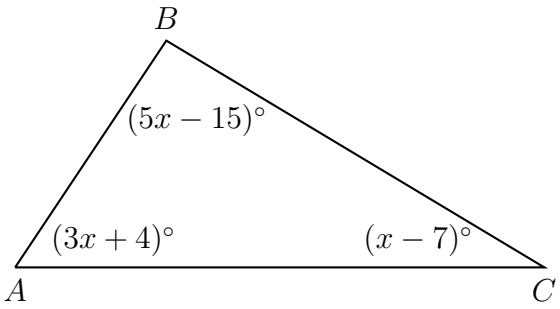
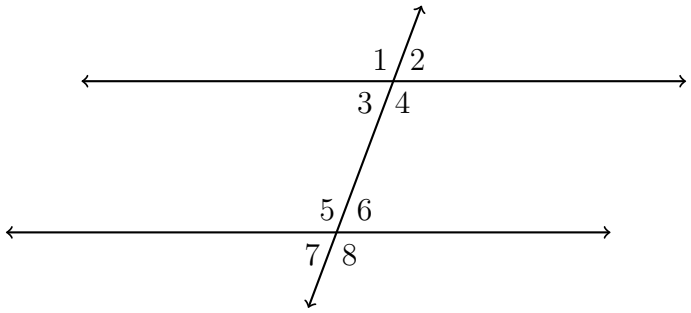
**Test: Triangles, transformations, proof**

1. In $\triangle ABC$ shown below, $m\angle A = (3x+4)^\circ$, $m\angle B = (5x-15)^\circ$, and $m\angle C = (x-7)^\circ$. What is $m\angle A$?




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

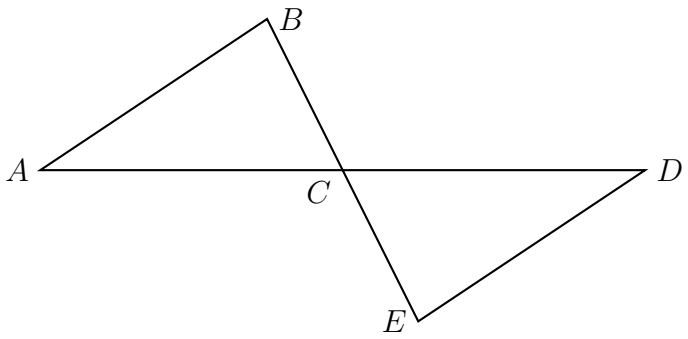



   (a) State the angle corresponding with $\angle 5$.

   (b) Given $m\angle 3 = 78^\circ$ and $m\angle 5 = 3x^\circ$. Find $x$.

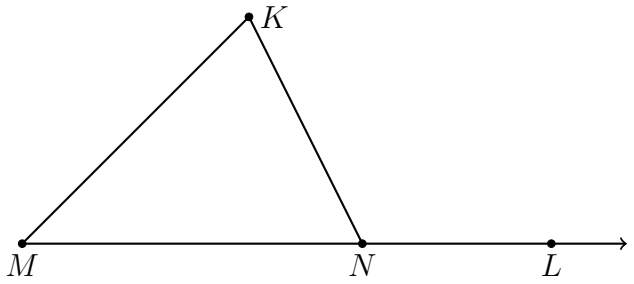
   (c) In a proof, what reason would justify $\angle 3 \cong \angle 6$? _____

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

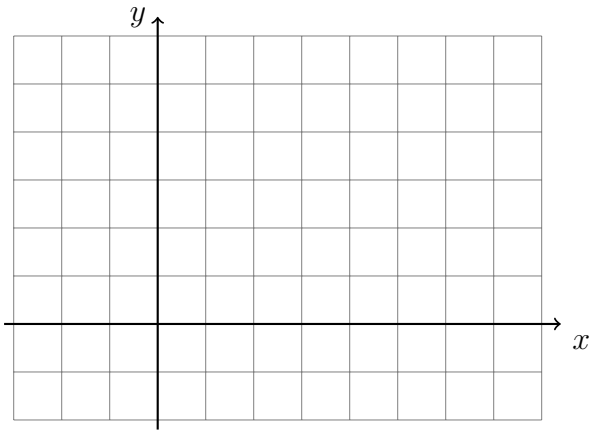



| Statement | Reason |
|---|---|
| 1) _____ | 1) Given |
| 2) _____ | 2) Given |
| 3) _____ | 3) Given |
| 4) $\angle BCA \cong \angle ECD$ | 4) _____ |
| 5) _____ | 5) Definition of a midpoint |
| 6) $\triangle ABC \cong \triangle DEC$ | 6) _____ |

4. Given $m\angle K = 38°$ and $m\angle KNL = 111°$. Find $m\angle M$.



5. On the graph below, draw $\overline{AB}$, with $A(-2, 1)$ and $B(6, 3)$, 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.

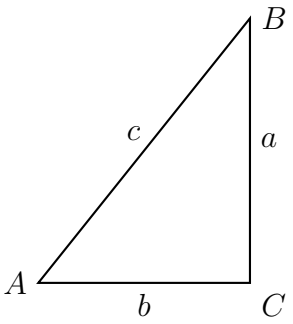
(a) $\sin 60° =$

(b) $\cos 23° =$

(c) $\tan 45° =$

(d) $\sin 81° =$

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.

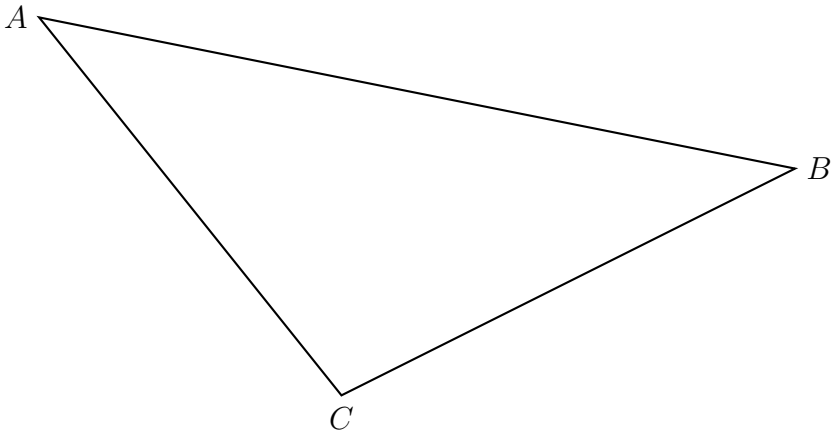



(a) $\sin A =$

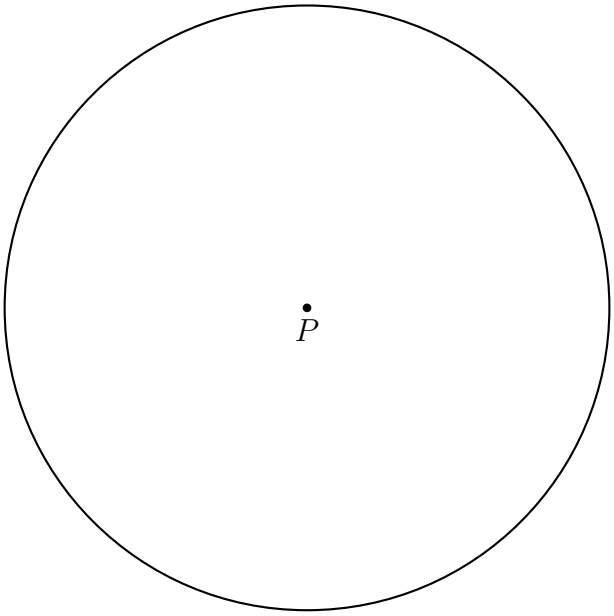
(b) $\cos A =$

(c) $\tan A =$

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




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



10. $A(3,1)$ is one endpoint of $\overline{AB}$. The segment's midpoint is $M(7,6)$. Find the other endpoint, $B$.

11. The line $l$ has the equation $y = -\frac{3}{2}x - 7$.

    (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 $P(-2,9)$ and $Q(3,-3)$, find the length of $\overline{PQ}$.

13. Apply the translation $(x, y) \to (x - 2, y + 4)$ to the point $A(2, -1)$.

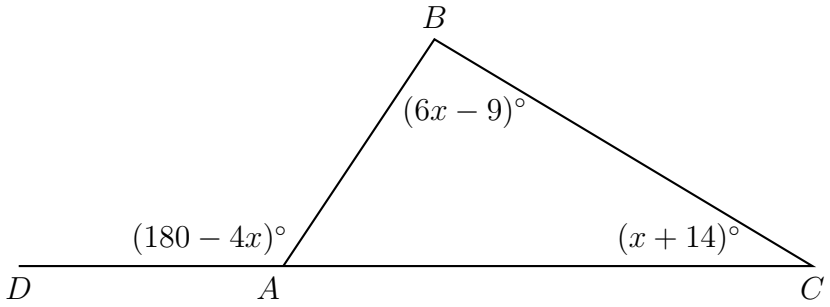
14. What is the image of $B(2, 7)$ under a reflection across the $x$-axis?

15. State the translation that would map $C(-3, 1)$ onto $C'(4, 0)$.

16. A translation maps $D(1, 9) \to D'(4, 3)$. What is the image of $E(6, -2)$ under the same translation?

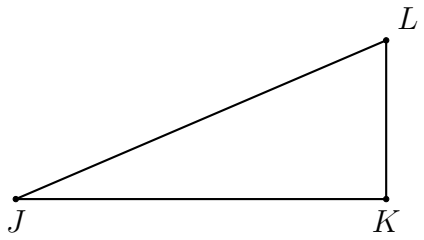
17. The image of triangle $ABC$ after a translation is $\triangle A'B'C'$. Is the area of the triangle greater, smaller, or the same after the translation? Justify your answer.

18. In $\triangle ABC$ shown below, side $\overline{AC}$ is extended to point $D$ with $m\angle DAB = (180-4x)^\circ$, $m\angle C = (x+14)^\circ$, and $m\angle B = (6x-9)^\circ$.

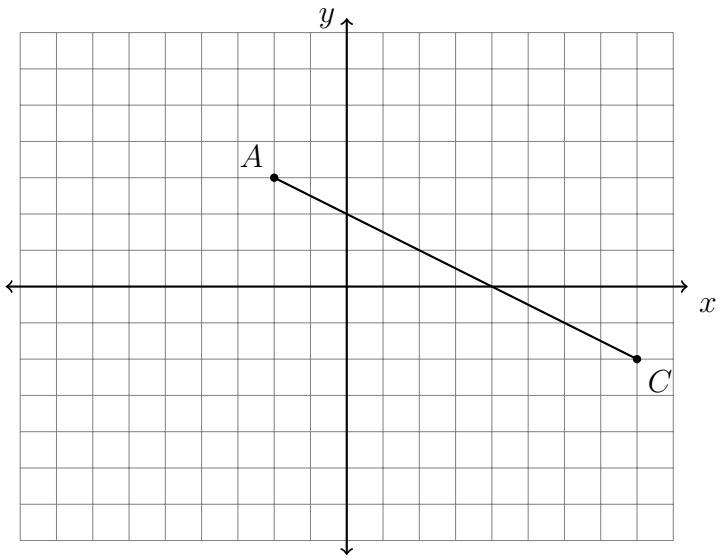



What is $m\angle BAC$?

19. Given right $\triangle JKL$ with $\overline{JK} \perp \overline{KL}$, $JL = 9$, $m\angle J = 32°$. Find the length $JK$.

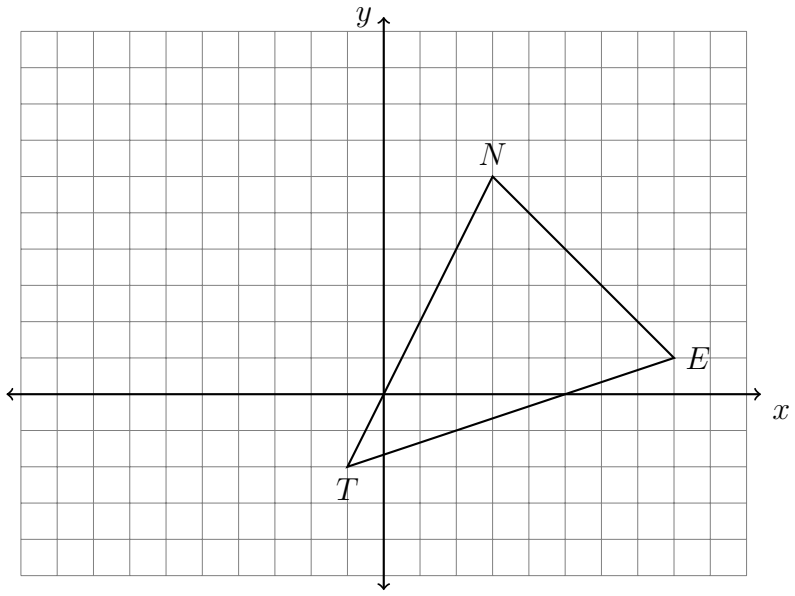



20. In the diagram below, $\overleftrightarrow{AC}$ has endpoints with coordinates $A(-2, 3)$ and $C(8, -2)$.




If $B$ is a point on $\overline{AC}$ and $AB{:}BC = 2{:}3$, what are the coordinates of $B$?

21. Triangle $\triangle DAN$ is graphed on the set of axes below. The vertices of $\triangle DAN$ have the coordinates $T(-1,-2)$, $E(8,1)$, and $N(3,6)$.




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

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

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

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