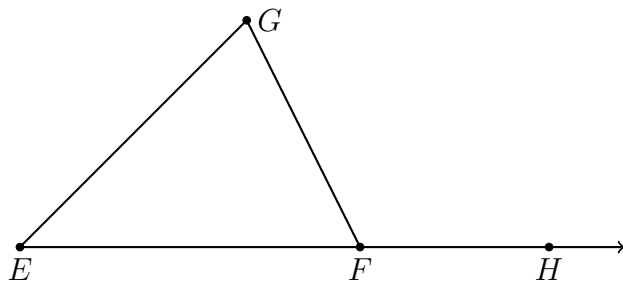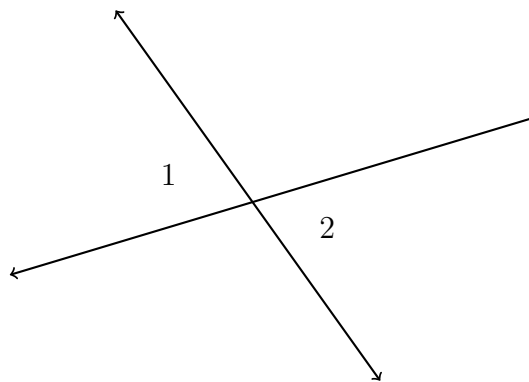**Take-home Test**

Open book, open notes. You may use your notebook, papers, and online resources. No working with classmates or other human help.
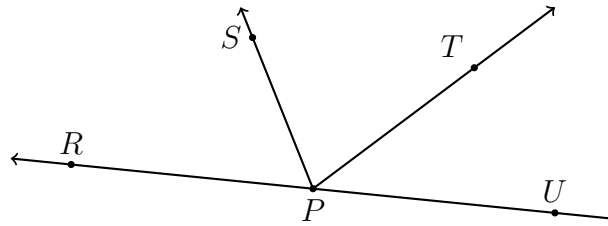
1. Given $m\angle E = 44$, and $m\angle GFH = 112$. Find $m\angle G$.

2. Given two vertical angles, $m\angle 1 = 4x + 5$, $m\angle 2 = \dfrac{9x - 7}{2}$. Find $m\angle 1$.
   For full credit, check by comparing to $m\angle 2$.

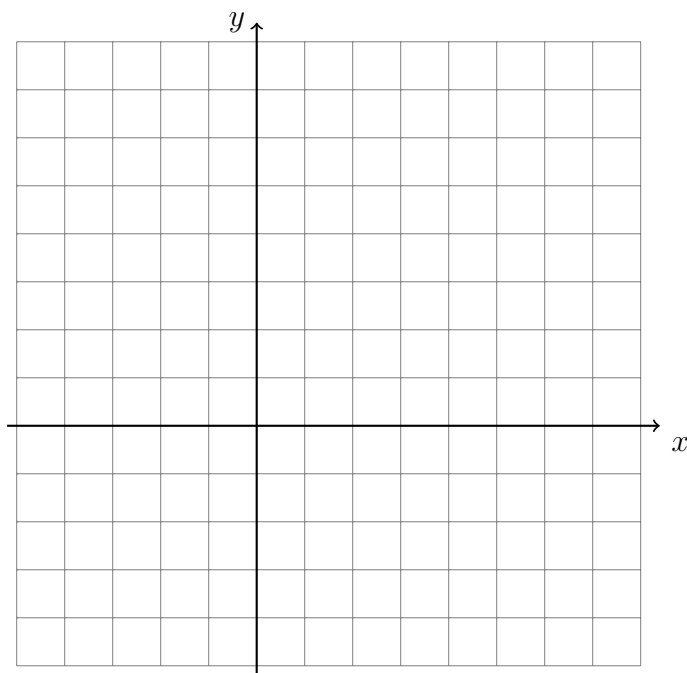3. Given the situation in the diagram, answer each question. Circle True or False.

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

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

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

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

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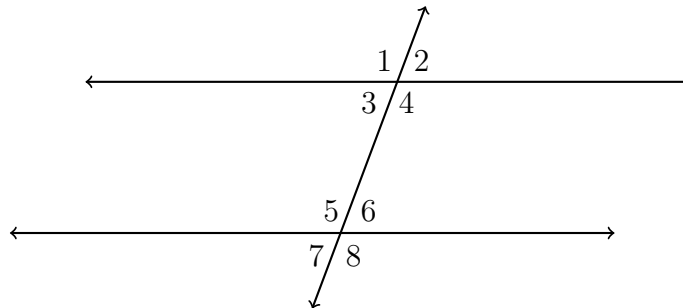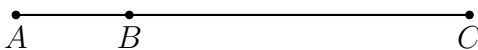

(a) State the angle corresponding with $\angle 7$.

(b) Given $m\angle 2 = 68°$. Find $m\angle 3$.

(c) In a proof, what reason would justify $\angle 4 \cong \angle 5$? _____

(d) Given $m\angle 5 = 112°$ and $m\angle 3 = 4x°$. Find x.

5. On the graph below, draw $\overline{CD}$, with $C(-1,6)$ and $D(7,3)$, labeling the end points. Determine and state the coordinates of the midpoint M of $\overline{CD}$ and mark and label it on the graph.
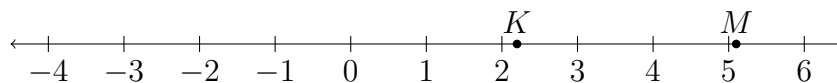
6. Given $\overline{ABC}$, $AC = 24$, and the point B partitions $\overline{AC}$ in a ratio of 1:3.

   Find AB.

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7. Given $\overleftrightarrow{KM}$ as shown on the number line, with K having the coordinate 2.2 and M the coordinate 5.1

$$
\begin{array}{ccccccccccc}
& & & & & & K & & M & \\
\text{---} & \text{-3} & \text{-2} & \text{-1} & 0 & 1 & 2 & 3 & 4 & 5 & 6
\end{array}
$$
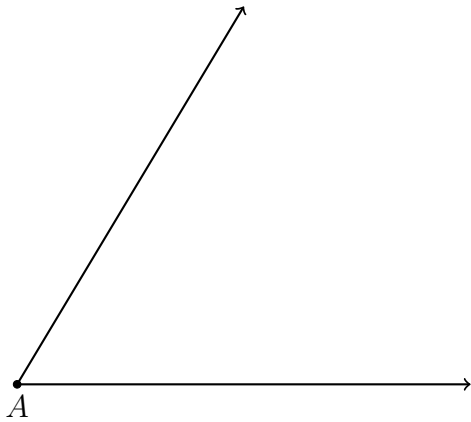
(a) Find the value of the coordinate of the point L, the midpoint of $\overline{KM}$.

(b) The point J is collinear with $\overleftrightarrow{KM}$ such that K is the midpoint of $\overleftrightarrow{JM}$. Mark J on the line and state the value of its coordinate.
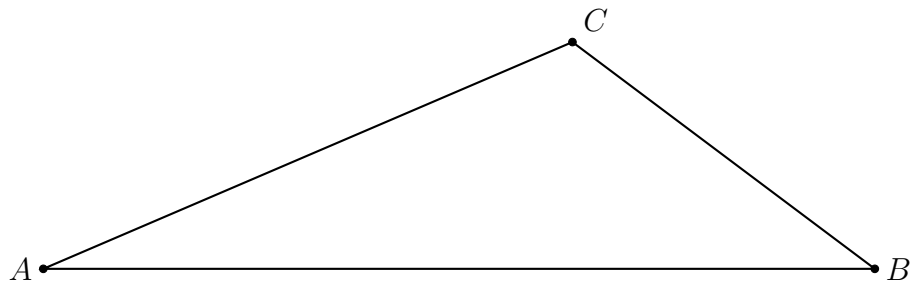
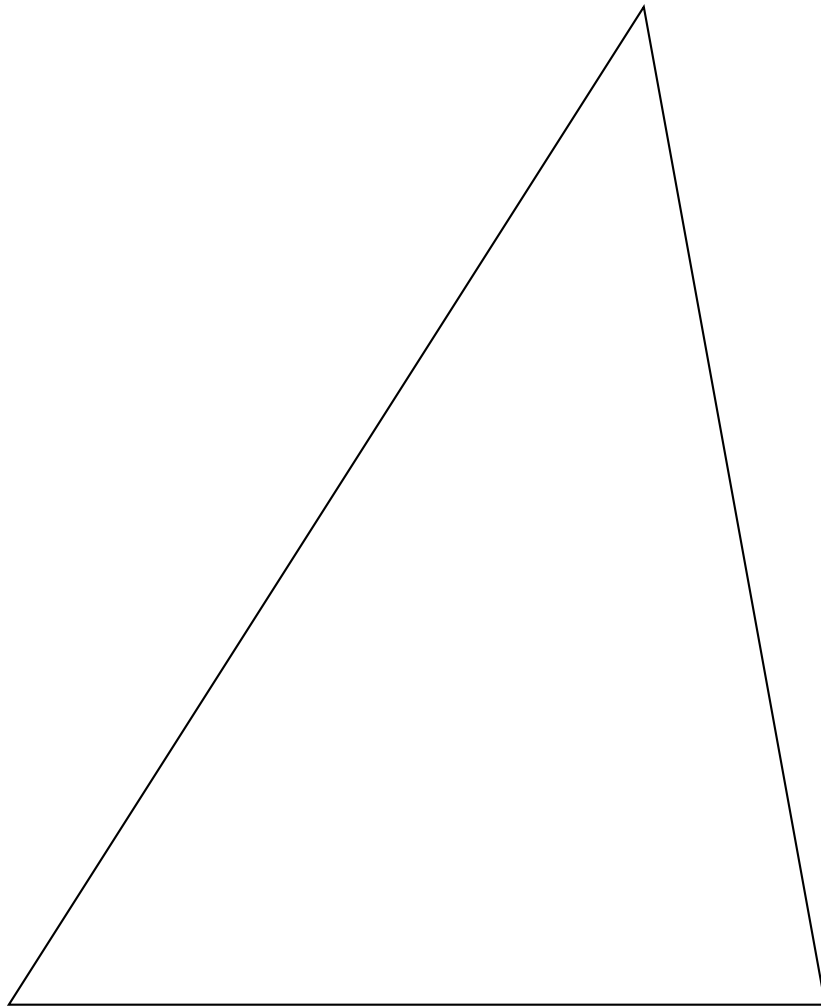8. Given $\triangle DEF$. $\overline{DF} \cong \overline{EF}$, $m\angle F = 68$. Find $m\angle D$.
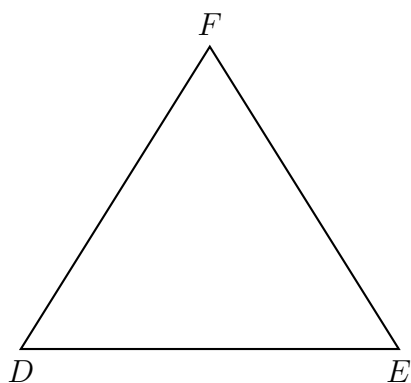
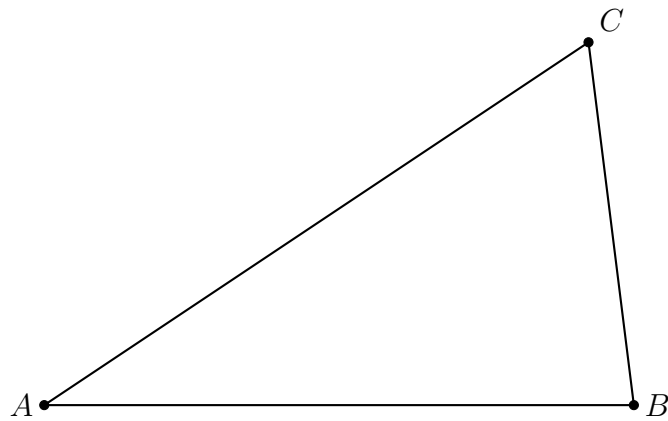9. Construct a duplicate of the given angle A. [Leave all construction marks.]

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

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

12. Construct the centroid of $\triangle ABC$, leaving all construction marks.

13. Given $M(-7, 10)$ and $N(-2, -2)$, find the length of $\overline{MN}$.

14. Given $\triangle GEM$ with $G(-9, -3)$, $E(6, -3)$, and $M(6, 5)$.

    (a) Plot and label $\triangle GEM$ on the graph, labeling its vertices.

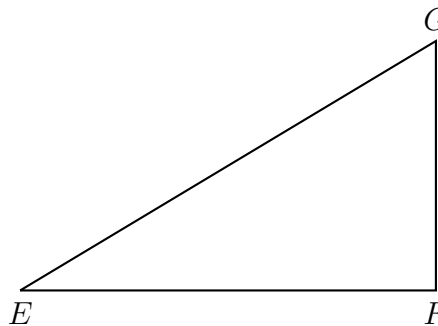   (b) Find the lengths of each side of the triangle. Show the substitution into the proper formulas for full credit.
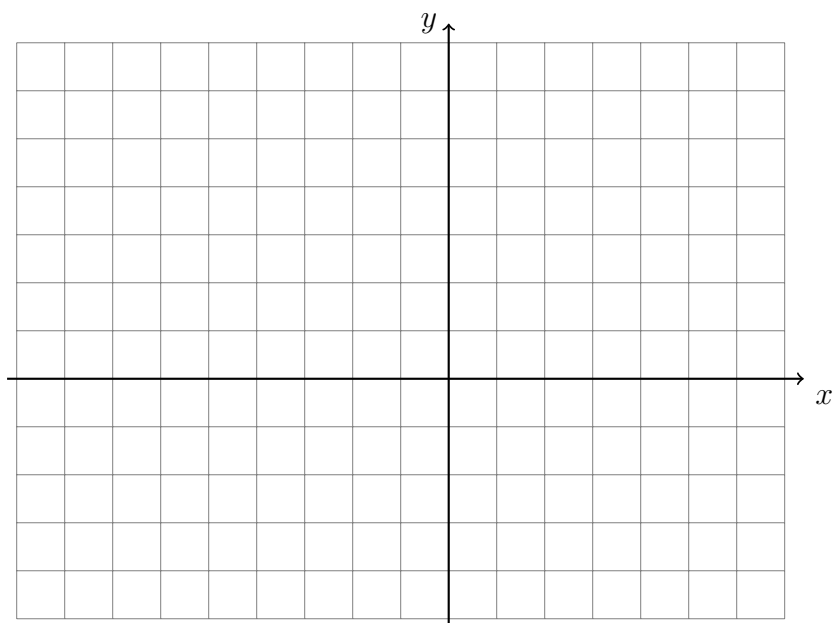
15. Given right $\triangle EFG$ with $m\angle F = 90°$, $EG = 8$, and $m\angle E = 43°$. Round each value to three decimal places.

    (a) $\sin E =$

    (b) $\tan E =$

    (c) Find EF.

16. Find the slope of each line.

    (a) $y = -3x - 7$ (b) $2x - 3y = 9$
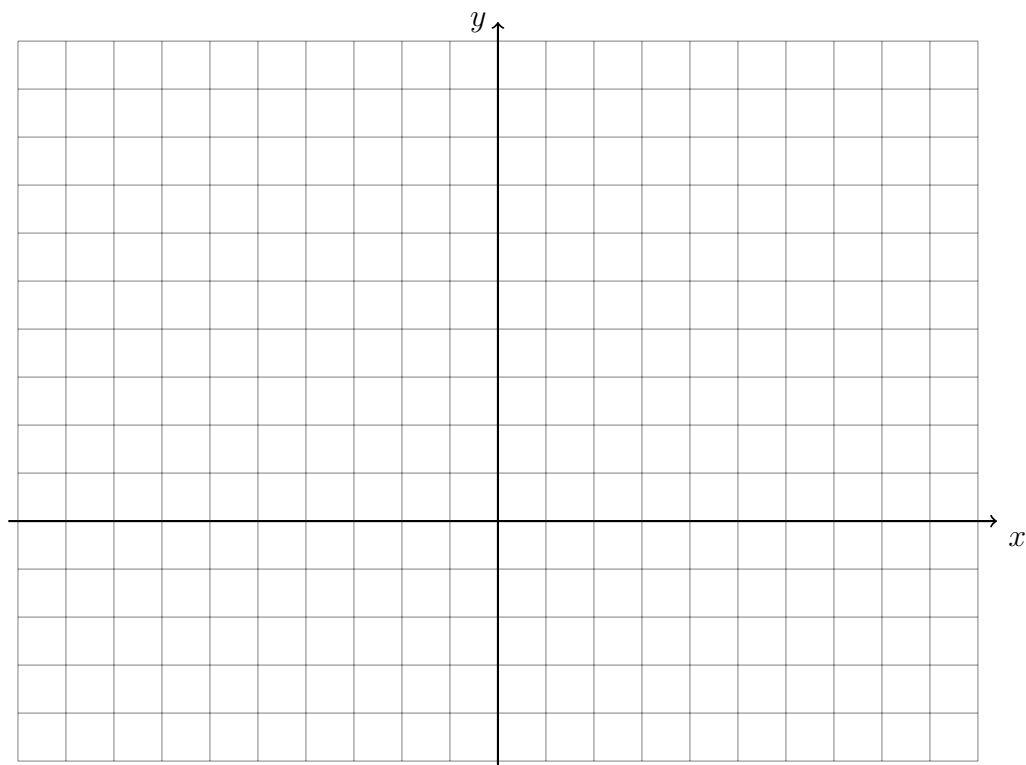
17. Find the slope of the line through the points $A(5, 3)$ and $B(7, -1)$.

18. 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) Find the slope of the diagonals $\overline{RT}$ and $\overline{SU}$.

    (c) Theorem: A quadrilateral is a rhombus if and only if its diagonals are perpendicular.
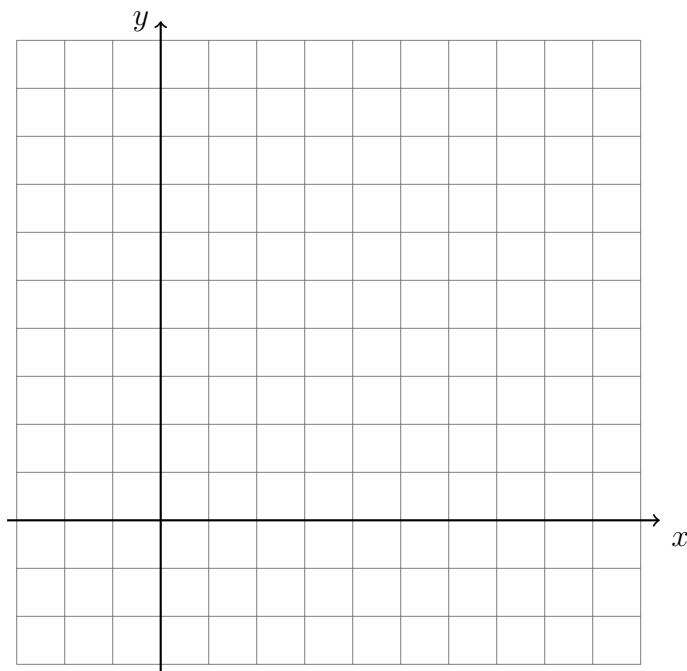
        Prove that $RSTU$ is a rhombus.

19. Given the square $EASY$ with $E(-1,1)$, $A(6,1)$, $S(6,8)$, and $Y(-1,8)$.

   (a) Draw $EASY$ on the graph, labeling the vertices.

   (b) Find the area of $EASY$.

   (c) Find the perimeter of $EASY$.
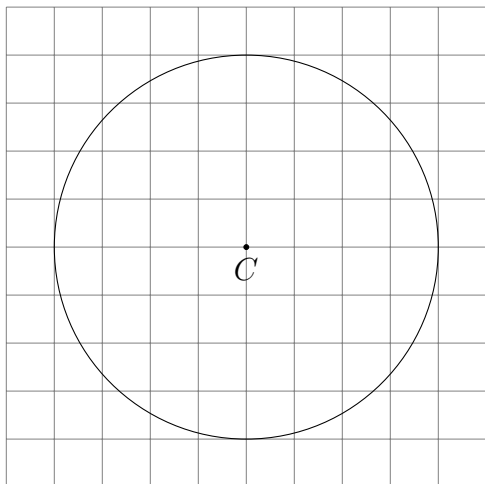

20. Given a circle O with radius 2.2.

   (a) Find the circumference of O.

   (b) Find the area of O.

21. Given the circle C with circumference 8π.

    (a) Write down the formula for the circumference of a circle and solve for the radius yielding a circumference of 8π.

    (b) Find the area of the circle.

22. On the graph, draw polygon ABCDEF with vertices A(-1, 1), B(4, 1), C(4, 5), D(9, 5), E(9, 8), and F(-1, 8). Find the perimeter and the area of the polygon.