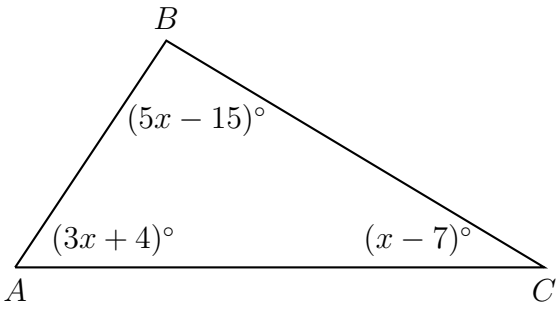
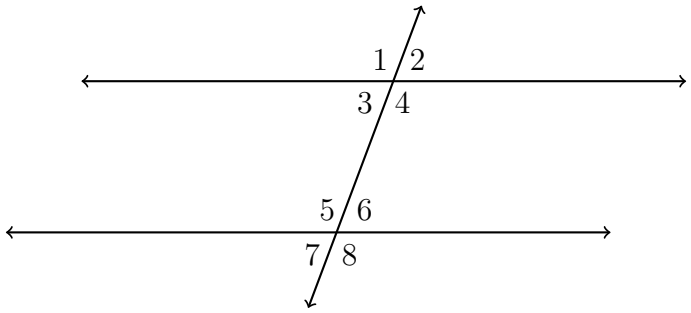
Test: Triangles, transformations, proof

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.

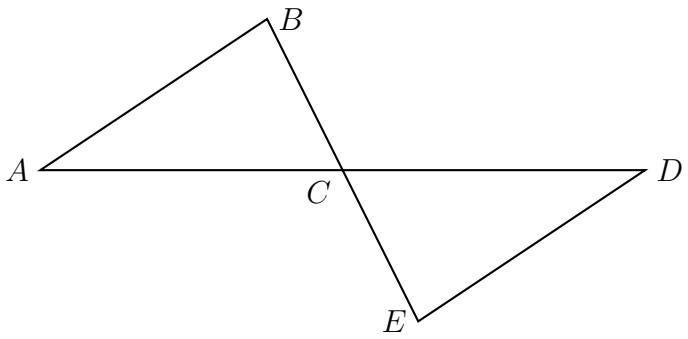


   (a) State the angle corresponding with $\angle 5$.

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

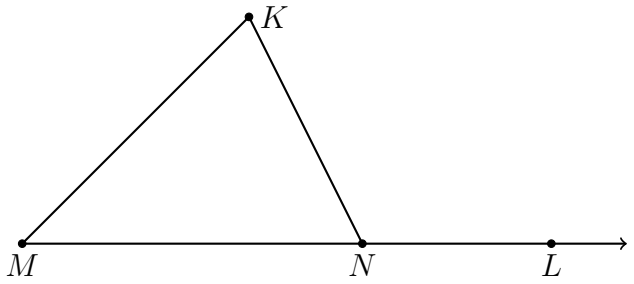
   (c) In a proof, what reason would justify $\angle 3 \cong \angle 6$? _____

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

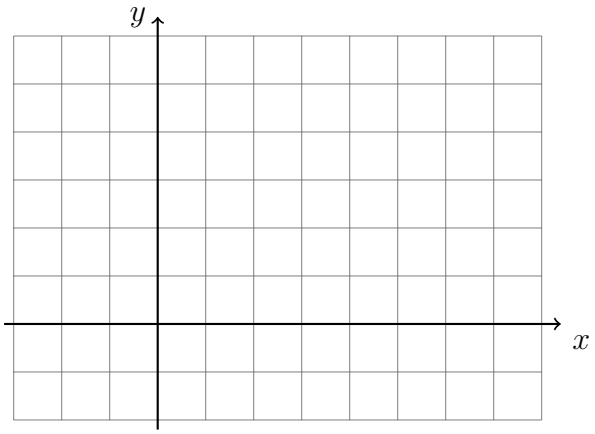


Statement	Reason
1) _____	1) Given
2) _____	2) Given
3) _____	3) Given
4) $\angle BCA \cong \angle ECD$	4) _____
5) _____	5) Definition of a midpoint
6) $\triangle ABC \cong \triangle DEC$	6) _____

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.

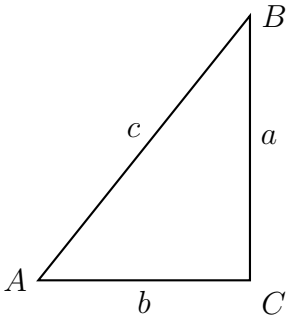
   (a) $\sin 60° =$

   (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.

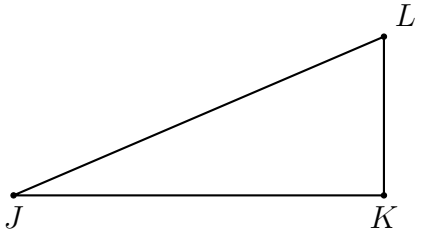


   (a) $\sin A =$

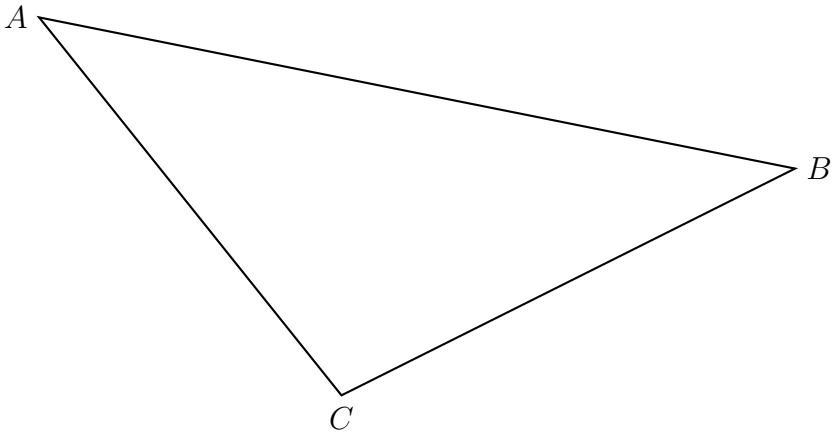
   (b) $\cos A =$

   (c) $\tan A =$

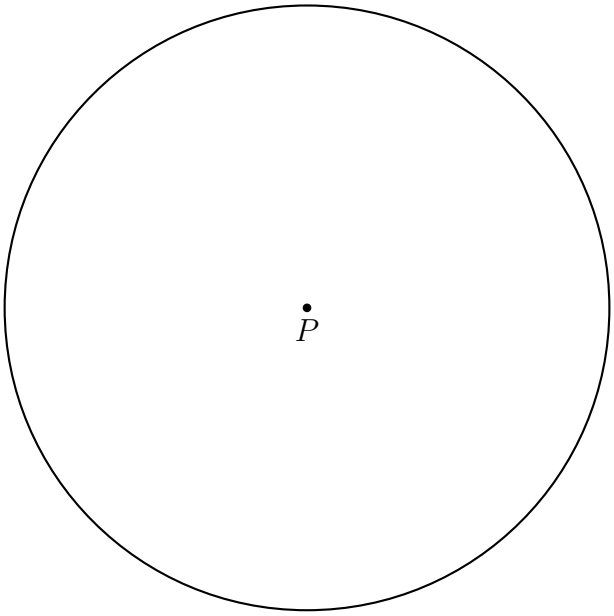
8. Given right $\triangle JKL$ with $\overline{JK} \perp \overline{KL}$, $JL = 9$, $m\angle J = 29°$. Find the length JK.



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



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



11. $M(5,5)$ is the midpoint of AB. Given $A(2,3)$, find the other endpoint, B.

12. The line l has the equation $y = \frac{1}{2}x - 3$.

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

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

13. Given $P(3,4)$ and $Q(11,-2)$, find the length of $\overline{PQ}$.

14. Apply the translation $(x,y) \to (x-1, y+3)$ to the point $A(0,-4)$.

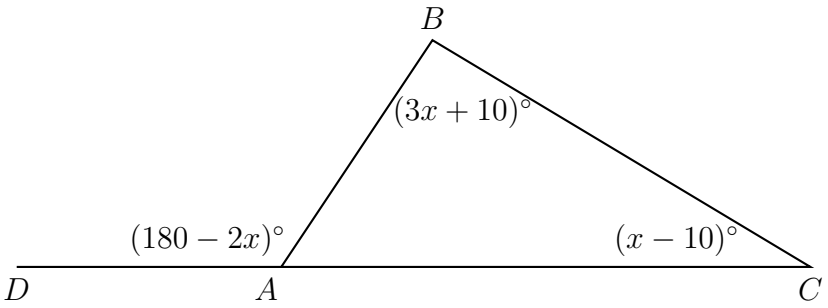
15. What is the image of $B(4,3)$ under a reflection across the x-axis?

16. State the translation that would map $C(1,5)$ onto $C'(4,3)$.

17. A translation maps $A(5,2) \to A'(-2,3)$. What is the image of $B(-1,5)$ under the same translation?

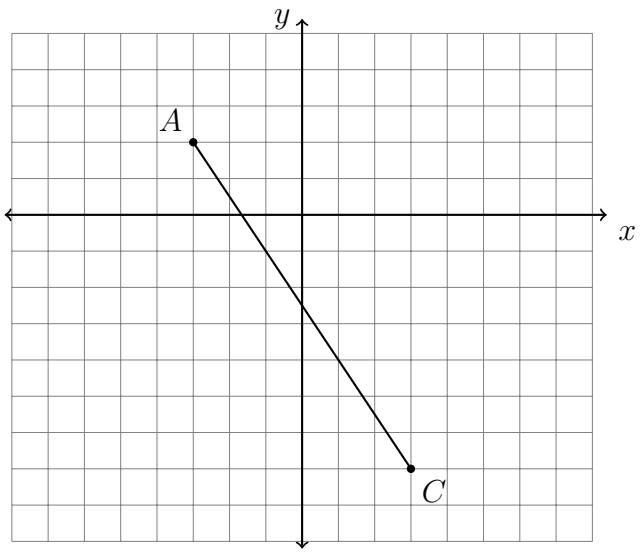
18. The image of triangle ABC after a translation is $\triangle A'B'C'$. Is the area of the triangle greater, smaller, or the same after the translation? Justify your answer.

19. In $\triangle ABC$ shown below, side $\overline{AC}$ is extended to point D with $m\angle DAB = (180 - 2x)°$, $m\angle C = (x - 10)°$, and $m\angle B = (3x + 10)°$.



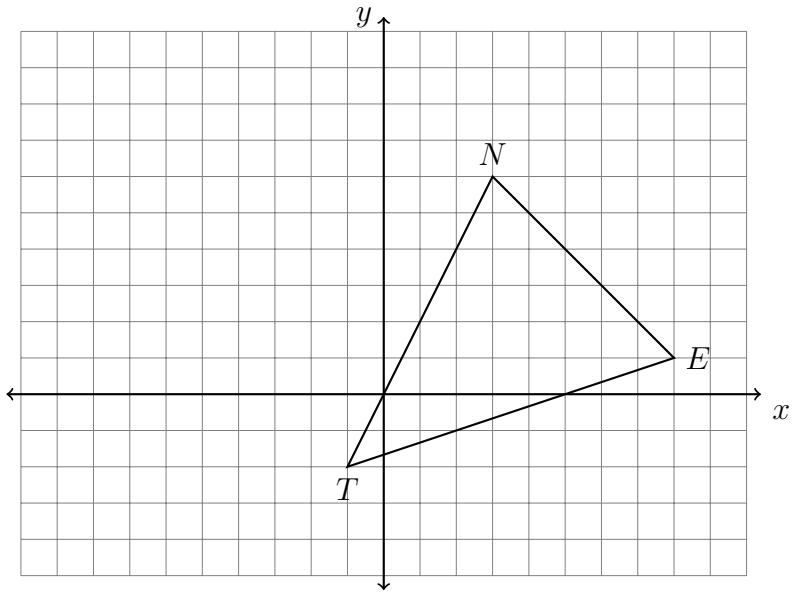
What is $m\angle BAC$?

20. In the diagram below, $\overleftrightarrow{AC}$ has endpoints with coordinates $A(-3, 2)$ and $C(3, -7)$.



If B is a point on and $AB{:}BC = 1{:}2$, 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 $\triangle DAN$.