

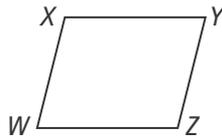


UNDERSTAND

13. **Construct Arguments** Write a proof of Theorem 6-7.

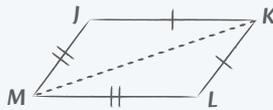
Given: $\overline{WX} \parallel \overline{ZY}$, $\overline{WZ} \parallel \overline{XY}$

Prove: $\overline{WX} \cong \overline{ZY}$, $\overline{WZ} \cong \overline{XY}$



14. **Error Analysis** In the statements shown, explain the student's error. What shape is the quadrilateral?

$\overline{JK} \cong \overline{KL}$ and $\overline{LM} \cong \overline{MJ}$.
 $\angle MJK \cong \angle KLM$



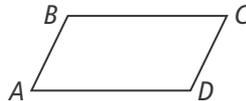
Therefore, $\triangle MJK \cong \triangle KLM$ by SAS. The triangular halves of $JKLM$ are congruent, so $JKLM$ must be a parallelogram.



15. **Construct Arguments** Write a proof of Theorem 6-8.

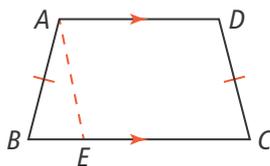
Given: $\overline{AB} \parallel \overline{DC}$, $\overline{AD} \parallel \overline{BC}$

Prove: $m\angle A + m\angle B = 180$
 $m\angle B + m\angle C = 180$
 $m\angle C + m\angle D = 180$
 $m\angle D + m\angle A = 180$



16. **Use Appropriate Tools** In a parallelogram, opposite sides are congruent, and opposite angles are congruent. If all sides in a parallelogram are congruent, are all angles congruent also? Draw a picture to explain your answer.

17. Prove that each pair of base angles of an isosceles trapezoid are congruent. *Hint:* Use the figure below and construct \overline{AE} to be parallel to \overline{DC} .

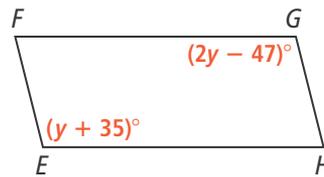


PRACTICE

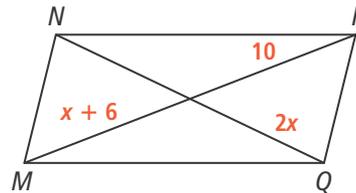
18. What are the values of AB and DE in parallelogram $ABCD$? SEE EXAMPLES 1 AND 2



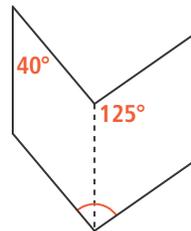
19. Quadrilateral $EFGH$ is a parallelogram. What is $m\angle F$? SEE EXAMPLES 3 AND 4



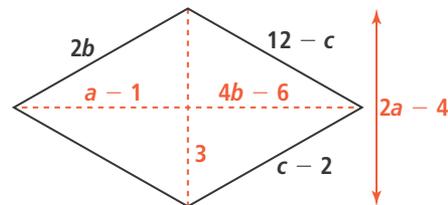
20. Quadrilateral $MNPQ$ is a parallelogram. What is NQ ? SEE EXAMPLES 5 AND 6



21. The figure below can be divided into two parallelograms. What is the angle measure of the point at the bottom?



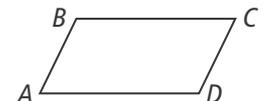
22. Find the perimeter of the parallelogram.



23. Write a proof of Theorem 6-9.

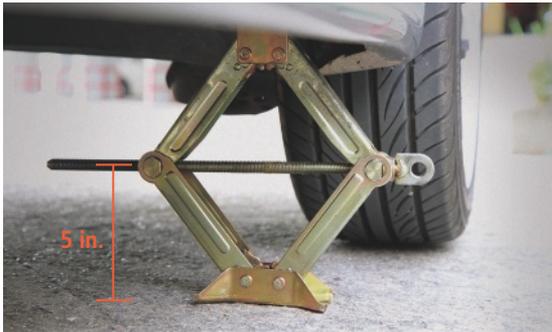
Given: $\overline{AB} \parallel \overline{DC}$, $\overline{AD} \parallel \overline{BC}$

Prove: $\angle A \cong \angle C$, $\angle B \cong \angle D$

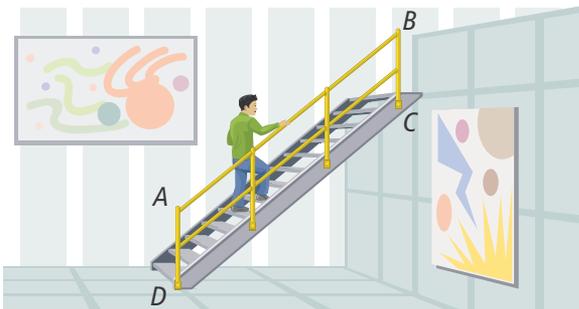


APPLY

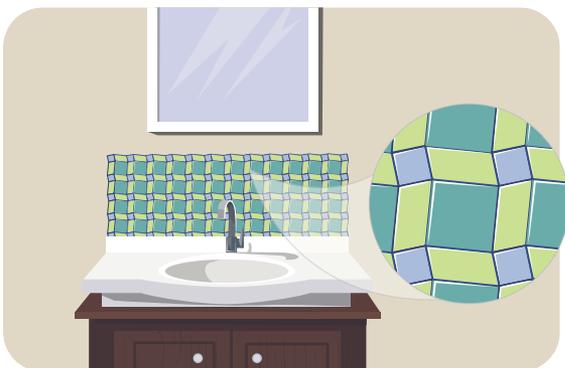
24. **Model With Mathematics** All four arms of a mechanical jack are the same length, and they form a parallelogram. Turning the crank pulls the arms together, raising the top of the jack. How high is the top of the jack when the crank is 5 inches off the ground? Explain.



25. **Use Structure** The handrails for a steel staircase form a parallelogram $ABCD$. Additional bars are needed one third and two thirds of the way up the stairs. Explain why the additional bars must be the same length as the end bars.

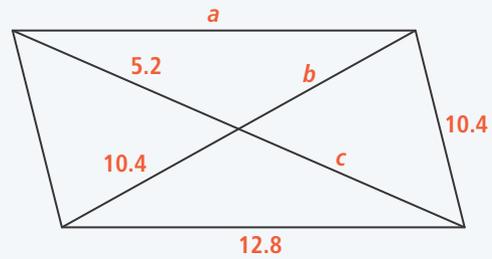


26. **Higher Order Thinking** Reagan designs a pattern consisting of large squares of the same size, small squares of the same size, and some parallelograms. She wants to replicate the pattern using tiles for her bathroom. Are the vertical and horizontal parallelograms congruent? Explain.



ASSESSMENT PRACTICE

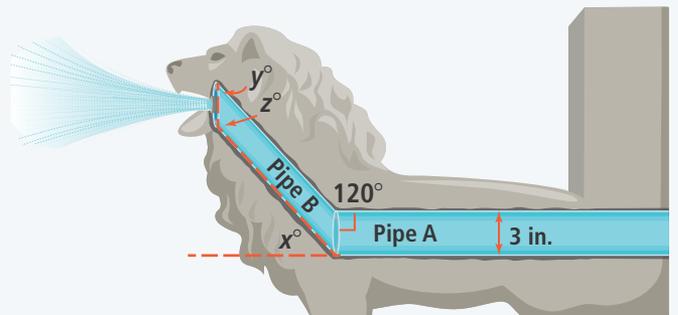
27. Find the values of a , b , and c in the parallelogram.



28. **SAT/ACT** In parallelogram $ABCD$, which angle is congruent to $\angle ABC$?

- (A) $\angle ABD$ (C) $\angle BCD$
(B) $\angle CDA$ (D) $\angle DAB$

29. **Performance Task** A pipe at an amusement park sprays water onto visitors. A cross section of each pipe has the shape of a parallelogram.



Part A Pipe A makes a 120° angle with Pipe B. What are the interior angles of parallelogram B? What is x , the measure of the angle that Pipe B makes with the horizontal? Explain.

Part B Park engineers fasten a circular cap onto the end of Pipe B. In the middle of the cap is a nozzle to turn the spray of water into a mist. If the diameter of Pipe A is 3 inches, what is the diameter of the circular cap? Explain.

Part C What are y and z , the angle measures that the cap makes with Pipe B? Explain.