Geometry

6.1 Perpendicular and Angle Bisectors

Perpendicular Bisector

- Segment that is _____ to and _____ a _____
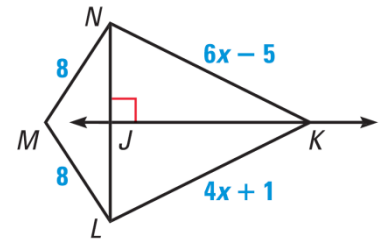

Perpendicular Bisector Theorem

If a point is on the _____ of a segment, then it is _____ from the _____ of the segment

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Converse of the Perpendicular Bisector Theorem

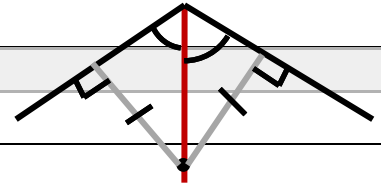If a point is _____ from the _____ of a segment, then it is on the _____ of the segment

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In the diagram, $\overline{JK}$ is the perpendicular bisector of $\overline{NL}$.
Find NK.

Explain why M is on $\overleftrightarrow{JK}$.

Angle Bisector
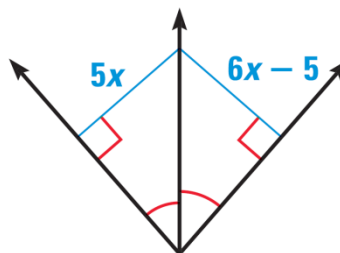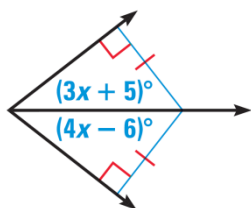
Ray that _____ an _____

Angle Bisector Theorem

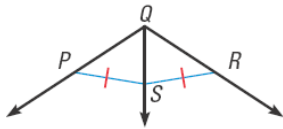If a _____ is on the _____, then it is _____ from the _____ of the angle

---

Converse of the Angle Bisector Theorem

If a _____ is _____ from the _____ of an angle, then it is on the _____

Find the value of x.

Do you have enough information to conclude that $\overrightarrow{QS}$ bisects ∠PQR?
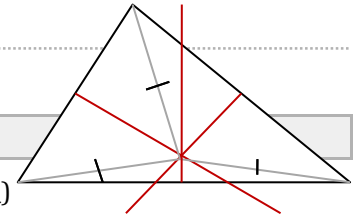

Write Equations of Perpendicular Bisectors

1. Find _____
2. Find _____
3. Find _____ slope
4. Write _____ using _____ from #3 and _____ from #1

Write the perpendicular bisector of a segment with endpoints $D(5, -1)$ and $E(-11, 3)$

Assignment: 296 #2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 38, 40, 43 = 15 total
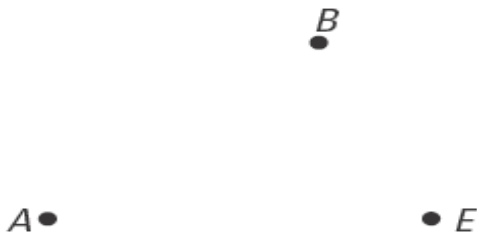
Geometry

6.2 Bisectors of Triangles

Concurrent

- Several lines that _____ at same _____ (_____)

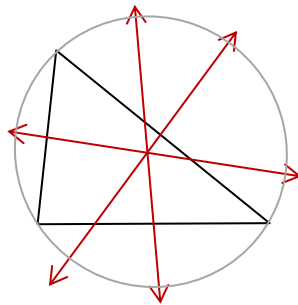**Concurrency of Perpendicular Bisectors of a Triangle**

The _____ of a _____ intersect at a point that is _____ from the _____ of a triangle

---

Hot pretzels are sold from store at A, B, and E. Where could the pretzel distributor be located if it is equidistant from those three points?

B

A *E*

Circumcenter

- The point of _____ of the _____ of a triangle.
- If a circle was _____ around a _____, the _____ would also be the _____ of the circle.
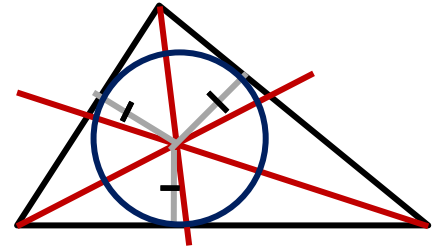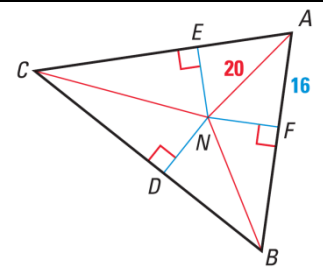
Concurrency of Angle Bisectors of a Triangle

The angle bisectors of a _____ intersect at a point that is _____ from the _____ of a triangle

Incenter

- Point of _____ of the _____ of a triangle
- If a circle was _____ in a triangle, the _____ would also be the _____ of the circle.

N is the incenter. Find *EN*

Assignment: 305 #1, 4, 6, 8, 12, 14, 16, 26, 27, 29, 30, 31, 32, 36, 37, 51, 53, 55, 56, 58 = 20 total
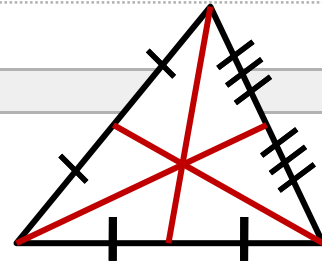
Geometry

6.3 Medians and Altitudes of Triangles

Median

Segment that connects a _____ to a _____ of side of a triangle.
Point of concurrency is called the _____.
The centroid is the _____.

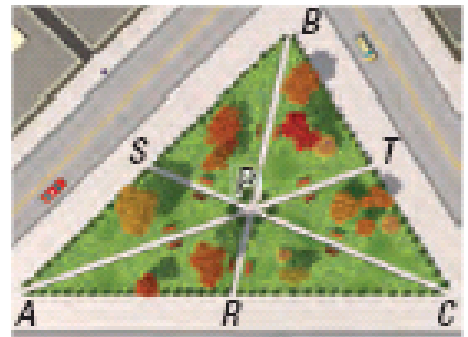### Concurrency of Medians of a Triangle

The medians of a triangle intersect at a point that is _____ of the _____ from each _____ to the _____ of the _____.

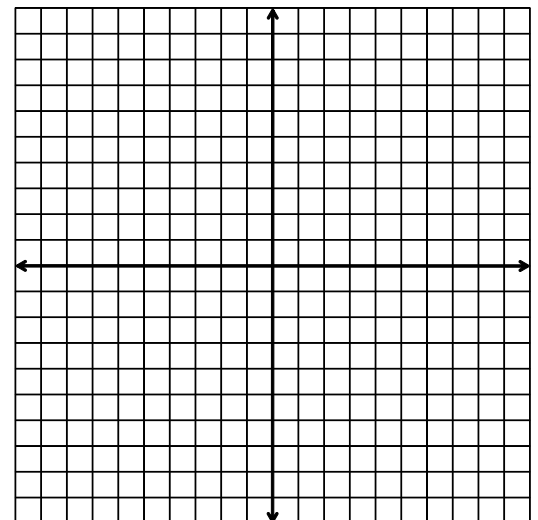Each path goes from the midpoint of one edge to the opposite corner. The paths meet at *P*.
If *SC* = 2100 ft, find *PS* and *PC*.

If *BT* = 1000 ft, find *TC* and *BC*.

If *PT* = 800 ft, find *PA* and *TA*.
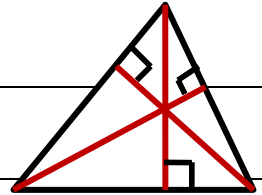
Find the coordinates of the centroid of △*ABC* with vertices
A(0, 4), *B*(−4, −2), and *C*(7, 1).

Altitudes

Segment from a _____ and _____ to the opposite side of a triangle.

Point of concurrency is called the _____.
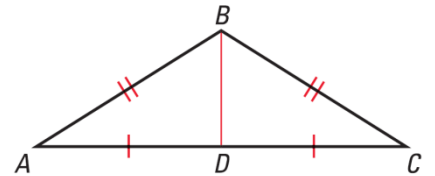
Concurrency of Altitudes of a Triangle

The lines containing the _____ of a triangle are _____.
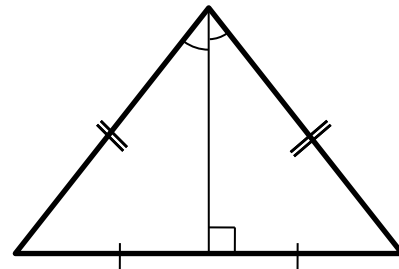
Acute Δ → orthocenter _____ triangle

Right Δ → orthocenter _____ of triangle

Obtuse Δ → orthocenter _____ of triangle

Find the orthocenter.

In an _____ triangle, the _____, _____, _____, and _____ from the vertex angle are all the _____.

Given: *ΔABC* is isosceles, $\overline{BD}$ is a median

Prove: $\overline{BD}$ is an angle bisector
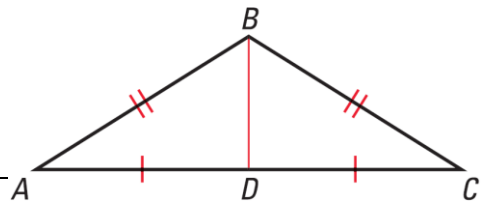
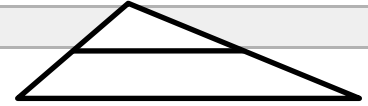| Statements	Reasons
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.

Assignment: 314 #2, 4, 6, 8, 10, 12, 14, 16, 18, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 40, 52, 56, 58, 60, 63 = 25 total

Geometry

6.4 The Triangle Midsegment Theorem

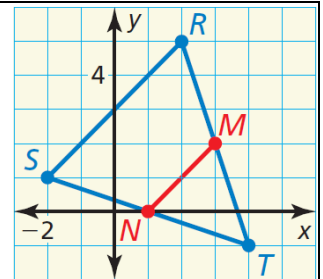### Midsegment of a Triangle

- Segment that connects the _____ of two _____ of a triangle

Midsegment Theorem

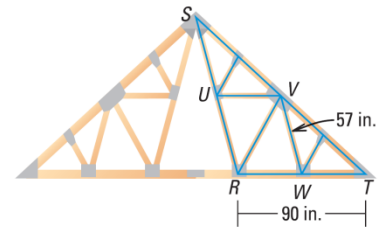The midsegment of a triangle is _____ to the _____ side and is _____ as long as that _____.

In △RST, show that midsegment $\overline{MN}$ is parallel to $\overline{RS}$ and that $MN = \frac{1}{2}RS$.

Name the midsegments.

Draw the third midsegment.

Let UW be 81 inches. Find VS.

Geometry 6.4   Name: _____

Given: $CF = FB$ and $CD = DA$

Prove: $\overline{DF} \parallel \overline{AB}$
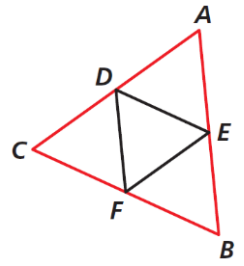
Statements	Reasons
1.	1.
2.	2.
3.	3.
4.	4.

Assignment: 321 #2, 6, 7, 8, 9, 10, 11, 12, 14, 16, 17, 18, 19, 20, 23, 24, 25, 27, 28, 31 = 20 total

Geometry

6.5 Indirect Proof and Inequalities in One Triangle

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Indirect Reasoning

- You are taking a multiple-choice test.
- You don't know the correct answer.
- You eliminate the answers you know are incorrect.
- The answer that is left is the correct answer.

You can use the same type of logic to prove geometric things.

Indirect Proof

- Proving things by making an _____ and showing that the _____ leads to a _____.
- Essentially it is proof by _____ all the other _____.

Steps for writing indirect proofs

1. _____ what you are trying to _____. Temporarily, assume the _____ is _____ and that the
    _____ is _____.
2. Show that this leads to a _____ of the _____ or some other _____.
3. Point out that the _____ must be _____, so the _____ must be _____.

Suppose you wanted to prove the statement "If x + y ≠ 14 and y = 5, then x ≠ 9." What temporary assumption could you make to prove the conclusion indirectly?

How does that assumption lead to a contradiction?

Write an indirect proof that if two lines are *not* parallel, then consecutive interior angles are *not* supplementary.
Given Line ℓ is not parallel to line *k*.
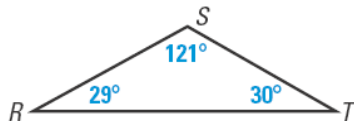**Prove** ∠3 and ∠5 are not supplementary.
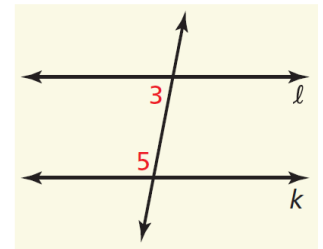
Big Angle Opposite Big Side Theorem

If one _____ of a triangle is _____ than another _____, then the _____ _____ the _____ side is _____ than the angle opposite the shorter side.

Big Side Opposite Big Angle Theorem

If one _____ of a triangle is _____ than another _____, then the _____ opposite the _____ angle is _____ than the side opposite the smaller angle.

List the sides in order from shortest to longest.

Triangle Inequality Theorem

The _____ of two _____ of a triangle is _____ than the _____ of the _____ side.
AB + BC > AC; AB + AC > BC; BC + AC > AB

A triangle has one side of 11 inches and another of 15 inches. Describe the possible lengths of the third side.

Assignment: 328 #2, 4, 6, 8, 12, 14, 16, 18, 20, 22, 24, 26, 28, 32, 40, 47, 49, 52, 53, 55 = 20 total

Geometry

6.6 Inequalities in Two Triangles

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Hinge Theorem

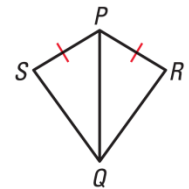If _____ of one Δ are congruent to _____ of another Δ, and the _____ angle of the 1st Δ is _____ than the _____ angle of the 2nd Δ, then the _____ of the 1st Δ is _____ than the _____ of the 2nd Δ.

10   15

40°   60°
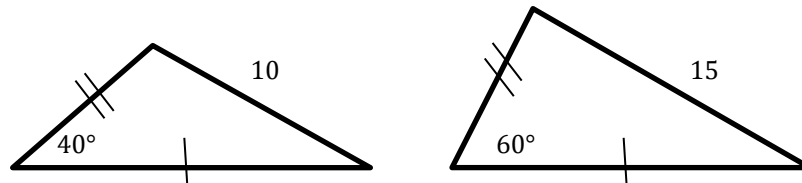
Converse of the Hinge Theorem

If _____ of one Δ are congruent to _____ of another Δ, and the _____ of the first is _____ than the _____ of the 2nd Δ, then the _____ angle of the 1st Δ is _____ than the _____ angle of the 2nd Δ.
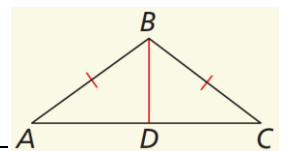
If *PR* = *PS* and *m∠QPR* > *m∠QPS*, which is longer, $\overline{SQ}$ or $\overline{RQ}$?

If *PR* = *PS* and *RQ* < *SQ*, which is larger, *m∠RPQ* or *m∠SPQ*?

P

S   R

Q

Given: $\overline{AB} \cong \overline{BC}$, *AD* > *CD*
Prove: *m∠ABD* > *m∠CBD*

B

A   D   C

Statements	Reasons
1.	1.
2.	2.
3.	3.

Two groups of joggers leave the same starting location heading in opposite directions. Each group travels 2 miles, then changes direction and travels 1 mile. Group A starts due north then turns 35° toward west. Group B starts due south then turns 25° toward east. Which group is farther from the start location? Explain your reasoning.
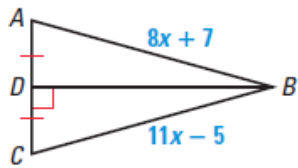
Assignment: 335 #2, 4, 6, 8, 10, 12, 13, 14, 15, 16, 20, 21, 22, 24, 25 = 15 total
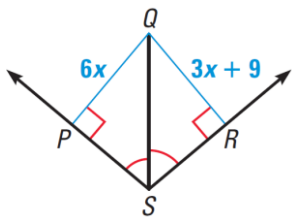
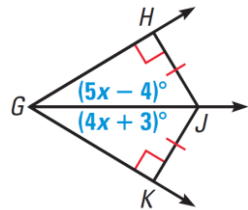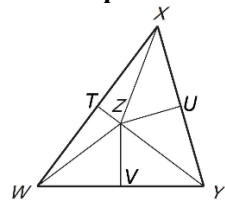## Geometry Chapter 6 Review

Find the value of x.
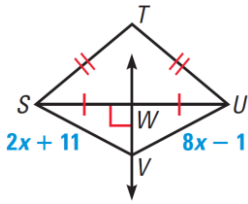
1.

2.

3.

4.

In the diagram, the perpendicular bisectors of ΔWXY meet at point Z. Find the indicated measure.
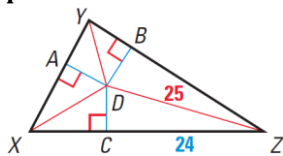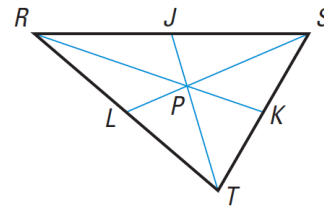

XZ = 42
ZV = 31
WT = 35

5. Find *YZ*.

6. Find *TX*.

In the diagram, the angle bisectors of ΔXYZ meet at point D.

7. Find *CD*.
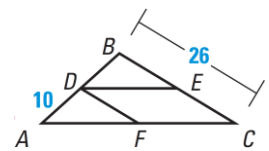
8. Find *AD*.

P is the centroid of ΔRST.

9. If *LS* = 36, find *PL*.

10. If *TP* = 20, find *TJ*.

11. Where is the orthocenter on an acute triangle? Right triangle? Obtuse triangle?

Two midsegments of ΔABC are $\overline{DE}$ and $\overline{DF}$.
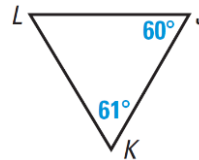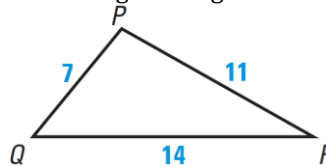

12. Find *DB*.

13. Find *DF*.

14. If $DE = 12$ and $AC = 2x$, find the value of x.

15. Which side is longest?

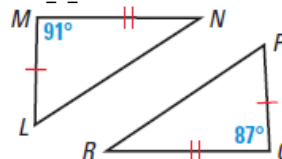16. Which angle is largest?

17. A triangle has one side length of 9 and another of 8. Describe the possible lengths of the third side.
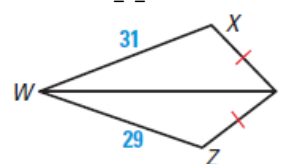
18. Write a temporary assumption you could make to prove the conclusion indirectly: If $RS + ST \neq 12$ and $ST = 5$, then $RS \neq 7$.

Copy and complete with >, < or =.

19. *LN* _?_ *PR*

20. $m\angle WYX$ _?_ $m\angle WYZ$

21. Two boats leave the port. Boat A sails 50 miles due south then turns 20° towards the west and sails 10 more miles. Boat B sails 50 miles due north and then turns 30° towards the east and sails 10 more miles. Which boat is farther from the port?

Answers

1. 2
2. 4
3. 3
4. 7
5. 42
6. 35
7. 7
8. 7
9. 12
10. 30
11. Inside triangle; on right angle of triangle; outside triangle
12. 10
13. 13
14. 12
15. $\overline{LJ}$
16. $\angle P$
17. $1 < x < 17$
18. $RS = 7$
19. >
20. >
21. Boat A (From the hinge theorem. The angle inside the triangle is 160° compared to 150° for boat B.)