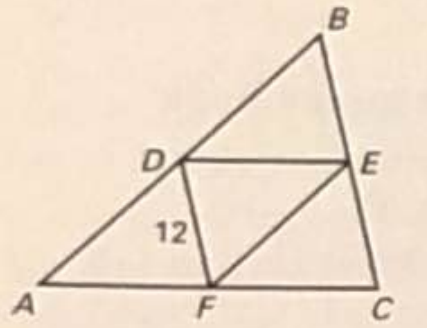
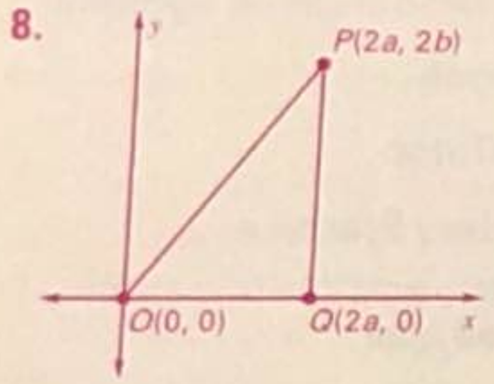
Extra Example 5.1

In the diagram, $\overline{DF}$ is a midsegment of $\triangle ABC$. Find BC. 24



8.



5 CHAPTER REVIEW

@HomeTutor
classzone.com
• Multi-Language Glossary
• Vocabulary practice

REVIEW KEY VOCABULARY

For a list of postulates and theorems, see pp. 926–931.

- midsegment of a triangle, *p. 295*
- coordinate proof, *p. 296*
- perpendicular bisector, *p. 303*
- equidistant, *p. 303*
- concurrent, *p. 305*
- point of concurrency, *p. 305*
- circumcenter, *p. 306*
- incenter, *p. 312*
- median of a triangle, *p. 319*
- centroid, *p. 319*
- altitude of a triangle, *p. 320*
- orthocenter, *p. 321*
- indirect proof, *p. 337*

VOCABULARY EXERCISES

1. Copy and complete: A _?_ is a segment, ray, line, or plane that is perpendicular to a segment at its midpoint. perpendicular bisector

2. **WRITING** *Explain* how to draw a circle that is circumscribed about a triangle. What is the center of the circle called? *Describe* its radius.

2. Find the intersection of three perpendicular bisectors of the triangle. Using this point as the center of the circle, draw a circle whose radius is the distance from the point to any of the vertices; circumcenter; the distance from the circumcenter to any of the vertices

In Exercises 3–5, match the term with the correct definition.

3. Incenter B
4. Centroid A
5. Orthocenter C

A. The point of concurrency of the medians of a triangle
B. The point of concurrency of the angle bisectors of a triangle
C. The point of concurrency of the altitudes of a triangle

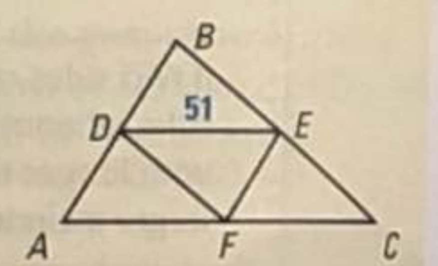
REVIEW EXAMPLES AND EXERCISES

Use the review examples and exercises below to check your understanding of the concepts you have learned in each lesson of Chapter 5.

5.1 Midsegment Theorem and Coordinate Proof *pp. 295–301*

EXAMPLE

In the diagram, $\overline{DE}$ is a midsegment of $\triangle ABC$. Find AC.



By the Midsegment Theorem, $DE = \frac{1}{2}AC$.

So, $AC = 2DE = 2(51) = 102$.

EXERCISES

EXAMPLES 1, 4, and 5 on pp. 295, 297 for Exs. 6–8

Use the diagram above where $\overline{DF}$ and $\overline{EF}$ are midsegments of $\triangle ABC$.

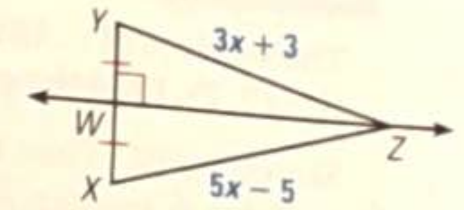
6. If $AB = 72$, find EF. 36
7. If $DF = 45$, find EC. 45
8. Graph $\triangle PQR$, with vertices $P(2a, 2b)$, $Q(2a, 0)$, and $O(0, 0)$. Find the coordinates of midpoint S of $\overline{PQ}$ and midpoint T of $\overline{QO}$. Show $\overline{ST} \parallel \overline{PO}$.
$S(2a, b)$, $T(a, 0)$; slope of $\overline{ST}$ is $\frac{b}{a}$ and slope of $\overline{OP}$ is $\frac{b}{a}$; see margin for art.

@HomeTutor
classzone.com
Chapter Review Practice

5.2 Use Perpendicular Bisectors *pp. 303–309*

EXAMPLE

Use the diagram at the right to find XZ.



$\overleftrightarrow{WZ}$ is the perpendicular bisector of $\overline{XY}$.

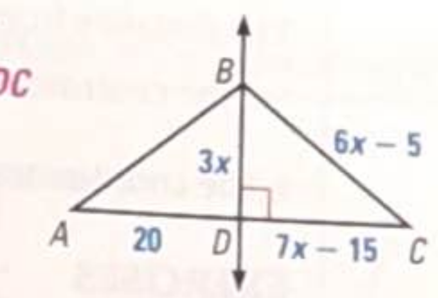
$5x - 5 = 3x + 3$	By the Perpendicular Bisector Theorem, $ZX = ZY$.
$x = 4$	Solve for x.

▶ So, $XZ = 5x - 5 = 5(4) - 5 = 15$.

EXERCISES

EXAMPLES 1 and 2 on pp. 303–304 for Exs. 9–11

In the diagram, $\overleftrightarrow{BD}$ is the perpendicular bisector of $\overline{AC}$.

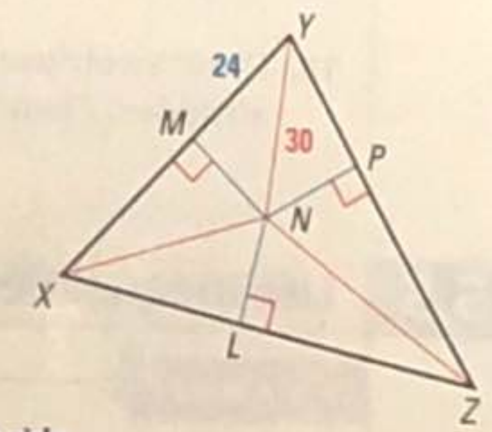


9. What segment lengths are equal? BA and BC, DA and DC
10. What is the value of x? 5
11. Find AB. 25

5.3 Use Angle Bisectors of Triangles *pp. 310–316*

EXAMPLE

In the diagram, N is the incenter of $\triangle XYZ$. Find NL.



Use the Pythagorean Theorem to find NM in $\triangle NMY$.

$c^2 = a^2 + b^2$	Pythagorean Theorem
$30^2 = NM^2 + 24^2$	Substitute known values.
$900 = NM^2 + 576$	Multiply.
$324 = NM^2$	Subtract 576 from each side.
$18 = NM$	Take positive square root of each side.

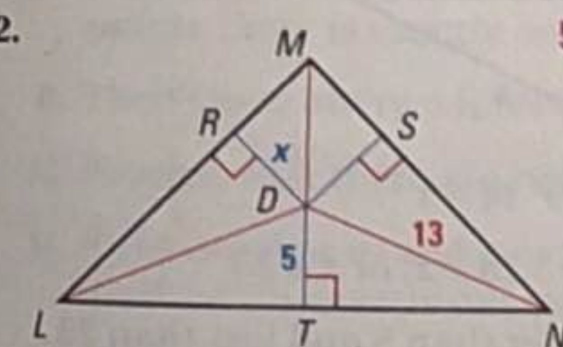
▶ By the Concurrency of Angle Bisectors of a Triangle, the incenter N of $\triangle XYZ$ is equidistant from all three sides of $\triangle XYZ$. So, because $NM = NL$, $NL = 18$.

EXERCISES

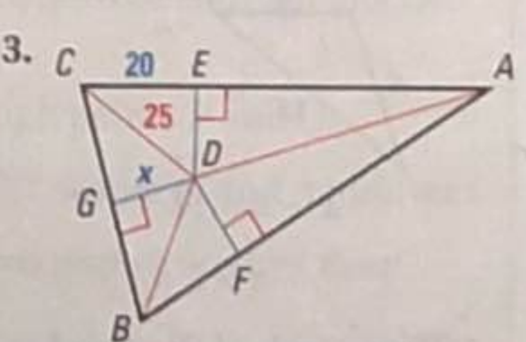
EXAMPLE 4 on p. 312 for Exs. 12–13

Point D is the incenter of the triangle. Find the value of x.

12. 5

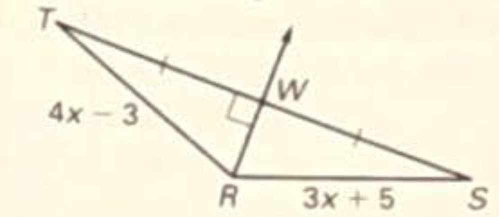


13. 15



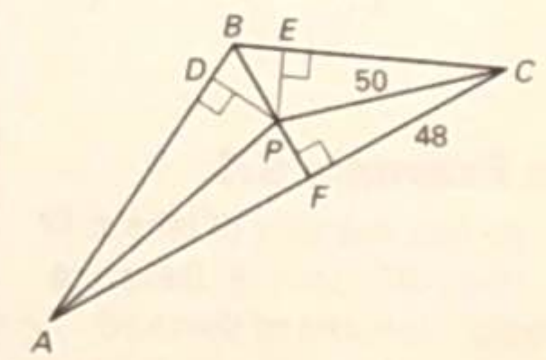
Extra Example 5.2

Uses the diagram to find RS. 29



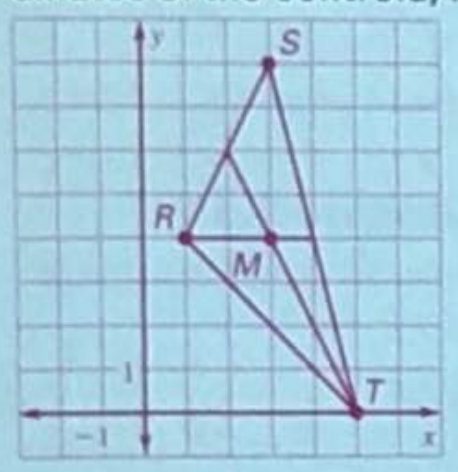
Extra Example 5.3

In the diagram, P is the incenter of $\triangle ABC$. Find PD. 14



Extra Example 5.4

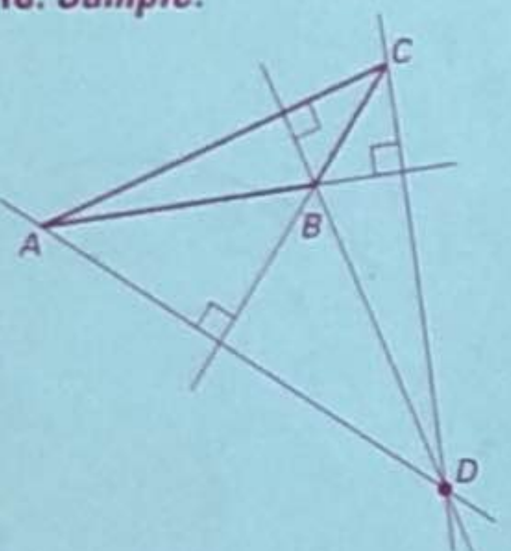
The vertices of $\triangle RST$ are $R(1, 4)$, $S(3, 8)$, and $T(5, 0)$. Find the coordinates of the centroid, M. **$(3, 4)$**



Extra Example 5.5

A triangle has one side of length 13 and another of length 18. Describe the possible lengths of the third side. **The length of the third side must be greater than 5 and less than 31.**

18. *Sample:*



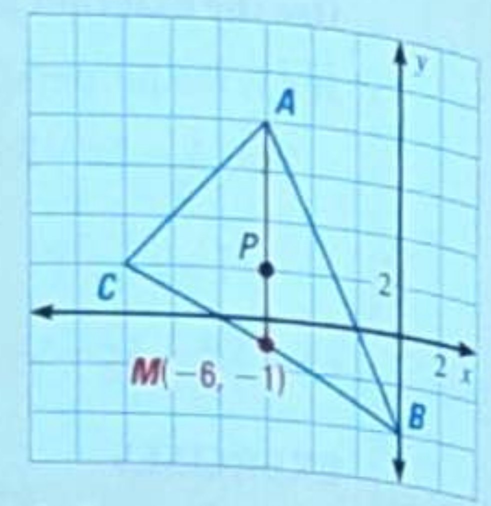
5 CHAPTER REVIEW

5.4 Use Medians and Altitudes

pp. 319–325

EXAMPLE

The vertices of $\triangle ABC$ are $A(-6, 8)$, $B(0, -4)$, and $C(-12, 2)$. Find the coordinates of its centroid P.



Sketch $\triangle ABC$. Then find the midpoint M of $\overline{BC}$ and sketch median $\overline{AM}$.

$$M\left(\frac{-12+0}{2}, \frac{2+(-4)}{2}\right) = M(-6, -1)$$

The centroid is two thirds of the distance from a vertex to the midpoint of the opposite side.

The distance from vertex $A(-6, 8)$ to midpoint $M(-6, -1)$ is $8 - (-1) = 9$ units.

So, the centroid P is $\frac{2}{3}(9) = 6$ units down from A on $\overline{AM}$.

▸ The coordinates of the centroid P are $(-6, 8 - 6)$, or $(-6, 2)$.

EXERCISES

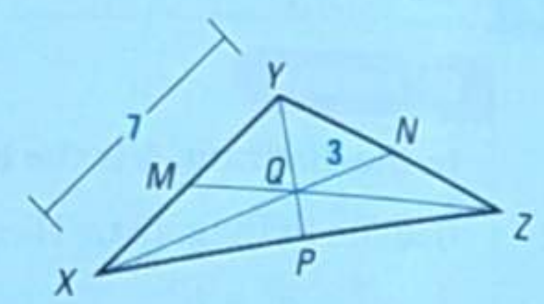
EXAMPLES 1, 2, and 3 on pp. 319–321 for Exs. 14–18

Find the coordinates of the centroid D of $\triangle RST$.

14. $R(-4, 0)$, $S(2, 2)$, $T(2, -2)$ **(0, 0)**

15. $R(-6, 2)$, $S(-2, 6)$, $T(2, 4)$ **(−2, 4)**

Point Q is the centroid of $\triangle XYZ$.



16. Find XQ. **6**

17. Find XM. **3.5**

18. Draw an obtuse $\triangle ABC$. Draw its three altitudes. Then label its orthocenter D. **See margin.**

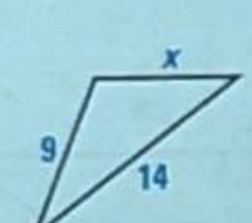
5.5 Use Inequalities in a Triangle

pp. 328–334

EXAMPLE

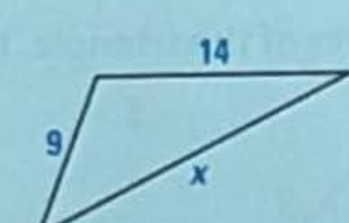
A triangle has one side of length 9 and another of length 14. Describe the possible lengths of the third side.

Let x represent the length of the third side. Draw diagrams and use the Triangle Inequality Theorem to write inequalities involving x.



$x + 9 > 14$

$x > 5$



$9 + 14 > x$

$23 > x$, or $x < 23$

▸ The length of the third side must be greater than 5 and less than 23.

@HomeTutor classzone.com Chapter Review Practice

EXERCISES

EXAMPLES 1, 2, and 3 on pp. 328–330 for Exs. 19–24

Describe the possible lengths of the third side of the triangle given the lengths of the other two sides.

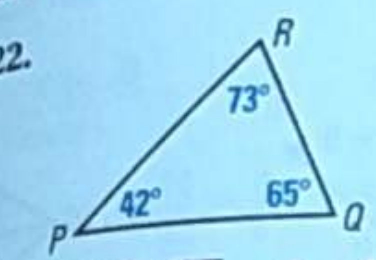
19. 4 inches, 8 inches **4 in. < ℓ < 12 in.**

20. 6 meters, 9 meters **3 m < ℓ < 15 m**

21. 12 feet, 20 feet **8 ft < ℓ < 32 ft**

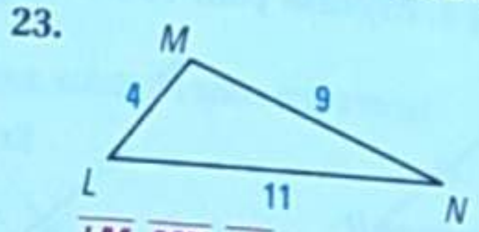
List the sides and the angles in order from smallest to largest.

22.



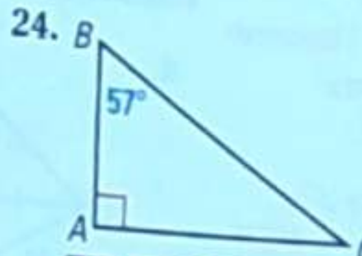
$\overline{RQ}$, $\overline{PR}$, $\overline{QP}$; $\angle P$, $\angle Q$, $\angle R$

23.



$\overline{LM}$, $\overline{MN}$, $\overline{LN}$; $\angle N$, $\angle L$, $\angle M$

24.



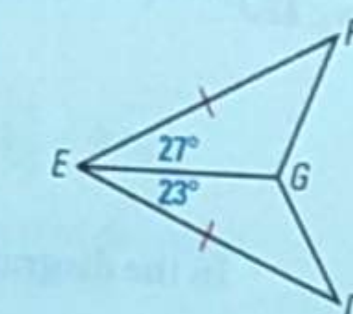
$\overline{AB}$, $\overline{AC}$, $\overline{BC}$; $\angle C$, $\angle B$, $\angle A$

5.6 Inequalities in Two Triangles and Indirect Proof

pp. 335–341

EXAMPLE

How does the length of $\overline{DG}$ compare to the length of $\overline{FG}$?



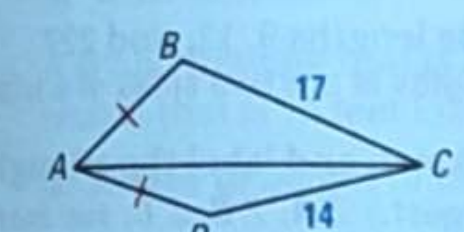
▸ Because $27° > 23°$, $m\angle GEF > m\angle GED$. You are given that $\overline{DE} \cong \overline{FE}$ and you know that $\overline{EG} \cong \overline{EG}$. Two sides of $\triangle GEF$ are congruent to two sides of $\triangle GED$ and the included angle is larger so, by the Hinge Theorem, $FG > DG$.

EXERCISES

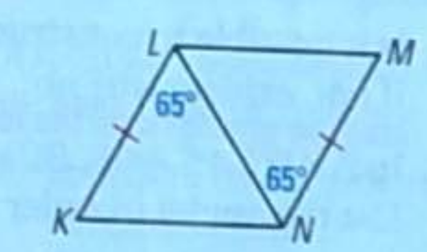
EXAMPLES 1, 3, and 4 on pp. 336–338 for Exs. 25–27

Copy and complete with <, >, or =.

25. $m\angle BAC$ _?_ $m\angle DAC$ **>**



26. LM _?_ KN **=**



27. Arrange statements A–D in correct order to write an indirect proof of the statement: *If two lines intersect, then their intersection is exactly one point.* **C, B, A, D**

GIVEN ▸ Intersecting lines m and n

PROVE ▸ The intersection of lines m and n is exactly one point.

A. But this contradicts Postulate 5, which states that through any two points there is exactly one line.

B. Then there are two lines (m and n) through points P and Q.

C. Assume that there are two points, P and Q, where m and n intersect.

D. It is false that m and n can intersect in two points, so they must intersect in exactly one point.

Extra Example 5.6

How does the length of $\overline{CD}$ compare to the length of $\overline{CB}$? **$CD < CB$**