CHAPTER 9

Cumulative Practice

for Chapters 1–9

1. If three points all lie in two different planes, can the points be the vertices of a triangle? Explain why or why not. **(2.1)**

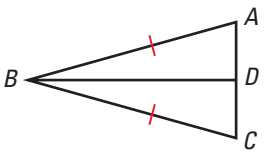
In Exercises 2–4, use *always*, *sometimes*, or *never* to complete the statement.

2. Lines m, n, and t are three different coplanar lines. If $m \perp t$ and $n \perp t$, then line m and line n are __?__ parallel. **(3.1, 3.5)**

3. The numbers 8, 14, and 23 can __?__ represent the lengths of the sides of a triangle. **(5.5)**

4. A rhombus is __?__ a parallelogram. **(6.6)**

5. **PROOF** Prove that the median to the base of an isosceles triangle bisects the vertex angle. **(4.6, 5.3)**



GIVEN ▶ In $\triangle ABC$, $\overline{AB} \cong \overline{CB}$; $\overline{BD}$ is a median to $\overline{AC}$.

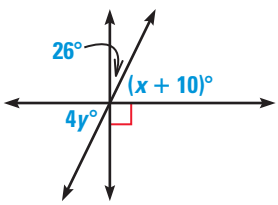
PROVE ▶ $\overline{BD}$ bisects $\angle ABC$.

6. In quadrilateral $ABCD$, $m\angle A = 37°$, $m\angle B = 143°$, and $m\angle C = 37°$. Prove that quadrilateral $ABCD$ is a parallelogram. **(6.1, 6.3)**

7. Does the design at the right have rotational symmetry? If so, describe the rotations that map the image onto itself. **(7.3)**

Find the value of each variable. **(3.2, 3.3, 6.5)**

8.



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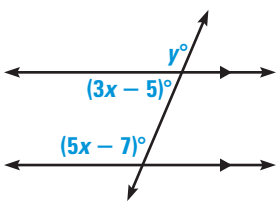

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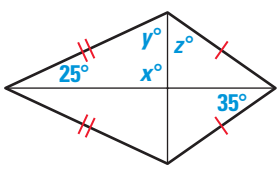


In Exercises 11–15, use $\triangle ABC$ with vertices $A(1, -2)$, $B(-3, -5)$, and $C(-5, 6)$.

11. Find an equation of the perpendicular bisector of $\overline{AC}$. **(5.1)**

12. Classify $\triangle ABC$ by its sides and by its angles. **(4.1, 9.3)**

13. Find the coordinates of the vertices of the image of $\triangle ABC$ after a reflection in the y-axis. **(7.2)**

14. Find the coordinates of the vertices of the image of $\triangle ABC$ after a rotation of 90° counterclockwise about the origin. **(7.3)**

15. Find the coordinates of the image of $\triangle ABC$ after the translation $(x, y) \rightarrow (x - 4, y - 4)$ and then a reflection in the x-axis. **(7.5)**

Solve the proportion. **(8.1)**

16. $\frac{12}{x} = \frac{5}{2}$

17. $\frac{3}{7} = \frac{x}{8}$

18. $\frac{7}{9} = \frac{y}{y + 3}$

19. Rectangle $ABCD$ has coordinates $A(0, 4)$, $B(8, 4)$, $C(8, -2)$, and $D(0, -2)$. Points P and Q are the midpoints of $\overline{AB}$ and $\overline{DC}$, respectively. Is rectangle $ABCD$ similar to rectangle $APQD$? Explain your answer. **(8.3)**

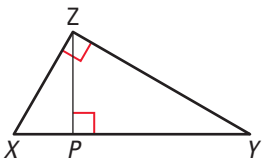
20. Show that the midsegment of a triangle forms one side of a triangle that is similar to the original triangle. **(5.4, 8.4)**

21. Is a triangle with sides of lengths 6, 8, and 12 similar to a triangle with sides of lengths 9, 12, and 18? Explain your answer. **(8.5)**

22. The side lengths of a triangle are 7 centimeters, 8 centimeters, and 9 centimeters. A ray bisects the largest angle, dividing the side opposite the angle into two segments. Find the lengths of these segments. **(8.6)**

23. A segment has endpoints at $A(6, -4)$ and $B(12, 9)$. Find the images of the segment under two dilations, one with scale factor $\frac{1}{3}$ and center $(0, 0)$, and the other with scale factor $\frac{1}{2}$ and center $(0, 0)$. Then tell whether the two image segments are parallel. **(8.7)**

In Exercises 24–26, use the diagram at the right.



24. If $XP = 2$ and $PY = 6$, find ZP and XZ. **(9.1)**

25. Find XY if $ZY = 2\sqrt{3}$ and $PY = 3$. **(9.1)**

26. Find XY if $XZ = 10$ and $ZY = 24$. **(9.2)**

27. Is a triangle with side lengths 12, 15, and 19 *acute*, *right*, or *obtuse*? **(9.3)**

28. A square and an equilateral triangle have sides that are 8 feet long. Find the ratio of the length of a diagonal of the square to the height of the triangle. **(9.4)**

29. The lengths of the legs of a right triangle are 8 and 15. Find the sine, the cosine, and the tangent of the smaller acute angle of the triangle. Express each value as a fraction. **(9.5)**

30. In right $\triangle RST$, $m\angle R = 57°$. The length of the hypotenuse, $\overline{RS}$, is 20 inches. Solve the right triangle. Round decimals to the nearest tenth. **(9.6)**

31. Add the vectors $\vec{u} = \langle 5, 7 \rangle$ and $\vec{v} = \langle -3, 9 \rangle$. Draw the sum vector $\vec{u} + \vec{v}$ in a coordinate plane. Find its magnitude and its direction relative to east. **(9.7)**

32. **JEWELRY DESIGN** A jewelry designer has a triangular piece of flat silver. The designer wants to cut out the largest possible circle from the piece of silver. Explain how to find the center and the radius of that circle. **(5.2)**

33. **CAR TRIP** On the first four days of an automobile trip, a family drove 376 miles on 16 gallons of gasoline. At that rate, how many gallons of gas will they need for the next 470 miles of their trip? **(8.1)**

34. **PHOTOGRAPHY** A 3 inch by 5 inch photograph is enlarged so its perimeter is 36 inches. What are the dimensions of the enlargement? **(8.3)**

35. **AIRPLANES** Two jets leave an airport at the same time. One jet flies west, averaging 510 miles per hour. The other jet flies north, averaging 560 miles per hour. To the nearest tenth of a mile, how far apart are the jets after 15 minutes? **(9.2)**