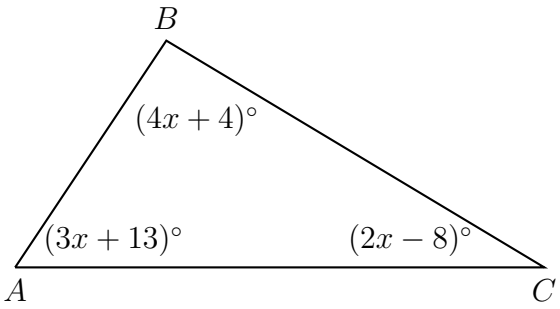
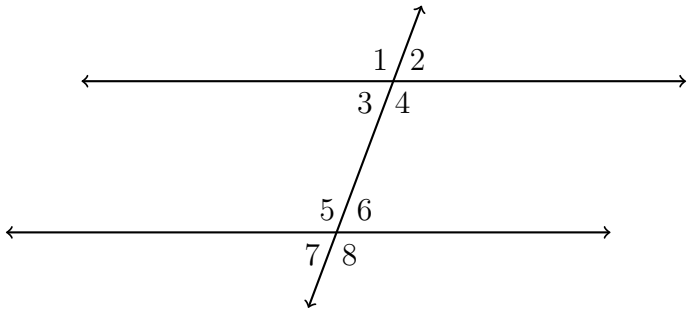
**Take Home Test: Triangles, transformations, proof**

1. In $\triangle ABC$ shown below, $m\angle A = (3x+13)°$, $m\angle B = (4x+4)°$, and $m\angle C = (2x-8)°$. What is $m\angle A$?




2. Given two parallel lines and a transversal, as shown below.

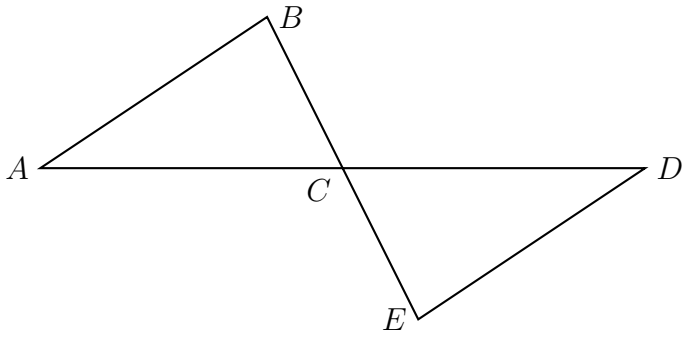



   (a) State the angle corresponding with $\angle 6$.

   (b) Given $m\angle 3 = 73°$ and $m\angle 5 = (3x-1)°$. Find $x$.

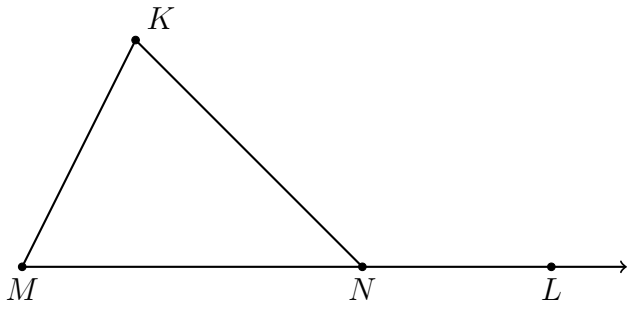
   (c) In a proof, what reason would justify $m\angle 5 + m\angle 6 = 180°$? _____

3. Given $\triangle ABC$ and $\triangle DEC$ with $\angle B \cong \angle E$. $C$ is the midpoint of $\overline{AD}$. Prove $\triangle ABC \cong \triangle DEC$.

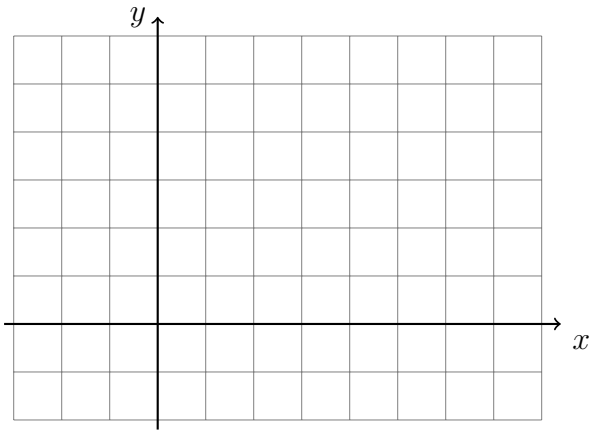



| Statement | Reason |
|---|---|
| 1) _____ | 1) Given |
| 2) _____ | 2) Given |
| 3) _____ | 3) Given |
| 4) $\angle BCA \cong \angle ECD$ | 4) _____ |
| 5) _____ | 5) Definition of a midpoint |
| 6) $\triangle ABC \cong \triangle DEC$ | 6) _____ |

4. Given $\overline{KN} \cong \overline{MN}$ and $m\angle KNL = 108°$. Find $m\angle M$.



5. On the graph below, draw $\overline{AB}$, with $A(-1,-1)$ and $B(7,1)$, labeling the end points. Determine and state the coordinates of the midpoint $M$ of $\overline{AB}$ and mark and label it on the graph.




6. Express the result to *the nearest thousandth*.

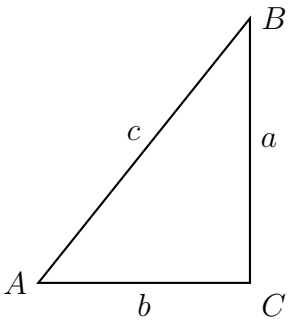
(a) $\sin 42° =$

(b) $\cos 19° =$

(c) $\cos 48° =$

(d) $\sin 71° =$

7. $\triangle ABC$ is shown with $m\angle C = 90°$. The lengths of the triangle's sides are $a$, $b$, and $c$. Express each trigonometric ratio as a fraction of two variables.

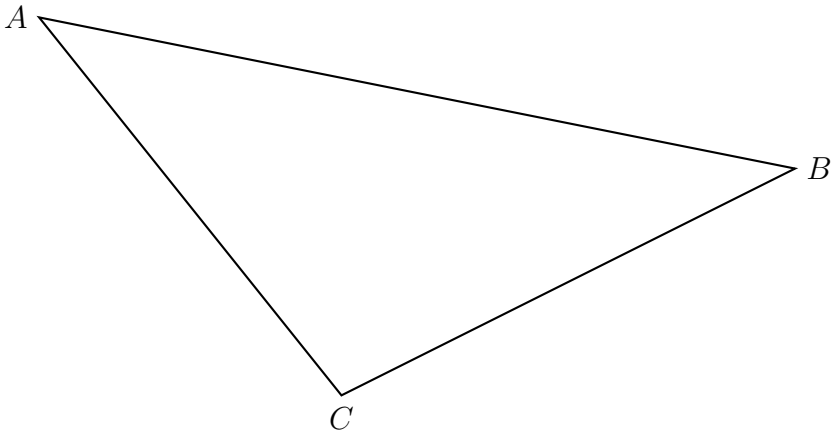



(a) $\sin B =$

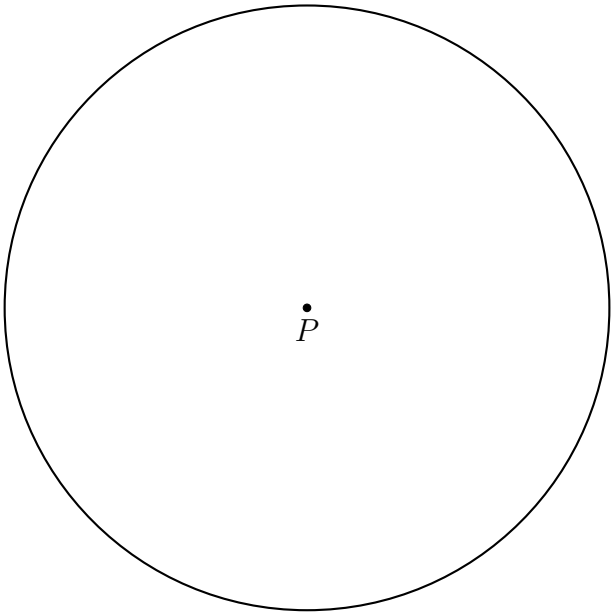
(b) $\cos A =$

(c) Explain why $\angle A$ and $\angle B$ are complementary.

8. Using a compass and straightedge, construct the median to side $\overline{AC}$ in $\triangle ABC$ below. (Leave all construction marks.)




9. With a compass and straightedge, construct a regular hexagon inscribed in circle $P$. (Leave all construction marks.)



10. $A(-2,-5)$ is one endpoint of $\overline{AB}$. The segment's midpoint is $M(4,-1)$. Find the other endpoint, $B$.

11. The line $l$ has the equation $y = -\frac{3}{4}x + 3$.

    (a) What is the slope of the line $k$, given $k \parallel l$?

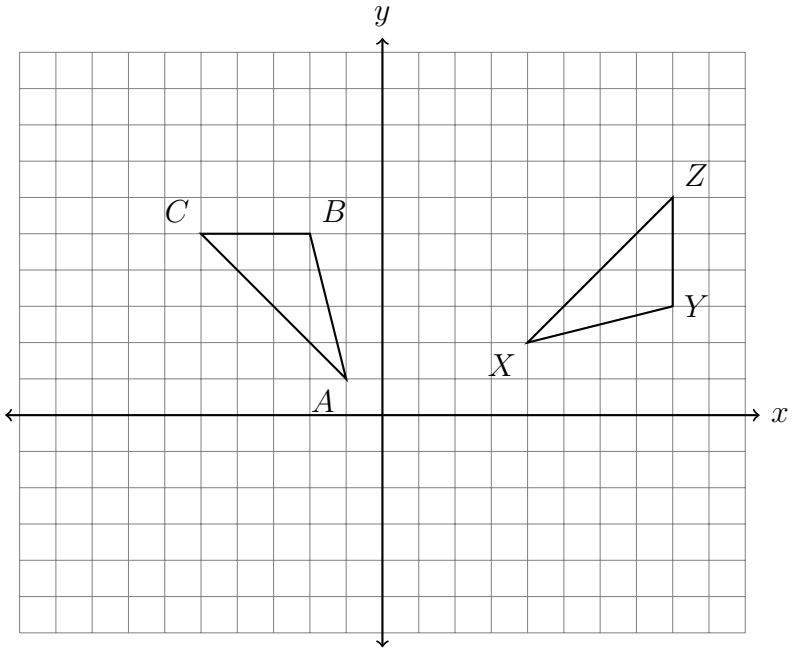
    (b) What is the slope of the line $m$, given $m \perp l$?

12. Given $P(-3,9)$ and $Q(3,1)$, find the length of $\overline{PQ}$.

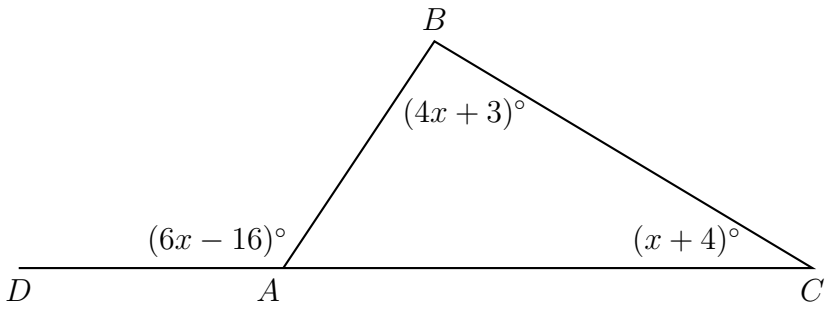
13. A translation maps $D(2, 4) \rightarrow D'(-3, 4)$. What is the image of $E(5, -5)$ under the same translation?

14. The image of triangle $ABC$ after a rotation is $\triangle A'B'C'$. Is the area of the triangle greater, smaller, or the same after the translation? Justify your answer.

15. The triangle $ABC$, shown below, undergoes two rigid motions carrying it onto triangle $XYZ$. State the two isometric transformations. (be specific)

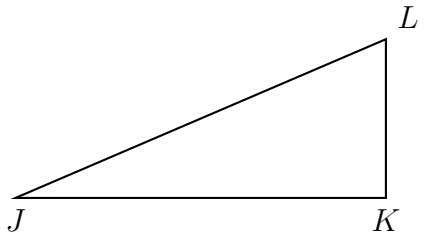


16. In $\triangle ABC$ shown below, side $\overline{AC}$ is extended to point $D$ with $m\angle DAB = (6x - 16)^\circ$, $m\angle C = (x + 4)^\circ$, and $m\angle B = (4x + 3)^\circ$.

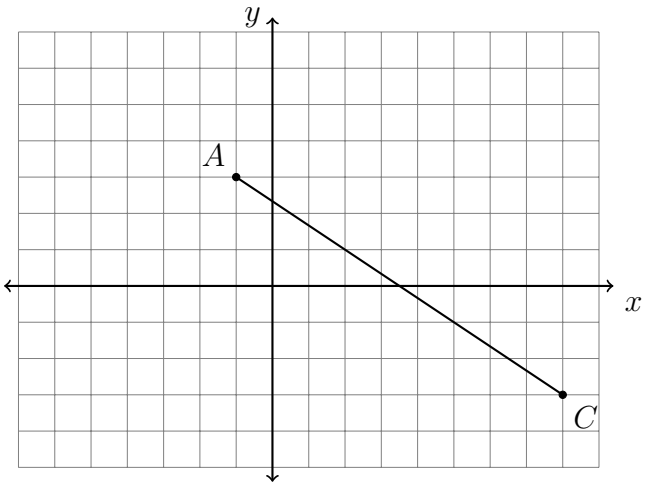



What is $m\angle BAC$?

17. Given right $\triangle JKL$ with $\overline{JK} \perp \overline{KL}$, $JL = 9.7$, $m\angle J = 36°$. Find the length $JK$, *rounded to the nearest thousandth.*

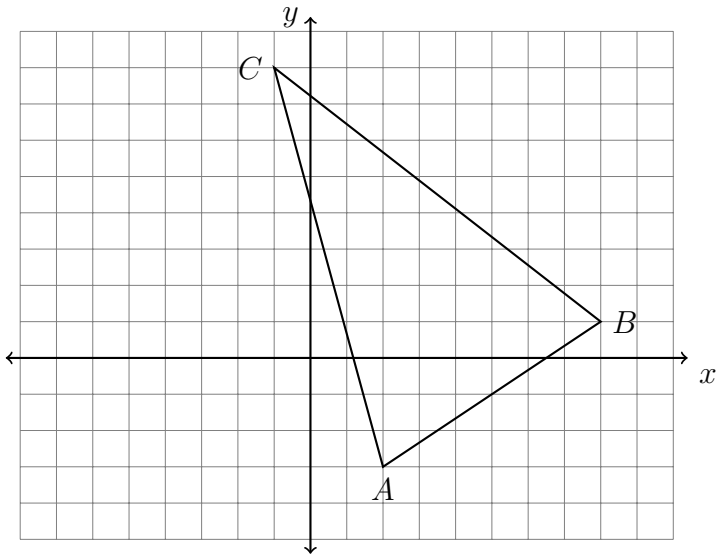



18. In the diagram below, $\overleftrightarrow{AC}$ has endpoints with coordinates $A(-1, 3)$ and $C(8, -3)$.




If $B$ is a point on $\overline{AC}$ and $AB{:}BC = 1{:}2$, what are the coordinates of $B$?

19. Spicy: Triangle $\triangle ABC$ is graphed on the set of axes below. The vertices of $\triangle ABC$ have the coordinates $A(2, -3)$, $B(8, 1)$, and $C(-1, 8)$.




(a) Draw an altitude through point $C$ perpendicular to $\overline{AB}$.

(b) What is the length of the altitude drawn through $C$?

(c) What is the length of the base, $AB$?

(d) Find the area of $\triangle ABC$.