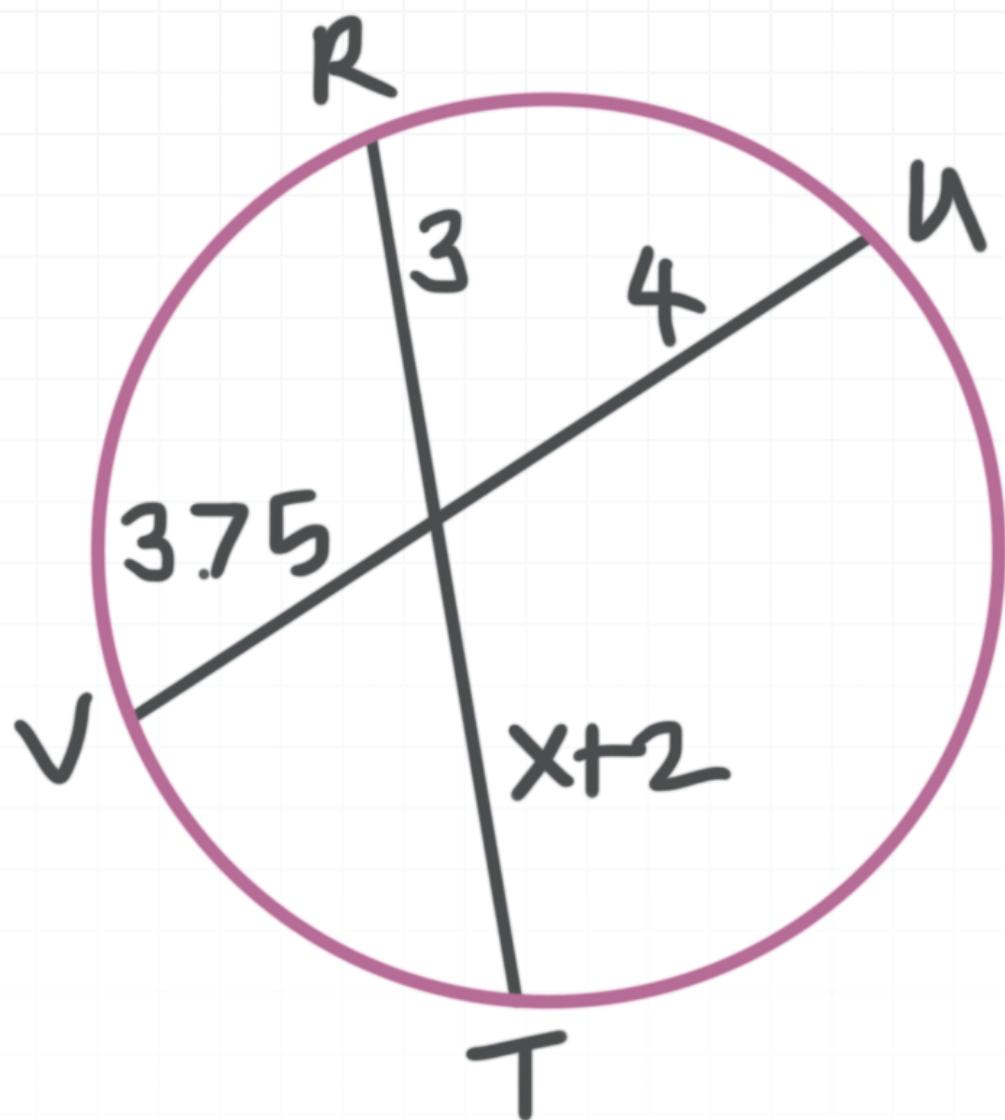
- 1.  $\overline{AB}$  and  $\overline{CD}$  are intersecting chords of the circle. Find  $x$ .



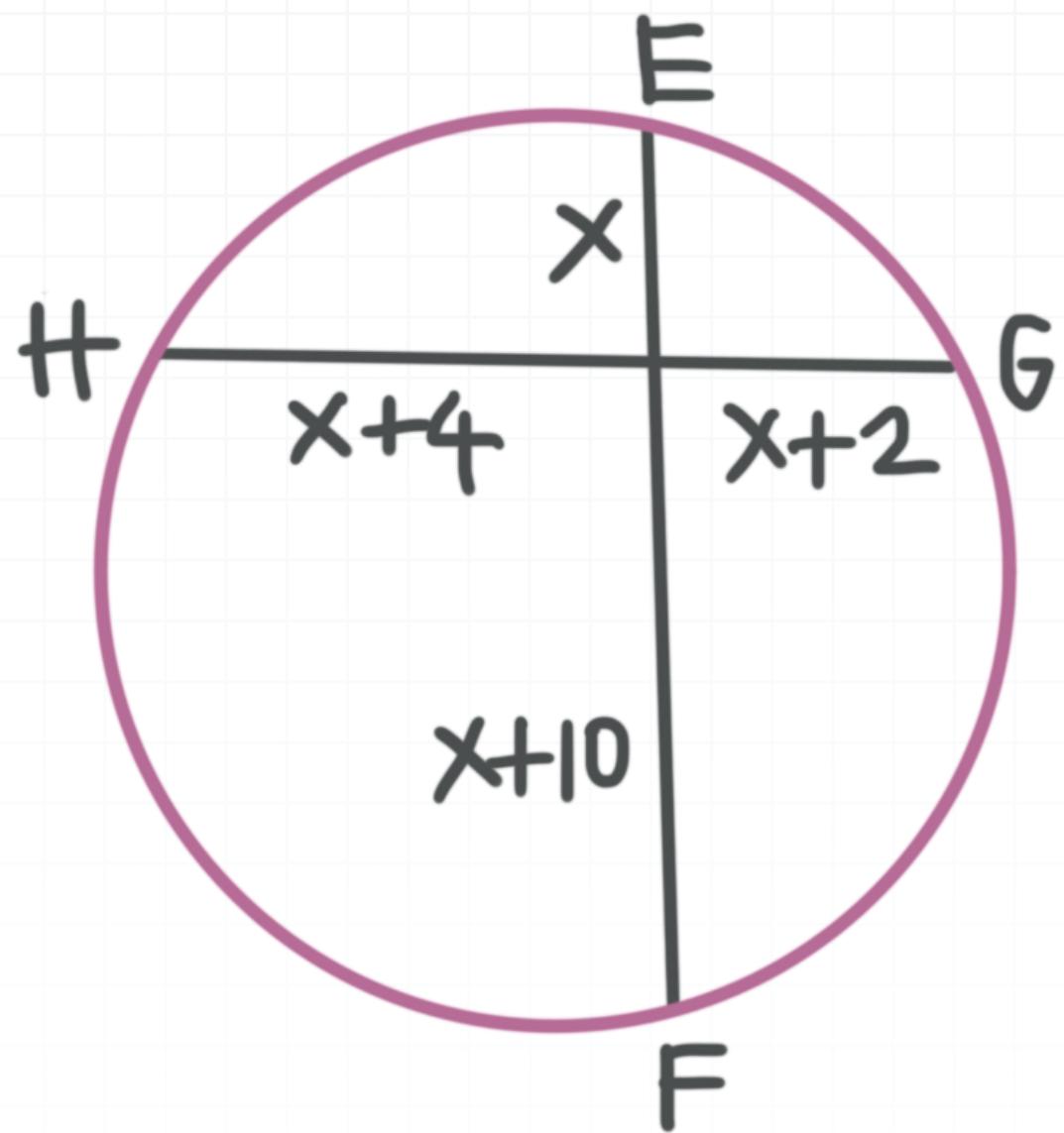
- 2.  $\overline{MP}$  and  $\overline{QS}$  are intersecting chords of the circle. Find  $x$ .



- 3.  $\overline{RT}$  and  $\overline{UV}$  are intersecting chords of the circle. Find  $x$ .

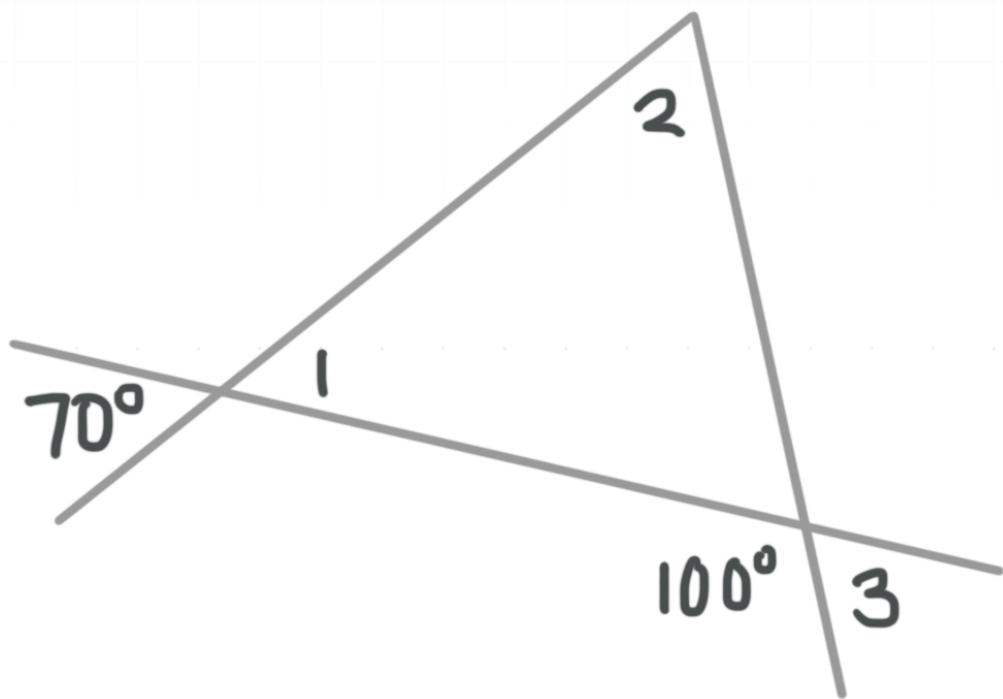


- 4.  $\overline{EF}$  and  $\overline{HG}$  are intersecting chords of the circle. Find  $x$ .

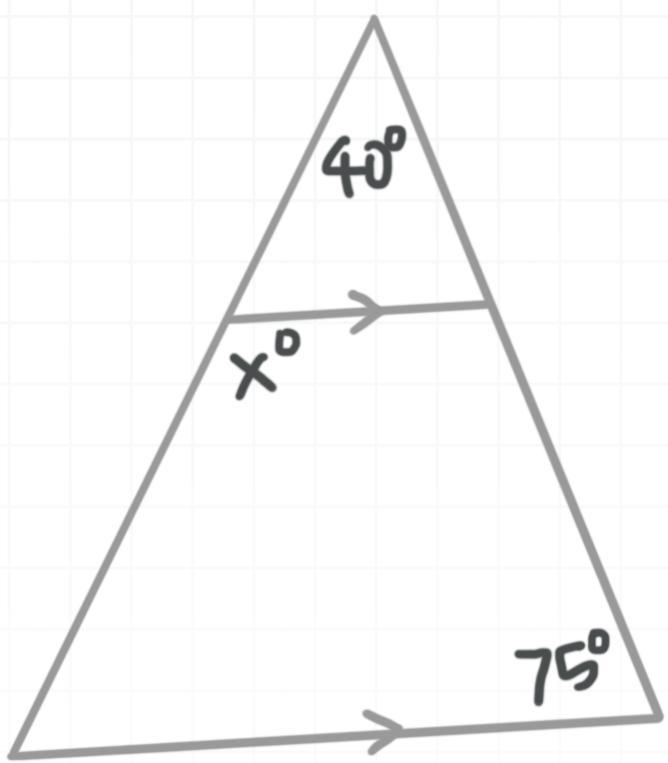


## INTERIOR ANGLES OF TRIANGLES

- 1.  $\triangle LMN$  is a right, isosceles triangle where  $\angle M$  is the vertex angle. Find  $m\angle L$ ,  $m\angle M$ , and  $m\angle N$ .
- 2.  $\triangle ABC$  has  $m\angle A = 3x + 5$ ,  $m\angle B = 10x + 5$ , and  $m\angle C = 4x$ . Find the value of  $x$  and determine whether this is an obtuse, acute, or right triangle.
- 3. Find  $m\angle 1$ ,  $m\angle 2$ , and  $m\angle 3$  from the figure.

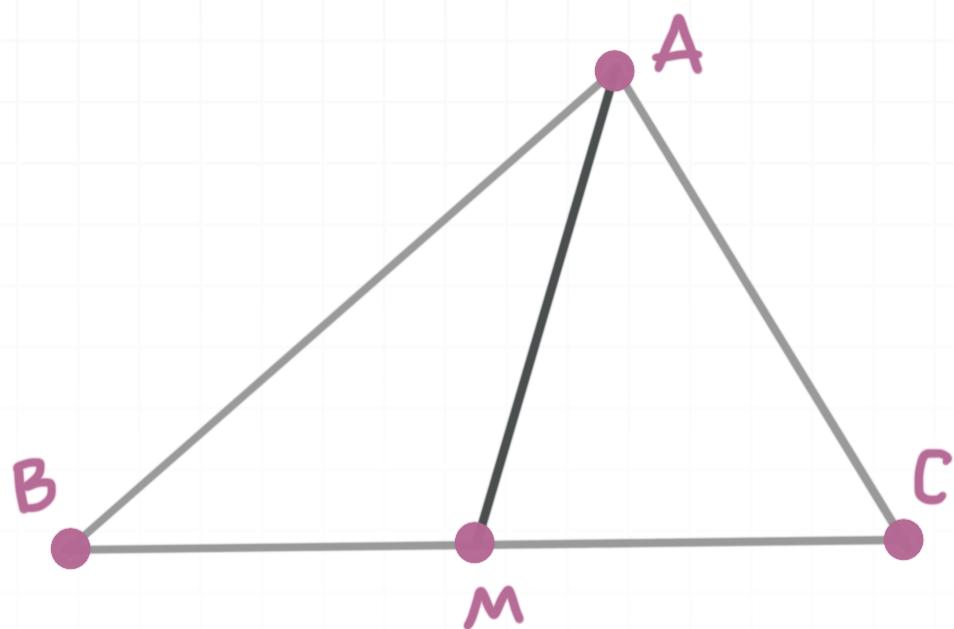


- 4. Find the value of  $x$  from the figure.

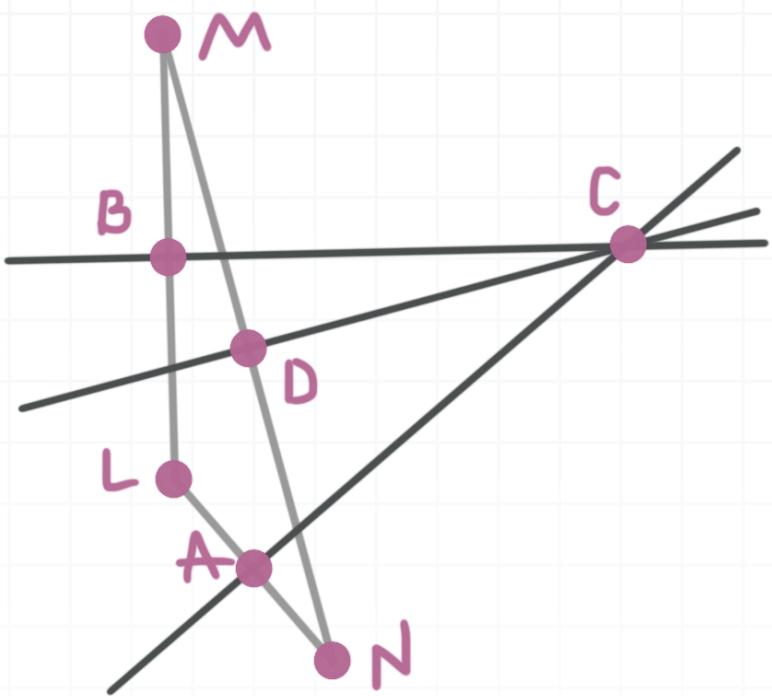


## PERPENDICULAR AND ANGLE BISECTORS

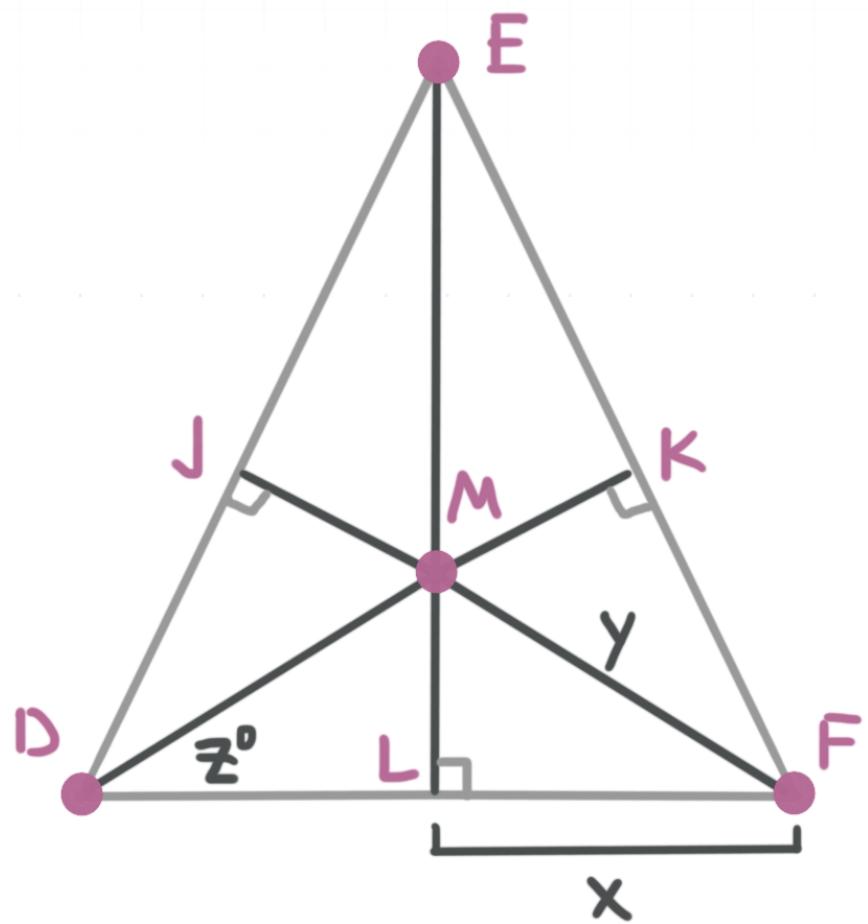
- 1.  $\overline{AM}$  is an angle bisector of  $\triangle ABC$ .  $m\angle BMA = 108$  and  $m\angle MBA = 40$ . Find  $x$  if  $m\angle CAM = 2x + 12$ .



- 2.  $\overline{AC}$ ,  $\overline{DC}$ , and  $\overline{BC}$  are perpendicular bisectors of  $\triangle NLM$ . Give the special name for C and find the length of  $ND$  if  $NM = 14x - 22$  and  $DM = 3x + 1$ .



- 3. Find the values of  $x$ ,  $y$ , and  $z$ , given  $M$  is an incenter,  $MK = 6$ ,  $FK = 8$ , and  $m\angle EDF = 80$ .

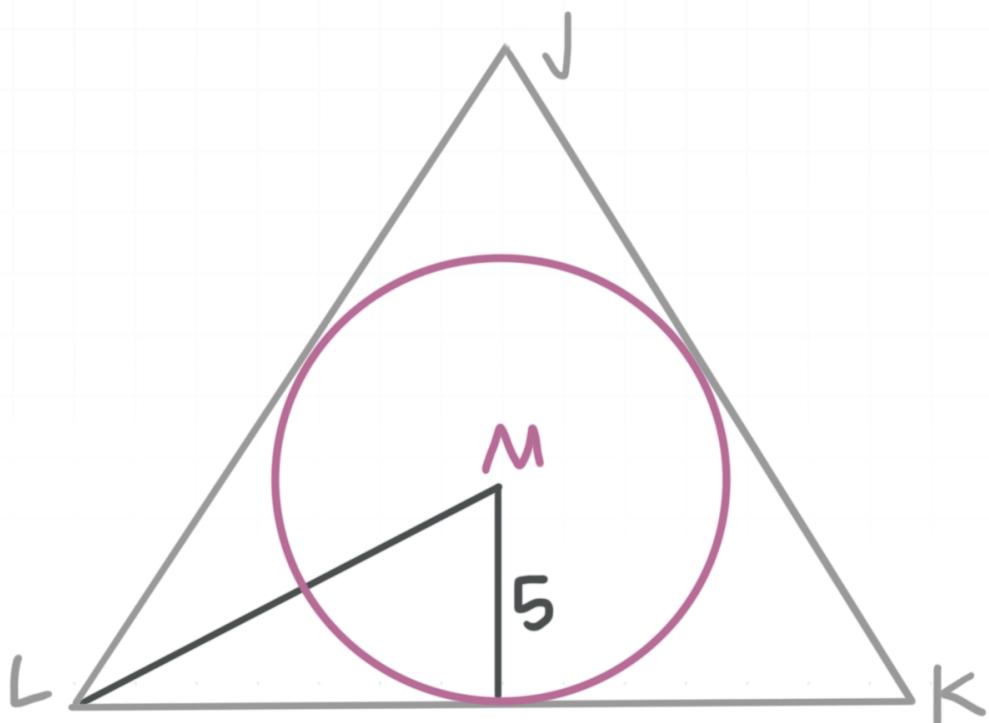


- 4.  $\triangle ABC$  has coordinates  $A(-3,1)$ ,  $B(3,3)$ , and  $C(2, -2)$ . Write the equation for the perpendicular bisector of  $\overline{AB}$ .

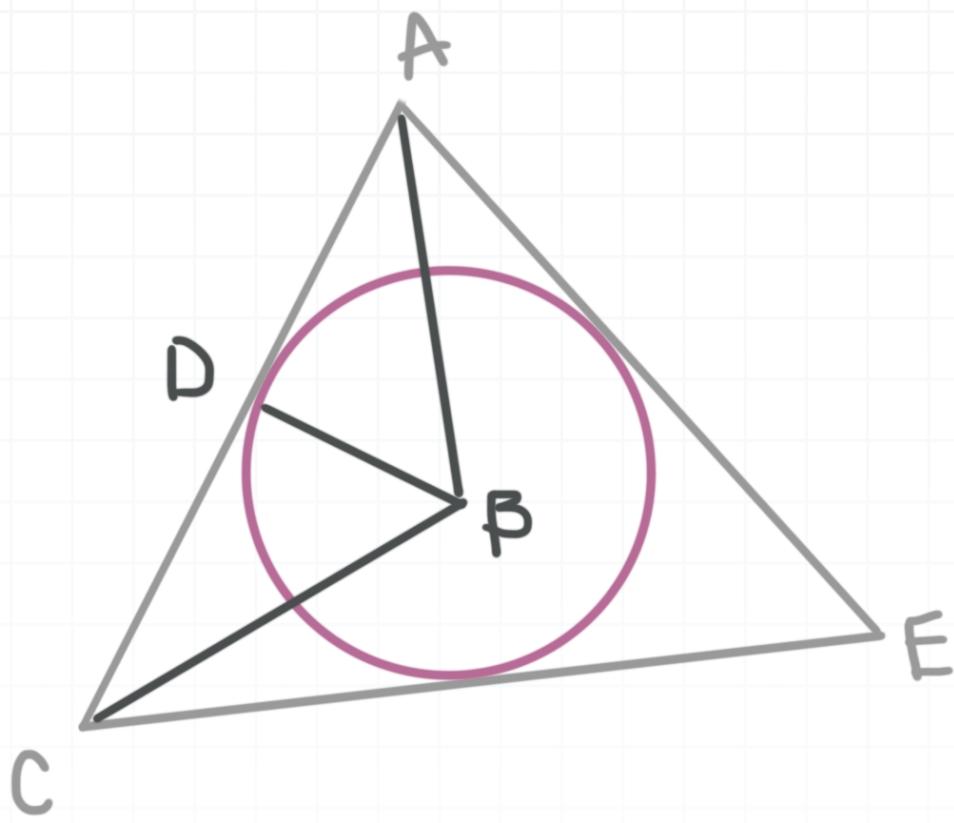


## CIRCUMSCRIBED AND INSCRIBED CIRCLES OF A TRIANGLE

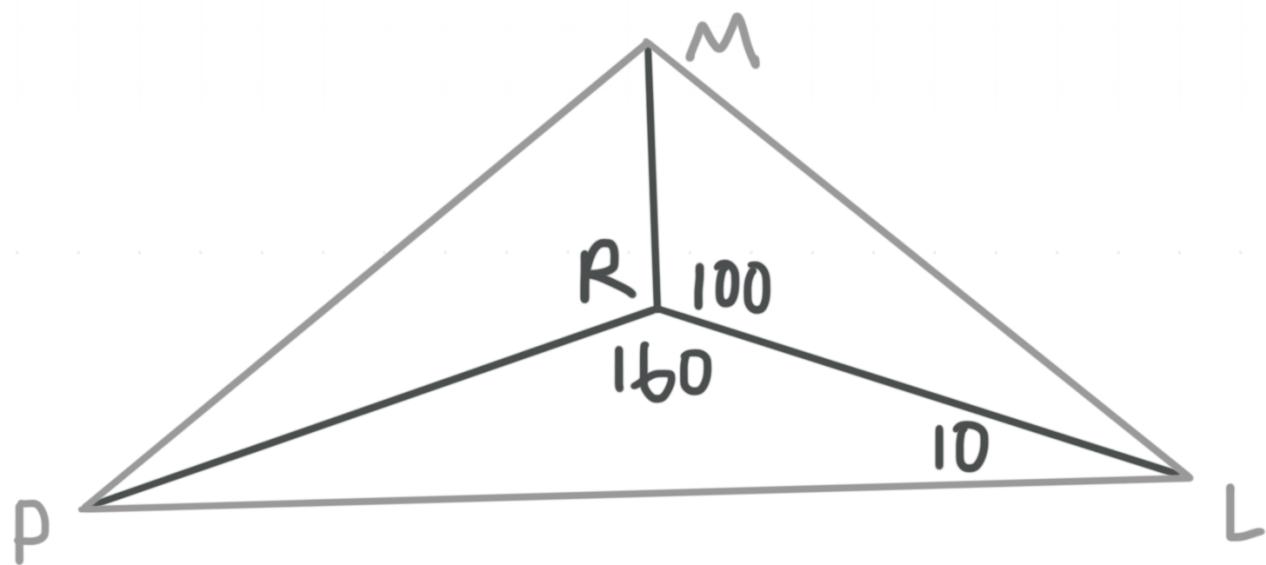
- 1. Equilateral triangle  $ABC$  is inscribed in  $\odot D$ . Find  $m\angle ADC$ .
- 2.  $\triangle JKL$  is equilateral and is circumscribed about  $\odot M$ . The radius of  $\odot M$  is 5. Find the perimeter of  $\triangle JKL$ .



- 3. If  $AB = 12$ , find the length of the radius of  $\odot B$ .

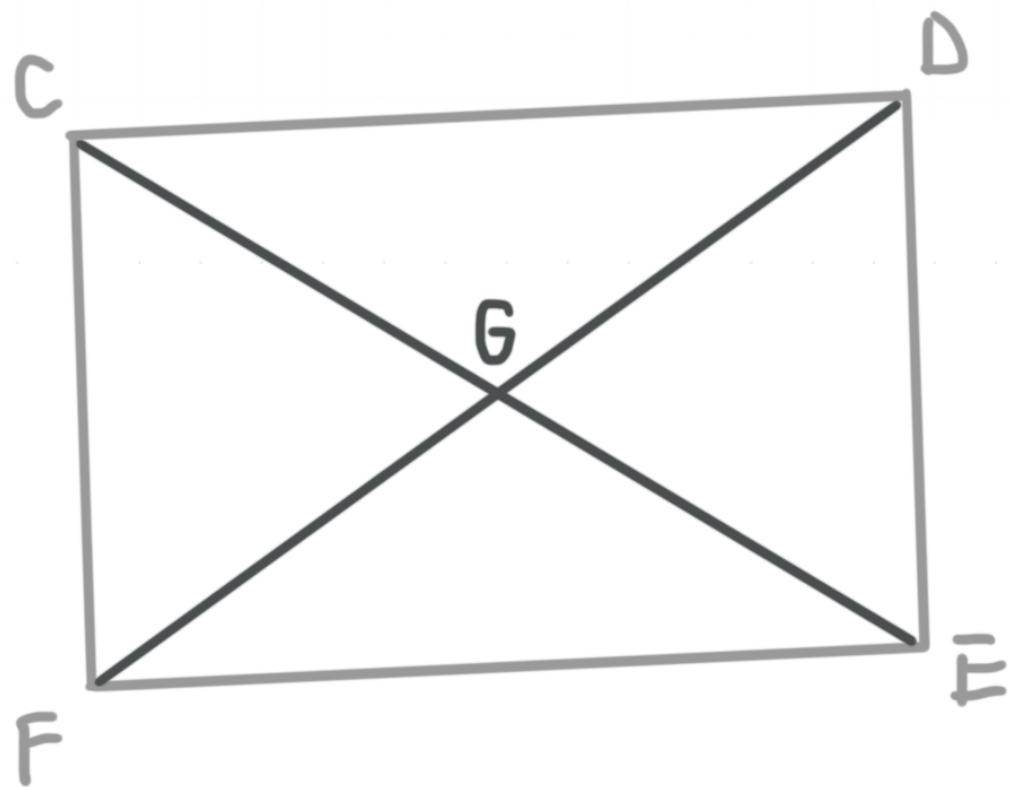


- 4.  $R$  is the incenter of  $\triangle PML$ . Find  $m\angle PMR$ .

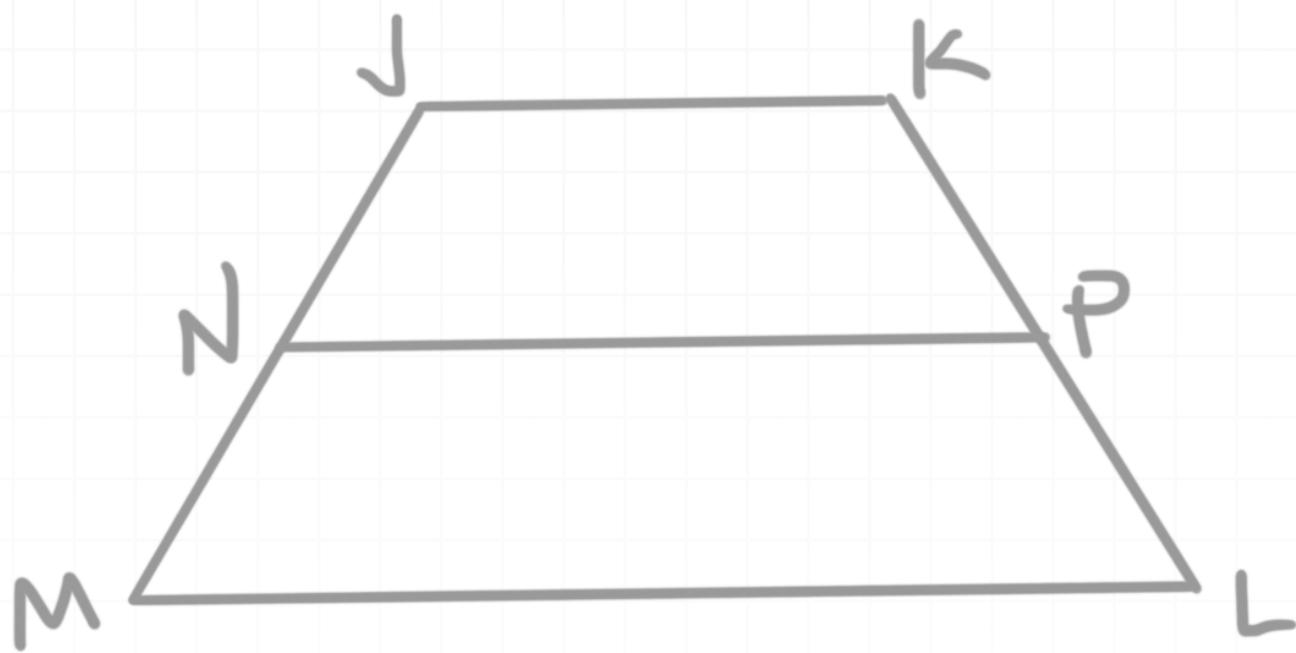


## MEASURES OF QUADRILATERALS

- 1. A rectangle has a width of 6 inches and diagonal with length 10 inches. Find the perimeter of the rectangle.
- 2. Classify quadrilateral  $ABCD$  with vertices at  $A(1, -3)$ ,  $B(5,0)$ ,  $C(10,0)$ , and  $D(6, -3)$ .
- 3.  $CDEF$  is a rectangle with diagonals intersecting at  $G$ .  $CG = 2x + 1$ ,  $DG = x + 4$ ,  $FG = 4y - 1$ , and  $EG = y + 5$ . Find  $FD$ .

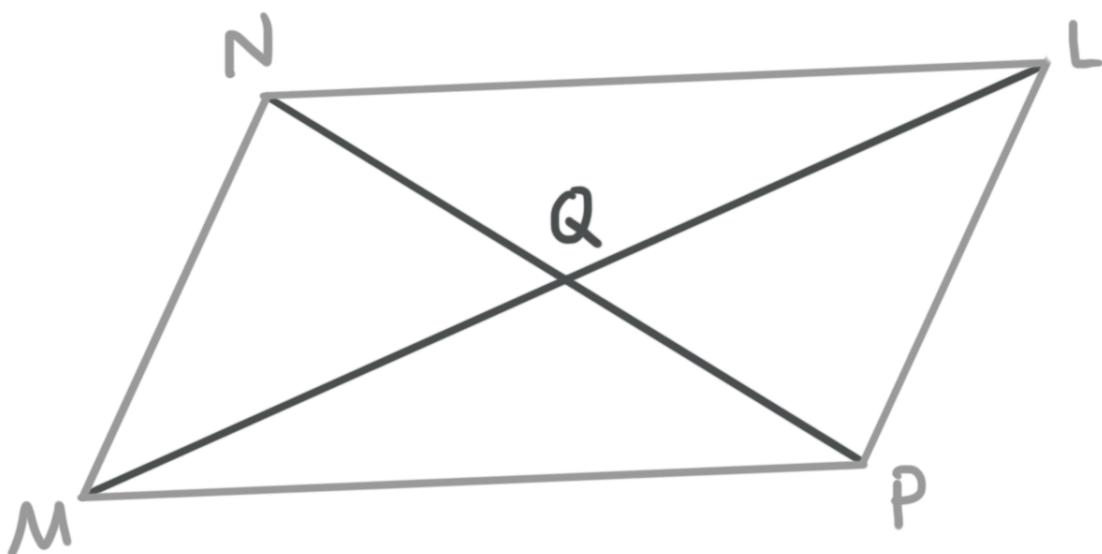


- 4.  $JKLM$  is an isosceles trapezoid with median  $\overline{NP}$ .  $MJ = 14$ ,  $m\angle MLP = 72$ ,  $NP = 16$ , and  $ML = 20$ . Find  $KP$ ,  $m\angle MJK$ , and  $JK$ .



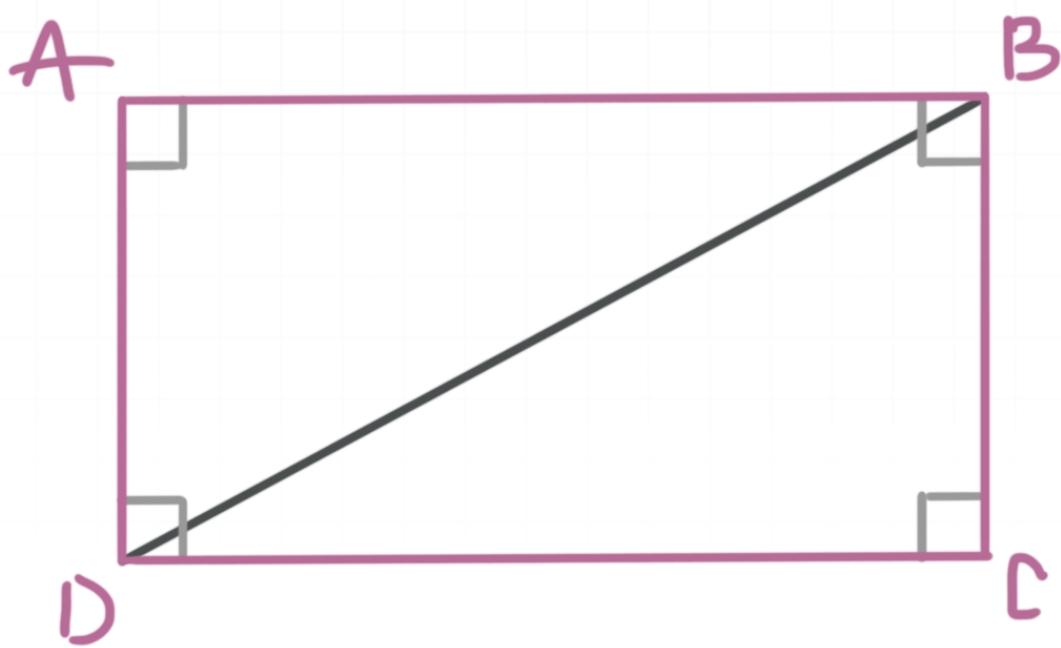
## MEASURES OF PARALLELOGRAMS

- 1.  $ABCD$  is a parallelogram with  $m\angle A = 2x + 10$ ,  $m\angle B = y - 5$ , and  $\angle C = 100$ . Find the values of  $x$  and  $y$ .
- 2.  $EFGH$  is a rhombus with  $FH = 24$  and  $GE = 10$ . Find the perimeter of  $EFGH$ .
- 3.  $JKLM$  has vertices  $J(-3,2)$ ,  $K(3,0)$ ,  $L(3, -6)$ , and  $M(-3, -4)$ . Determine whether  $JKLM$  is a parallelogram by checking if it has two sets up opposite sides that are congruent.
- 4.  $NLPM$  is a parallelogram with diagonals intersecting at point  $Q$ .  $m\angle MNP = 85$ ,  $m\angle MQP = 115$ , and  $m\angle MNL = 135$ . Find  $m\angle PML$ .

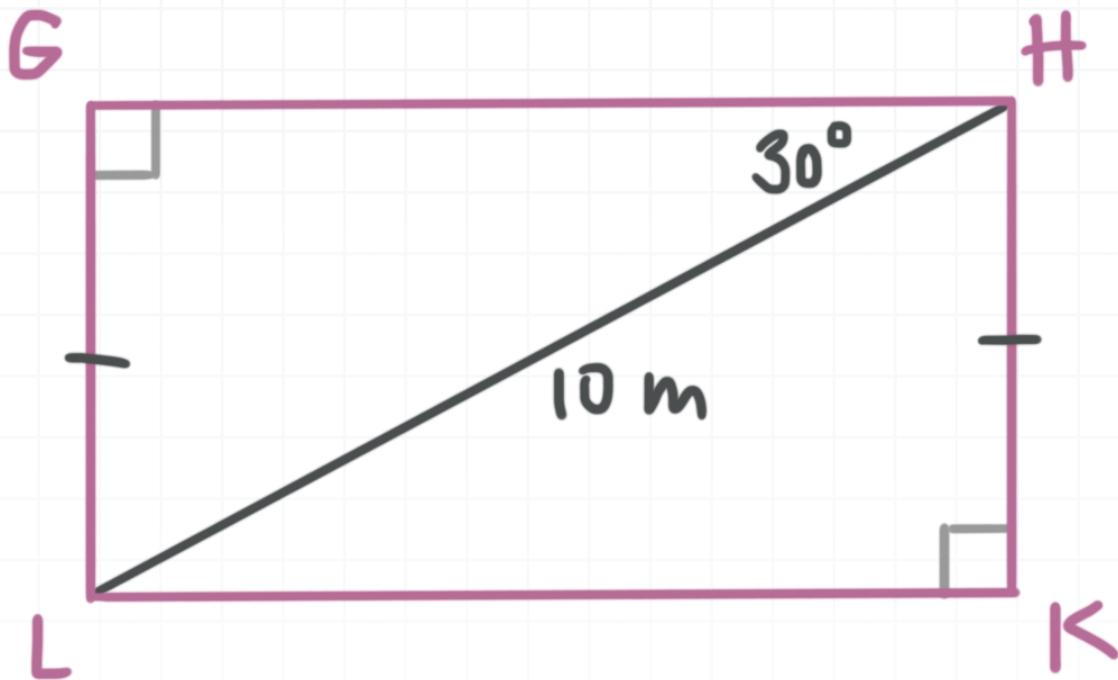


## AREA OF A RECTANGLE

- 1. The base of a rectangle is 8 feet. Find its height if the area of the rectangle is  $80 \text{ ft}^2$ .
  
- 2. In rectangle  $ABCD$ ,  $BD = 13$  and  $AB = 12$ . Find the area of this rectangle.



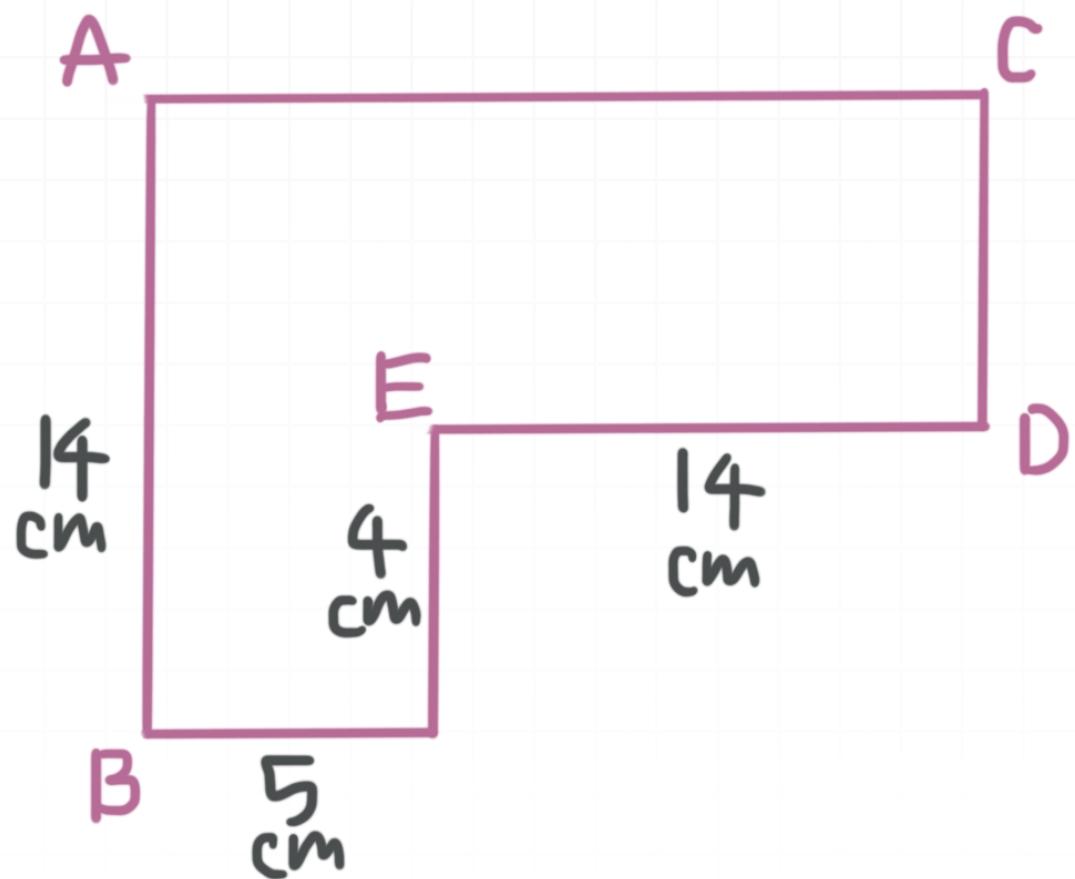
- 3. In rectangle  $GHKL$ ,  $LH = 10$  and  $m\angle GHL = 30$ . Find the exact area of the rectangle.



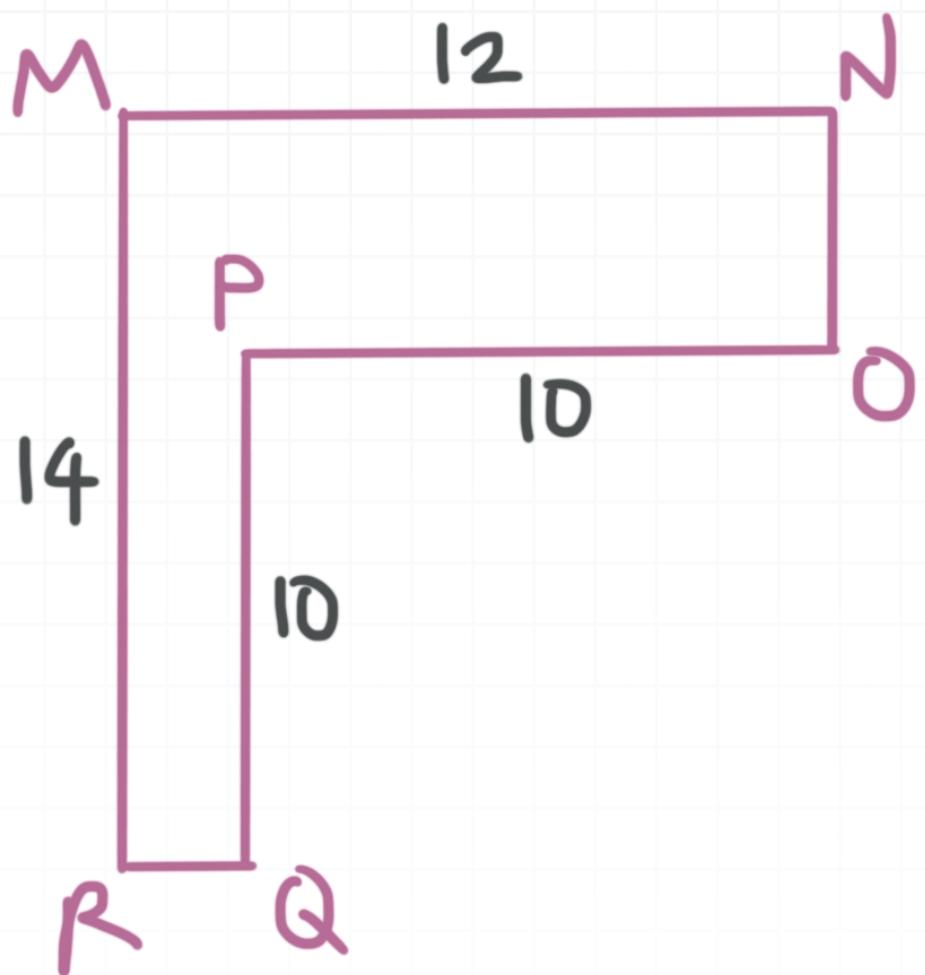
- 4. The area of a small square flower garden is  $49 \text{ ft}^2$ . Suppose we wish to make the garden bigger by adding 6 feet to one of the sides. How much more square footage is available in this new rectangular garden?

## AREA OF A RECTANGLE USING SUMS AND DIFFERENCES

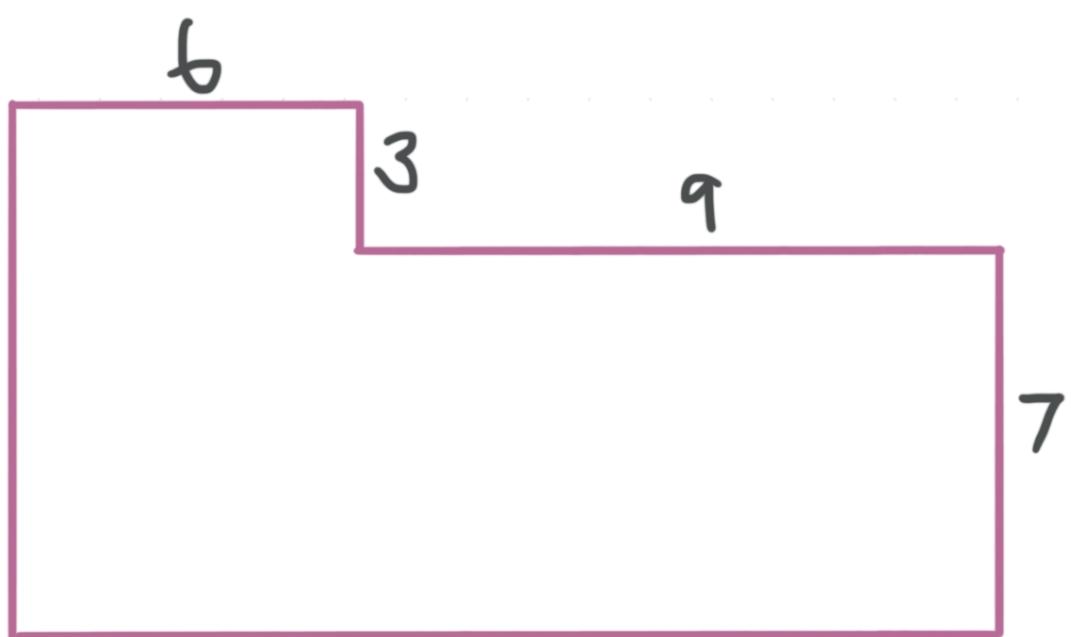
- 1. Find the area of the figure.



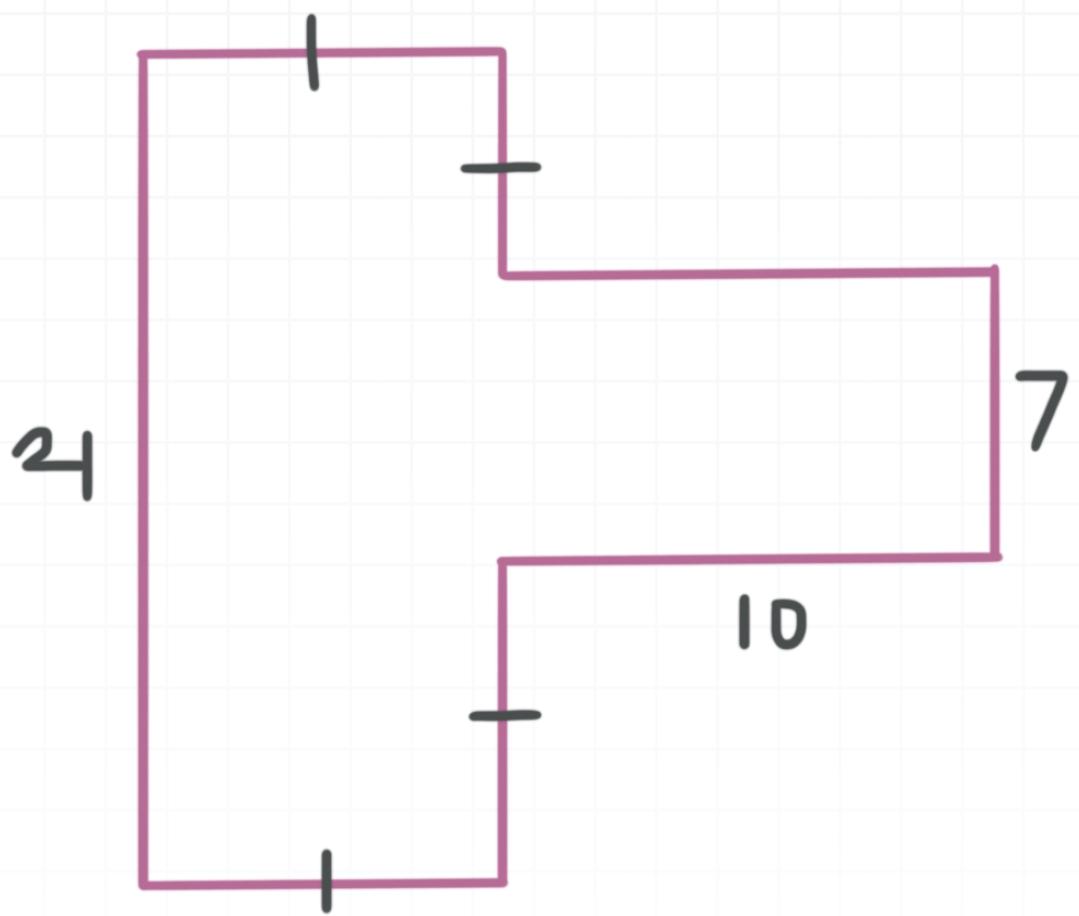
- 2. Find the area of the figure.



■ 3. Find the area of the figure.



■ 4. Find the area of the figure.



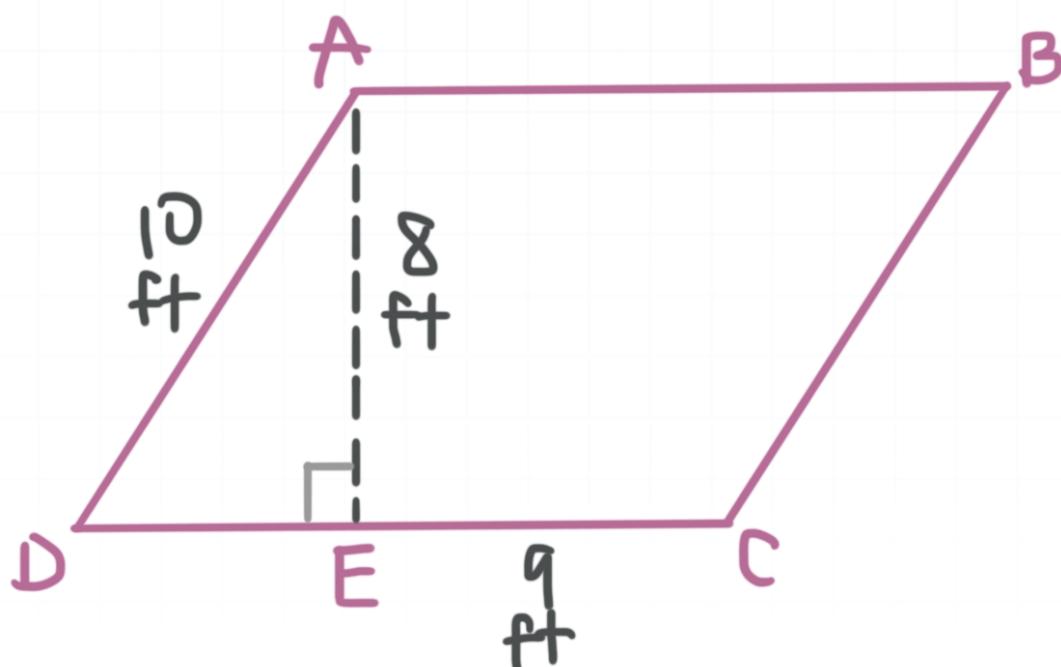
## PERIMETER OF A RECTANGLE

- 1. A rectangle has a base of 10 meters. The height is 4 meters greater than the base. Find the perimeter of this rectangle.
  
- 2. The area of a rectangle is  $40 \text{ ft}^2$ . Find the perimeter of this rectangle if the length of the rectangle is 3 feet longer than the width.
  
- 3. Find the perimeter of a rectangle with vertices at  $A(-3,0)$ ,  $B(0,4)$ ,  $C(4,1)$ , and  $D(1, -3)$ .
  
- 4. Find the value of  $x$  if the base of the rectangle has length  $x + 4$ , the height of the rectangle is  $x$ , and the perimeter of a rectangle is 20 units.

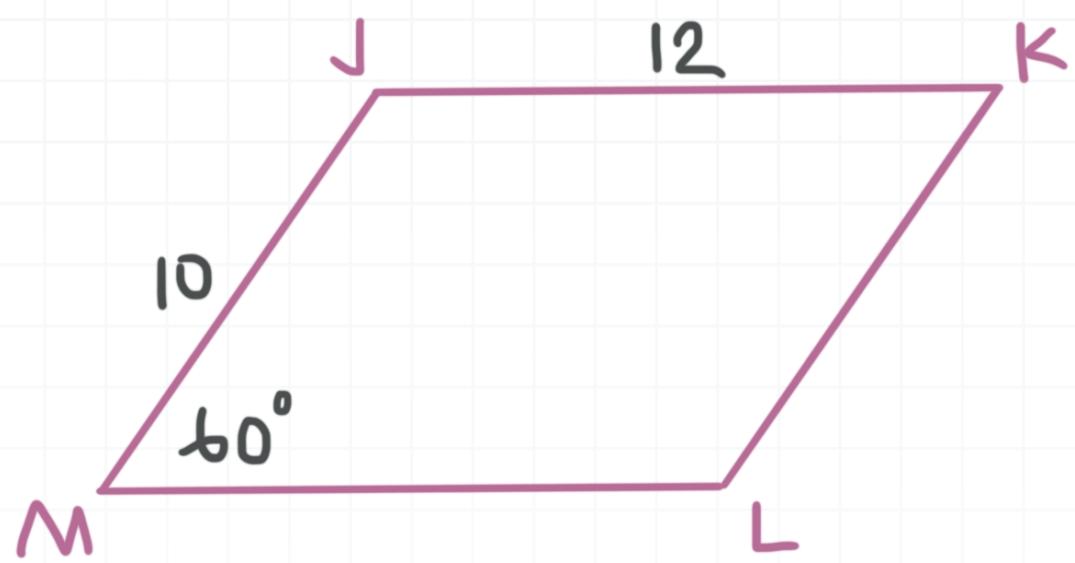


## AREA OF A PARALLELOGRAM

- 1. Find the area of a parallelogram with  $b = 14$  yards and  $h = 10$  yards.
- 2. Find the area of the parallelogram.

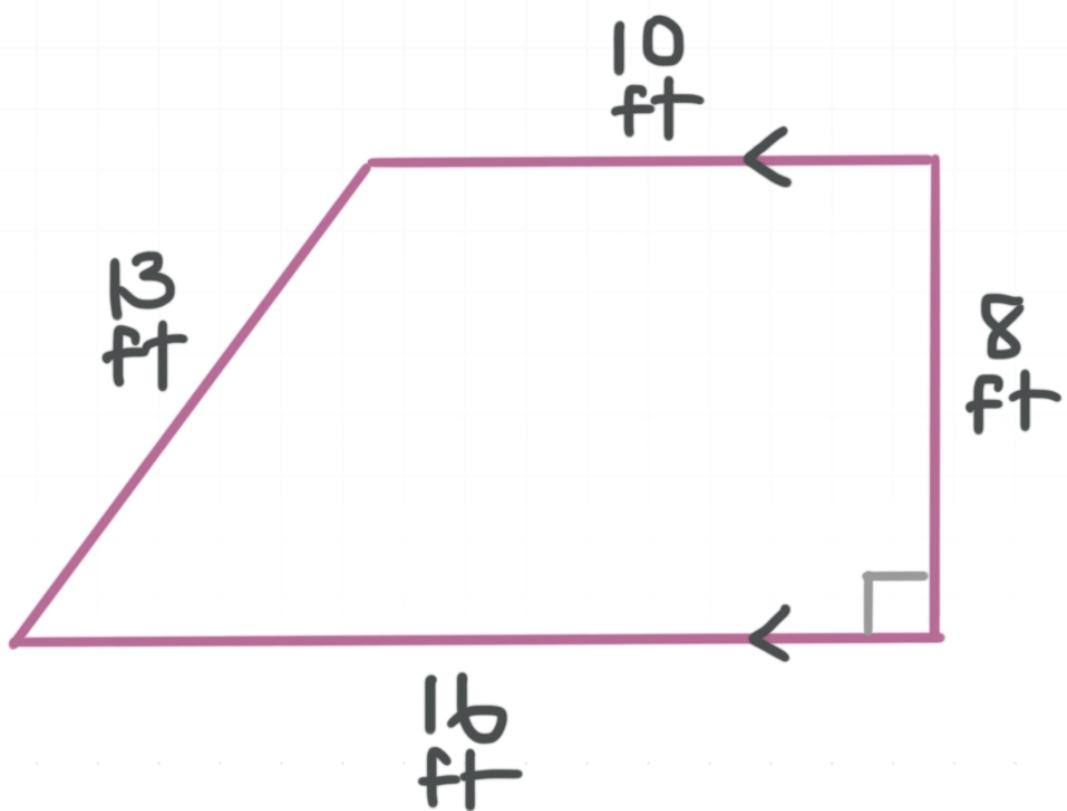


- 3. Find the area of parallelogram JKLM, if  $J(0,0)$ ,  $K(1,3)$ ,  $L(-5,3)$ , and  $M(-6,0)$ .
- 4. A parallelogram has a base that is 3 feet longer than it is tall. The area of the parallelogram is 88 square feet. Find the height of the parallelogram.
- 5. Find the exact area of the parallelogram.



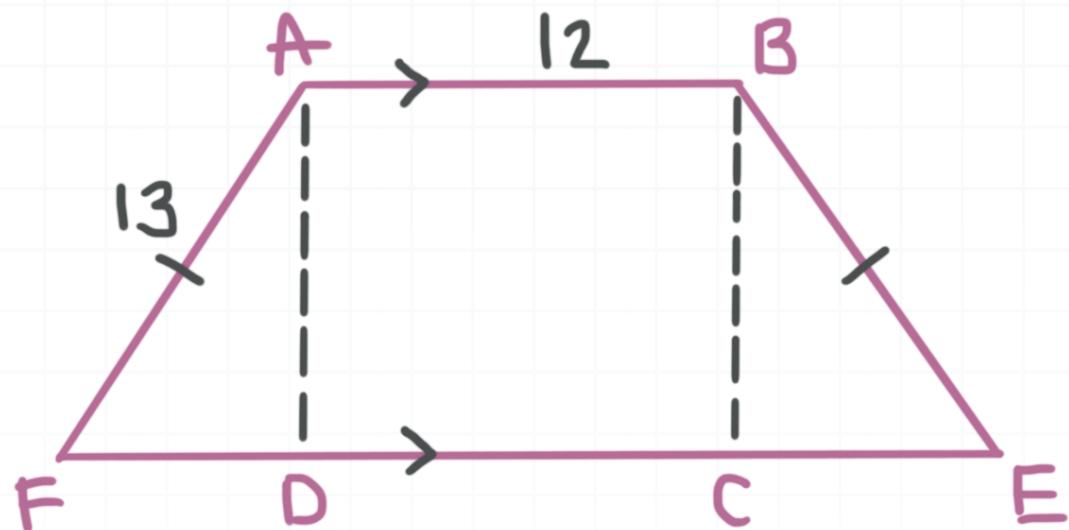
## AREA OF A TRAPEZOID

- 1. Find the area of a trapezoid with base lengths 16 and 18, and height 10.
- 2. Find the area of the trapezoid.



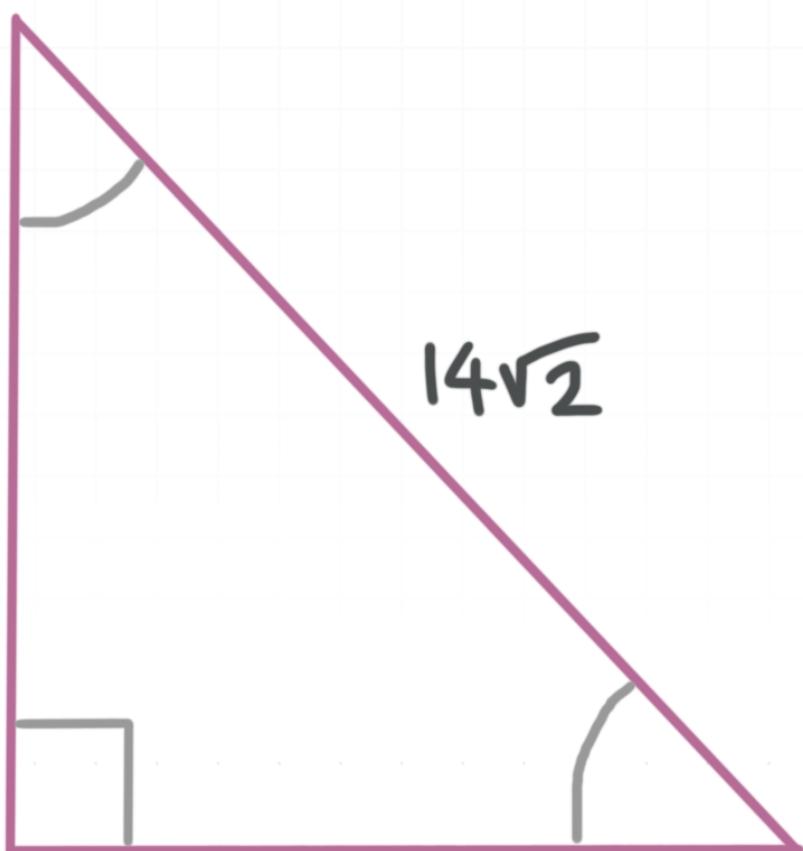
- 3. Find the exact area of the trapezoid that has congruent 2-meter bases and a height of 4 meters.
- 4. The area of a trapezoid is  $60 \text{ m}^2$ . One of the bases has a measure of 7 m and the height of the trapezoid is 10 m. Find the length of the other base.

- 5. Find the area of trapezoid  $ABEF$ , if  $ABCD$  is a square.

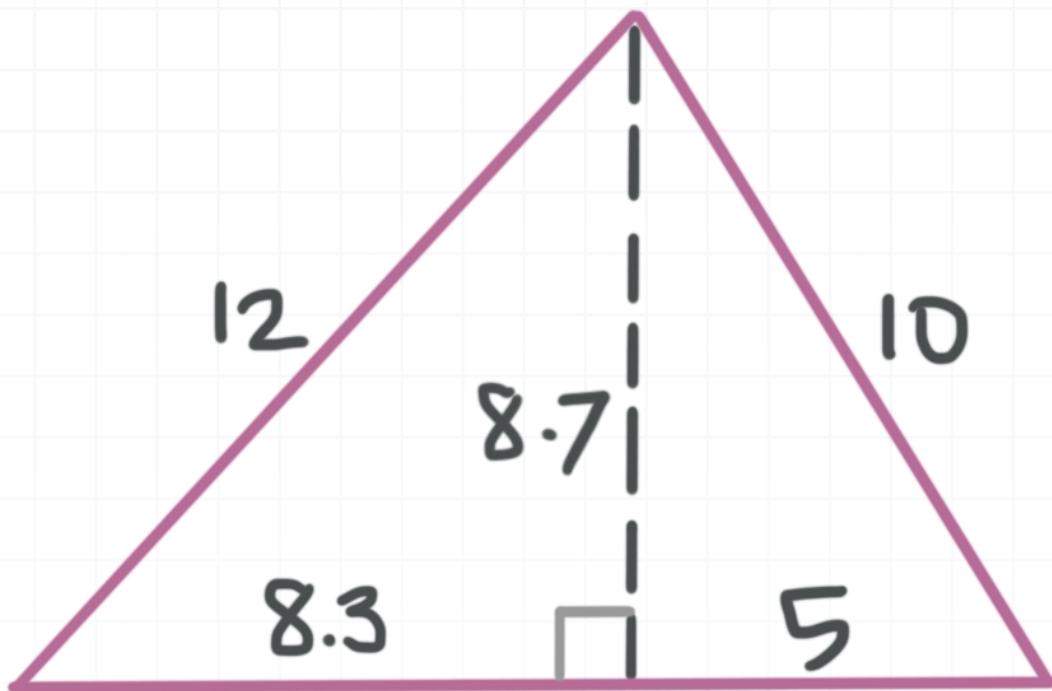


## AREA OF A TRIANGLE

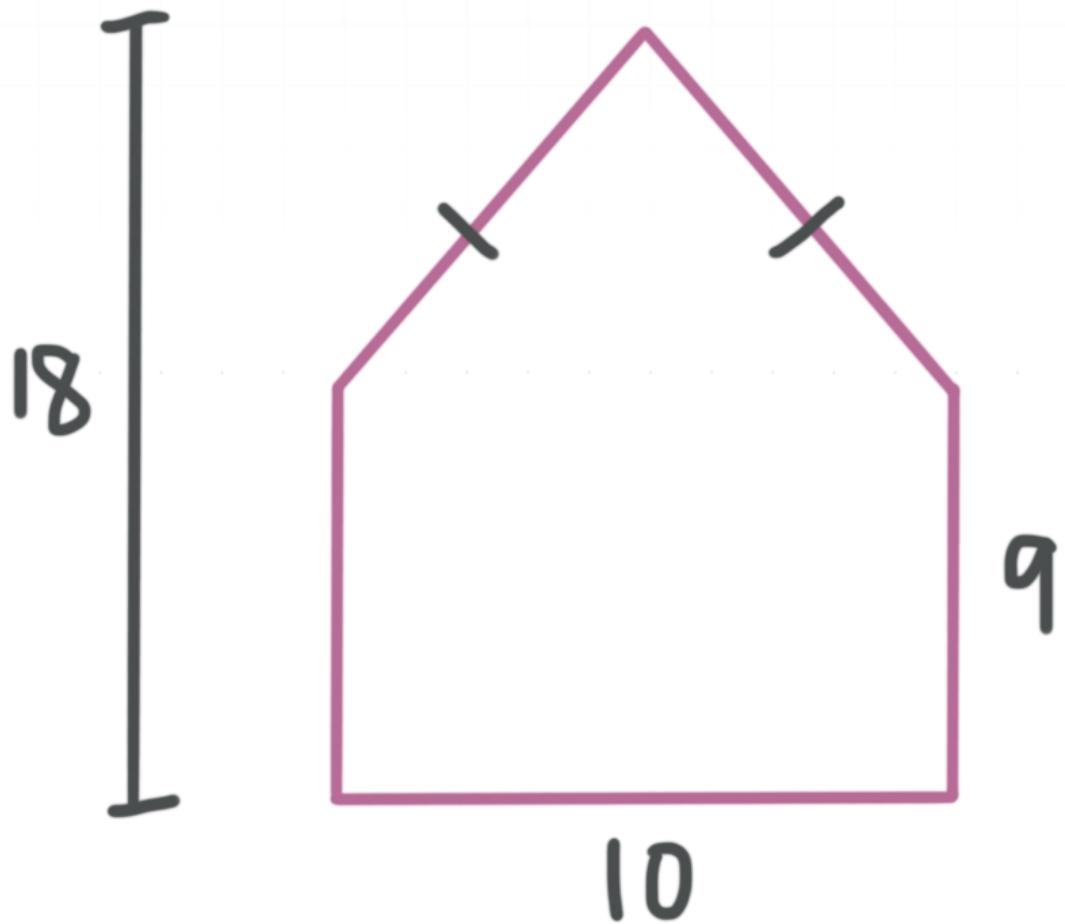
- 1. Find the area of a triangle that has base length 16 and height 14.
  
- 2. Find the area of the triangle.



- 3. Find the area of the triangle.

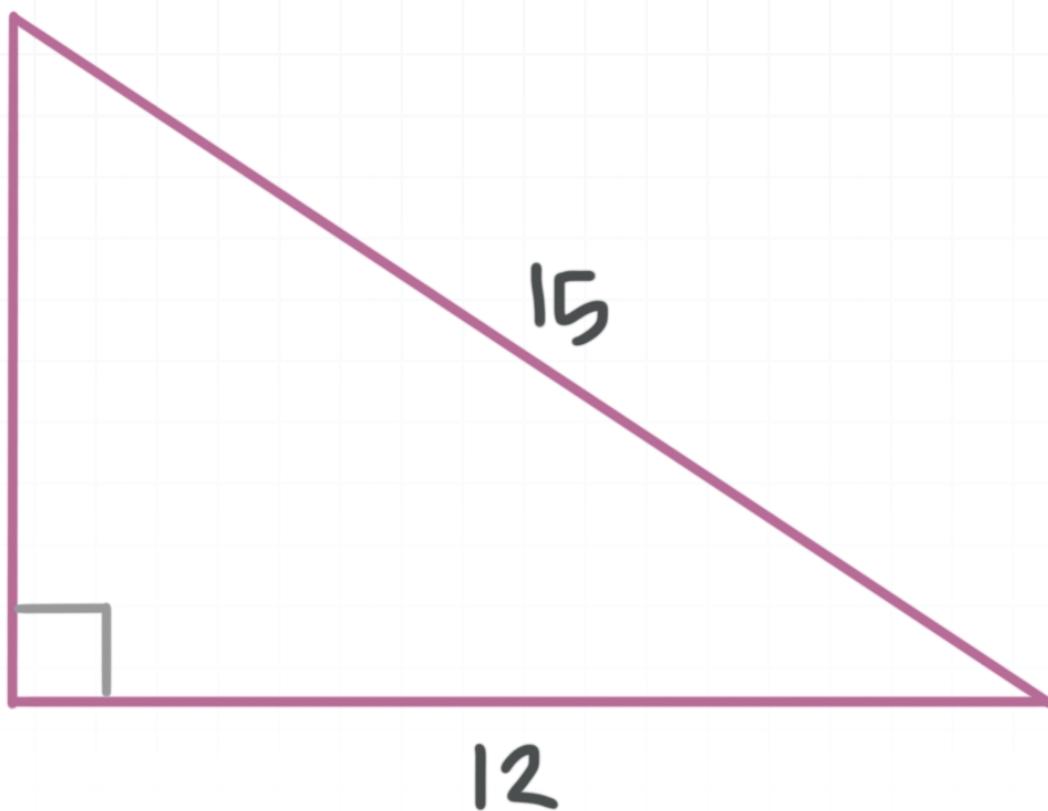


■ 4. Find the area of the figure below.

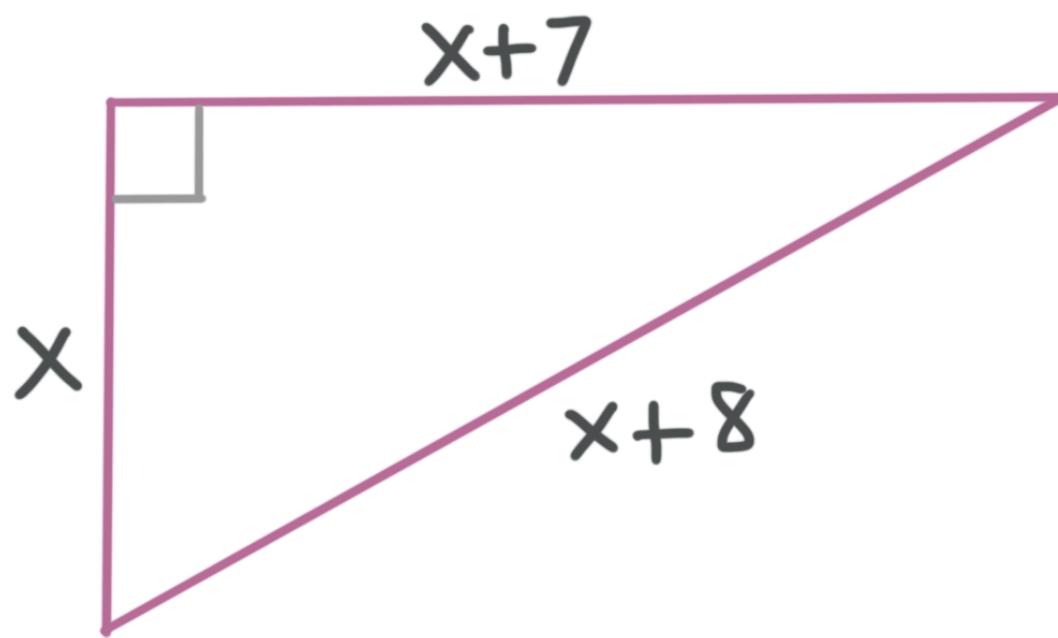


## PERIMETER OF A TRIANGLE

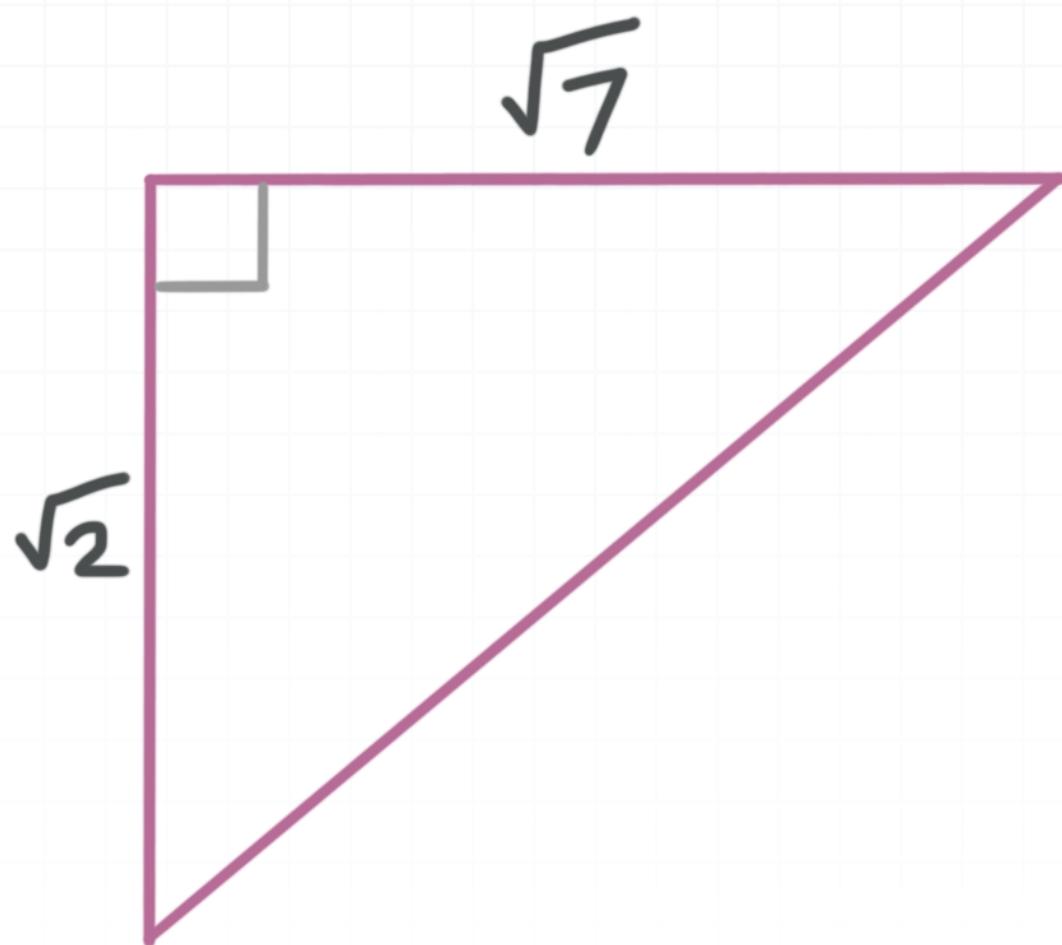
- 1. Find the perimeter of the triangle.



- 2. Find the perimeter of the triangle.



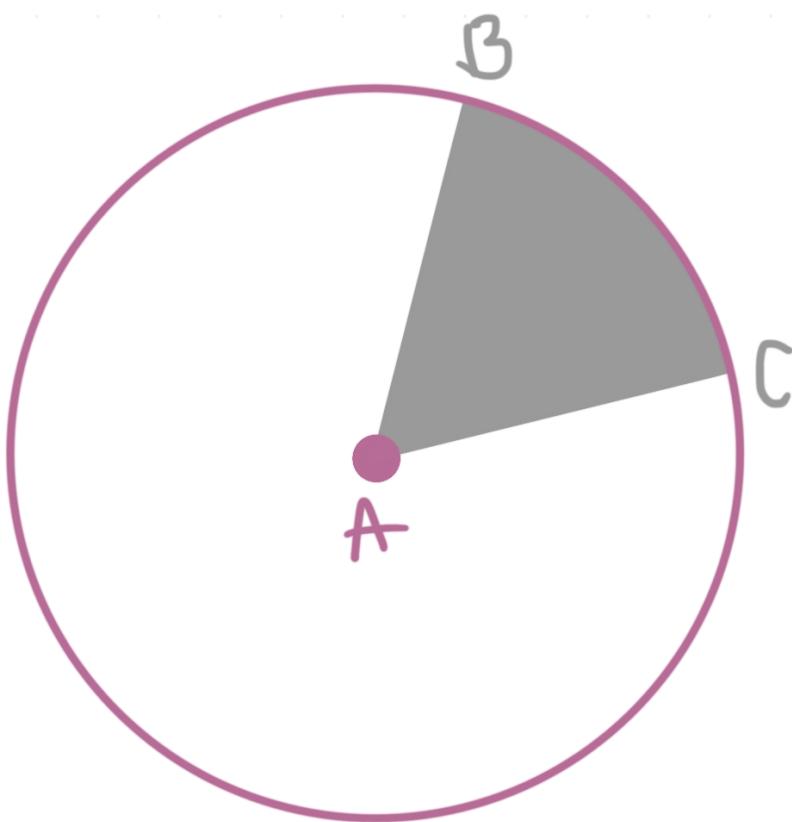
- 3. Find the exact perimeter of the triangle.



- 4. Find the perimeter of a right, isosceles triangle, to the nearest hundredth, in which one of the legs measures 5 inches.

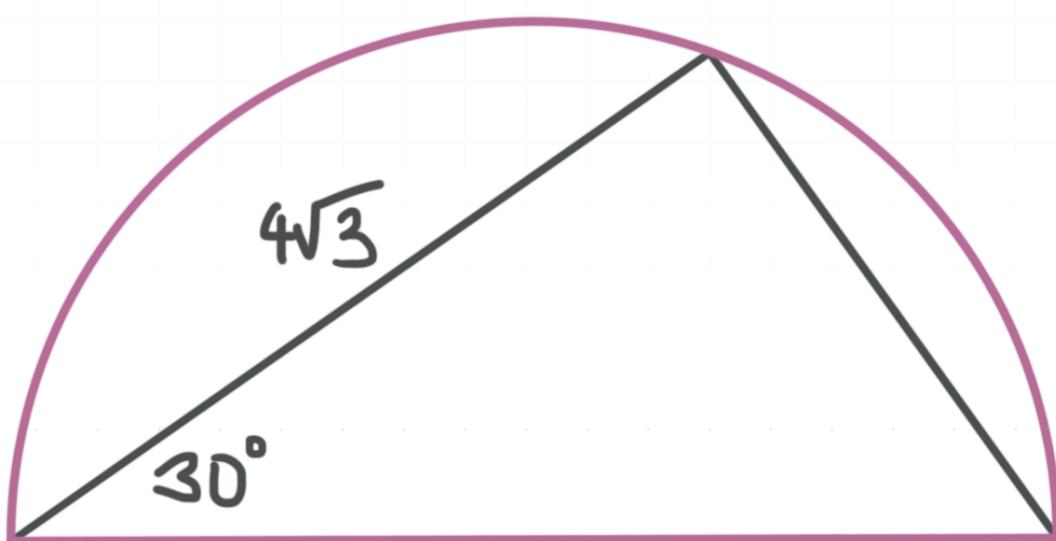
## AREA OF A CIRCLE

- 1. Find the area of a circle to the nearest hundredth with a diameter of 44 inches.
  
- 2. The area of a circle is  $300 \text{ cm}^2$ . Find the length of the radius to the nearest tenth of a centimeter.
  
- 3. Find the exact area of a circle with a circumference of  $18\pi$ .
  
- 4. Find the area of the shaded region to the nearest tenth if  $m\angle BAC = 60^\circ$  and  $AC = 16 \text{ feet}$ .

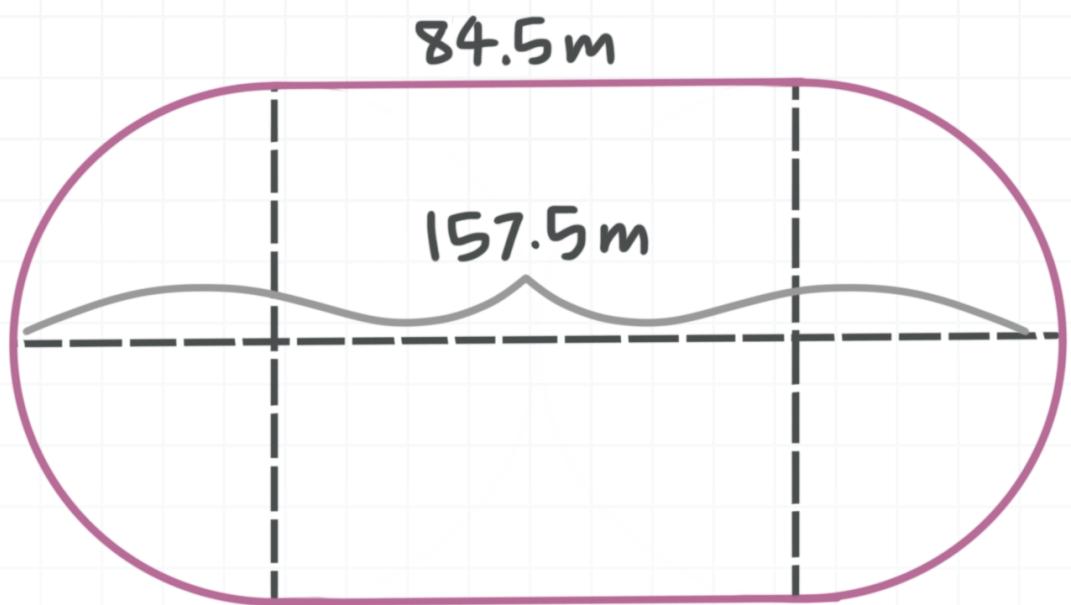


## CIRCUMFERENCE OF A CIRCLE

- 1. To the nearest hundredth, find the circumference of a circle that has a radius of 14 feet.
  
- 2. Find the area of a circle with a circumference of 400 ft.
  
- 3. Find the exact circumference of the semicircle.

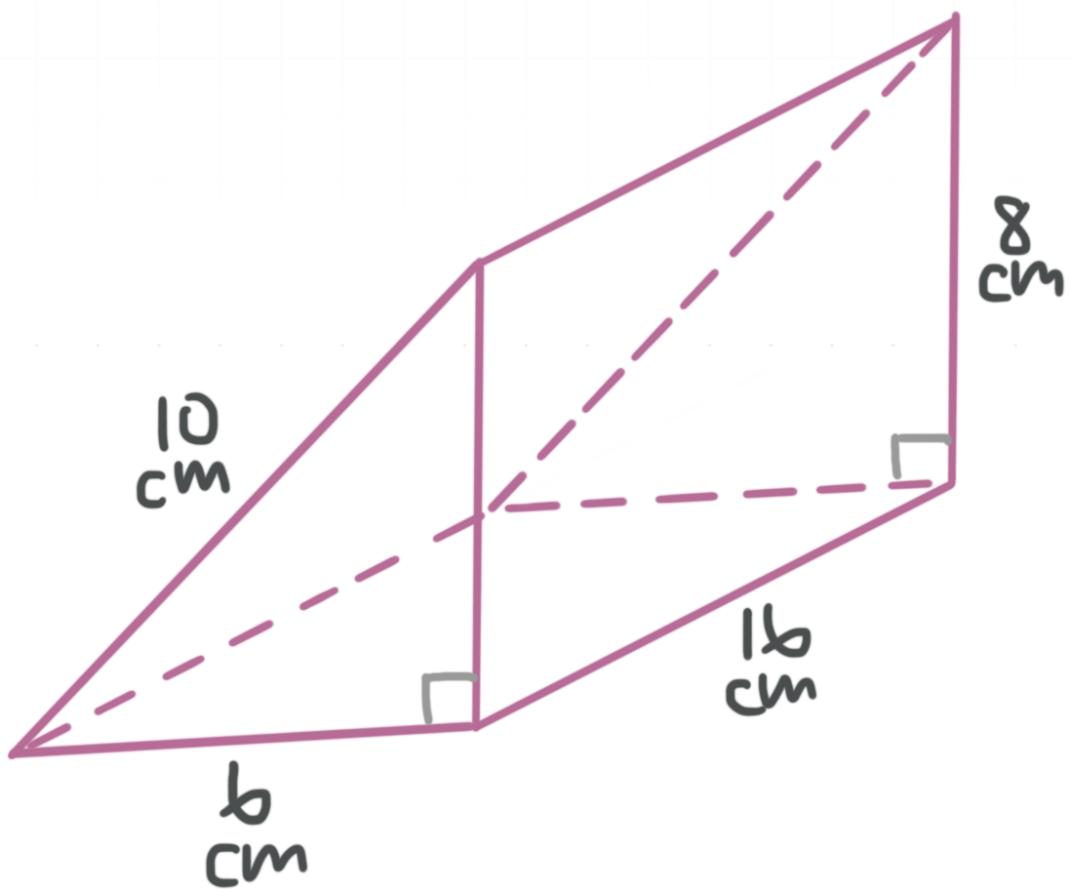


- 4. To the nearest tenth, find the distance around the following track.

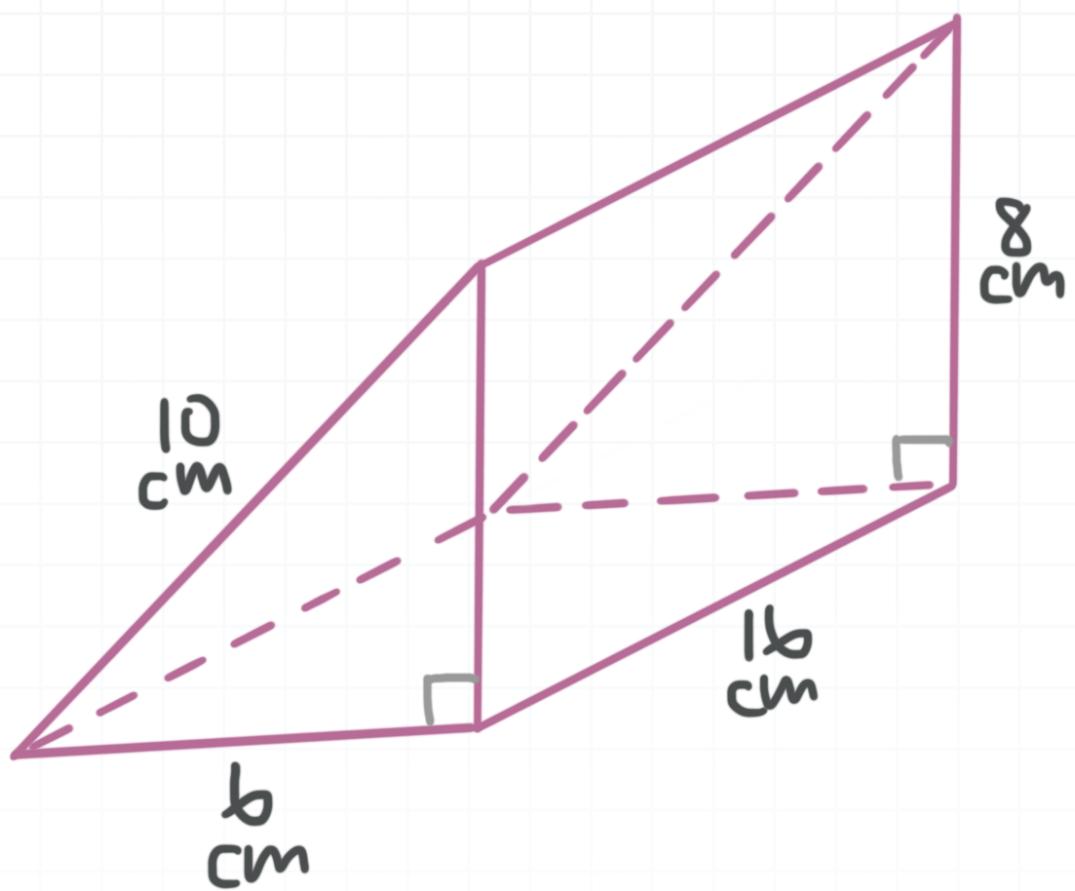


## NETS/VOLUME/SURFACE AREA OF PRISMS

- 1. Find the volume of a rectangular prism with length 14 feet, width 10 feet, and height 5 feet.
- 2. Find the surface area of a rectangular prism with length 14 feet, width 10 feet, and height 5 feet.
- 3. Find the surface area of the triangular prism.

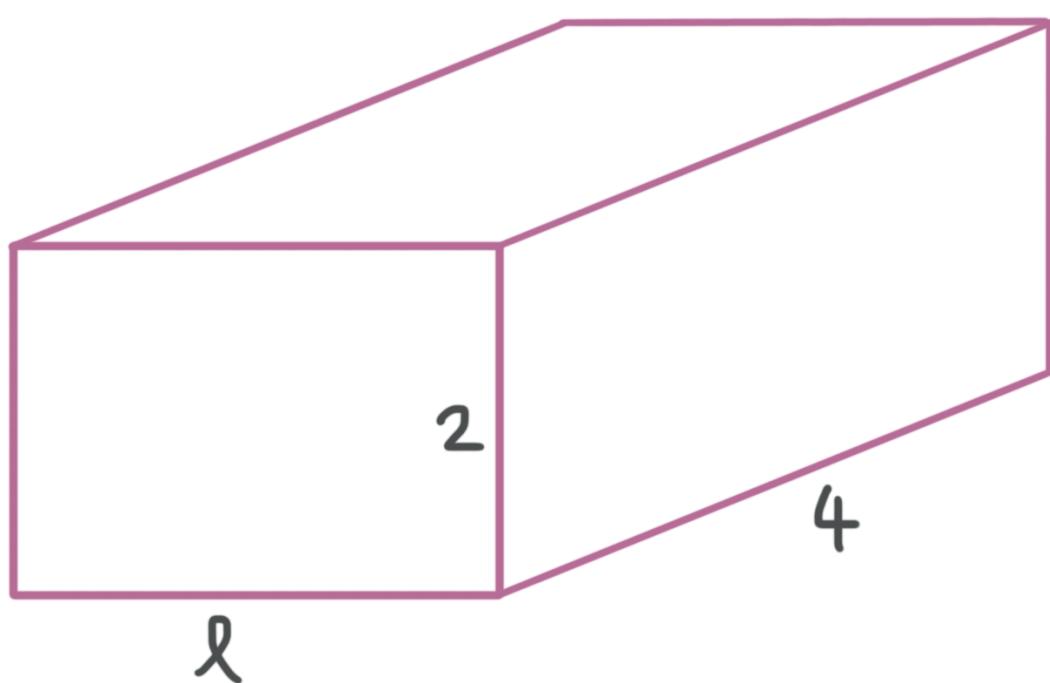


- 4. Find the volume of the triangular prism.

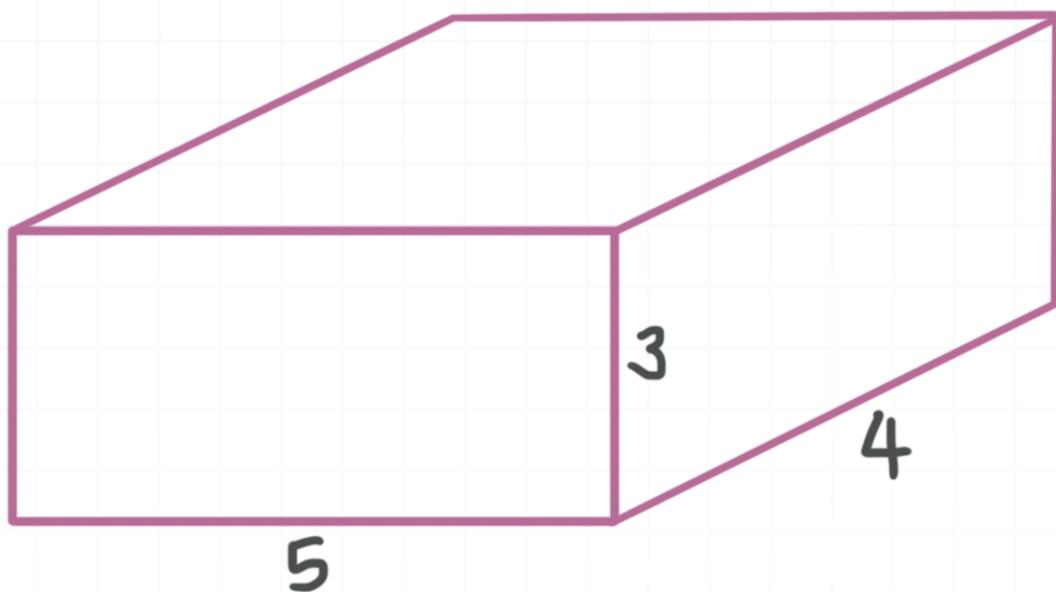


## SURFACE AREA TO VOLUME RATIO OF PRISMS

- 1. A rectangular prism has length, width, and height of 5 inches. Find the ratio of its surface area to its volume.
  
- 2. A cube has a volume of  $216 \text{ in}^3$ . Suppose we double the length of each side of the cube. What is the ratio of the smaller cube to the larger cube?
  
- 3. In lowest terms, find the ratio of volume to surface area of a cube with side length  $x$ .
  
- 4. The ratio of the volume to surface area for the following rectangular prism is  $1 : 2$ . Find the length of the prism.

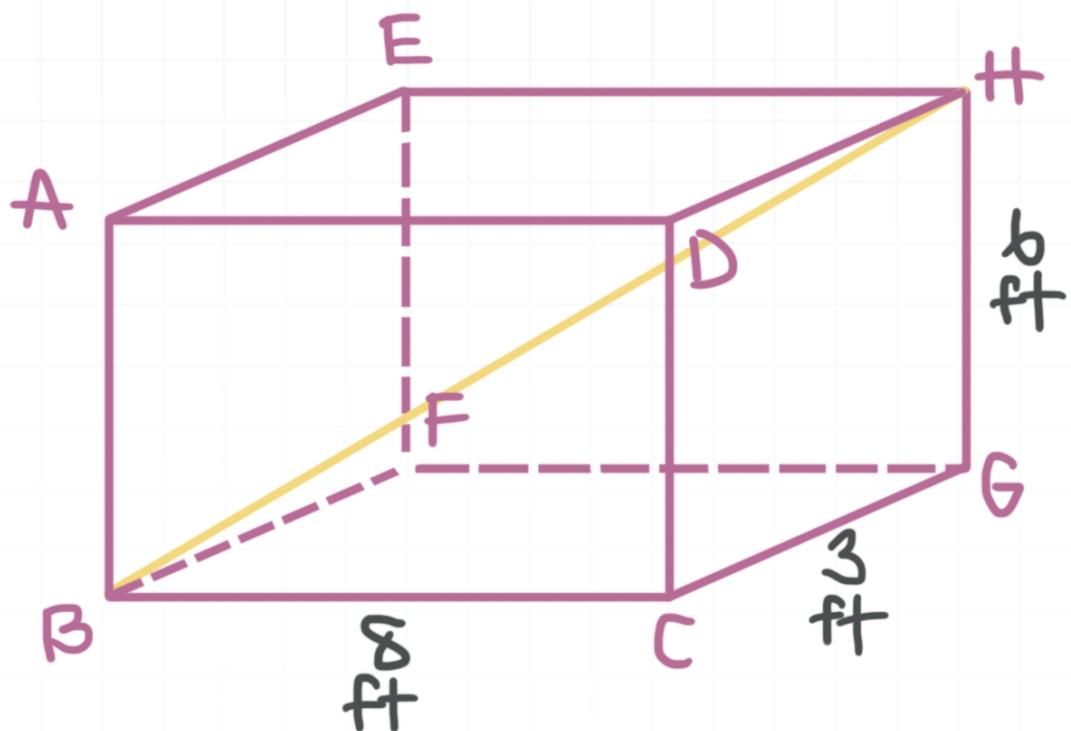


- 5. How many times greater will the surface area of this rectangular prism be if we double each side length?



## DIAGONAL OF A RIGHT RECTANGULAR PRISM

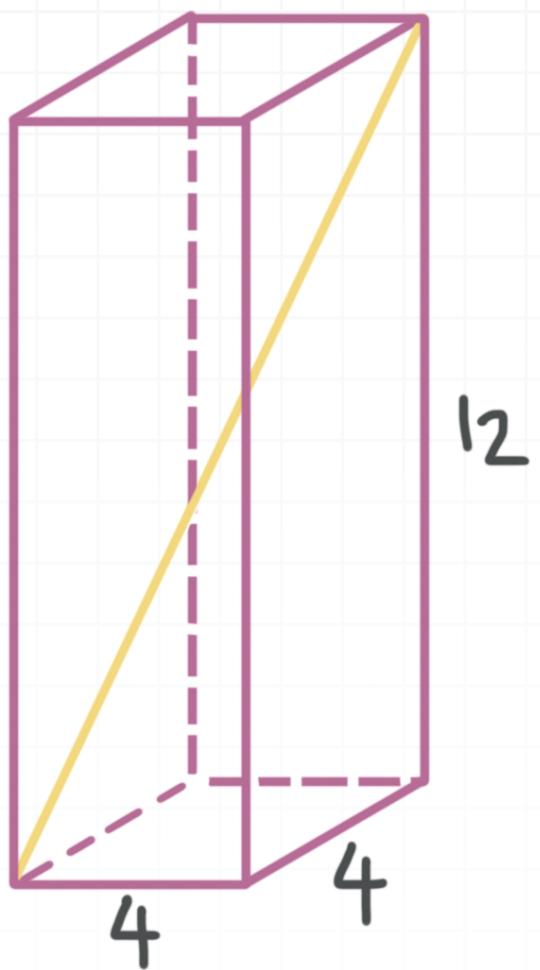
- 1. Find the length of  $BH$  in the right rectangular prism.



- 2. Find the length of the diagonal of a cube with side length 10.

- 3. If the length of the diagonal of a cube is  $4\sqrt{3}$ , find the length of each side of the cube.

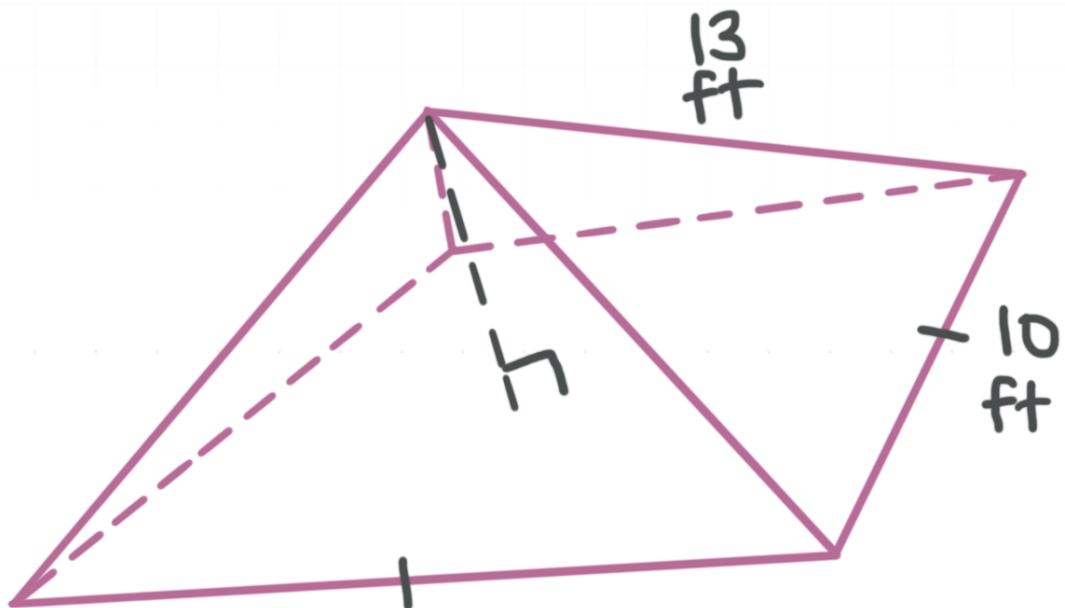
- 4. Find the length of the diagonal of the right rectangular prism.



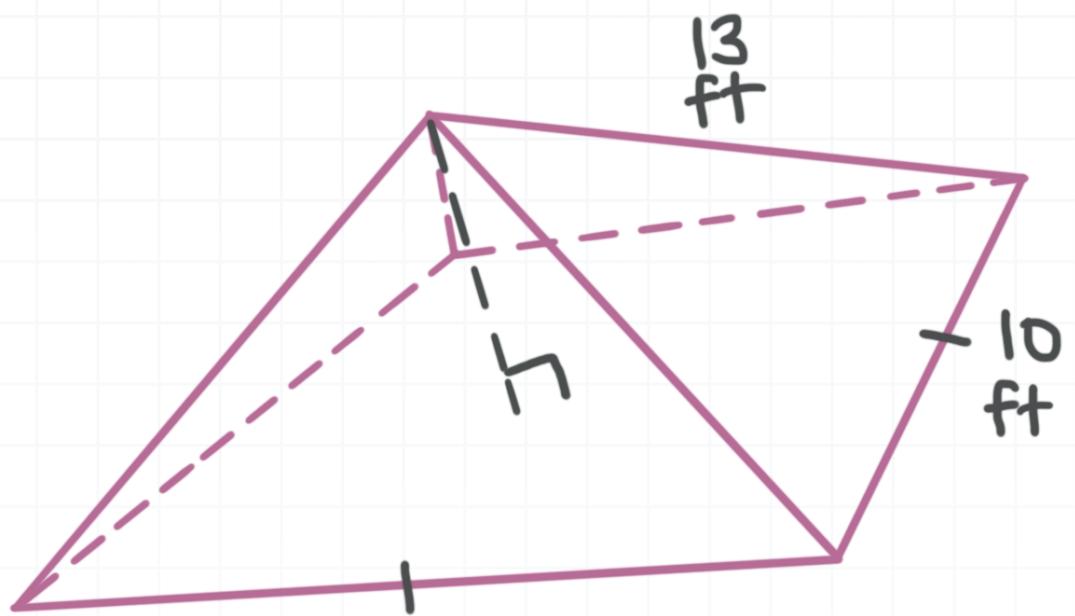
- 5. A right, rectangular prism has dimensions  $4 \times 5 \times x$ . Find the value of  $x$  if the diagonal is  $5\sqrt{2}$ .

## NETS/VOLUME/SURFACE AREA OF PYRAMIDS

- 1. A pyramid has a square base with area  $25 \text{ ft}^2$  and height 6 feet. Find the volume of this pyramid.
- 2. A pyramid has a square base with area  $25 \text{ ft}^2$  and height 6 feet. Find the surface area of this pyramid.
- 3. Find the surface area of the pyramid.

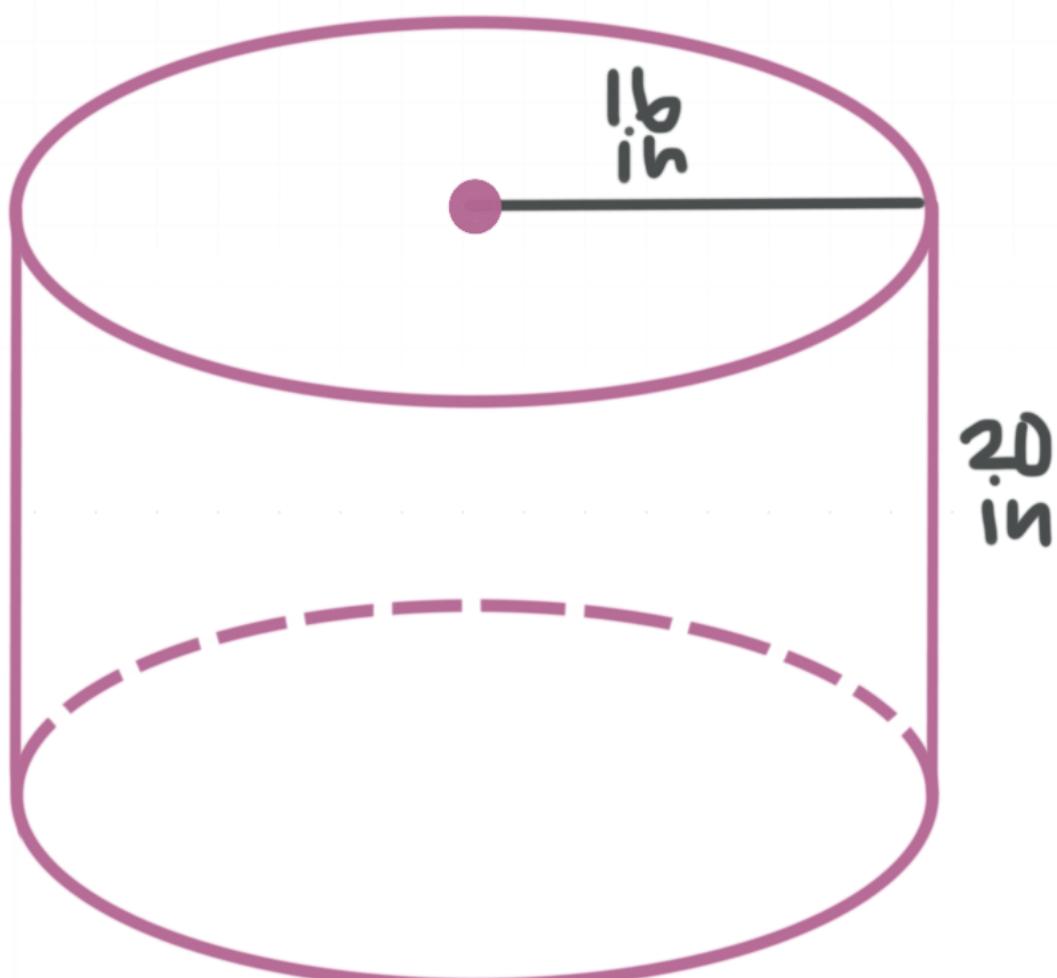


- 4. Find the height of the following pyramid to the nearest tenth. Then find its volume.

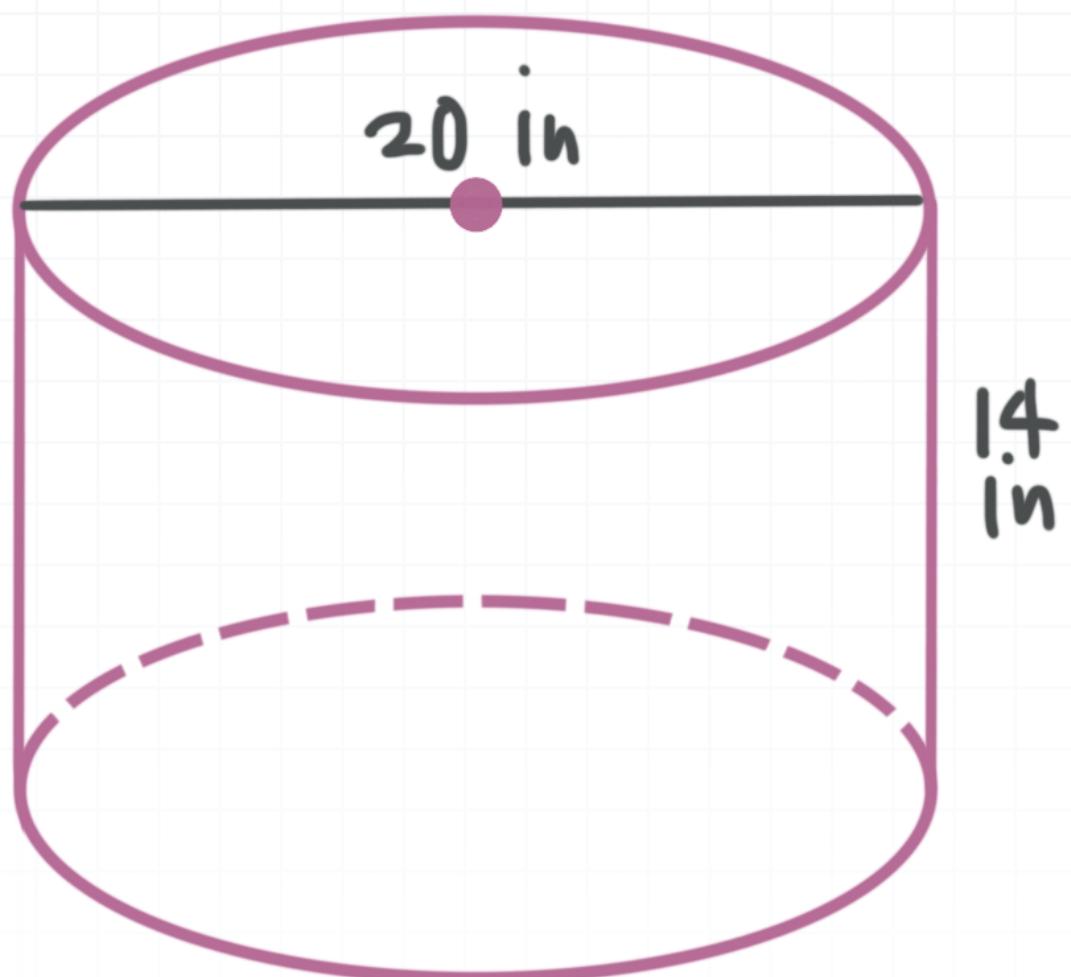


## NETS/VOLUME/SURFACE AREA OF CYLINDERS

- 1. Find the volume of a cylinder with diameter 10 cm and height 12 cm.
- 2. Find the height of a cylinder with volume  $2,814.867 \text{ in}^3$  and radius 8.
- 3. Find the surface area of the cylinder.

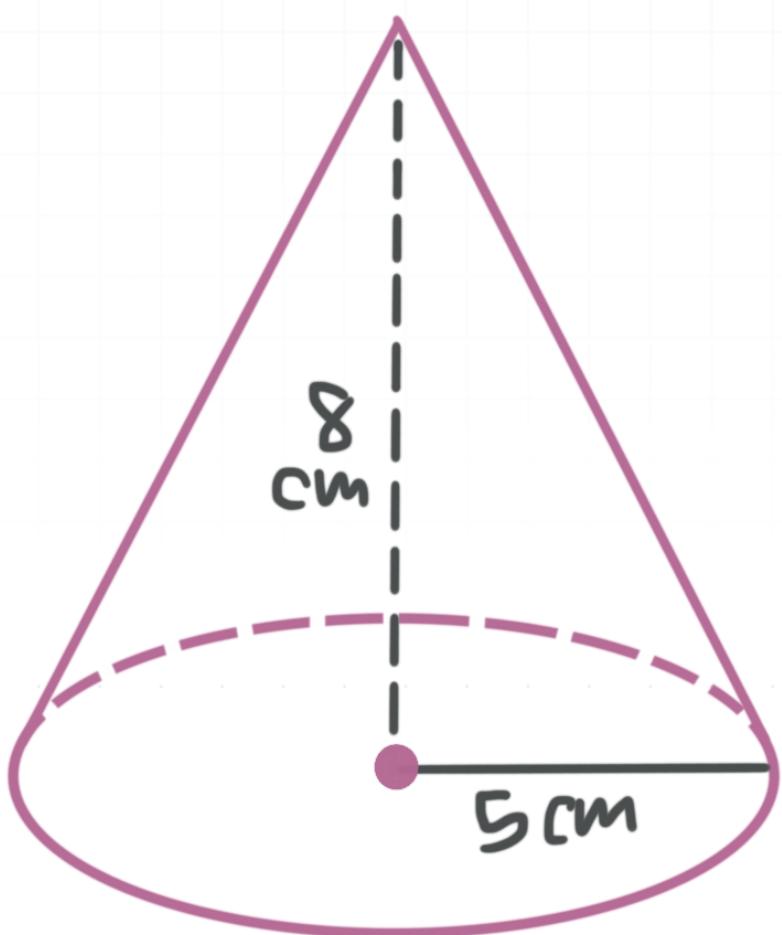


- 4. The circumference of the base of the cylinder is 62.832 inches. Find its volume.

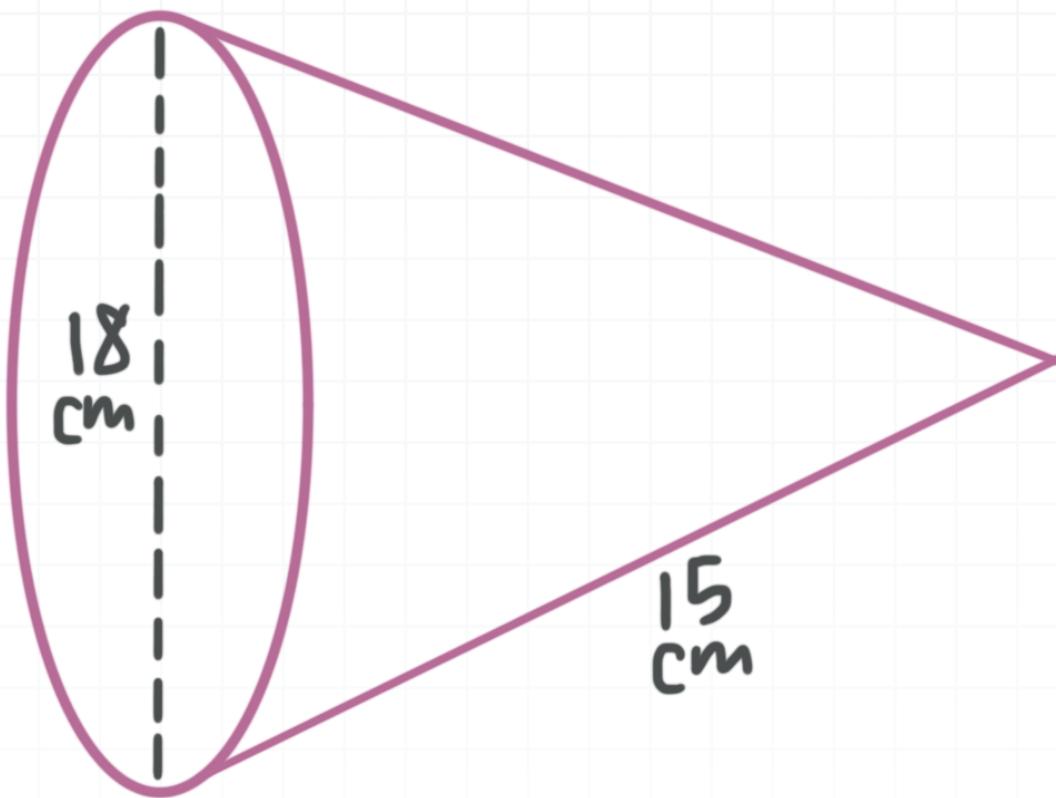


## NETS/VOLUME/SURFACE AREA OF CONES

- 1. Find the volume of a right cone with a height of 10.5 inches and a diameter of 8 inches at its base to the nearest hundredth.
  
- 2. Find the slant height of the cone.



- 3. Find the surface area of the cone in terms of  $\pi$ .



- 4. The volume of a cone is  $100\pi$ . Find the length of its radius if its height is 12.

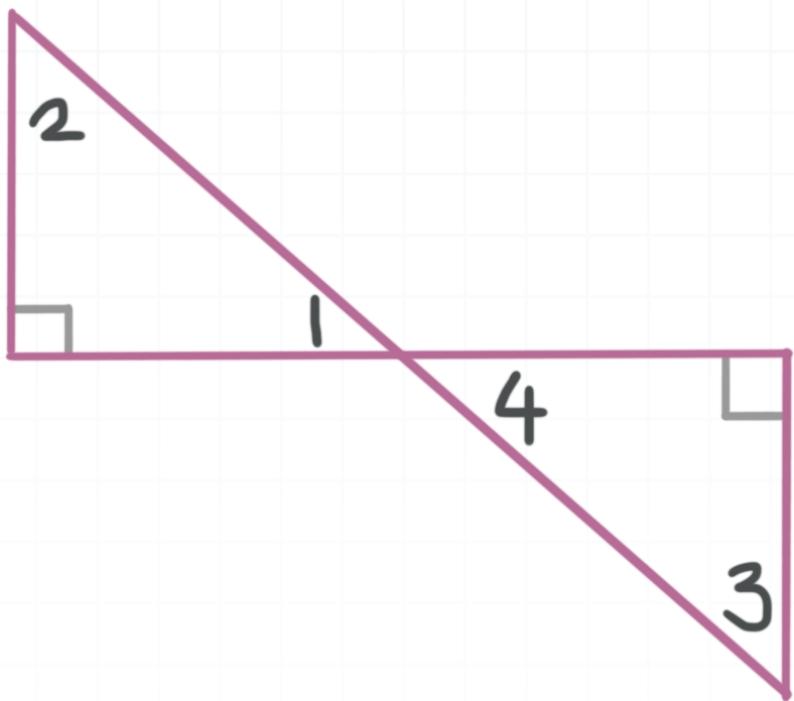
## VOLUME/SURFACE AREA OF SPHERES

- 1. Find the volume to the nearest hundredth of a sphere with radius 15 inches.
  
  
  
  
  
- 2. A basketball has a diameter of 9.55 inches. Find its surface area to the nearest hundredth.
  
  
  
  
  
- 3. A sphere has radius 10. How much greater is the volume than the surface area in terms of  $\pi$ ?
  
  
  
  
  
- 4. A sphere has a volume of  $288\pi$ . Find its diameter.

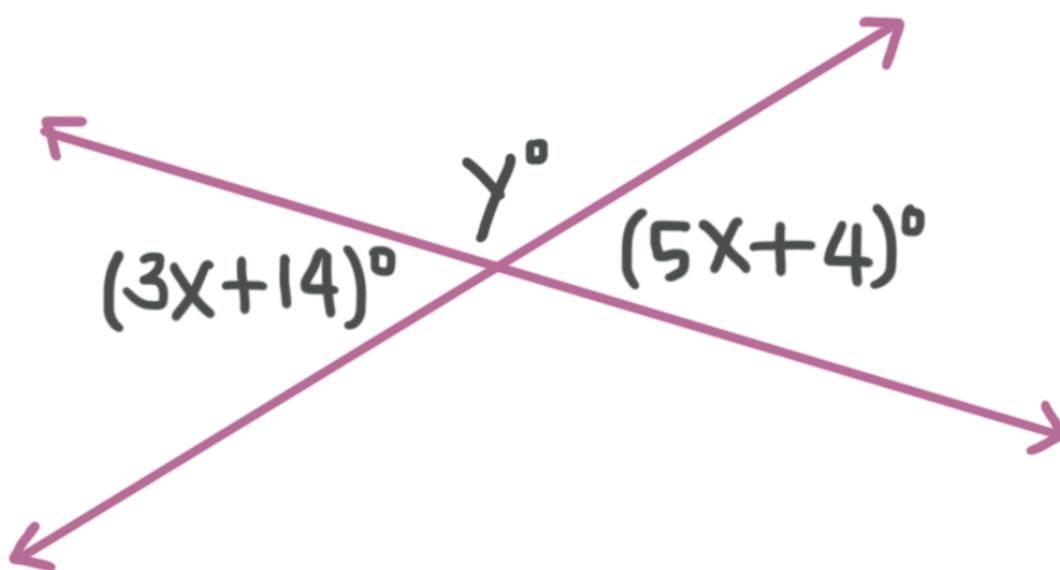


## CONGRUENT ANGLES

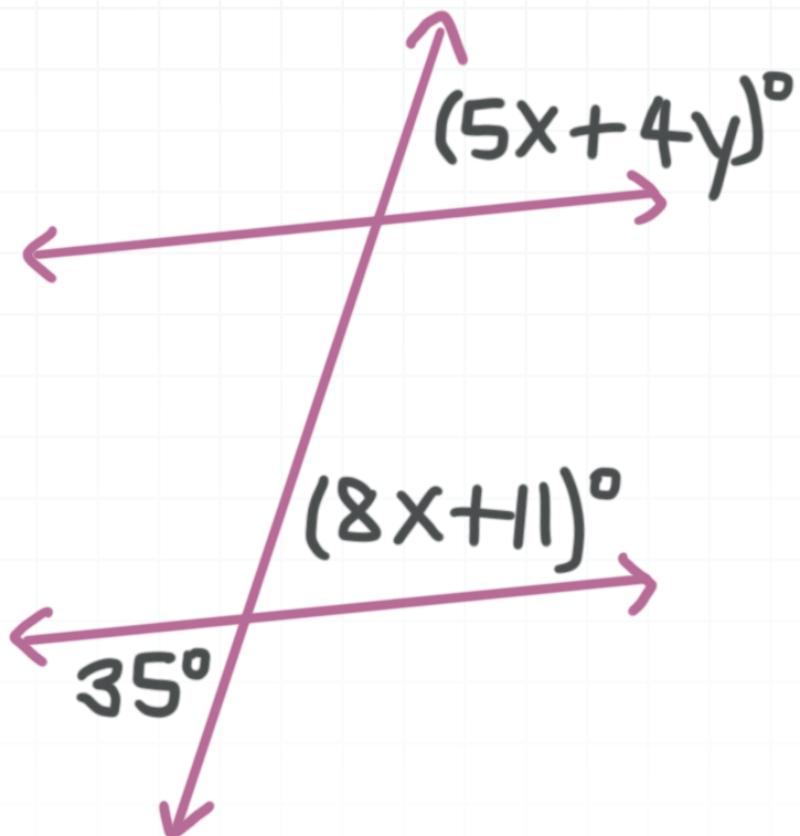
- 1.  $m\angle 3 = 4x - 11$  and  $m\angle 1 = 5x + 2$ . Find  $m\angle 2$ .



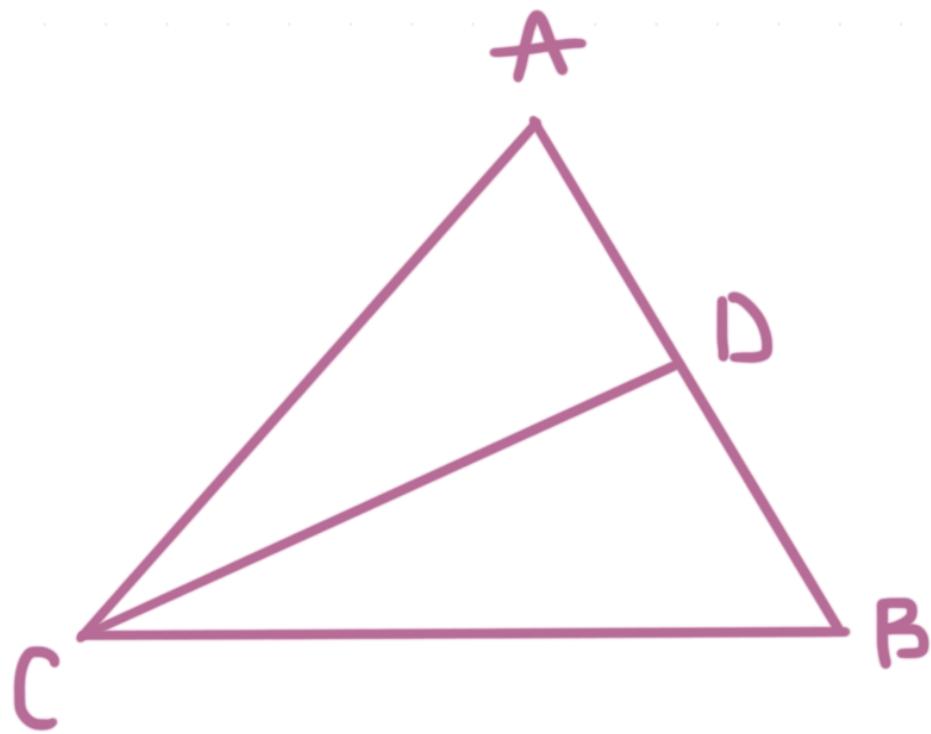
- 2. Find the values of  $x$  and  $y$ .



- 3. Find the value of  $x$  and  $y$ .

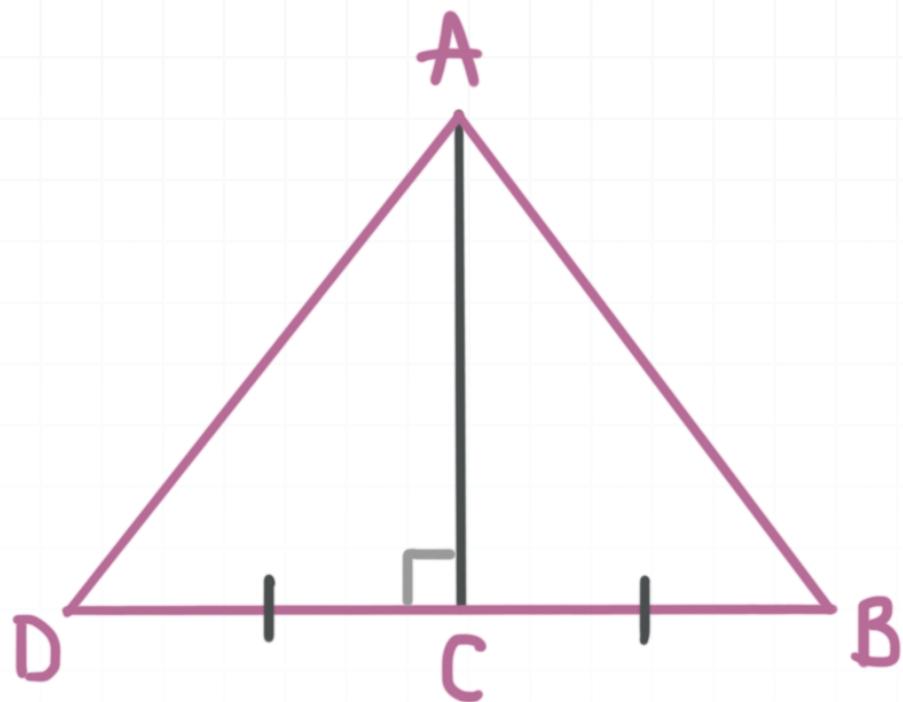


- 4.  $\overline{CD}$  is an angle bisector of the triangle and  $\overline{CD} \perp \overline{AB}$ .  $m\angle CAD = 5x - 10$  and  $m\angle BCD = 25$ . Find  $x$ .

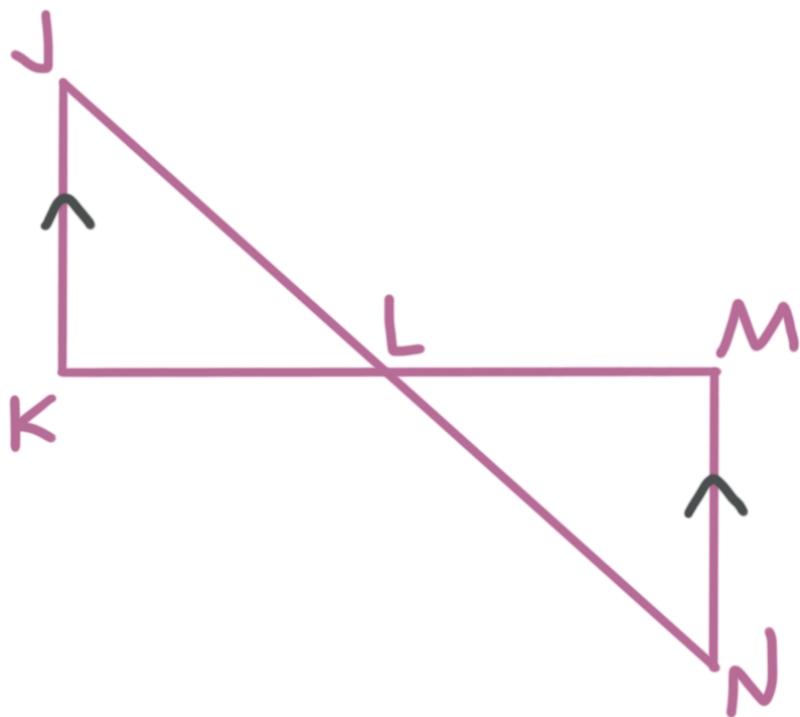


## TRIANGLE CONGRUENCE WITH SSS, ASA, SAS

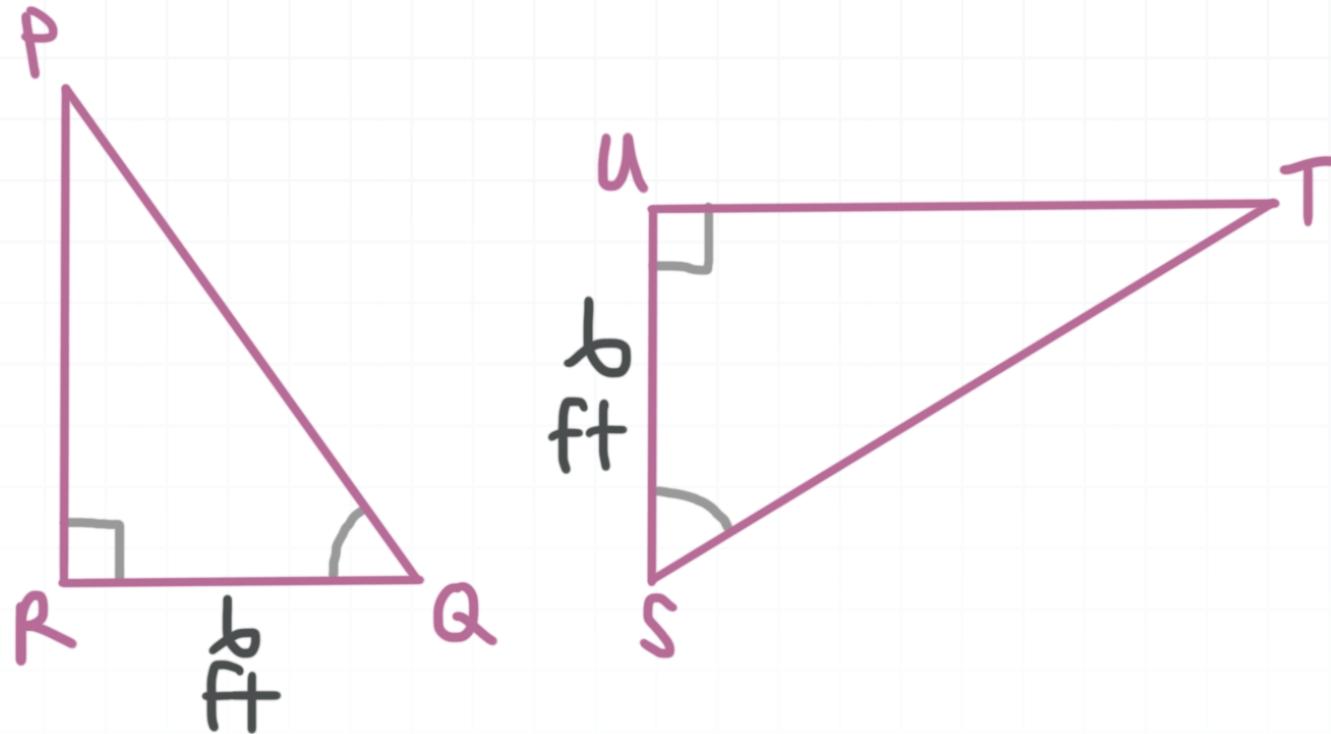
- 1. Fill in the blank.  $\triangle ABC \cong \triangle ADC$  by the \_\_\_\_\_ Theorem.



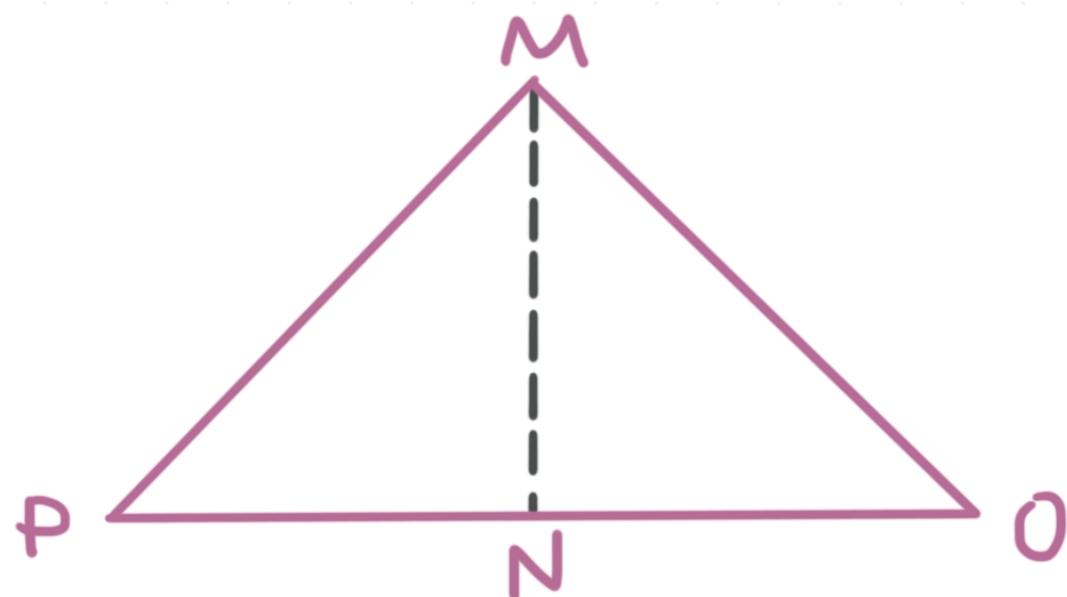
- 2. Fill in the blank.  $L$  is a midpoint of  $\overline{JN}$ .  $\triangle JKL \cong \triangle NML$  by the \_\_\_\_\_ Theorem.



- 3.  $\triangle PRQ \cong \triangle \underline{\hspace{2cm}}$  by the  $\underline{\hspace{2cm}}$  Theorem.

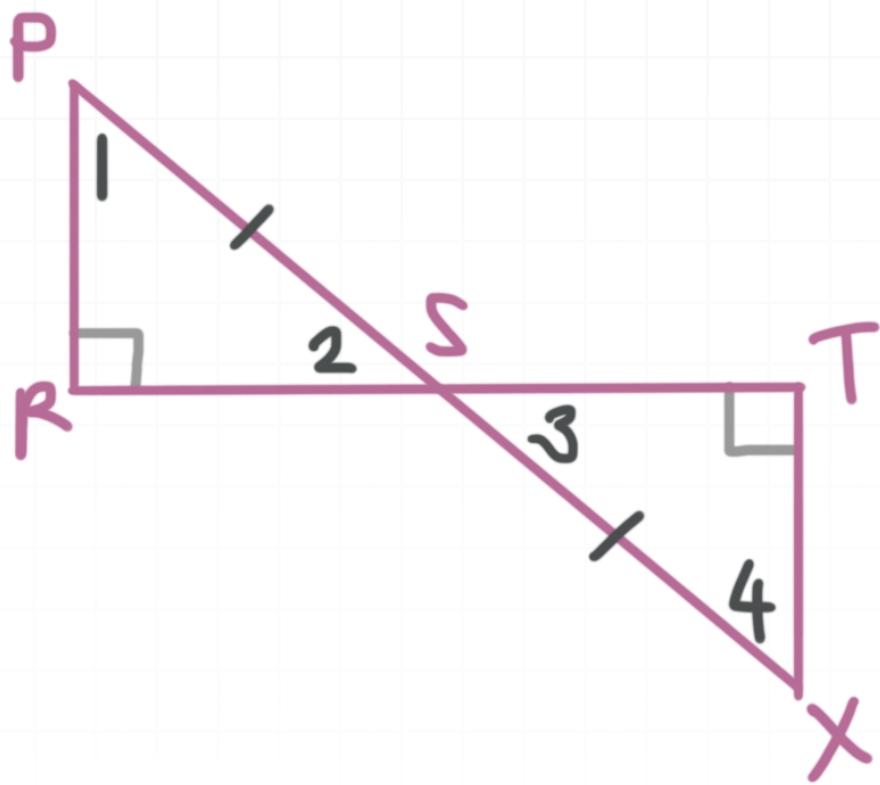


- 4.  $\triangle PMD$  is an isosceles triangle with vertex angle at  $M$ .  $N$  is a midpoint of  $\overline{PD}$ .  $\triangle PMN \cong \triangle DMN$  by the  $\underline{\hspace{2cm}}$  Theorem.



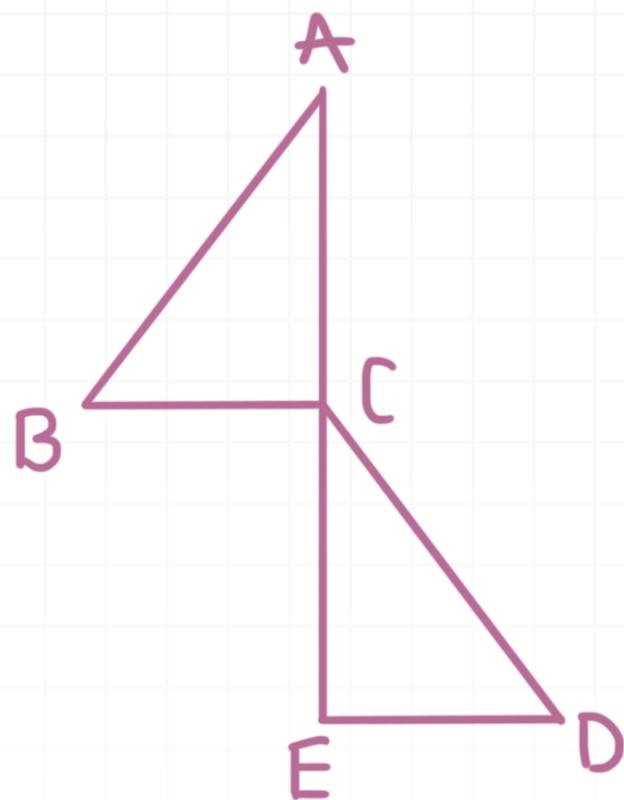
## TRIANGLE CONGRUENCE WITH AAS, HL

- 1. Which theorem could be used to prove  $\triangle PRS \cong \triangle XTS$ ?

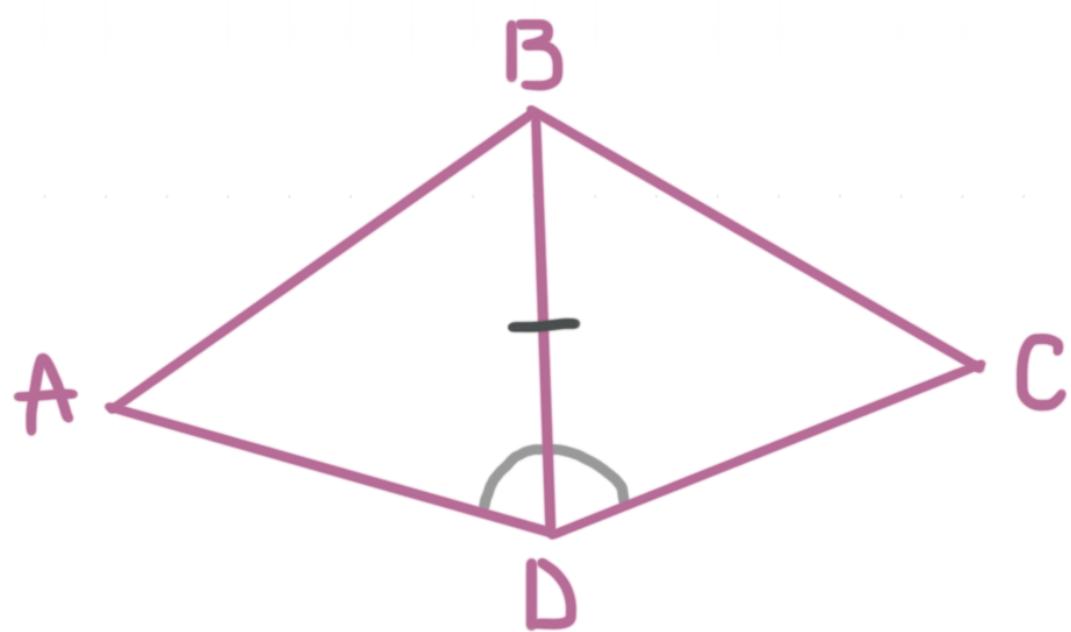


- 2. Which theorem could be used to prove  $\triangle ACB \cong \triangle ECD$ ? The following facts are given about the triangles.

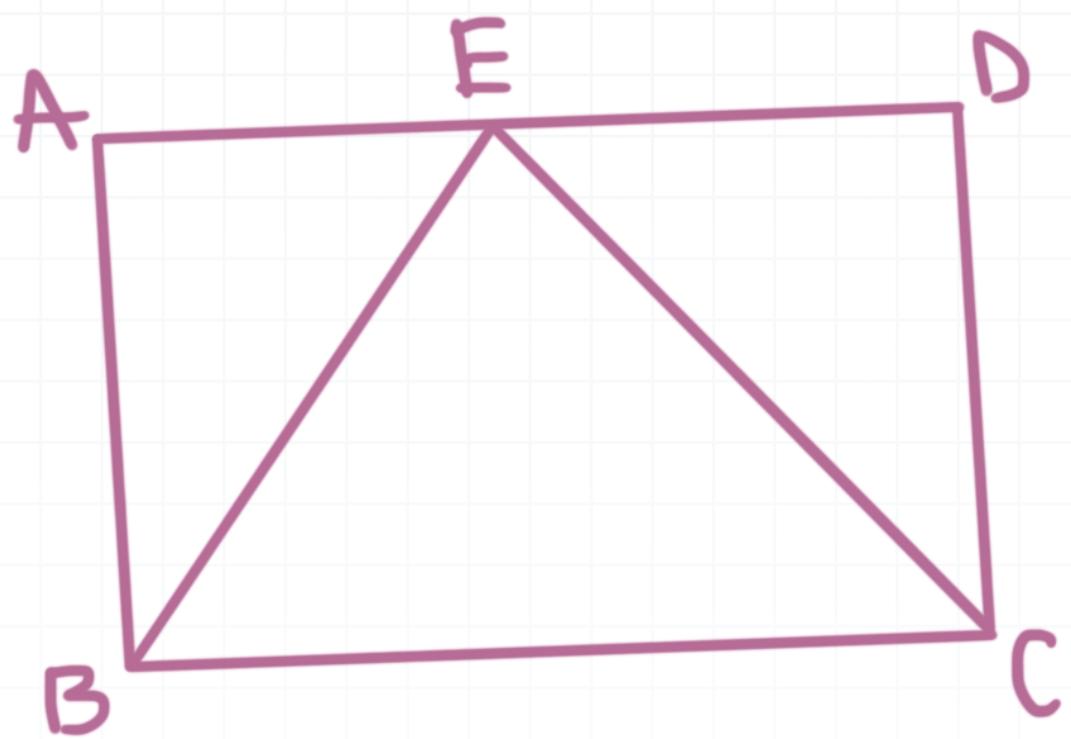
$\overline{AE} \perp \overline{BC}$ ,  $BC \parallel DE$ ,  $\overline{AB} \cong \overline{DC}$ , and  $C$  is a midpoint of  $\overline{AE}$



- 3. What additional information would we need to prove these triangles are congruent using AAS Theorem?

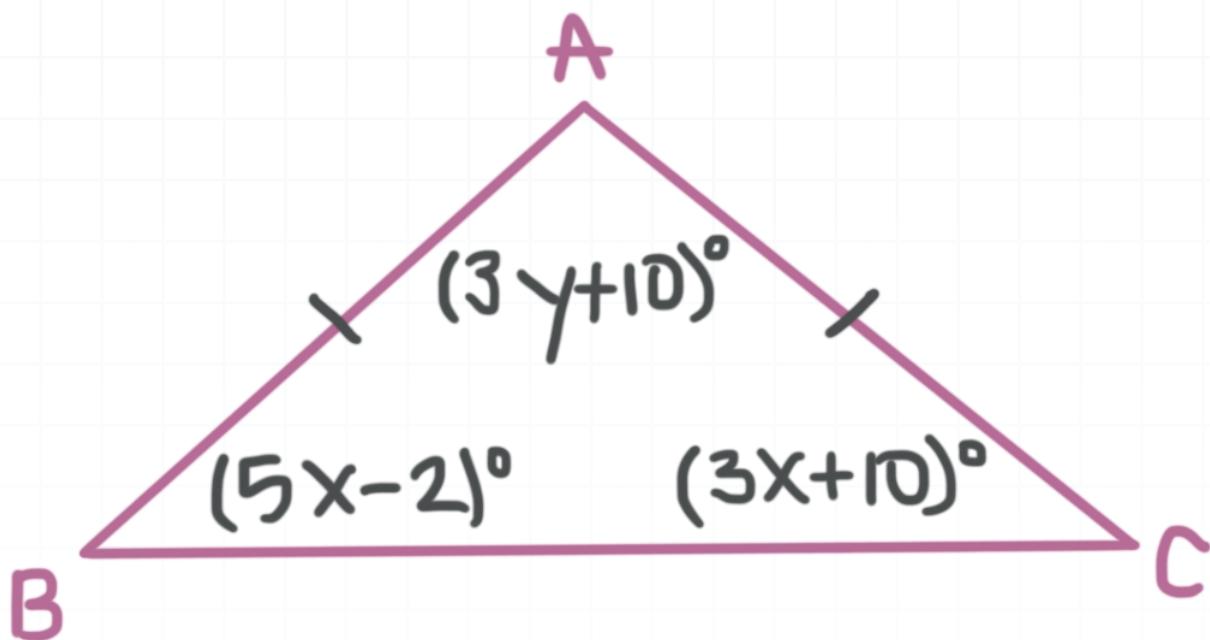


- 4.  $ABCD$  is a rectangle.  $BEC$  is an isosceles triangle with vertex angle at  $E$ . Write a proof to verify that  $\triangle BAE \cong \triangle CDE$  by the HL Theorem.



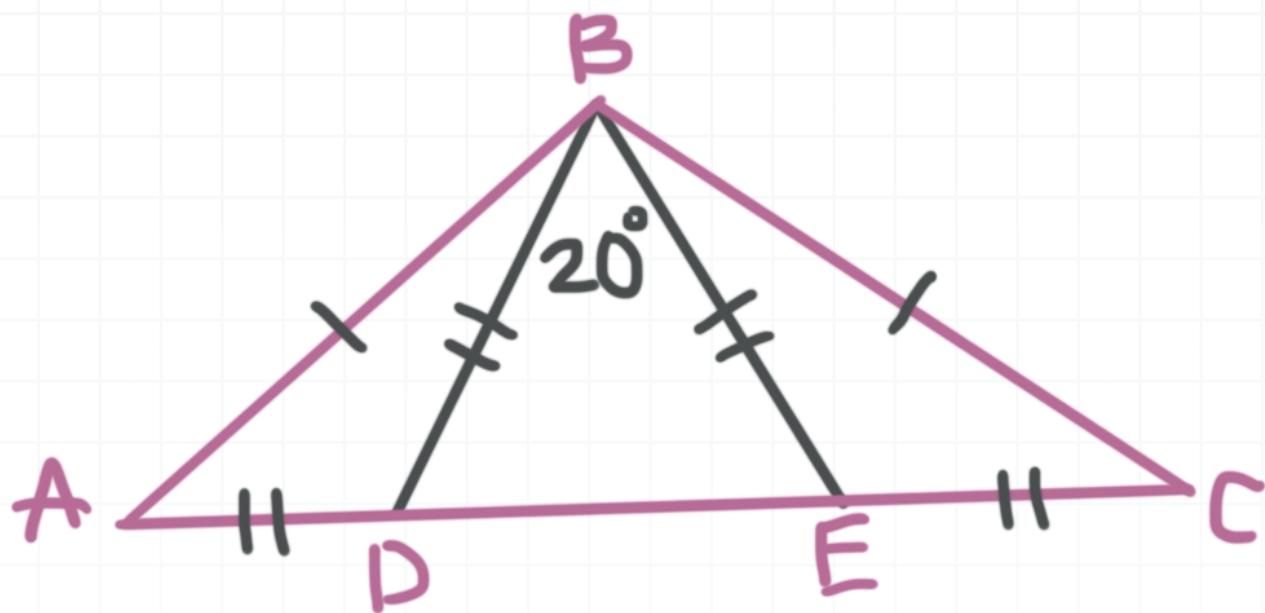
## ISOSCELES TRIANGLE THEOREM

- 1. Find the values of  $x$  and  $y$ .

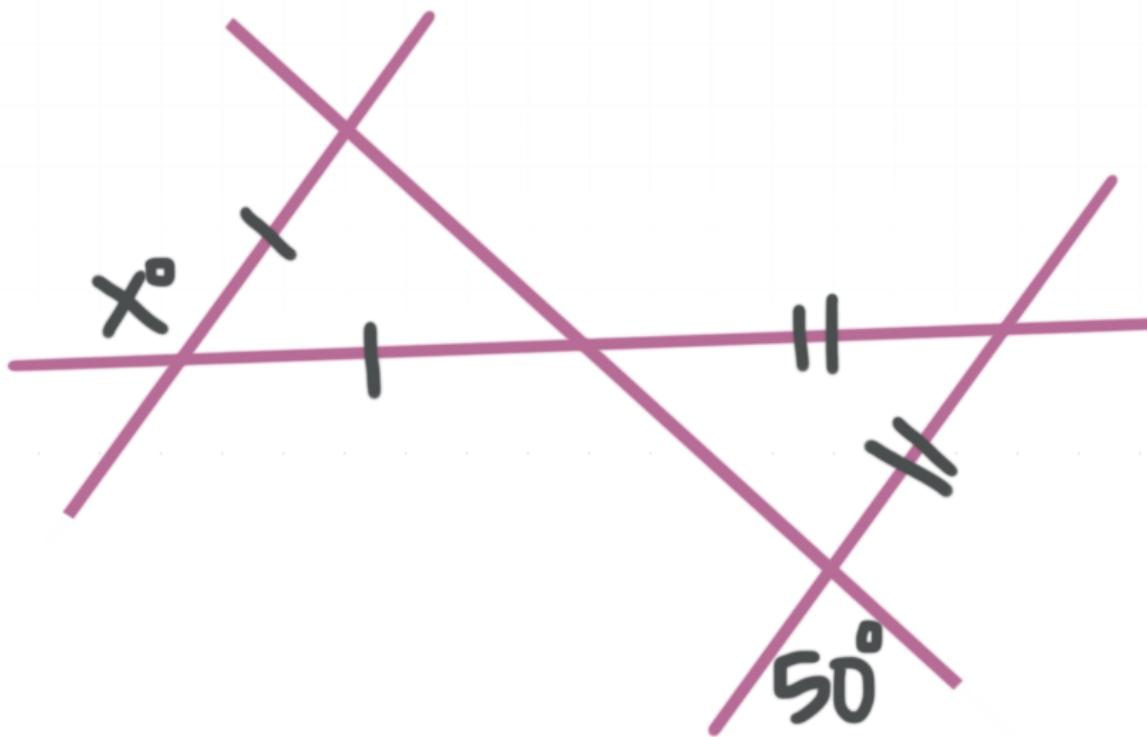


- 2.  $\triangle JKL$  is isosceles with vertex angle  $K$ .  $JK = 4x - 5$ ,  $LK = 3x + 8$ , and  $m\angle J = 2x + 4$ . Find  $m\angle L$ .

- 3. Find  $m\angle ABC$ .

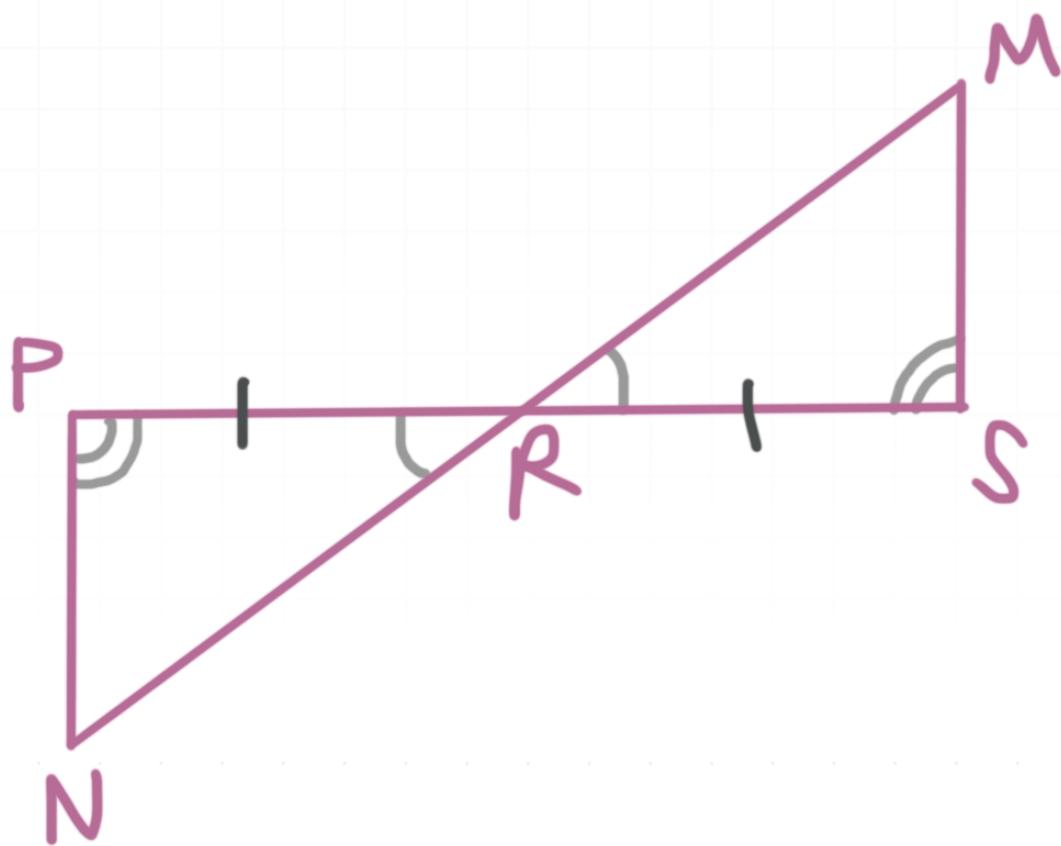


■ 4. Find  $x$ .

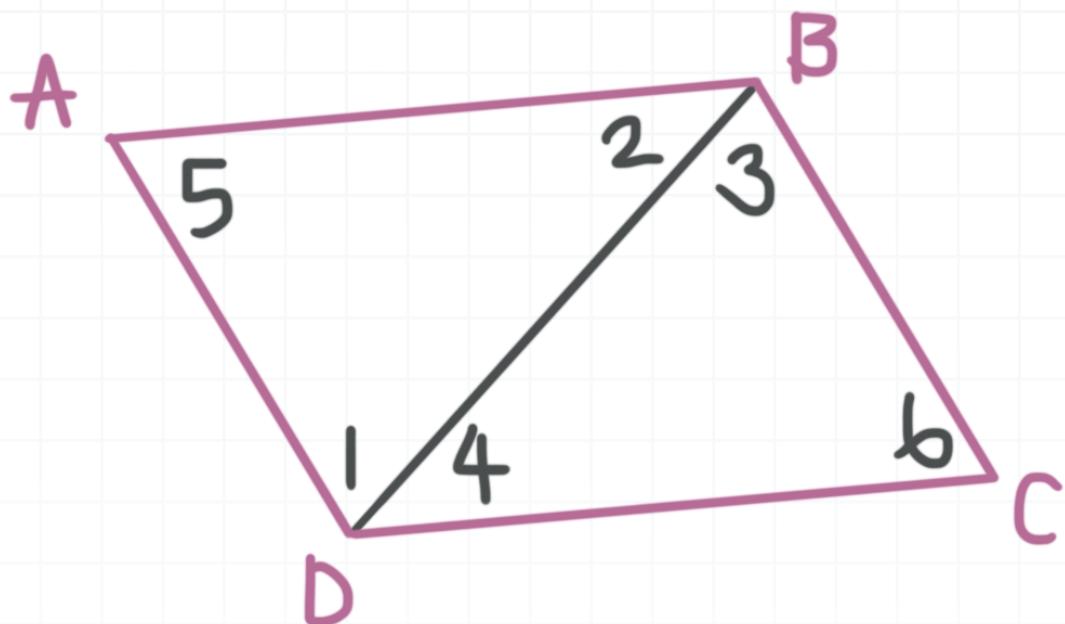


## CPCTC

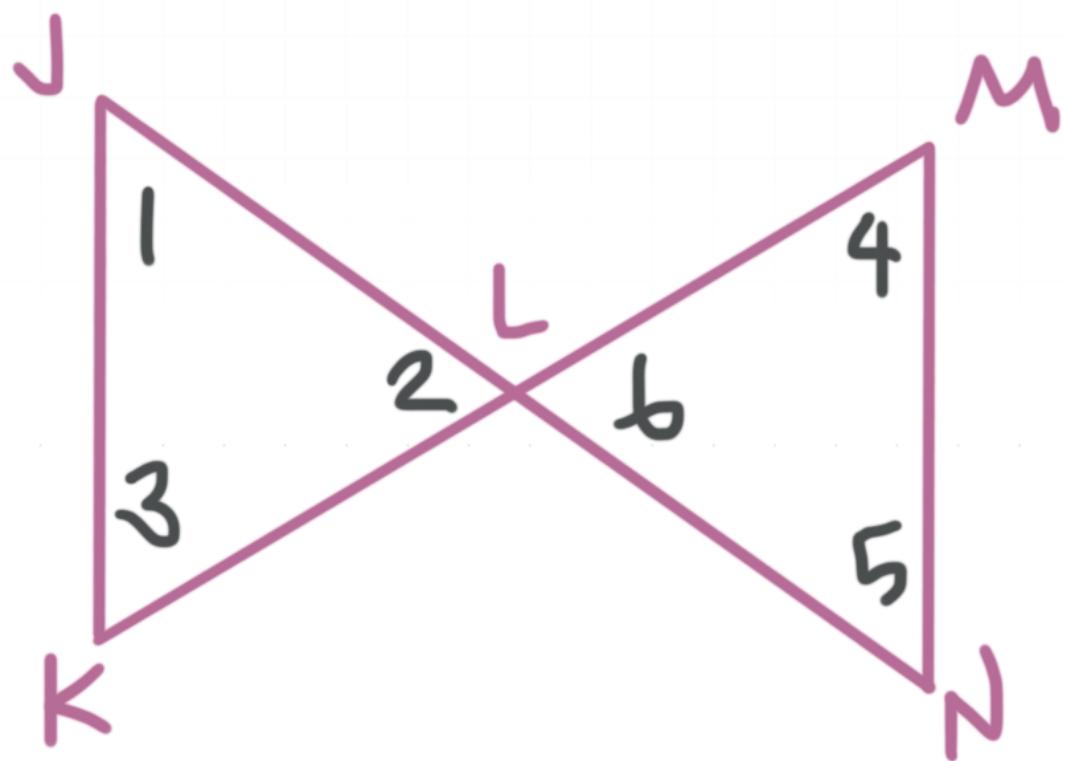
- 1. Fill in the blank. Given  $\triangle LMO \cong \triangle SQR$ ,  $\overline{LO} \cong$  \_\_\_\_\_.
- 2. Determine whether  $\angle M \cong \angle N$ . Justify your answer.



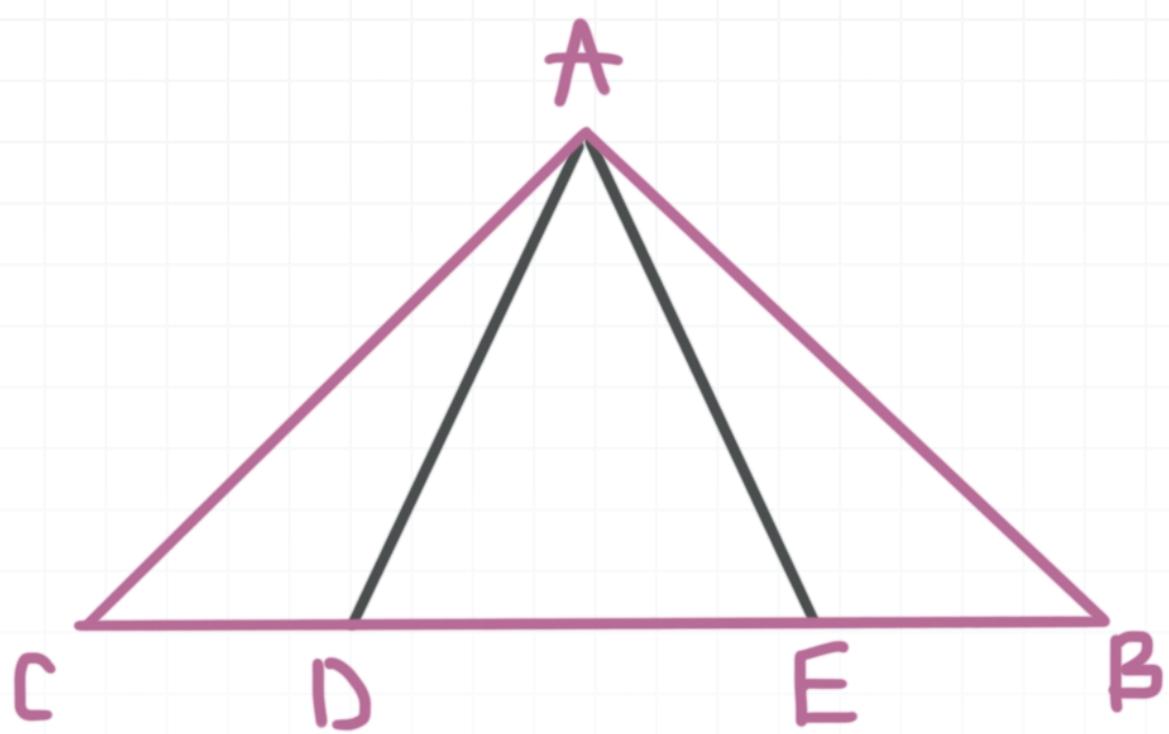
- 3.  $\triangle DOG \cong \triangle TCA$  by SSS. What three conclusions can be drawn by CPCTC?
- 4. Given  $\angle 1 \cong \angle 3$  and  $\angle 2 \cong \angle 4$ , prove  $\overline{AB} \cong \overline{CD}$ .



- 5. Given that  $L$  is the midpoint of  $\overline{JN}$  and  $\overline{KM}$ , prove  $\overline{JK} \cong \overline{NM}$ .

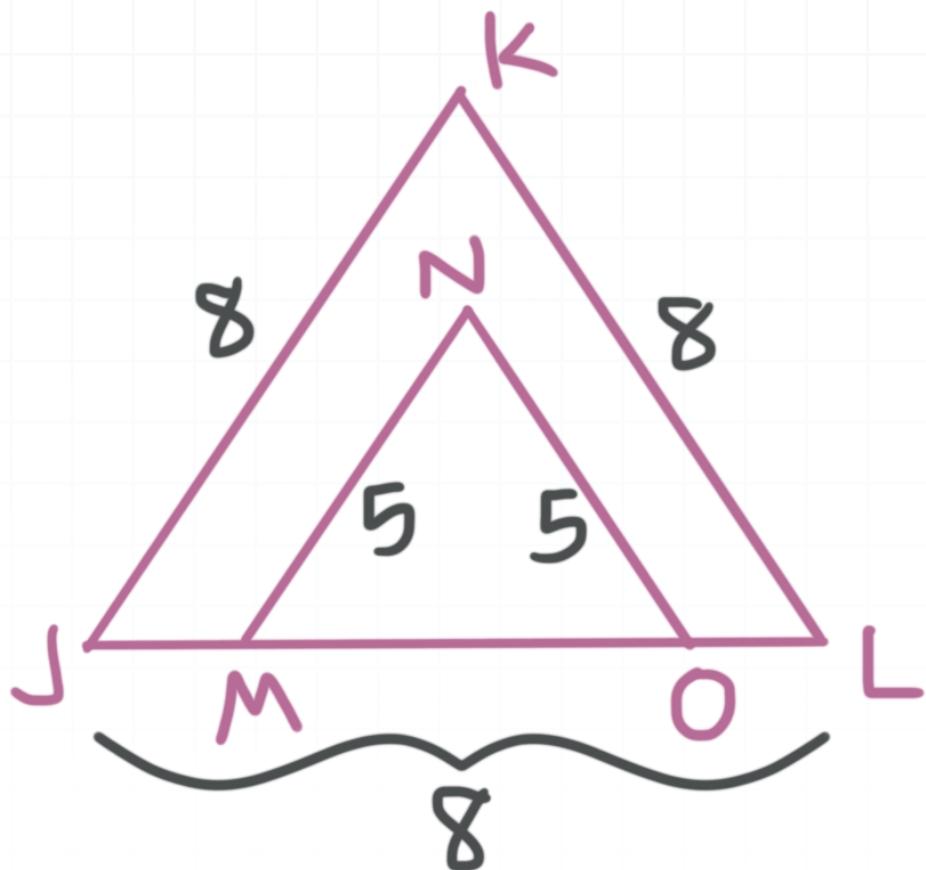


- 6. Given that  $\triangle CAB$  is an isosceles triangle, that  $D$  is the midpoint of  $\overline{CE}$ , and that  $E$  is the midpoint of  $\overline{BD}$ , prove that  $\triangle DAE$  is isosceles.

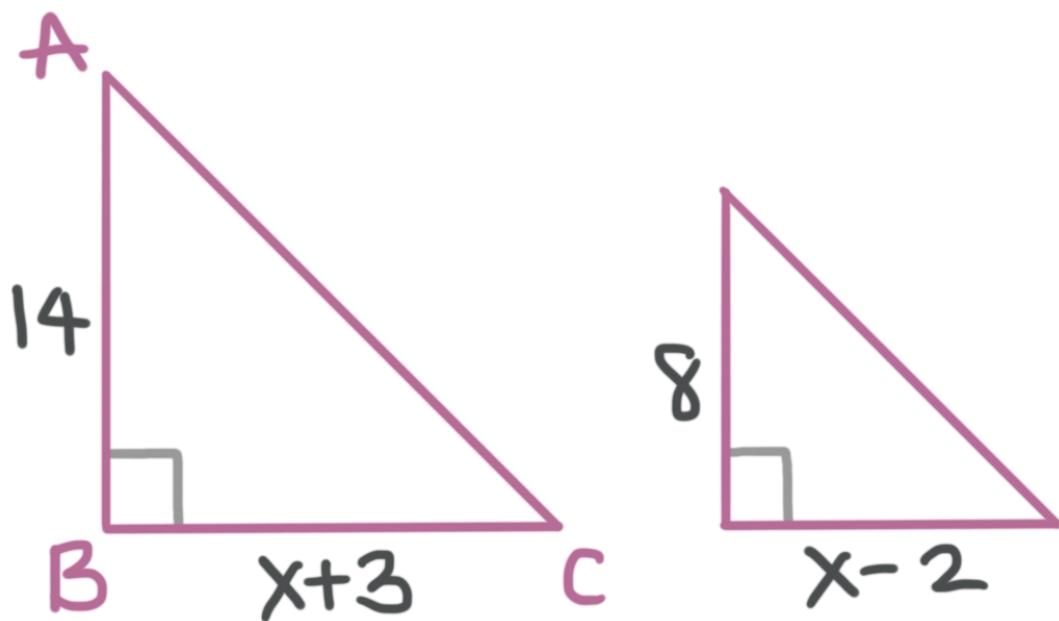


## SIMILAR TRIANGLES

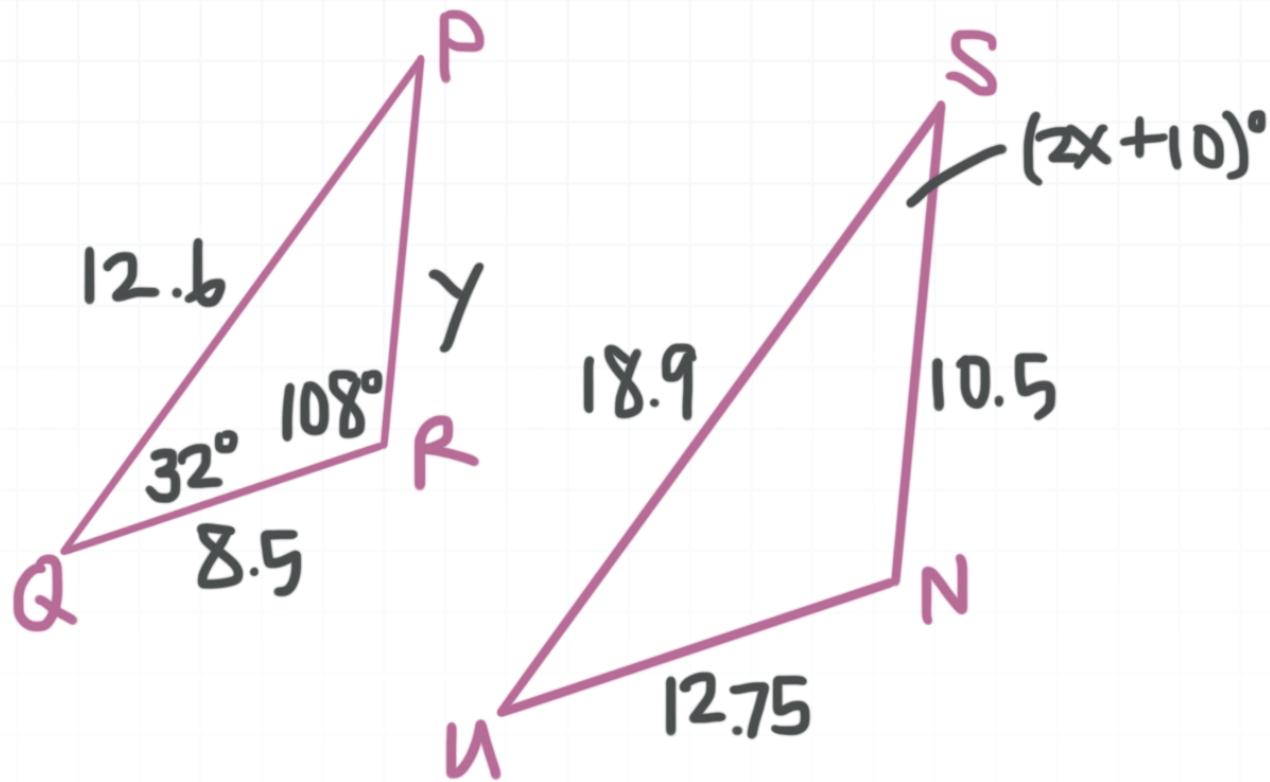
- 1.  $\triangle JKL$  is similar to  $\triangle MNO$ . Find  $MO$ .



- 2.  $\triangle ABC$  is similar to  $\triangle DEF$ . Set up a proportion to find the value of  $x$ .

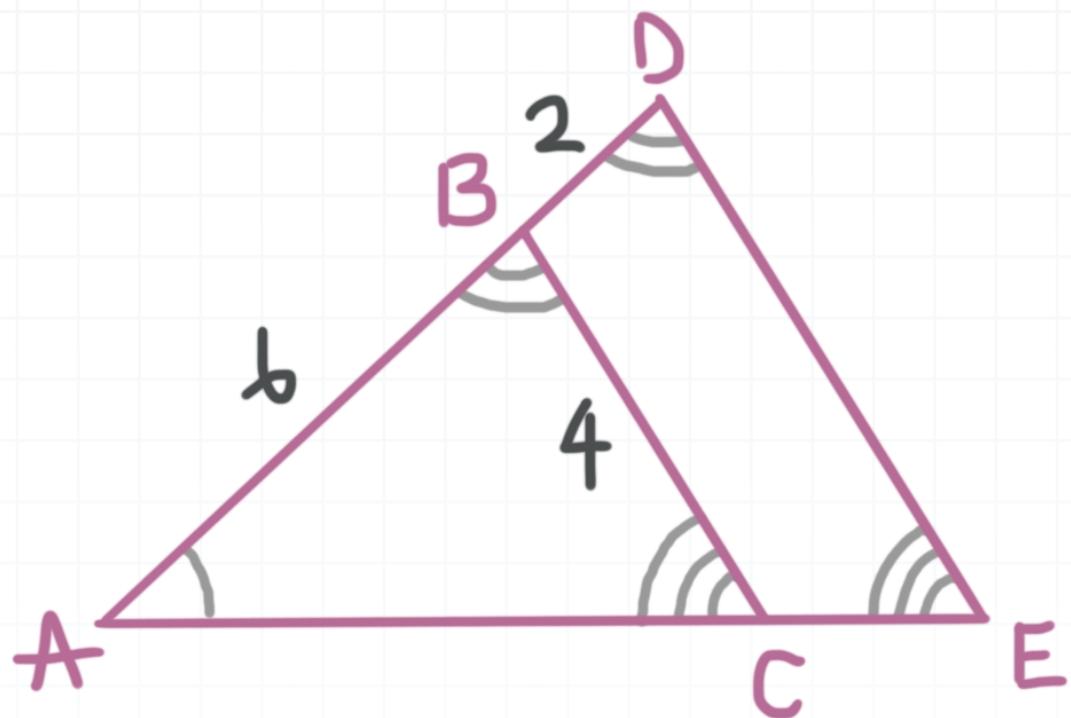


- 3.  $\triangle PQR$  is similar to  $\triangle SUN$ . Find the values of  $x$  and  $y$ .

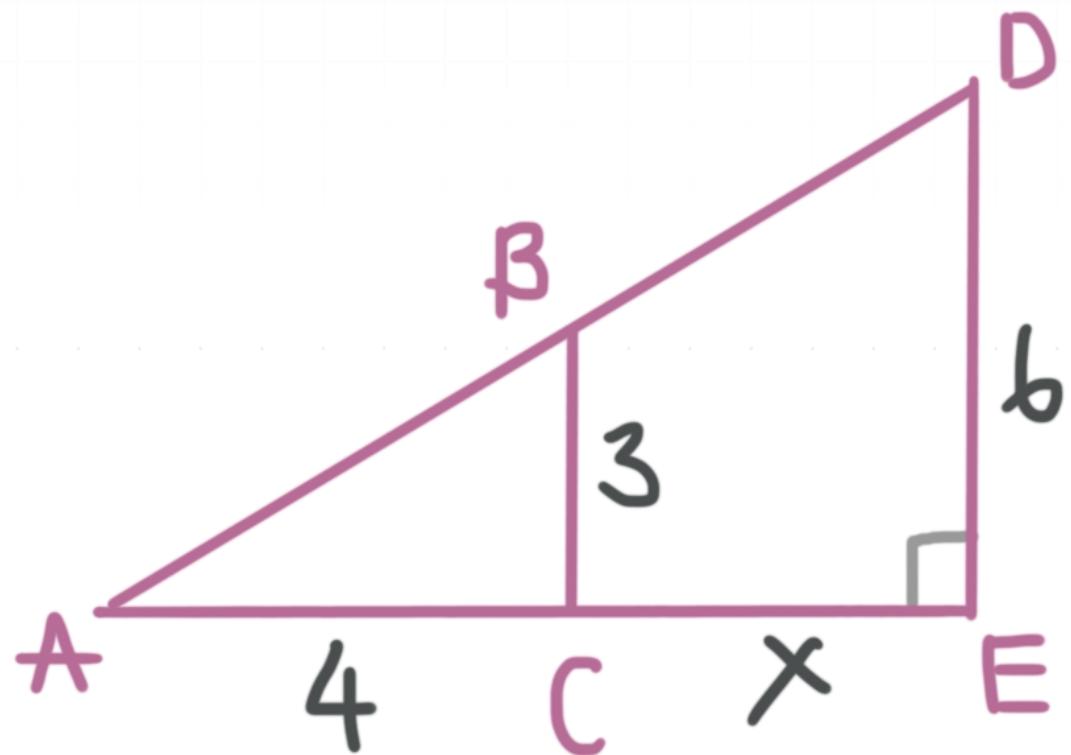


- 4. A 14-foot tree casts a 6-foot long shadow. A 3.5-foot tall child would have a shadow length of how many feet?

- 5. Find  $DE$ .

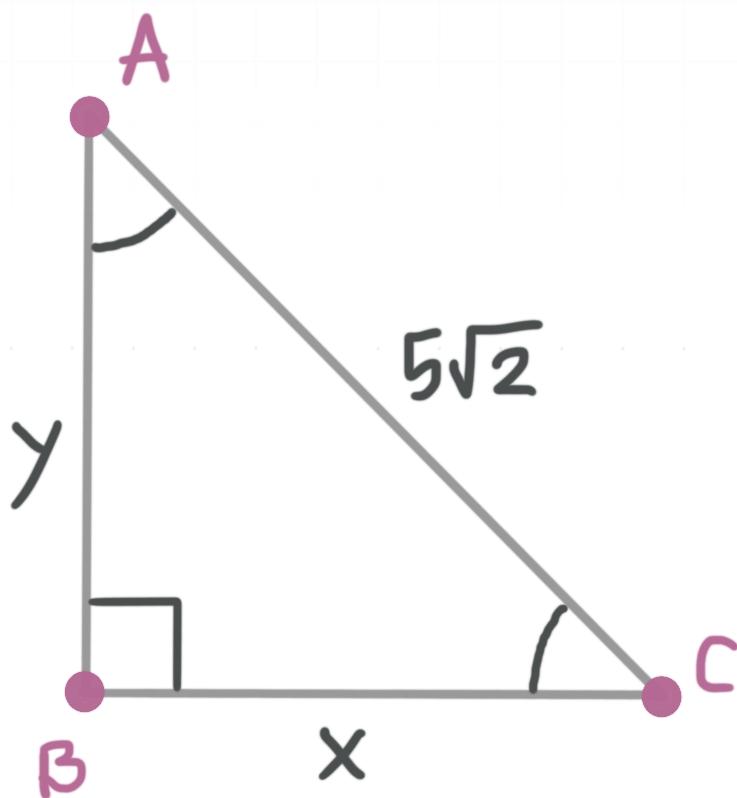


■ 6. Find  $CE$ .

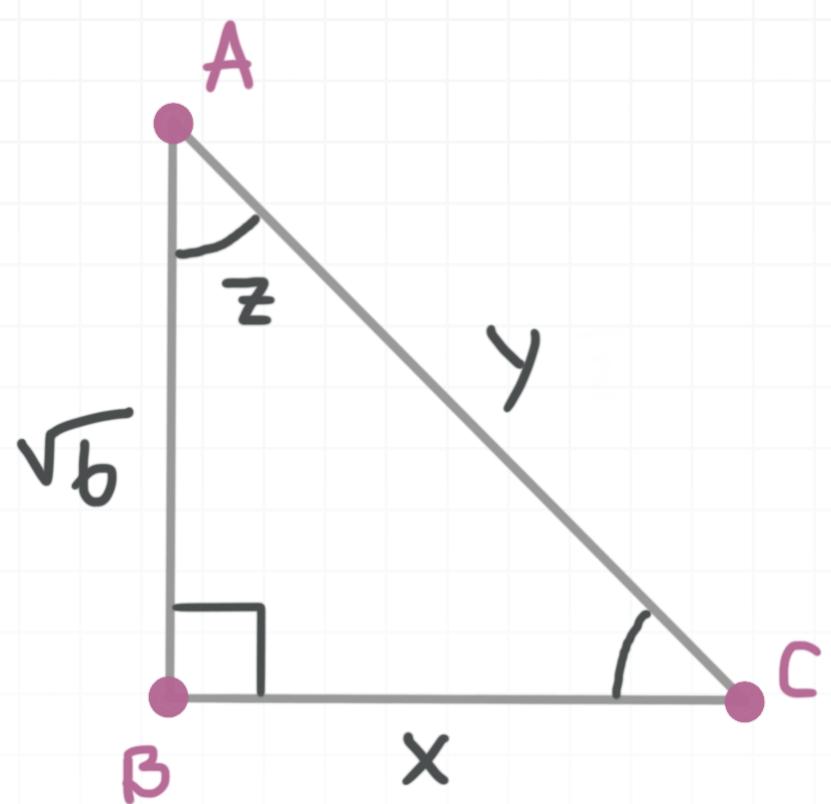


## 45-45-90 TRIANGLES

- 1.  $\triangle PDX$  is an isosceles right triangle with vertex  $\angle D$ , and  $PD = 4$ . Find  $DX$  and  $XP$ .
- 2. A square has a perimeter of 40 meters. Find the length of the diagonal of the square.
- 3. Find the values of  $x$  and  $y$ .

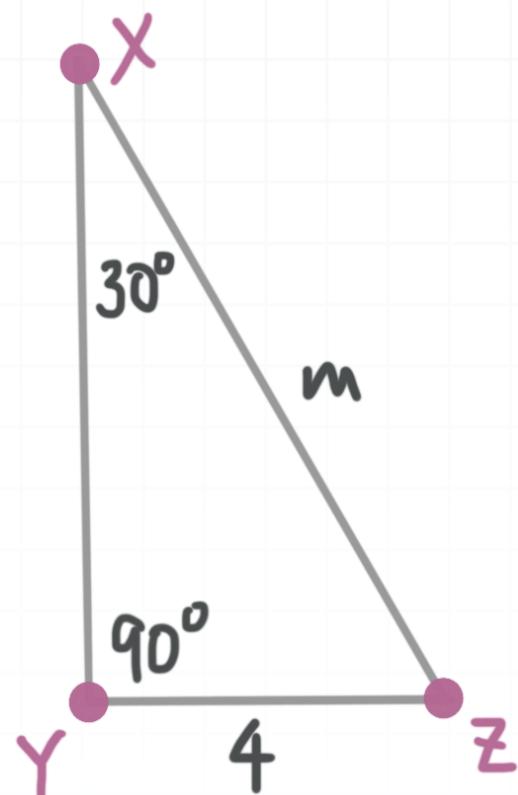


- 4. Find the values of  $x$ ,  $y$ , and  $z$ .

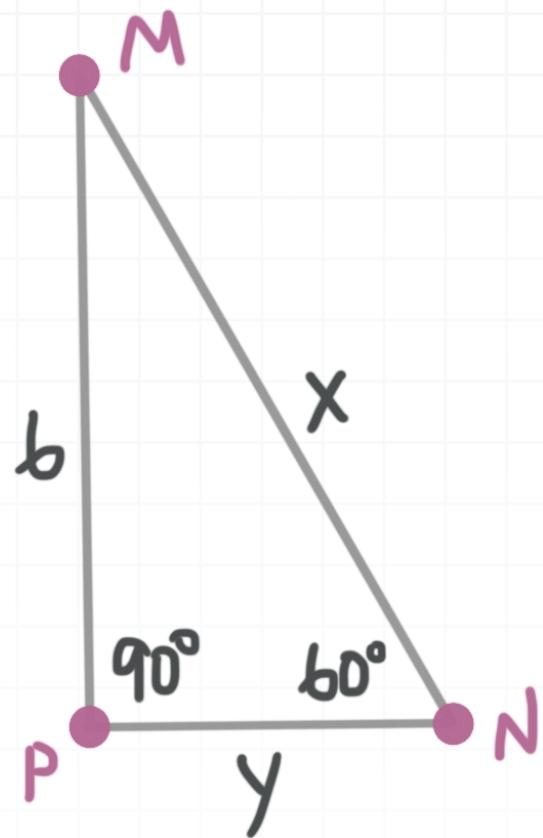


## 30-60-90 TRIANGLES

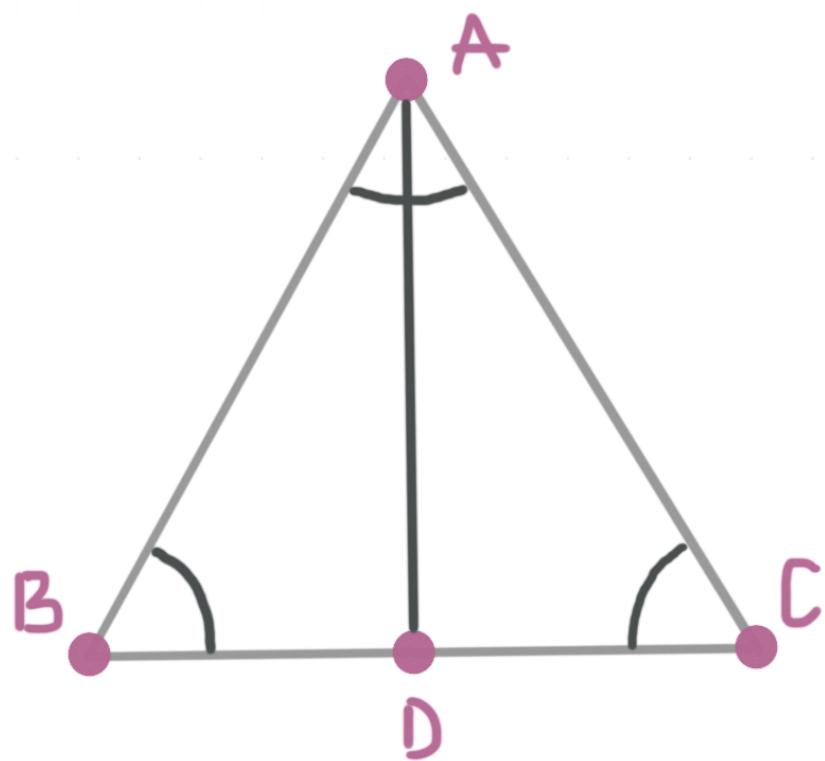
- 1. Find the value of  $m$  in the given triangle.



- 2. Find the values of  $x$  and  $y$  in the given triangle.



- 3.  $\triangle BAC$  is an equilateral triangle. The perimeter is 42 cm and  $m\angle ADC = 90$ . Find  $AD$ .

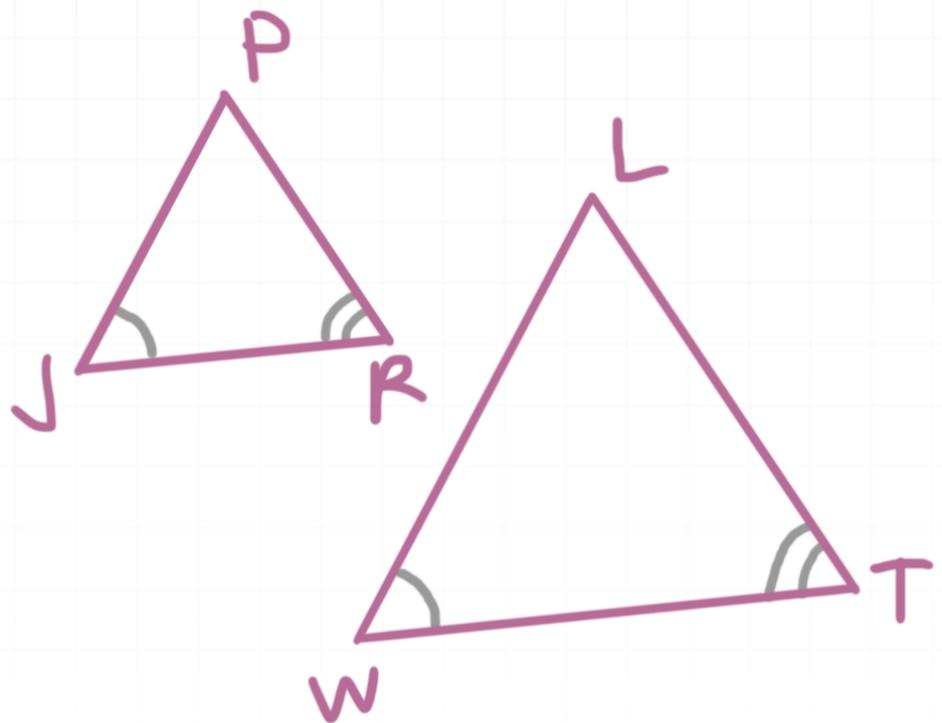


- 4.  $\triangle XYZ$  is an equilateral triangle.  $\overline{XM}$  is an altitude, median, and angle bisector of the triangle. If  $XM = 9$ , find the perimeter of the triangle.

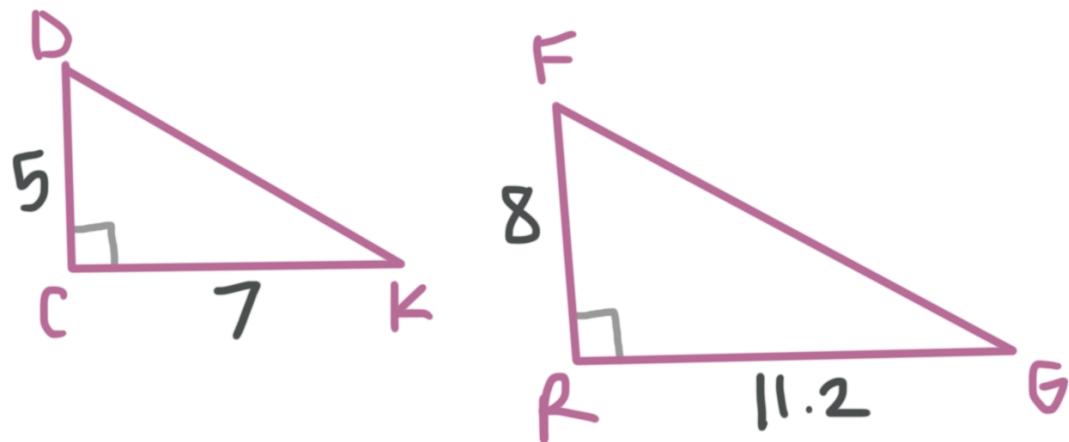


## TRIANGLE SIMILARITY THEOREMS

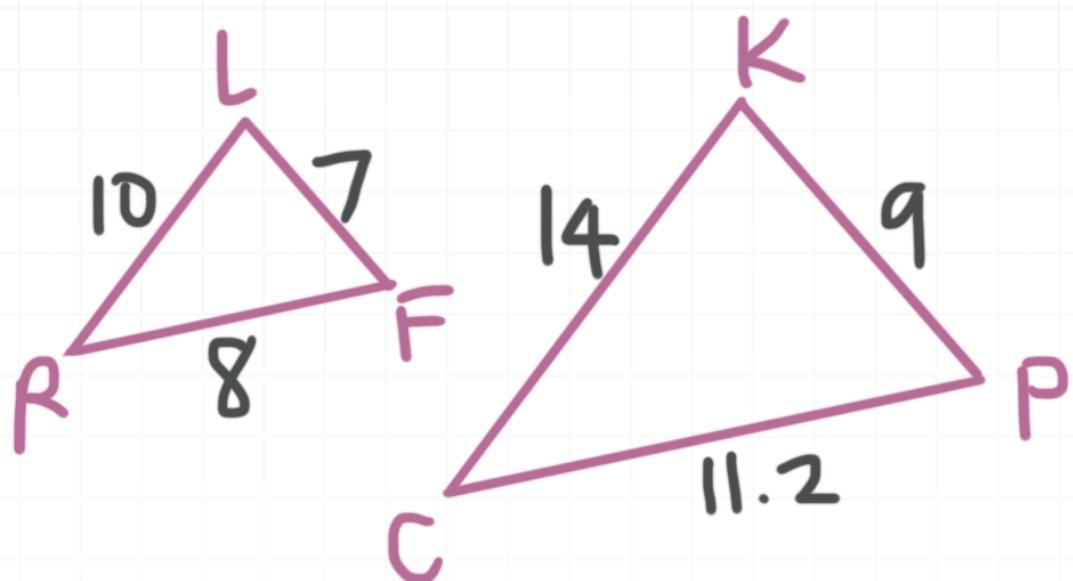
- 1. Write a similarity statement for the triangles and provide the theorem that proves they're similar.



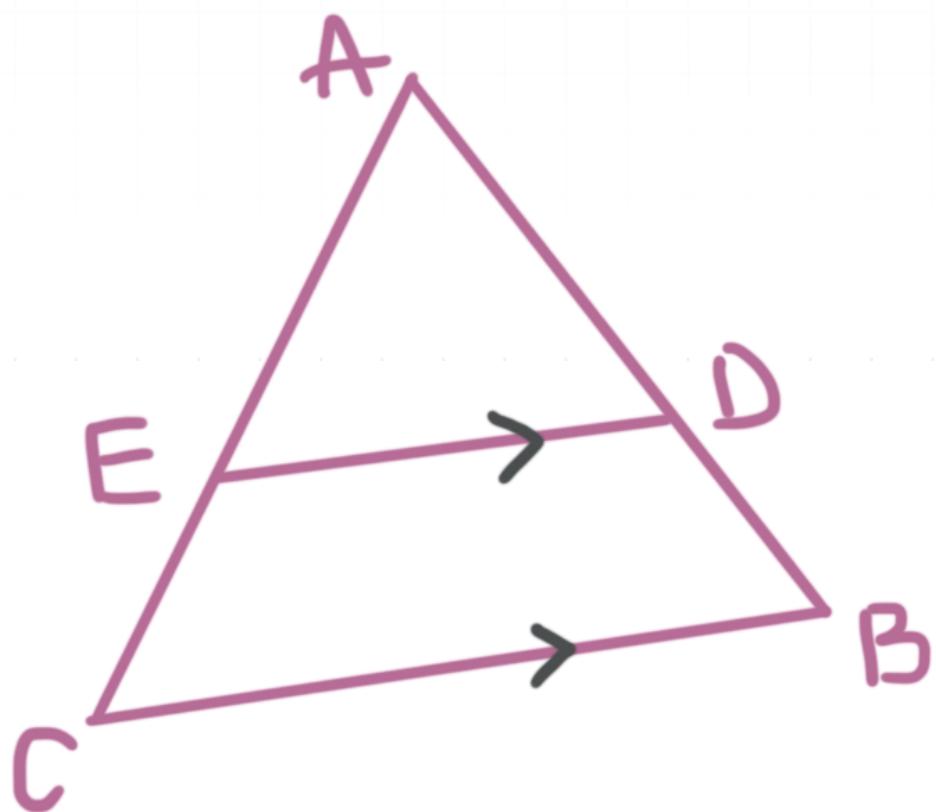
- 2. Write a similarity statement for the triangles and provide the theorem that proves they're similar.



■ 3. Is  $\triangle RLF \sim \triangle CKP$ ? Explain.

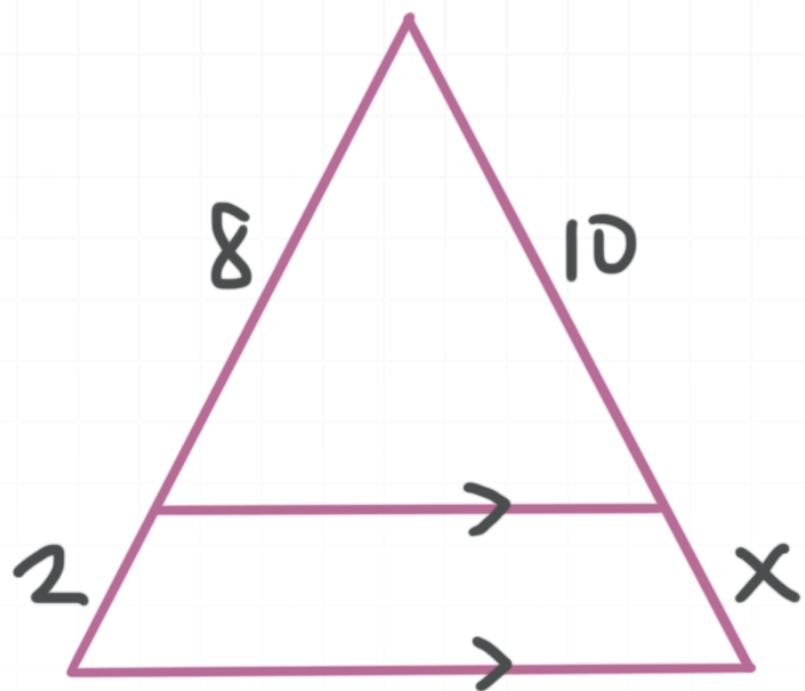


■ 4. Prove  $\triangle AED \sim \triangle ACB$ .

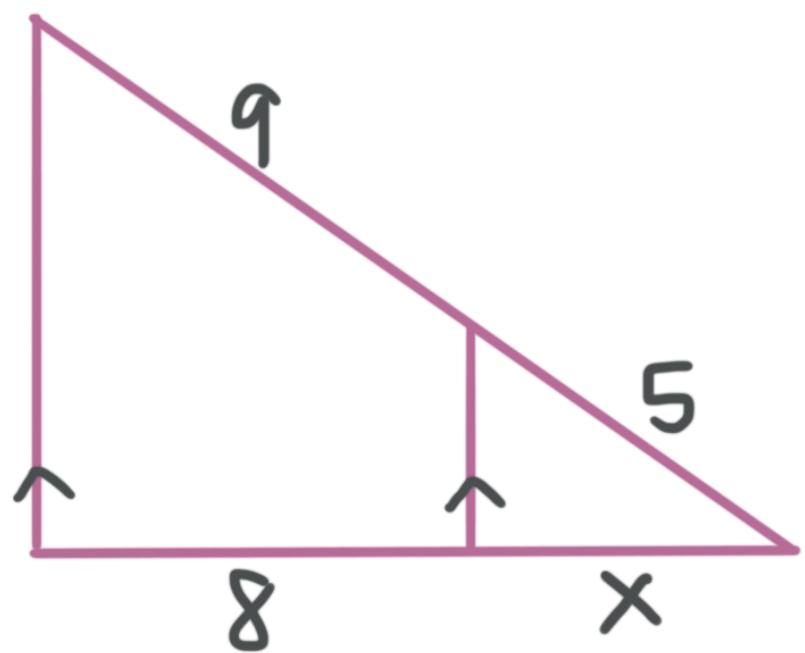


## TRIANGLE SIDE-SPLITTING THEOREM

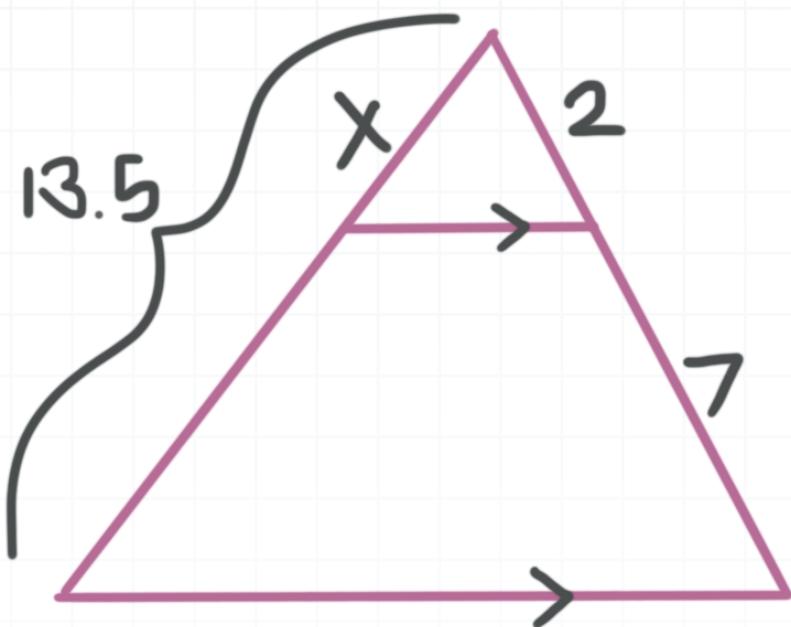
■ 1. Solve for  $x$ .



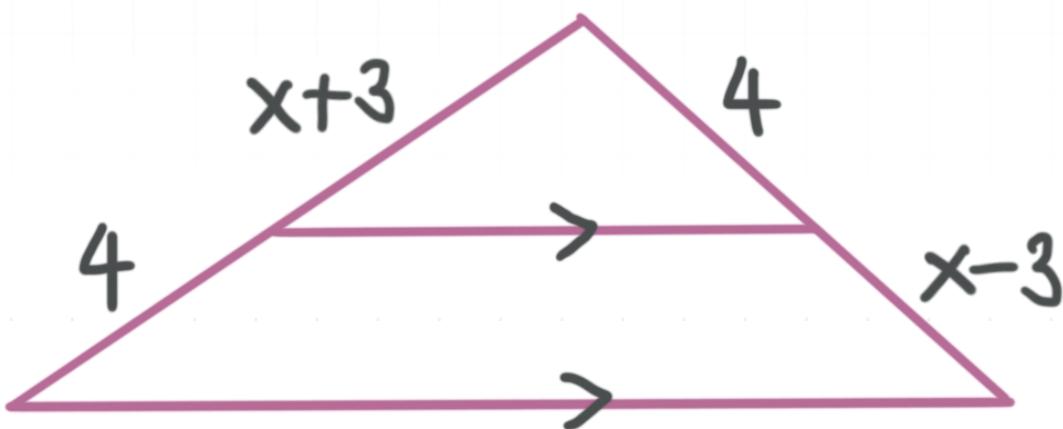
■ 2. Solve for  $x$ .



■ 3. Solve for  $x$ .

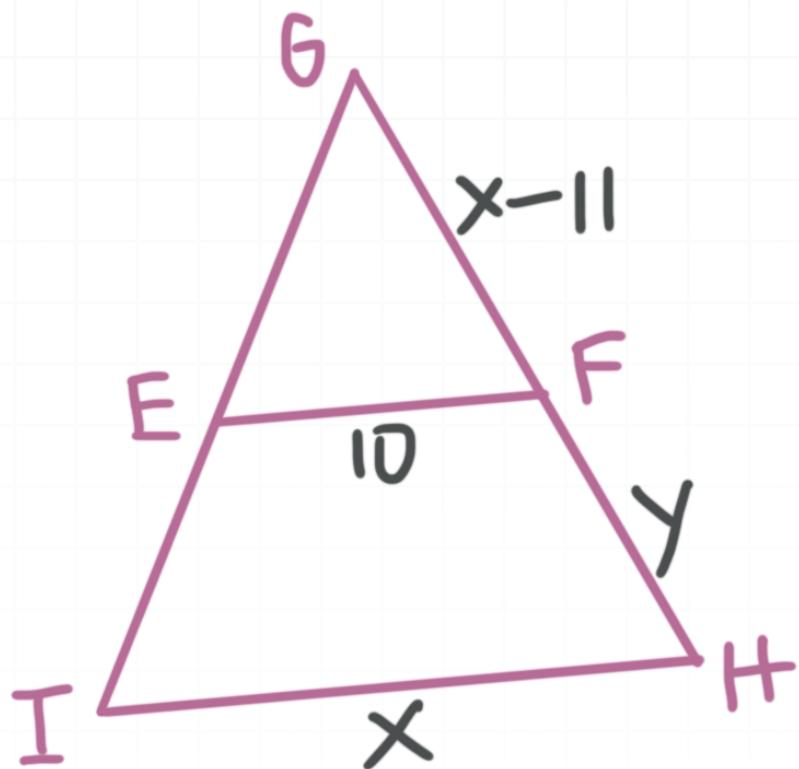


■ 4. Solve for  $x$ .

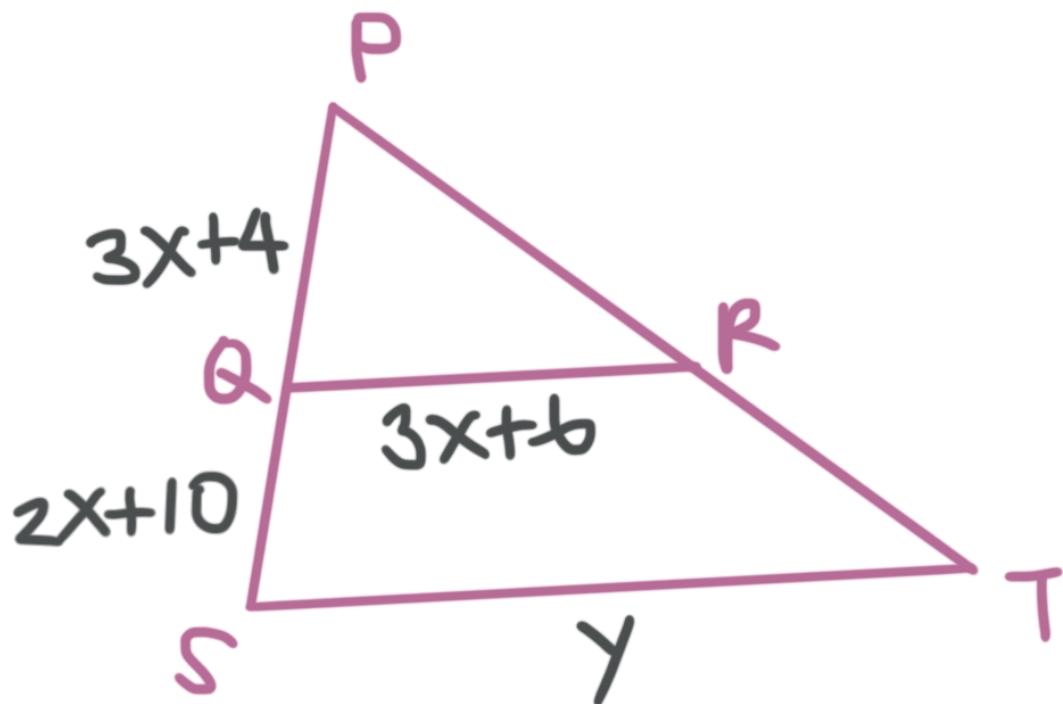


## MIDSEGMENTS OF TRIANGLES

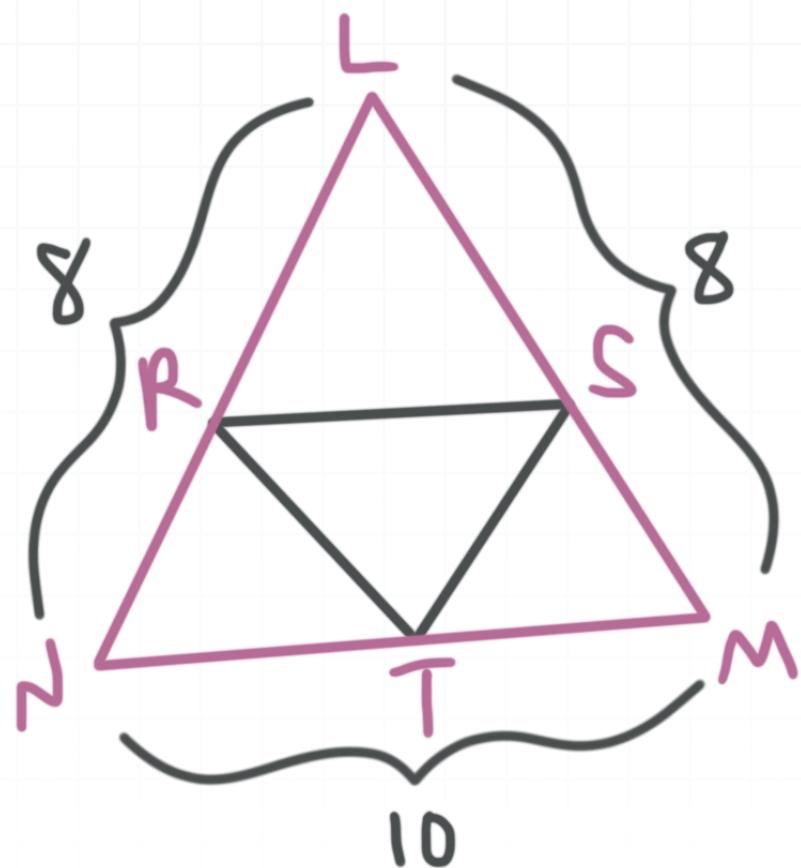
- 1.  $\overline{EF}$  is a midsegment of  $\triangle IGH$ . Find  $x$  and  $y$ .



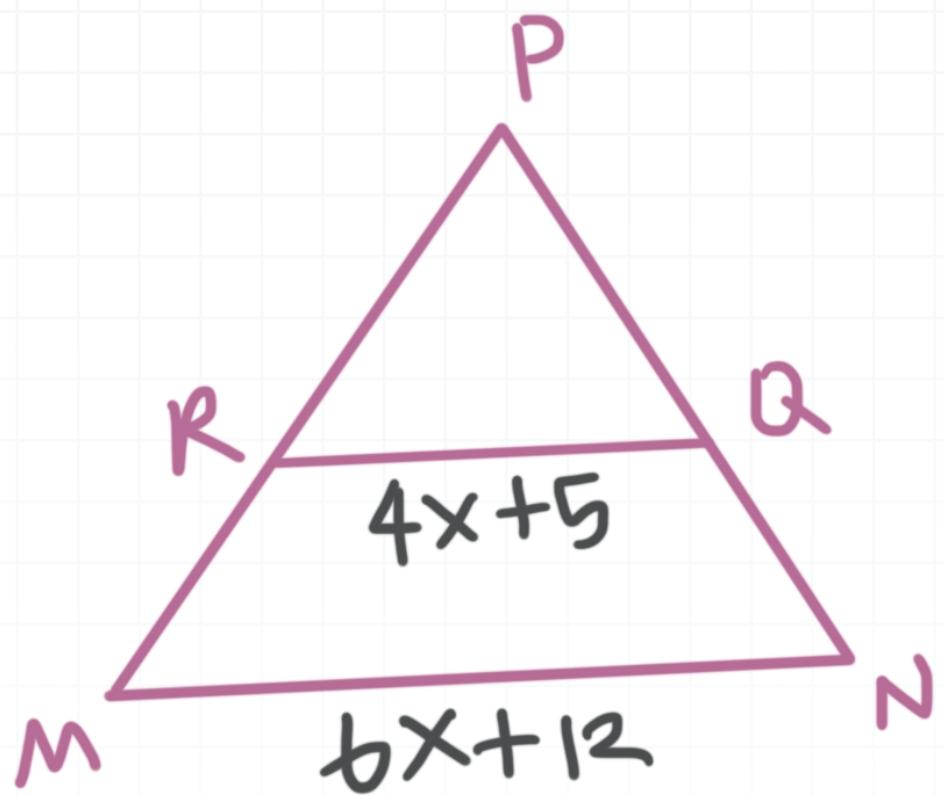
- 2.  $\overline{QR}$  is a midsegment of  $\triangle SPT$ . Find  $x$  and  $y$ .



- 3.  $\overline{RS}$ ,  $\overline{ST}$ , and  $\overline{RT}$  are midsegments of  $\triangle NLM$ . Find the perimeter of quadrilateral  $RTMS$ .

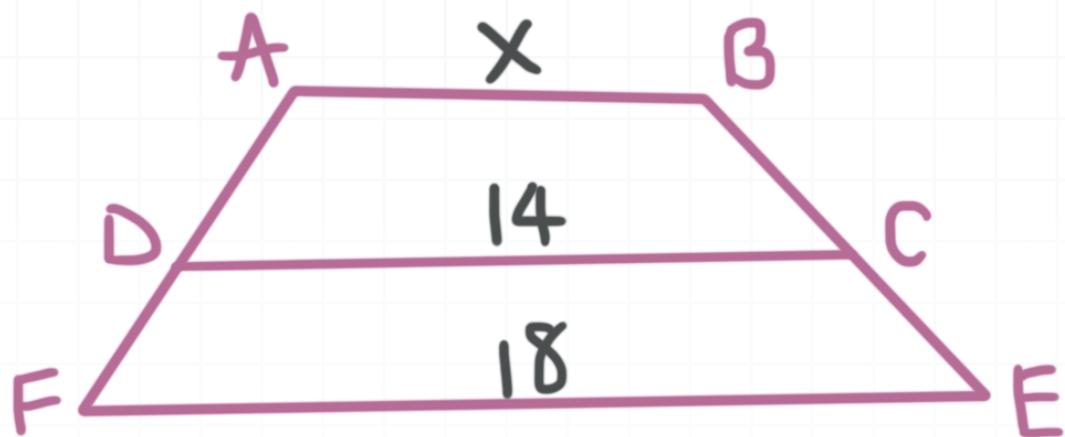


- 4.  $\overline{RQ}$  is a midsegment of  $\triangle MPN$ . Find  $x$  and  $MN$ .

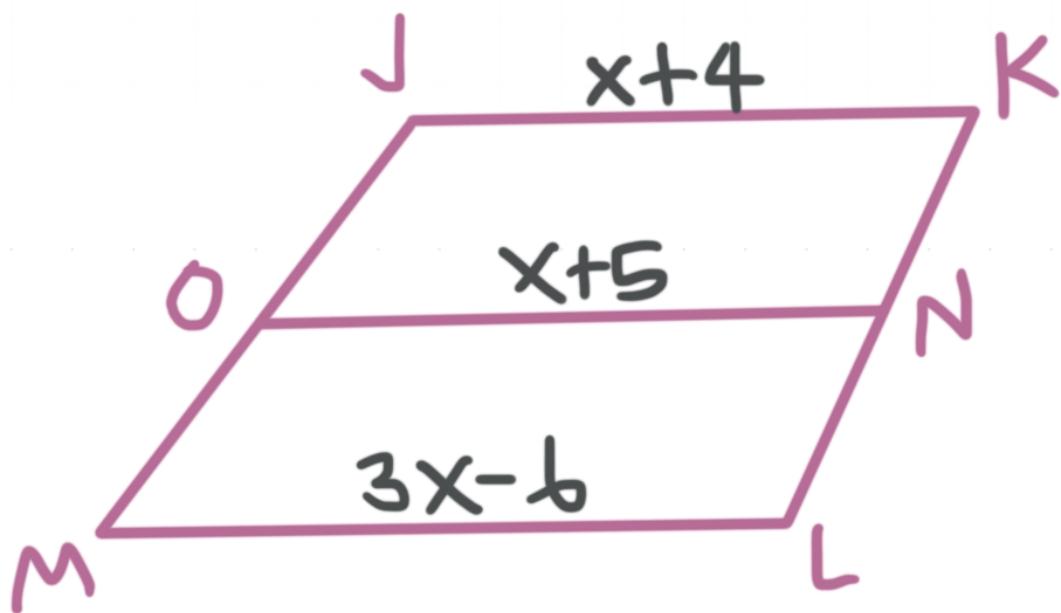


## MIDSEGMENTS OF TRAPEZOIDS

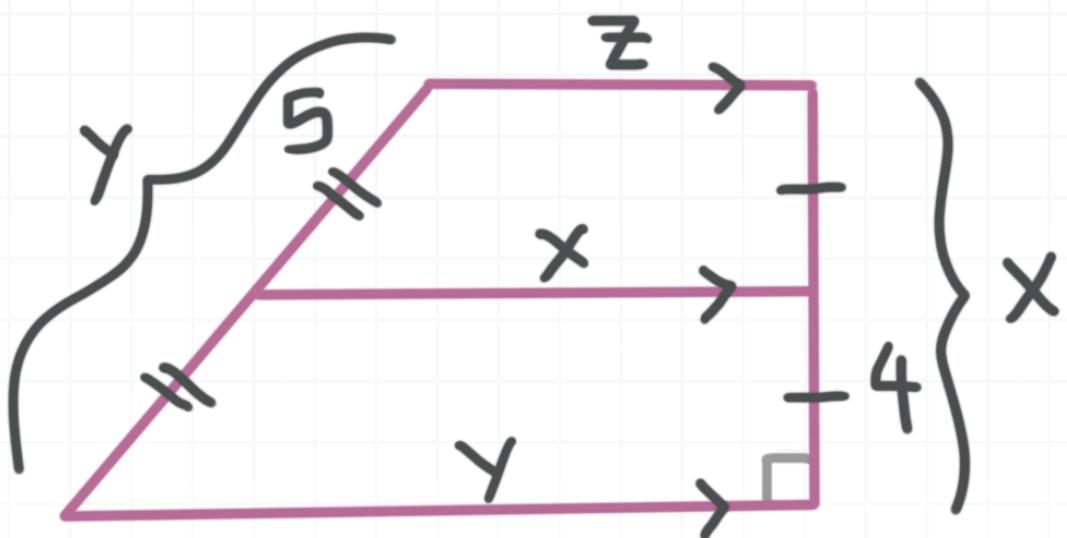
- 1. The trapezoid has midsegment  $\overline{DC}$ . Find the value of  $x$ .



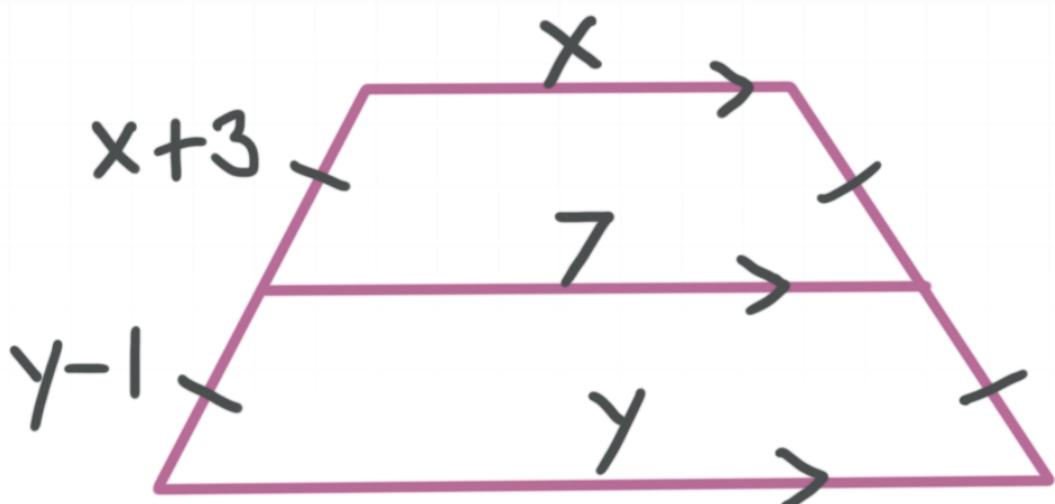
- 2.  $\overline{ON}$  is a midsegment of trapezoid JKLM. Find  $JK$ ,  $ON$ , and  $ML$ .



- 3. Find  $x$ ,  $y$ , and  $z$ .

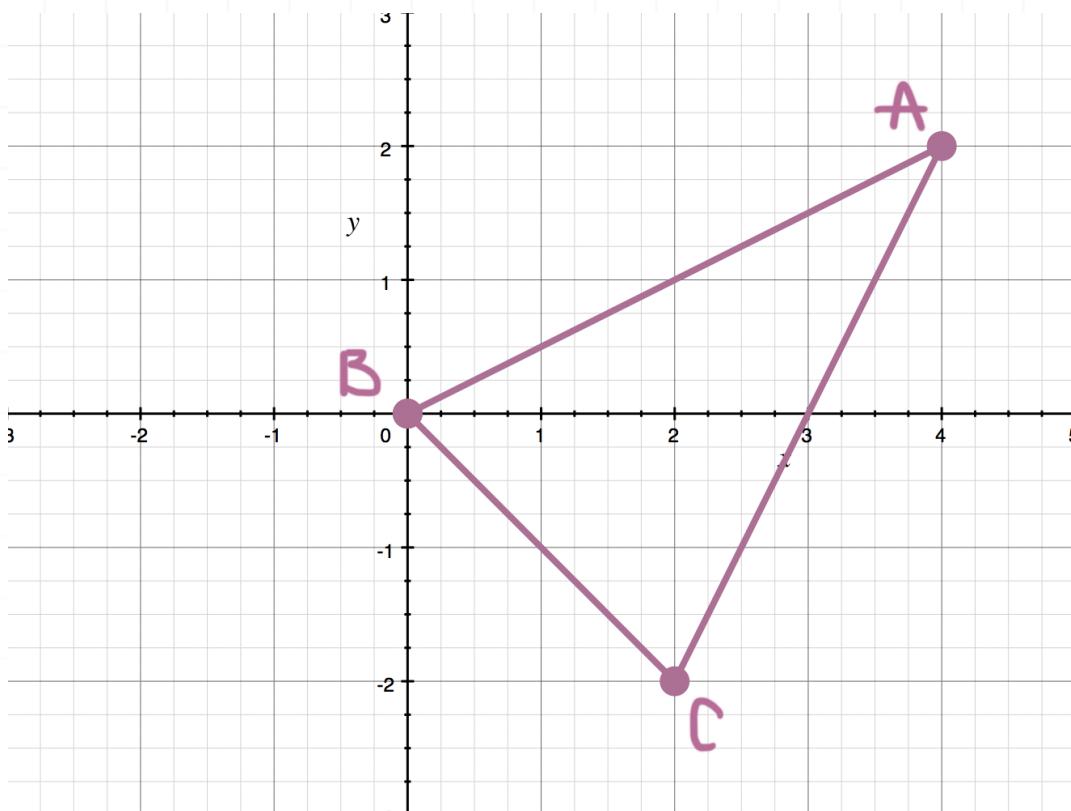


■ 4. Find  $x$  and  $y$ .

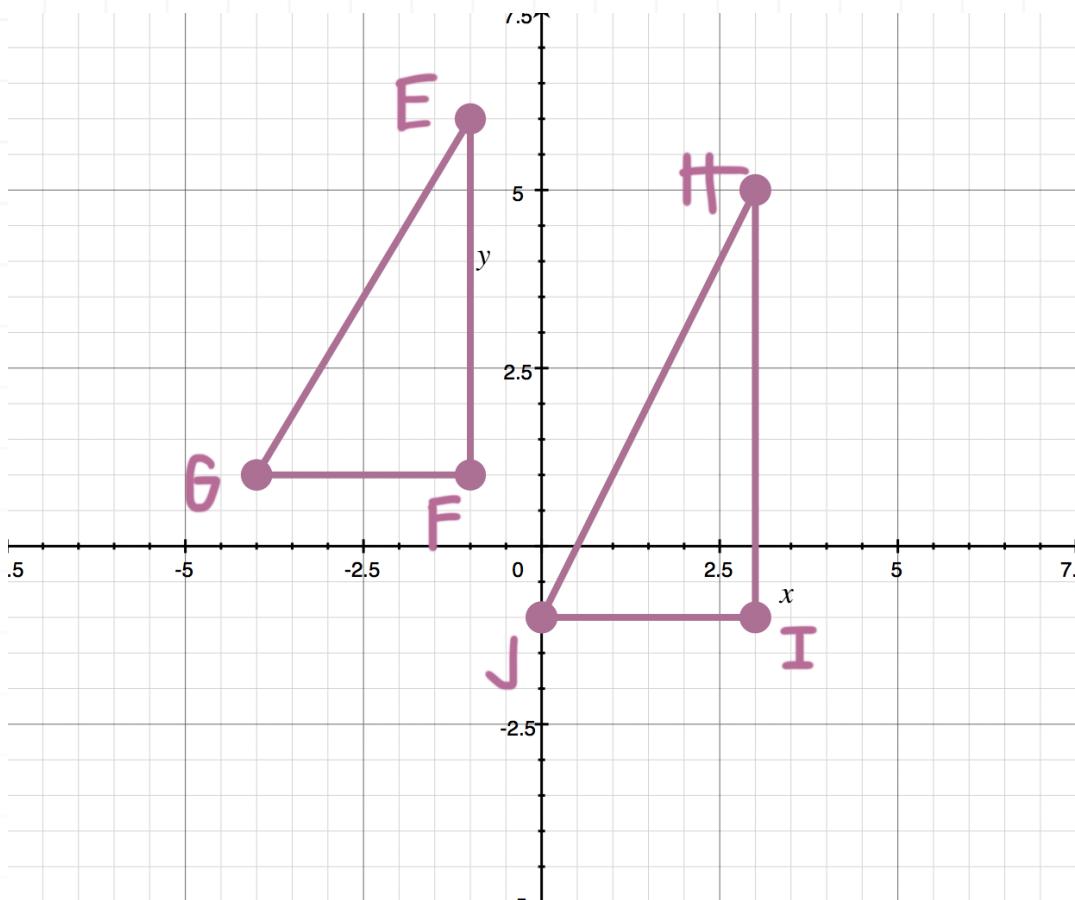


## TRANSLATING FIGURES IN COORDINATE SPACE

- 1. Find the new coordinates of  $\triangle ABC$  under a translation of  $(x, y) \rightarrow (x + 3, y - 2)$ .



- 2. Is  $\triangle EFG$  a translation of  $\triangle HIJ$ ? Explain why or why not.

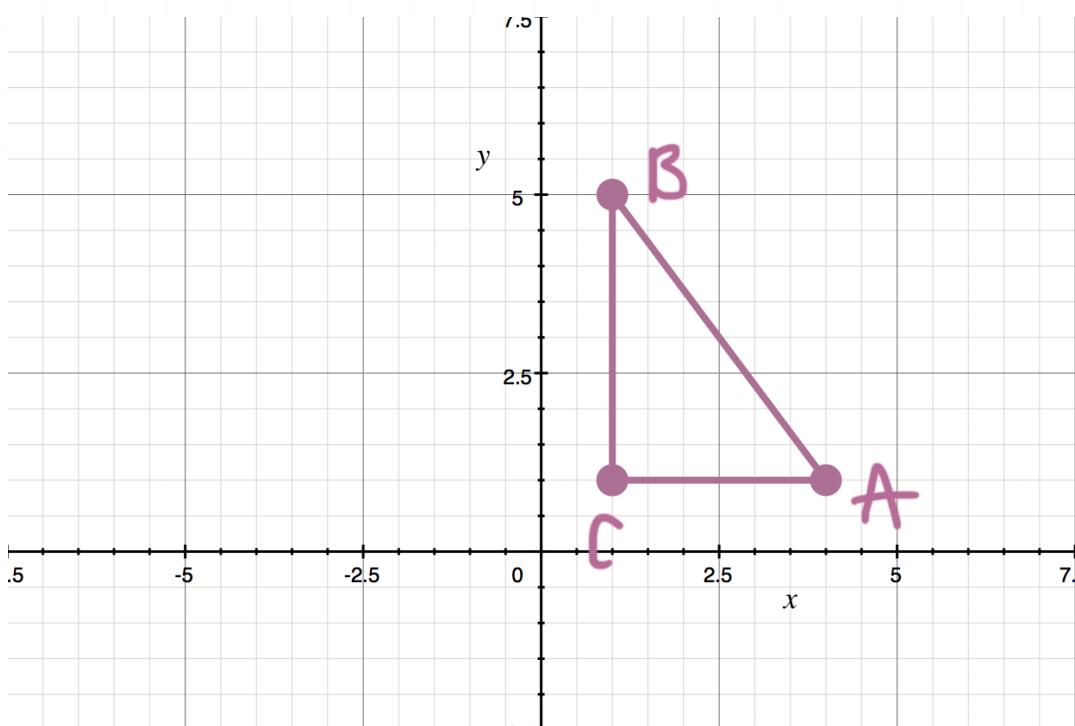


- 3.  $\odot A$  has its center at the origin and radius 3. Find the equation of this circle under a translation of 2 units to the right and 4 units up on the coordinate plane.

■ 4. A rectangle has a diagonal with endpoints at  $(5,1)$  and  $(14,7)$ . Find the area of this rectangle under the translation  $(x,y) \rightarrow (x - 5,y - 4)$ .

## ROTATING FIGURES IN COORDINATE SPACE

- 1.  $X(2,5)$  is rotated clockwise about the origin and its translated coordinate is  $X'(-5,2)$ . By how many degrees was this point rotated?
  
  
  
  
  
- 2.  $B(-3, -1)$  is rotated  $180^\circ$  counterclockwise about the origin. Find  $B'$ .
  
  
  
  
  
- 3. Graph  $\triangle ABC$  under a rotation of  $90^\circ$  counterclockwise.



- 4.  $G(-4, -6)$  is first translated 5 units to the right and 3 units up on the coordinate plane. Then this new coordinate is rotated  $90^\circ$  clockwise about the origin. Find its new coordinate.

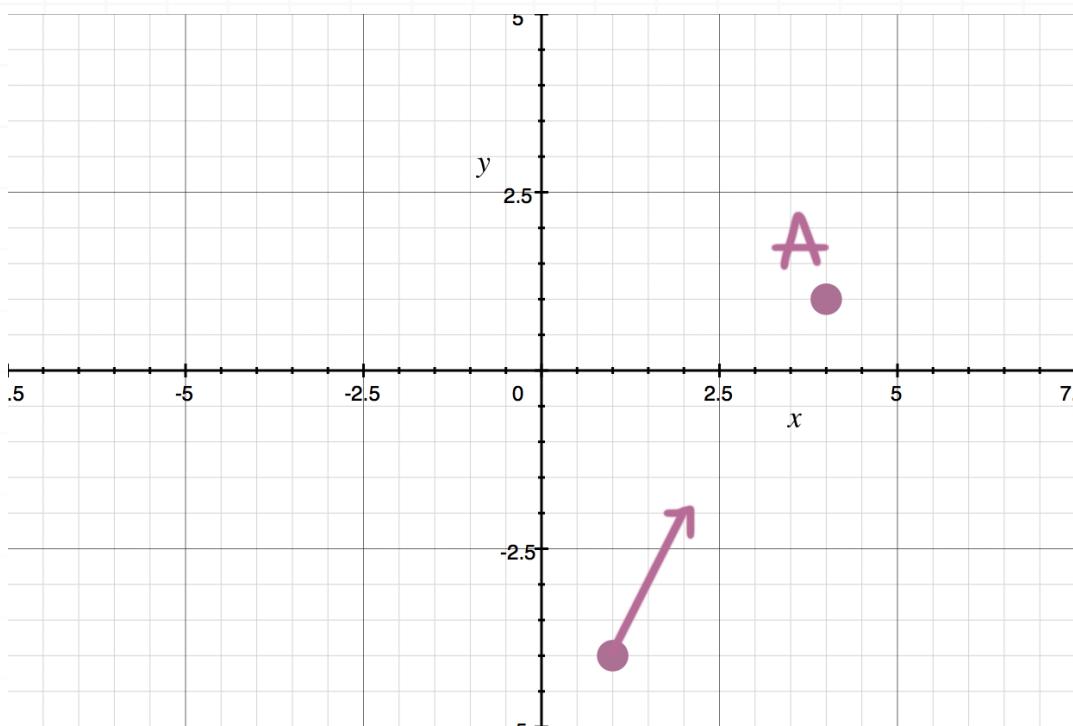
## REFLECTING FIGURES IN COORDINATE SPACE

- 1. Find the coordinates of  $A(-4,5)$  under a reflection over the  $x$ -axis.
- 2. Find the coordinates of  $J(3,4)$  under a reflection over the  $y$ -axis.
- 3. Find the coordinates of  $K(-1,4)$  under a reflection over the line  $y = 2$ .
- 4. Find the coordinates of  $P(5, -2)$  under a reflection over the line  $y = x$ .

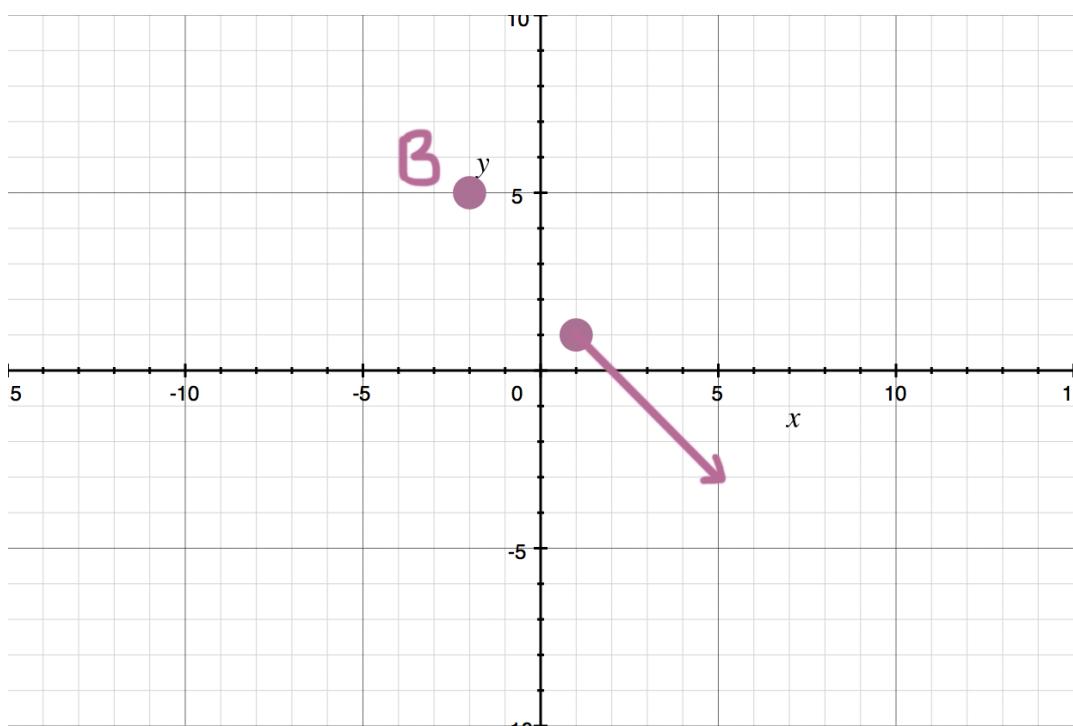


## TRANSLATION VECTORS

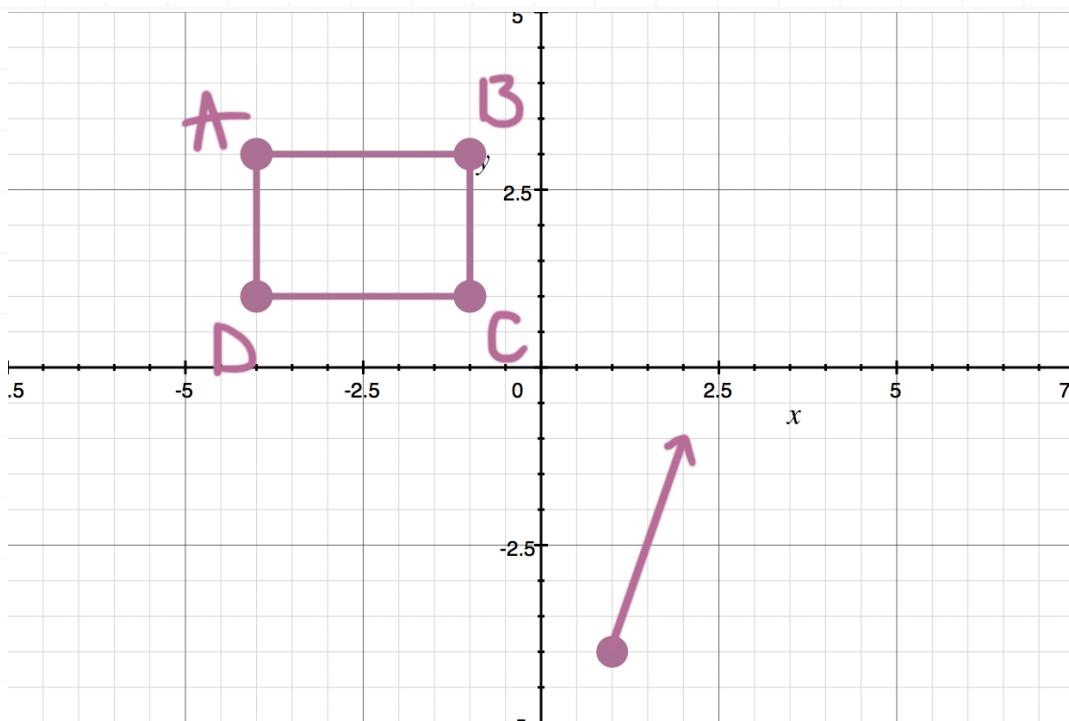
■ 1. Find  $A'$  as directed by the vector shown.



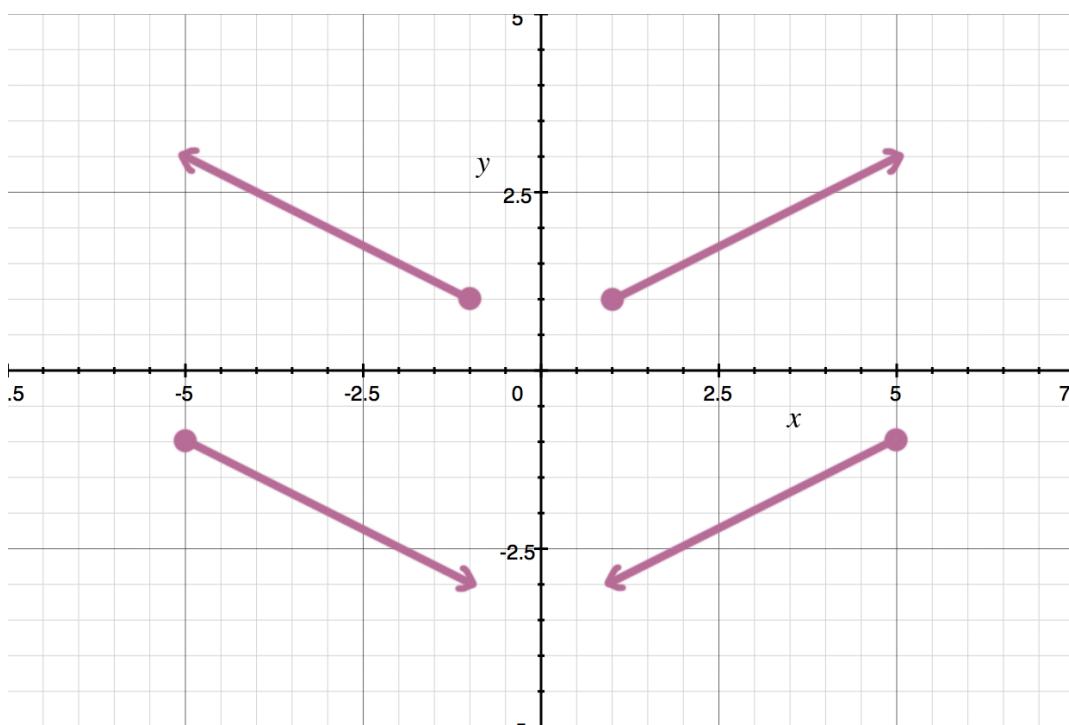
■ 2. Find  $B'$  as directed by the vector shown.



■ 3. Find  $D'$  as directed by the vector shown.



■ 4.  $M(3,1)$  is rotated  $90^\circ$  counterclockwise about the origin. Which translation vector (name the quadrant that contains the vector) would translate  $M$  to the correct location on the coordinate plane?



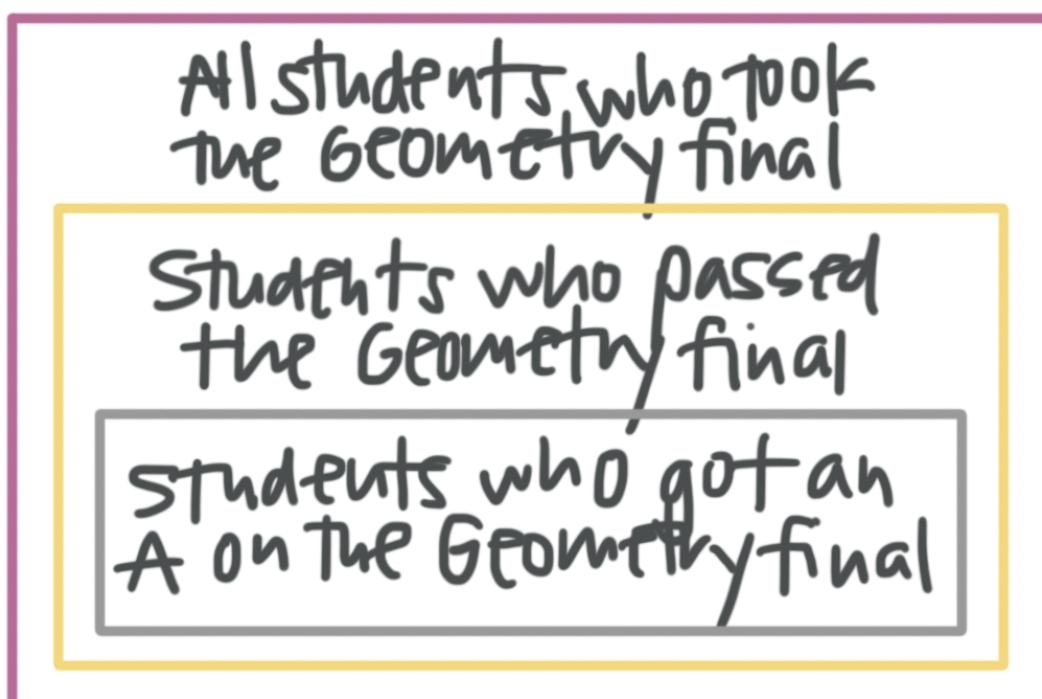
## CONDITIONALS AND EULER DIAGRAMS

- 1. Write the if-then statement that corresponds to the Euler diagram.



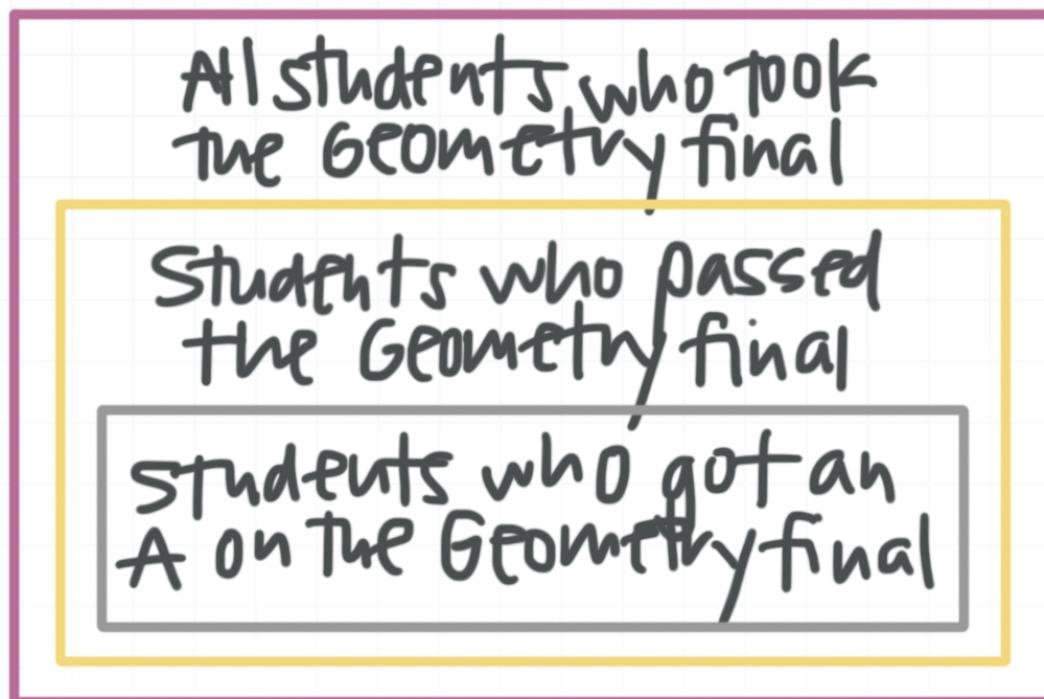
- 2. True or false? The if-then statement is true based on the Euler diagram.

"If a student passed the geometry final, then they got an A."



- 3. True or false? The statement is true based on the Euler diagram.

“If a student took the Geometry final exam, then they passed the test.”



- 4. Draw a Euler diagram for the statement, “All quadrilaterals are polygons.”



## CONVERSES OF CONDITIONALS

- 1. Write the converse for the if-then statement.

“If  $M$  is a midpoint of  $\overline{AB}$ , then  $AM = MB$ .”

- 2. Write the converse for the if-then statement.

“If a polygon is a triangle, the sum of its angles is  $180^\circ$ .

- 3. Write the converse of the if-then statement. Then determine if the converse is always, sometimes, or never true.

“If  $\angle 1$  and  $\angle 2$  are vertical angles, then they are congruent.”

- 4. Write the converse of the if-then statement. Determine if the converse is true or false. If it’s false, provide a counterexample.

“If an animal is a cow, then it has four legs.”



## ARRANGING CONDITIONALS IN A LOGICAL CHAIN

- 1. Fill in the blank with a logical conclusion.

All parallelograms have four sides.

All four-sided figures are quadrilaterals.

All parallelograms \_\_\_\_\_.

- 2. If Jane's alarm does not go off, she will be late to school. If Jane is late to school, she will get in trouble. Jane got in trouble. Can a valid conclusion be drawn? Explain.

- 3. Write the missing statement that will make the last statement true.

1. If a driver is going 60 mph, he is speeding.

2. \_\_\_\_\_

3. If a driver is going 60 mph, he will receive a speeding ticket.

- 4. All squares are rectangles. Rewrite this statement in if-then form:  $JKLM$  is a rectangle. Can a valid conclusion be drawn?



