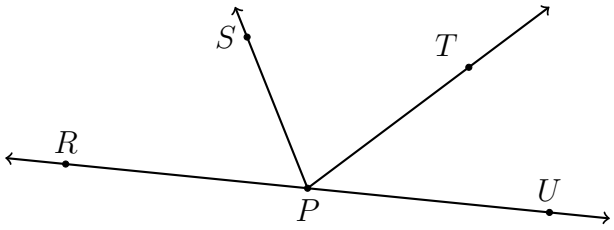
Unit 2: Introduction to Proof Name: .
8 November 2018

Trimester Final Exam

You may use your notebook. No papers or loose notes.

1. Given the situation in the diagram, answer each question. Circle True or False.



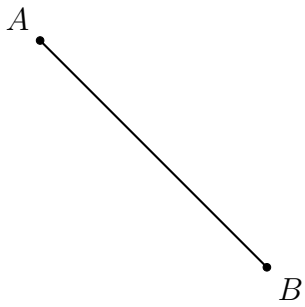
   (a) True or False: $\angle SPU$ is an acute angle.

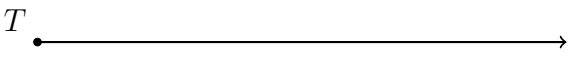
   (b) True or False: $\overrightarrow{RP}$ and $\overrightarrow{PU}$ are opposite rays.

   (c) True or False: $\angle RPS$ and $\angle SPU$ are a linear pair.

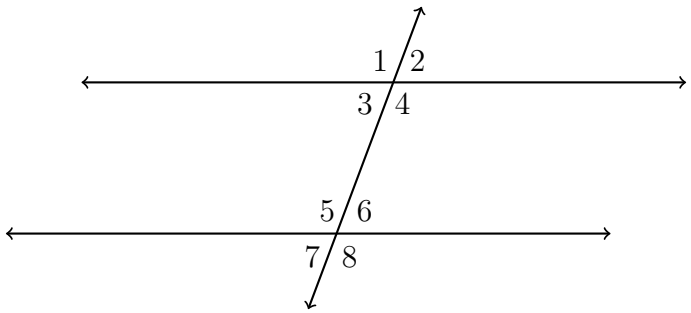
   (d) True or False: $\angle SPT$ and $\angle TPR$ are adjacent.

2. Construct an equilateral triangle having one side on $\overrightarrow{T}$ with each leg congruent to $\overline{AB}$. [Leave all construction marks.]





3. Given two parallel lines and a transversal, as shown. Apply the theorem, "If a transversal intersects two parallel lines, then corresponding angles are congruent."



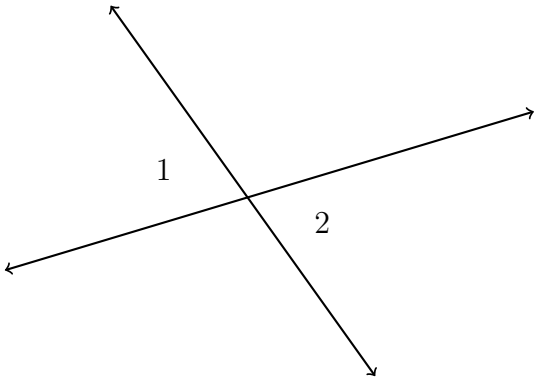
   (a) State the angle corresponding with $\angle 1$.

   (b) Given $m\angle 7 = 75°$ and $m\angle 3 = 5x°$. Find x.

   (c) Given $m\angle 4 = 105°$. Find $m\angle 6$.

   (d) In a proof, what reason would justify $\angle 3 \cong \angle 6$? _____

4. Given two vertical angles, $m\angle 1 = 5x + 13$, $m\angle 2 = 7x - 11$. Find $m\angle 1$.
   For full credit, check by comparing to $m\angle 2$.



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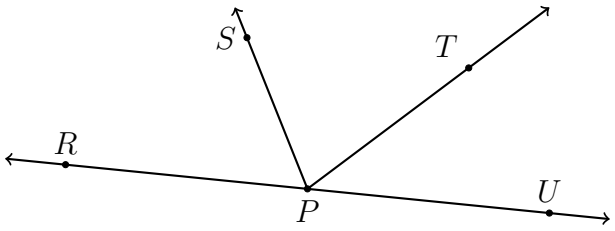

   (a) True or False: $\angle SPU$ is an acute angle.

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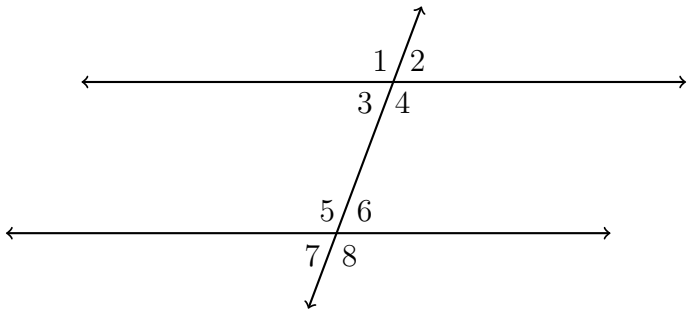

   (a) State the angle corresponding with $\angle 1$.

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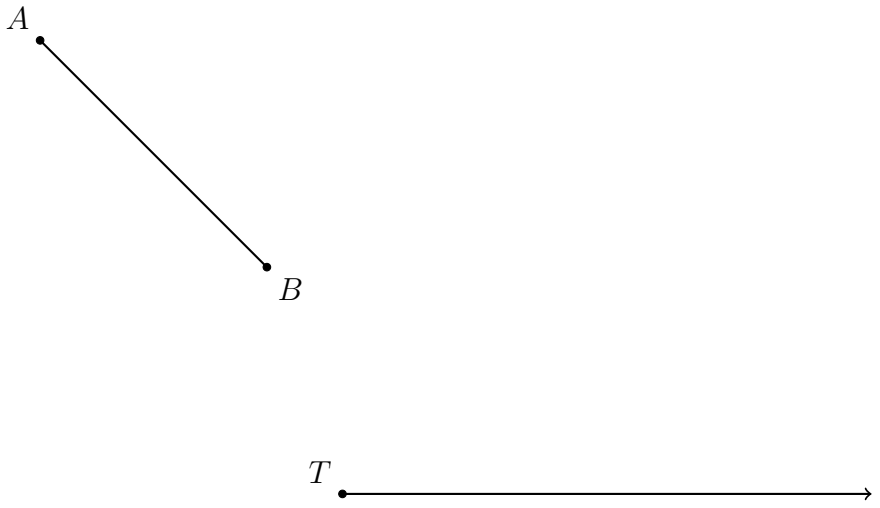
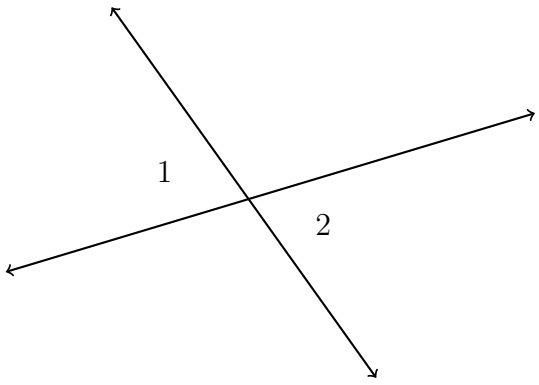
3. Construct an equilateral triangle having one side on $\overrightarrow{T}$ with each leg congruent to $\overline{AB}$. [Leave all construction marks.]

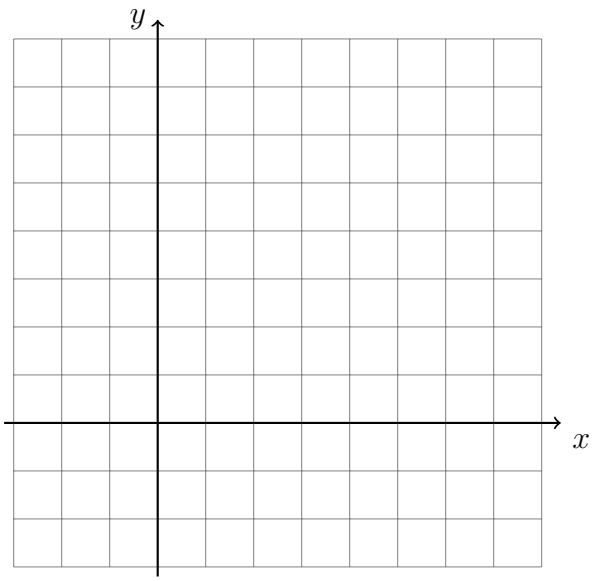


4. Given two vertical angles, $m\angle 1 = 5x + 13$, $m\angle 2 = 7x - 11$. Find $m\angle 1$. For full credit, check by comparing to $m\angle 2$.

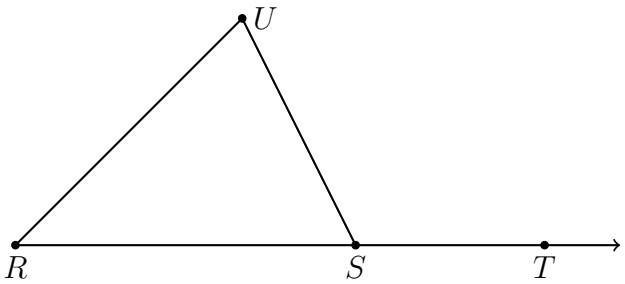


5. Given the square $EASY$ with $E(2,1)$, $A(7,1)$, $S(7,6)$, and $Y(2,6)$.
   (a) Draw $EASY$ on the graph, labeling the vertices.
   (b) Find the area of $EASY$.

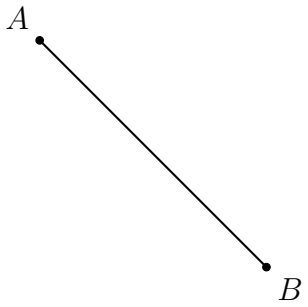
   (c) Find the perimeter of $EASY$.



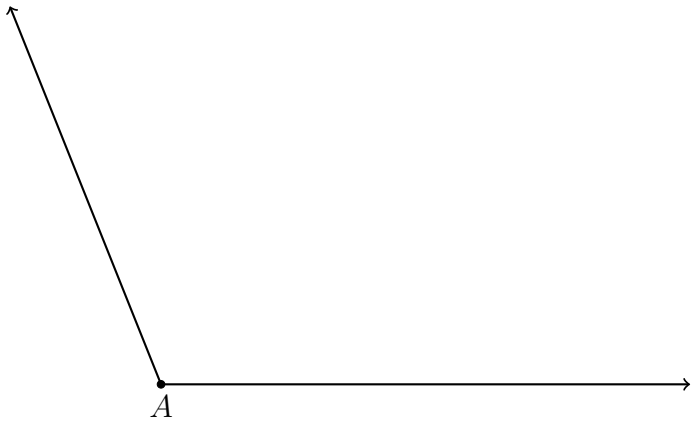
6. Given $m\angle R = 45$, $m\angle U = 55$, and $m\angle UST = 100$. Find $m\angle RSU$.



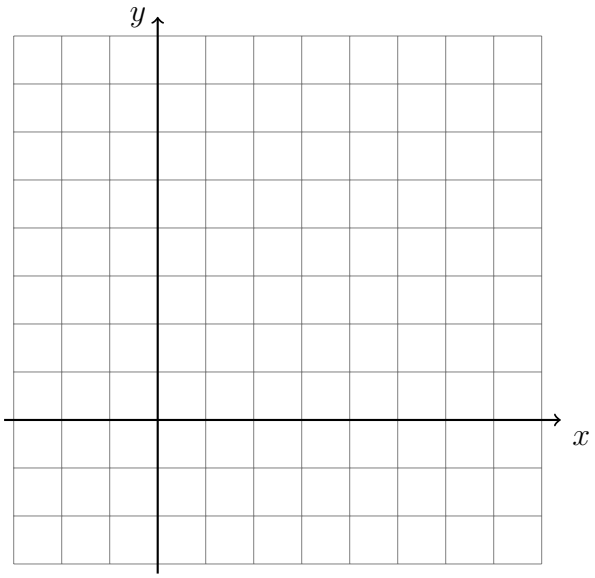
7. Construct a perpendicular bisector the given line segment $\overline{AB}$. Label the midpoint of $\overline{AB}$ as M. [Leave all construction marks.]



8. Construct an angle bisector the given angle A. [Leave all construction marks.]



9. On the graph below, draw $\overline{CD}$, with $C(-2, 3)$ and $D(6, 7)$, labeling the end points. Determine and state the coordinates of the midpoint M of $\overline{CD}$ and mark and label it on the graph.



10. In a proof, each of the following statements are written. Write down the reason that would justify each step.

    (a) $PQ + RS = QR + RS$ _____ property

    (b) $2(PQ + QR) = 2PQ + 2QR$ _____ property

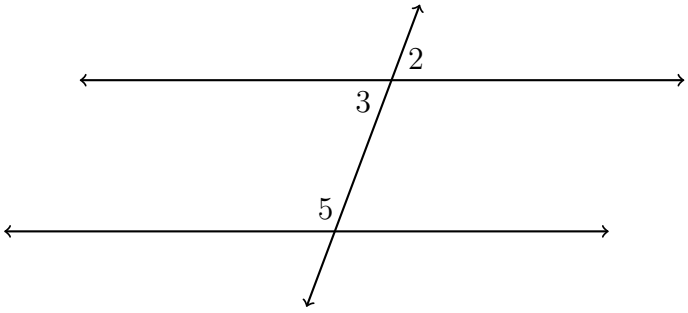
    (c) $\overline{PQ} \cong \overline{PQ}$ _____ property

11. Given a circle O with radius 7.

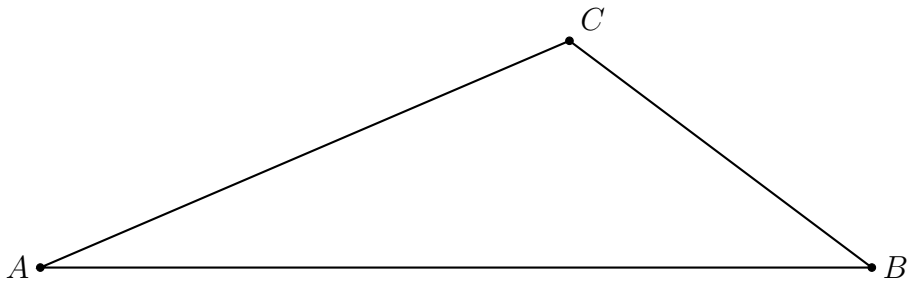
    (a) Find the circumference of O.

    (b) Find the area of O.

12. Given two parallel lines and a transversal, as shown. $m\angle 2 = 7x+19$ and $m\angle 5 = 10x+8$. Find $m\angle 5$. Show the check for full credit.



13. Construct a perpendicular to $\overline{AB}$ through C.



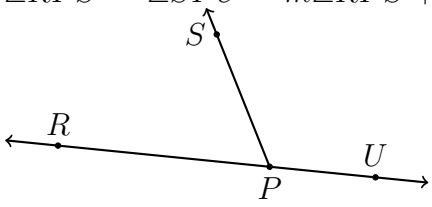
Circle the appropriate equation and state the justification

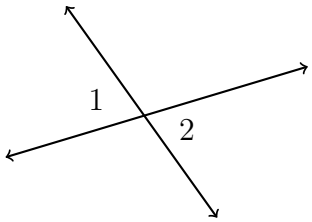
Use the postulates and theorems you have learned. You may abbreviate them as follows: "def. of bisector," "$\perp$ rays meet at 90°," "complementary $\angle$s add to 90," "linear pairs add to 180," "vertical $\angle$s are $\cong$," "corresponding $\angle$s of parallel lines are $\cong$."

14. Given corresponding angles of a transversal and two parellel lines, $\angle A$, $\angle B$.

    $\angle A \cong \angle B$ $\quad$ $m\angle A + m\angle B = 180°$ $\quad$ _____

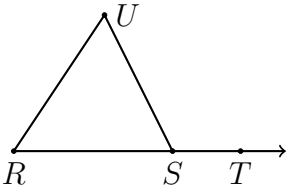
15. $\angle RPS \cong \angle SPU$ $\quad$ $m\angle RPS + m\angle SPU = 180°$ _____





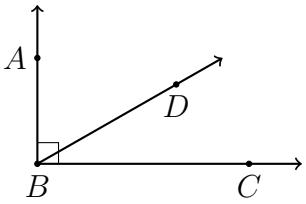
16. Given $m\angle 1 = 4x + 6$, $m\angle 2 = 6x - 32$. Find $m\angle 1$.

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



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

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



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

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

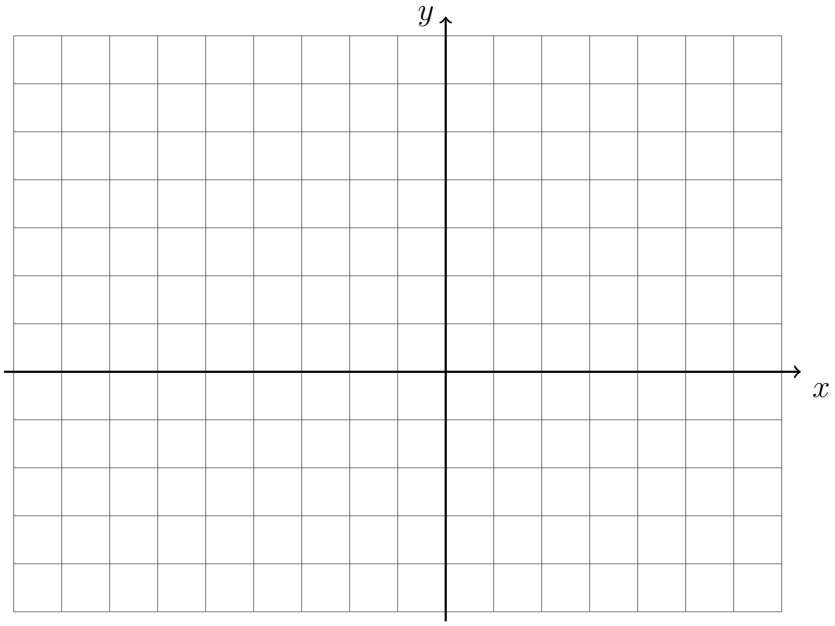
19. Given $N(-8,-1)$, $Y(4,-1)$, and $C(4,4)$.

    (a) Plot and label the points on the graph, drawing $\overline{NC}$

    (b) Draw the legs of the right triangle, $\overline{NY}$ and $\overline{YC}$, marking their lengths.

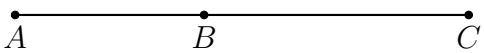
    (c) Write down the distance formula for NC, substituting coordinate values.

    (d) Find the value of NC.

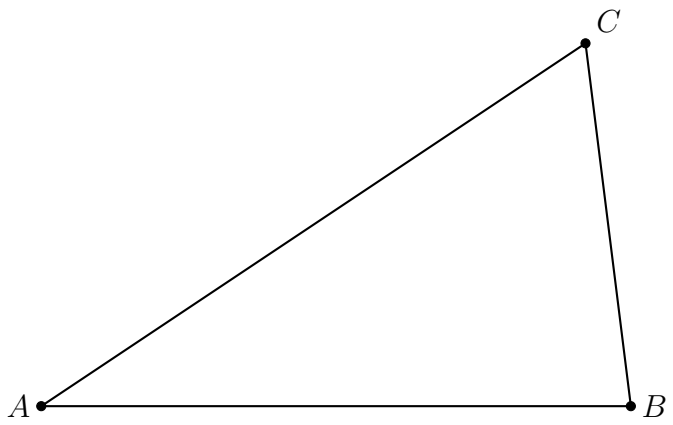


20. Given $\overline{ABC}$, $AC = 15$, and the point B partitions $\overline{AC}$ in a ratio of 1:2.

    Find AB.

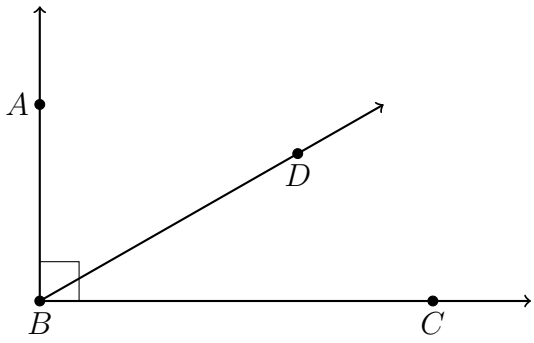


21. Construct the midpoint M of $\overline{AC}$ by using the perpendicular bisector construction. Draw $\overline{BM}$, a *median* of $\triangle ABC$.
    Spicy: Construct the other two medians, and hence, their intersection, the centroid.

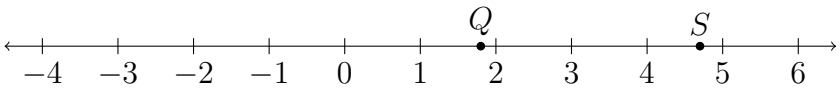


22. Given $\overrightarrow{BA} \perp \overrightarrow{BC}$, $m\angle ABD = 5x$, and $m\angle DBC = 2x - 1$. Find $m\angle DBC$.

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



23. Given $\overleftrightarrow{QS}$ as shown on the number line, with Q having the coordinate 1.8 and S the coordinate 4.7.

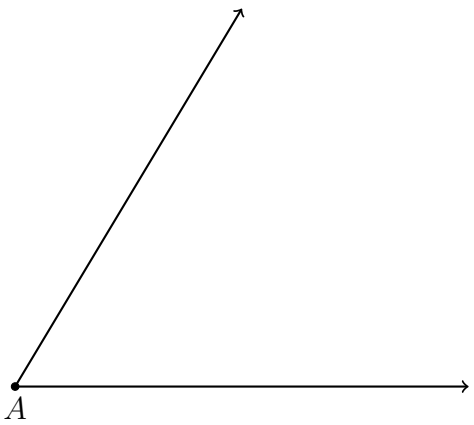


    (a) Find the value of the coordinate of the point R, the midpoint of $\overline{QS}$.

    (b) The point P is collinear with $\overleftrightarrow{QS}$ such that Q is the midpoint of $\overleftrightarrow{PS}$. Mark P on the line and state the value of its coordinate.

24. Given $M(-2, 4)$ and $N(6, -2)$, find the length of $\overline{MN}$.

25. Construct a duplicate of the given angle A. [Leave all construction marks.]

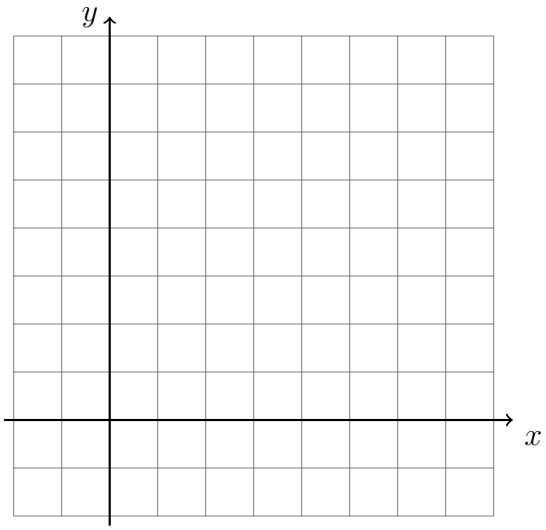


26. Prove the quadrilateral $BECA$ with $B(1,3)$, $E(3,2)$, $C(5,6)$, and $A(3,7)$ is a rectangle, using the theorem "If a quadrilateral's diagonals are congruent, then it is a rectangle."

    (a) Draw $BECA$, labeling the vertices, and draw the diagonals, $\overline{BC}$ and $\overline{EA}$.

    (b) Find the length EA, showing the subtraction of the y values, and BC, using the distance formula.

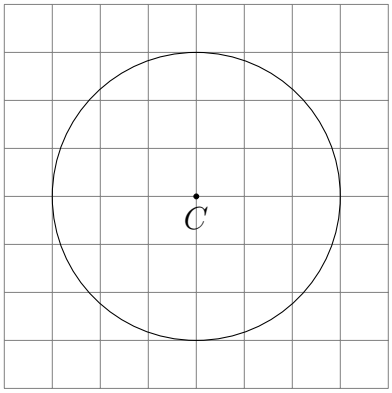
    (c) State the theorem above to complete the proof.



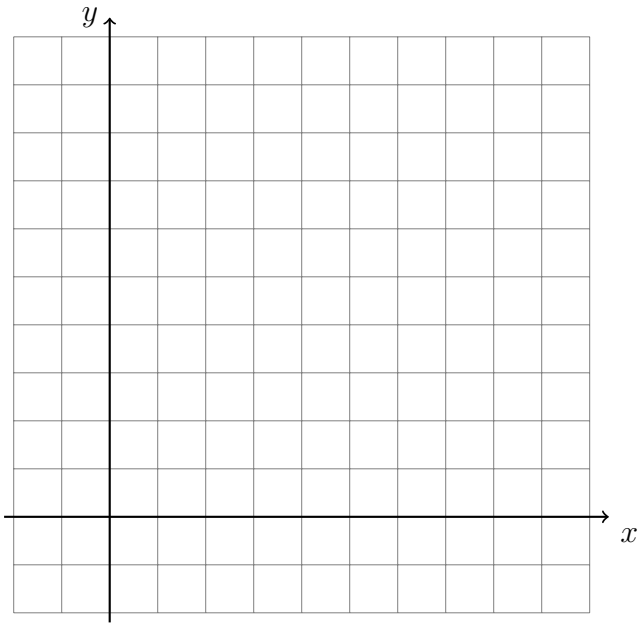
27. Given the circle C with circumference 6π.

    (a) Write down the formula for the circumference of a circle and solve for the radius yielding a circumference of 6π.

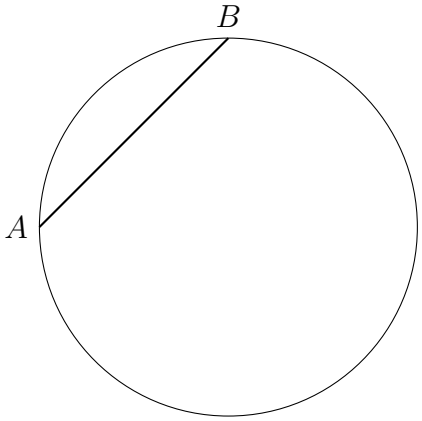
    (b) Find the area of the circle.



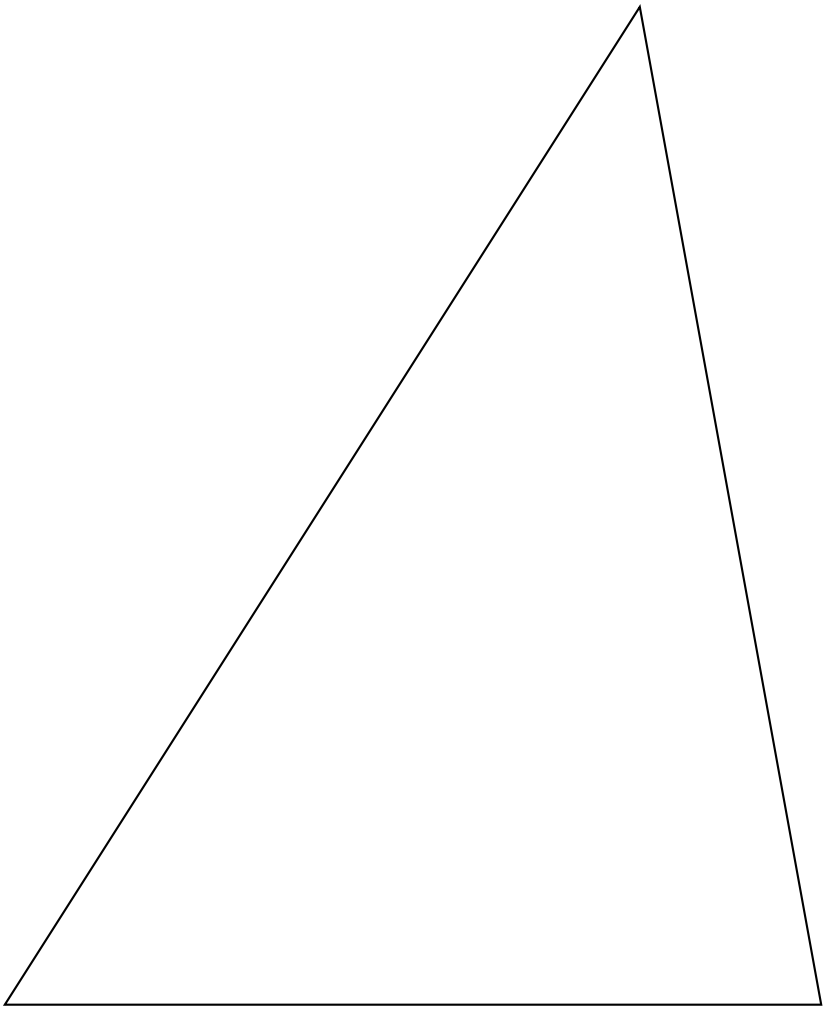
28. On the graph, draw polygon ABCDEF with vertices A(0, 0), B(0, 7), C(5, 7), D(5, 4), E(8, 4), and F(8, 0). Find the perimeter and the area of the polygon.



29. In the circle below, $\overline{AB}$ is a chord. Using a compass and straightedge, construct a perpendicular bisector of $\overline{AB}$, and hence, a diameter of the circle.
(Leave all construction marks.)



30. Construct the angle bisectors of the angles of the triangle and their intersection, the incenter.



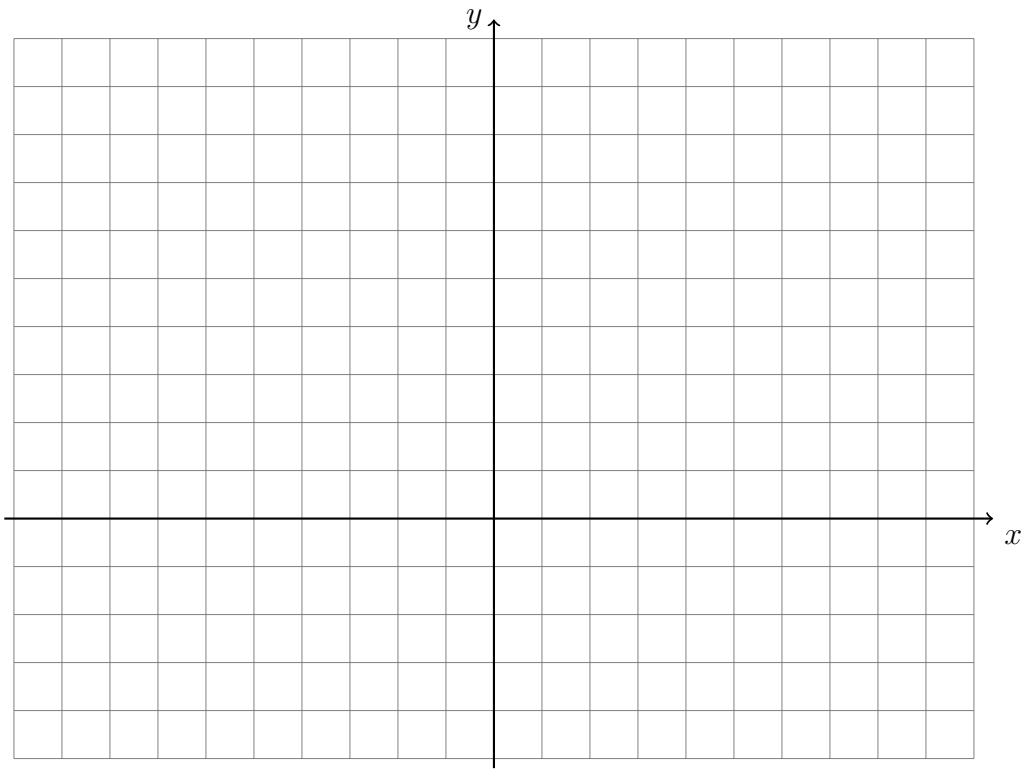
31. Given the quadrilateral $RSTU$ with $R(-8,-1)$, $S(2,-1)$, $T(10,5)$, and $U(0,5)$.

    (a) Plot and label $RSTU$ on the grid.

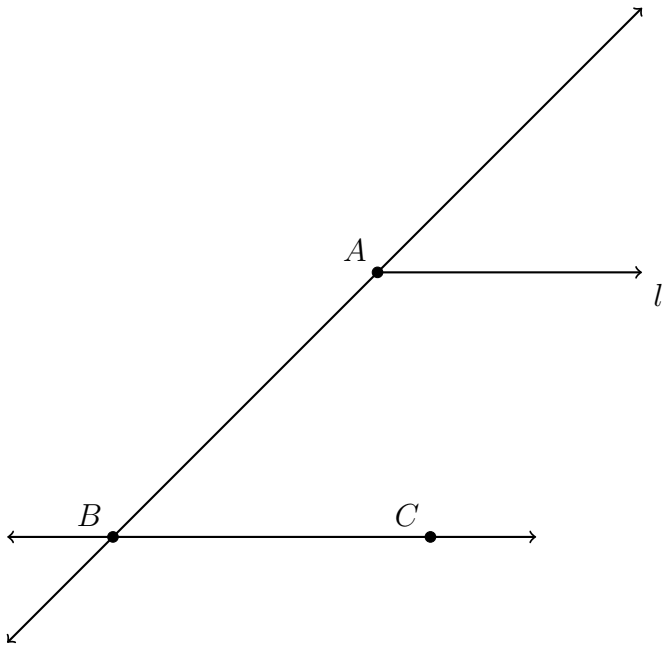
    (b) Using the distance formula or otherwise, calculate RS, ST, TU, and RU.

    (c) Definition: If a quadrilateral has four congruent sides, then it is a rhombus.

    Prove that $RSTU$ is a rhombus.



32. A duplicate of $\angle ABC$ is constructed with A as the vertex. The new leg of $\angle A$ is parallel to $\overleftrightarrow{BC}$, and labeled l.



(a) Are $\angle A$ and $\angle B$ complementary, supplementary, or congruent? Justify your answer.

(b) Would $\angle A$ and $\angle B$ be considered corresponding, alternate interior angles, or same-side exterior angles?