Geometry Honors
Sem 1 (Jan 2017) A/S/N Review

Name Key
Per ______

Answer always (A), sometimes (S) or never (N).

1. Theorems are false. N
2. If two lines are perpendicular, then their slopes are equal. N
3. A translation is the same as reflecting an object in two parallel lines. A
4. A pentagon is congruent to a hexagon. N
5. Two planes parallel to the same line are parallel. A
6. If two angles are complementary, then they form a right angle. S
7. AAS proves two triangles congruent. A
8. If two angles are congruent, then their supplements are congruent. A
9. A congruence transformation changes the size of a figure N
10. Theorems have true inverses. S
11. Three points determine exactly one plane. S
12. Two angles which are congruent and adjacent form a straight angle. S
13. Definitions have true converses. A
14. A right triangle is isosceles. S
15. If two lines are noncoplanar, then they are skew. A
16. A reflection is a rigid motion A
17. The supplement of an acute angle is acute. N
18. Two equilateral triangles are congruent. S
19. The slope of a horizontal line is zero. A
20. A triangle with two sides congruent is equiangular. S
21. Congruent segments have the same length. A
22. The measure of the exterior angle of a triangle is 180°. N
23. The median of a triangle bisects an angle. S
24. A conditional and its contrapositive are logically equivalent. A
25. If two angles and a side of one triangle are congruent to two angles and a side of another triangle, then the triangles are congruent. A
26. Three points are collinear. S
27. Corresponding angles are congruent. S
28. Vertical angles are supplementary. S
29. Two lines crossed by a transversal are parallel. S
30. A dilation changes the size of a figure. S
31. Three points are coplanar. A
32. Two obtuse angles are supplementary. N
33. The altitude of a triangle lies outside the triangle. S
34. The contrapositive of a given statement is true. S
35. Two right angles are complementary. N
36. A triangle with no sides congruent is scalene. A
37. An isosceles triangle is congruent to a right triangle. S
38. A rotation is the same as reflecting an object in two intersecting lines A

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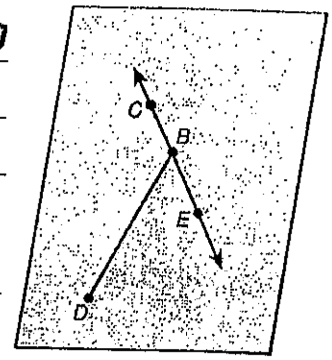
LESSON 1-1

Practice B

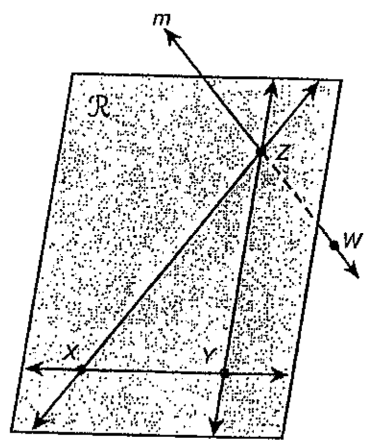
Understanding Points, Lines, and Planes

Use the figure for Exercises 1–7.



1. Name a plane. Possible answers: plane BCD; plane BED
2. Name a segment. $\overline{BD}$, $\overline{BC}$, $\overline{BE}$, or $\overline{CE}$
3. Name a line. Possible answers: $\overleftrightarrow{EC}$; $\overleftrightarrow{BC}$; $\overleftrightarrow{BE}$
4. Name three collinear points.
   points B, C, and E
5. Name three noncollinear points.
   Possible answers: points B, C, and D or points B, E, and D
6. Name the intersection of a line and a segment not on the line. point B
7. Name a pair of opposite rays. $\overrightarrow{BC}$ and $\overrightarrow{BE}$

Use the figure for Exercises 8–11.

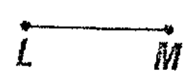


8. Name the points that determine plane $\mathcal{R}$.
   points X, Y, and Z
9. Name the point at which line m intersects plane $\mathcal{R}$. point Z
10. Name two lines in plane $\mathcal{R}$ that intersect line m.
    $\overleftrightarrow{XZ}$ and $\overleftrightarrow{YZ}$
11. Name a line in plane $\mathcal{R}$ that does not intersect line m. $\overleftrightarrow{XY}$

Draw your answers in the space provided.

Michelle Kwan won a bronze medal in figure skating at the 2002 Salt Lake City Winter Olympic Games.

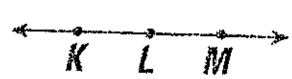
12. Michelle skates straight ahead from point L and stops at point M. Draw her path.



13. Michelle skates straight ahead from point L and continues through point M. Name a figure that represents her path. Draw her path.

ray

14. Michelle and her friend Alexei start back to back at point L and skate in opposite directions. Michelle skates through point M, and Alexei skates through point K. Draw their paths.



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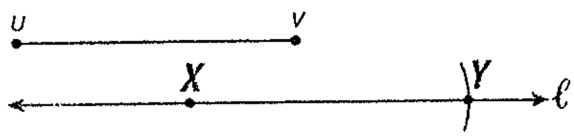
LESSON 1-2

Practice B

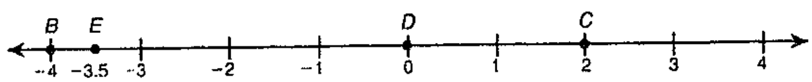
Measuring and Constructing Segments

Draw your answer in the space provided.

1. Use a compass and straightedge to construct $\overline{XY}$ congruent to $\overline{UV}$.



Find the coordinate of each point.



2. D 0

3. C 2

4. E −3.5

Find each length.

5. BE 0.5

6. DB 4

7. EC 5.5

For Exercises 8–11, *H* is between *I* and *J*.

8. $HI = 3.9$ and $HJ = 6.2$. Find IJ. 10.1

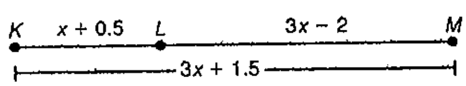
9. $JI = 25$ and $IH = 13$. Find HJ. 12

10. H is the midpoint of $\overline{IJ}$, and $IH = 0.75$. Find HJ. 0.75

11. H is the midpoint of $\overline{IJ}$, and $IJ = 9.4$. Find IH. 4.7

Find the measurements.

12.



Find LM. 7

13. A pole-vaulter uses a 15-foot-long pole. She grips the pole so that the segment below her left hand is twice the length of the segment above her left hand. Her right hand grips the pole 1.5 feet above her left hand. How far up the pole is her right hand? 11.5 ft

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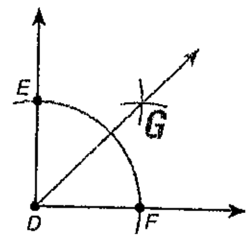
LESSON **1-3**

Practice B

Measuring and Constructing Angles

Draw your answer on the figure.

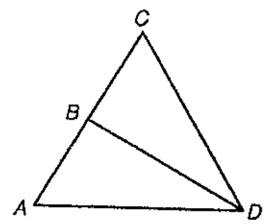
1. Use a compass and straightedge to construct angle bisector $\overrightarrow{DG}$.



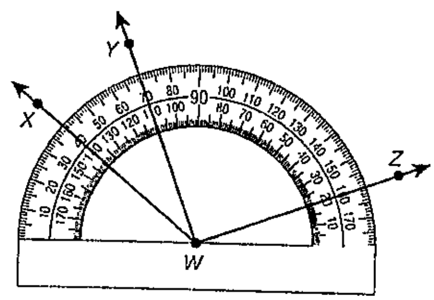
2. Name eight different angles in the figure.

$\angle A$, $\angle C$, $\angle ABC$, $\angle ABD$, $\angle ADB$,

$\angle ADC$, $\angle CBD$, and $\angle CDB$



Find the measure of each angle and classify each as acute, right, obtuse, or straight.



3. $\angle YWZ$

90°; right

4. $\angle XWZ$

120°; obtuse

5. $\angle YWX$

30°; acute

***T* is in the interior of $\angle PQR$. Find each of the following.**

6. $m\angle PQT$ if $m\angle PQR = 25°$ and $m\angle RQT = 11°$. 14°

7. $m\angle PQR$ if $m\angle PQR = (10x - 7)°$, $m\angle RQT = 5x°$, and $m\angle PQT = (4x + 6)°$. 123°

8. $m\angle PQR$ if $\overrightarrow{QT}$ bisects $\angle PQR$, $m\angle RQT = (10x - 13)°$, and $m\angle PQT = (6x + 1)°$. 44°

9. Longitude is a measurement of position around the equator of Earth. Longitude is measured in degrees, minutes, and seconds. Each degree contains 60 minutes, and each minute contains 60 seconds. Minutes are indicated by the symbol ′ and seconds are indicated by the symbol ″. Williamsburg, VA, is located at 76°42′25″. Roanoke, VA, is located at 79°57′30″. Find the difference of their longitudes in degrees, minutes, and seconds. 3°15′05″

10. To convert minutes and seconds into decimal parts of a degree, divide the number of minutes by 60 and the number of seconds by 3,600. Then add the numbers together. Write the location of Roanoke, VA, as a decimal to the nearest thousandths of a degree. 79.958°

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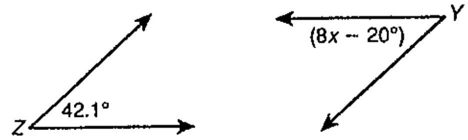
LESSON 1-4

Practice B
Pairs of Angles

1. $\angle PQR$ and $\angle SQR$ form a linear pair. Find the sum of their measures. **180°**

2. Name the ray that $\angle PQR$ and $\angle SQR$ share. $\overrightarrow{QR}$

Use the figures for Exercises 3 and 4.



3. supplement of $\angle Z$ **137.9°**

4. complement of $\angle Y$ **$(110 - 8x)°$**

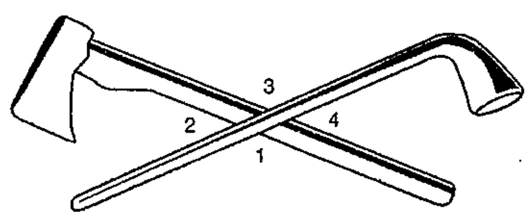
5. An angle measures 12 degrees less than three times its supplement. Find the measure of the angle. **132°**

6. An angle is its own complement. Find the measure of a supplement to this angle. **135°**

7. $\angle DEF$ and $\angle FEG$ are complementary. $m\angle DEF = (3x - 4)°$, and $m\angle FEG = (5x + 6)°$. Find the measures of both angles. **$m\angle DEF = 29°$; $m\angle FEG = 61°$**

8. $\angle DEF$ and $\angle FEG$ are supplementary. $m\angle DEF = (9x + 1)°$, and $m\angle FEG = (8x + 9)°$. Find the measures of both angles. **$m\angle DEF = 91°$; $m\angle FEG = 89°$**

Use the figure for Exercises 9 and 10.
In 2004, several nickels were minted to commemorate the Louisiana Purchase and Lewis and Clark's expedition into the American West. One nickel shows a pipe and a hatchet crossed to symbolize peace between the American government and Native American tribes.



9. Name a pair of vertical angles. **Possible answers: $\angle 1$ and $\angle 3$ or $\angle 2$ and $\angle 4$**

10. Name a linear pair of angles. **Possible answers: $\angle 1$ and $\angle 2$; $\angle 2$ and $\angle 3$; $\angle 3$ and $\angle 4$; or $\angle 1$ and $\angle 4$**

11. $\angle ABC$ and $\angle CBD$ form a linear pair and have equal measures. Tell if $\angle ABC$ is acute, right, or obtuse. **right**

12. $\angle KLM$ and $\angle MLN$ are complementary. $\overrightarrow{LM}$ bisects $\angle KLN$. Find the measures of $\angle KLM$ and $\angle MLN$. **45°; 45°**

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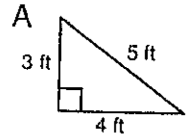
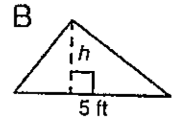
LESSON 1-5

Practice B
Using Formulas in Geometry

Use the figures for Exercises 1–3.

1. Find the perimeter of triangle A. 12 ft
2. Find the area of triangle A. 6 ft^2
3. Triangle A is identical to triangle B. Find the height h of triangle B. 2.4 ft or $2\frac{2}{5}$ ft

A


B


Find the perimeter and area of each shape.

4. square with a side 2.4 m in length

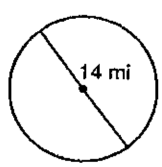
$P = 9.6$ m; $A = 5.76$ m^2

5. rectangle with length $(x + 3)$ and width 7

$P = 2x + 20$; $A = 7x + 21$

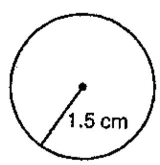
6. Although a circle does not have sides, it does have a perimeter. What is the term for the perimeter of a circle? circumference

Find the circumference and area of each circle.

7.


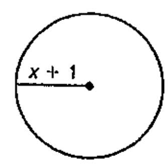
Use $\frac{22}{7}$ for π.

$C \approx 44$ mi
$A \approx 154$ mi^2

8.


Use 3.14 for π.

$C \approx 9.42$ cm
$A \approx 7.065$ cm^2

9.


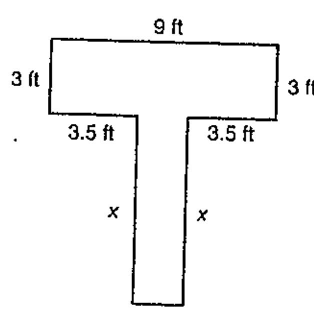
Leave π as π.

$C \approx 2\pi(x + 1)$
$A \approx \pi(x^2 + 2x + 1)$

10. The area of a square is $\frac{1}{4}$ in^2. Find the perimeter. 2 in.
11. The area of a triangle is 152 m^2, and the height is 16 m. Find the base. 19 m
12. The circumference of a circle is 25π mm. Find the radius. 12.5 mm

Use the figure for Exercises 13 and 14.

Lucas has a 39-foot-long rope. He uses all the rope to outline this T-shape in his backyard. All the angles in the figure are right angles.



13. Find x. 7.5 ft
14. Find the area enclosed by the rope. 42 ft^2

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LESSON 1-6

Practice B

Midpoint and Distance in the Coordinate Plane

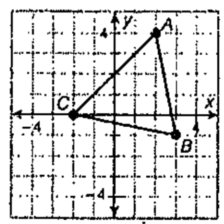
Find the coordinates of the midpoint of each segment.

1. $\overline{TU}$ with endpoints $T(5, -1)$ and $U(1, -5)$ $(3, -3)$

2. $\overline{VW}$ with endpoints $V(-2, -6)$ and $W(x + 2, y + 3)$ $\left(\frac{x}{2}, \frac{y-3}{2}\right)$

3. Y is the midpoint of $\overline{XZ}$. X has coordinates (2, 4), and Y has coordinates (–1, 1). Find the coordinates of Z. $(-4, -2)$

Use the figure for Exercises 4–7.



4. Find AB. $\sqrt{26}$ units

5. Find BC. $\sqrt{26}$ units

6. Find CA. $4\sqrt{2}$ units

7. Name a pair of congruent segments. $\overline{AB}$ and $\overline{BC}$

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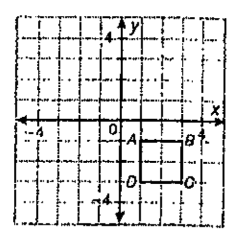
LESSON 1-7

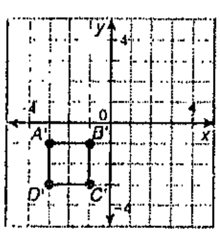
Practice B

Transformations in the Coordinate Plane

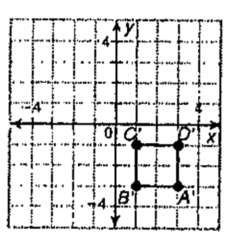
Use the figure for Exercises 1–3.

The figure in the plane at right shows the preimage in the transformation $ABCD \to A'B'C'D'$. Match the number of the image (below) with the name of the correct transformation.

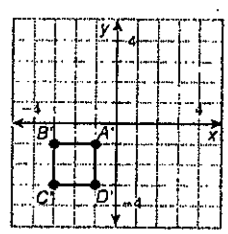




1



2



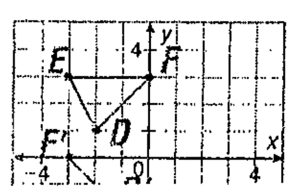
3

1. rotation 2

2. translation 1

3. reflection 3

4. A figure has vertices at $D(-2, 1)$, $E(-3, 3)$, and $F(0, 3)$. After a transformation, the image of the figure has vertices at $D'(-1, -2)$, $E'(-3, -3)$, and $F'(-3, 0)$. Draw the preimage and the image. Then identify the transformation.



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LESSON 2-1
Practice B
Using Inductive Reasoning to Make Conjectures

Find the next item in each pattern.

1. 100, 81, 64, 49, . . .

36

2. 

3. Alabama, Alaska, Arizona, . . .

Arkansas

4. west, south, east, . . .

north

Complete each conjecture.

5. The square of any negative number is positive.

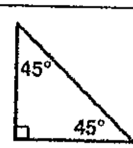
6. The number of diagonals that can be drawn from one vertex in a convex polygon that has n vertices is $n - 3$.

Show that each conjecture is false by finding a counterexample.

7. For any integer n, $n^3 > 0$.

Possible answers: zero, any negative number

8. Each angle in a right triangle has a different measure.



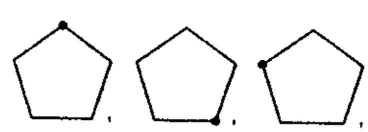
9. For many years in the United States, each bank printed its own currency. The variety of different bills led to widespread counterfeiting. By the time of the Civil War, a significant fraction of the currency in circulation was counterfeit. If one Civil War soldier had 48 bills, 16 of which were counterfeit, and another soldier had 39 bills, 13 of which were counterfeit, make a conjecture about what fraction of bills were counterfeit at the time of the Civil War.

One-third of the bills were counterfeit.

Make a conjecture about each pattern. Write the next two items.

10. 1, 2, 2, 4, 8, 32, . . .

Each item, starting with the third, is the product of the two preceding items; 256, 8192.

11. 

The dot skips over one vertex in a clockwise direction.

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LESSON 2-2

Practice B

Conditional Statements

Identify the hypothesis and conclusion of each conditional.

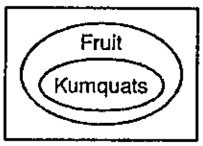
1. If you can see the stars, then it is night.
   Hypothesis: You can see the stars.
   Conclusion: It is night.

2. A pencil writes well if it is sharp.
   Hypothesis: A pencil is sharp.
   Conclusion: The pencil writes well.

Write a conditional statement from each of the following.

3. Three noncollinear points determine a plane.

   If three points are noncollinear, then they determine a plane.

4. 

   If a food is a kumquat, then it is a fruit.

Determine if each conditional is true. If false, give a counterexample.

5. If two points are noncollinear, then a right triangle contains one obtuse angle.

   true

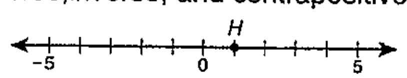
6. If a liquid is water, then it is composed of hydrogen and oxygen.

   true

7. If a living thing is green, then it is a plant.

   false; sample answer: a frog

8. "If G is at 4, then GH is 3." Write the converse, inverse, and contrapositive of this statement. Find the truth value of each.

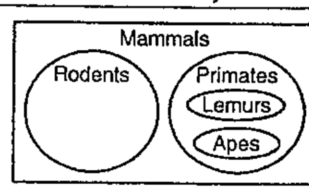


   Converse: If GH is 3, then G is at 4; false

   Inverse: If G is not at 4, then GH is not 3; false

   Contrapositive: If GH is not 3, then G is not at 4; true

This chart shows a small part of the *Mammalia* class of animals, the mammals. Write a conditional to describe the relationship between each given pair.



9. primates and mammals If an animal is a primate, then it is a mammal.
10. lemurs and rodents Sample answer: If an animal is a lemur, then it is not a rodent.
11. rodents and apes Sample answer: If an animal is a rodent, then it is not an ape.
12. apes and mammals If an animal is an ape, then it is a mammal.

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LESSON 2-3

Practice B
Using Deductive Reasoning to Verify Conjectures

Tell whether each conclusion is a result of inductive or deductive reasoning.

1. The United States Census Bureau collects data on the earnings of American citizens. Using data for the three years from 2001 to 2003, the bureau concluded that the national average median income for a four-person family was $43,527.

   inductive reasoning

2. A speeding ticket costs $40 plus $5 per mi/h over the speed limit. Lynne mentions to Frank that she was given a ticket for $75. Frank concludes that Lynne was driving 7 mi/h over the speed limit.

   deductive reasoning

Determine if each conjecture is valid by the Law of Detachment.

3. Given: If $m\angle ABC = m\angle CBD$, then $\overrightarrow{BC}$ bisects $\angle ABD$. $\overrightarrow{BC}$ bisects $\angle ABD$.
   Conjecture: $m\angle ABC = m\angle CBD$. invalid

4. Given: You will catch a catfish if you use stink bait. Stuart caught a catfish.
   Conjecture: Stuart used stink bait. invalid

5. Given: An obtuse triangle has two acute angles. Triangle *ABC* is obtuse.
   Conjecture: Triangle *ABC* has two acute angles. valid

Determine if each conjecture is valid by the Law of Syllogism.

6. Given: If the gossip said it, then it must be true. If it is true, then somebody is in big trouble.
   Conjecture: Somebody is in big trouble because the gossip said it. valid

7. Given: No human is immortal. Fido the dog is not human.
   Conjecture: Fido the dog is immortal. invalid

8. Given: The radio is distracting when I am studying. If it is 7:30 P.M. on a weeknight, I am studying.
   Conjecture: If it is 7:30 P.M. on a weeknight, the radio is distracting. valid

Draw a conclusion from the given information.

9. Given: If two segments intersect, then they are not parallel. If two segments are not parallel, then they could be perpendicular. $\overline{EF}$ and $\overline{MN}$ intersect.

   $\overline{EF}$ and $\overline{MN}$ could be perpendicular.

10. Given: When you are relaxed, your blood pressure is relatively low. If you are sailing, you are relaxed. Becky is sailing.

    Becky's blood pressure is relatively low.

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LESSON 2-4

Practice B

Biconditional Statements and Definitions

Write the conditional statement and converse within each biconditional.

1. The tea kettle is whistling if and only if the water is boiling.

   Conditional: If the tea kettle is whistling, then the water is boiling.

   Converse: If the water is boiling, then the tea kettle is whistling.

2. A biconditional is true if and only if the conditional and converse are both true.

   Conditional: If a biconditional is true, then the conditional and converse are both true.

   Converse: If the conditional and converse are both true, then the biconditional is true.

For each conditional, write the converse and a biconditional statement.

3. Conditional: If n is an odd number, then $n - 1$ is divisible by 2.

   Converse: If $n - 1$ is divisible by 2, then n is an odd number.

   Biconditional: n is an odd number if and only if $n - 1$ is divisible by 2.

4. Conditional: An angle is obtuse when it measures between 90° and 180°.

   Converse: If an angle measures between 90° and 180°, then the angle is obtuse.

   Biconditional: An angle is obtuse if and only if it measures between 90° and 180°.

Determine whether a true biconditional can be written from each conditional statement. If not, give a counterexample.

5. If the lamp is unplugged, then the bulb does not shine.

   No; sample answer: The switch could be off.

6. The date can be the 29th if and only if it is not February.

   No; possible answer: Leap years have a Feb. 29th.

Write each definition as a biconditional.

7. A cube is a three-dimensional solid with six square faces.

   A figure is a cube if and only if it is a three-dimensional solid with six square faces.

8. Tanya claims that the definition of *doofus* is "her younger brother."

   A person is a doofus if and only if the person is Tanya's younger brother.

Name ______________________ Date ____________ Class ____________

LESSON 2-5

Practice B

Algebraic Proof

Solve each equation. Show all your steps and write a justification for each step.

1. $\frac{1}{5}(a + 10) = -3$

$5\left[\frac{1}{5}(a + 10)\right] = 5(-3)$ (Mult. Prop. of =)

$a + 10 = -15$ (Simplify.)

$a + 10 - 10 = -15 - 10$ (Subtr. Prop. of =)

$a = -25$ (Simplify.)

2. $t + 6.5 = 3t - 1.3$

$t + 6.5 - t = 3t - 1.3 - t$ (Subtr. Prop. of =)

$6.5 = 2t - 1.3$ (Simplify.)

$6.5 + 1.3 = 2t - 1.3 + 1.3$ (Add. Prop. of =)

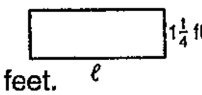
$7.8 = 2t$ (Simplify.)

$\frac{7.8}{2} = \frac{2t}{2}$ (Div. Prop. of =)

$3.9 = t$ (Simplify.)

$t = 3.9$ (Symmetric Prop. of =)

3. The formula for the perimeter P of a rectangle with length ℓ and width w is $P = 2(\ell + w)$. Find the length of the rectangle shown here if the perimeter is $9\frac{1}{2}$ feet. Solve the equation for ℓ and justify each step. **Possible answer:**



$P = 2(\ell + w)$ (Given)

$9\frac{1}{2} = 2(\ell + 1\frac{1}{4})$ (Subst. Prop. of =)

$9\frac{1}{2} = 2\ell + 2\frac{1}{2}$ (Distrib. Prop.)

$9\frac{1}{2} - 2\frac{1}{2} = 2\ell + 2\frac{1}{2} - 2\frac{1}{2}$ (Subtr. Prop. of =)

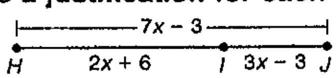
$7 = 2\ell$ (Simplify.)

$\frac{7}{2} = \frac{2\ell}{2}$ (Div. Prop. of =)

$3\frac{1}{2} = \ell$ (Simplify.)

$\ell = 3\frac{1}{2}$ (Symmetric Prop. of =)

Write a justification for each step.

4. 

$HJ = HI + IJ$	Seg. Add. Post.
$7x - 3 = (2x + 6) + (3x - 3)$	Subst. Prop. of =
$7x - 3 = 5x + 3$	Simplify.
$7x = 5x + 6$	Add. Prop. of =
$2x = 6$	Subtr. Prop. of =
$x = 3$	Div. Prop. of =

Identify the property that justifies each statement.

5. $m = n$, so $n = m$.

Symmetric Prop. of =

6. $\angle ABC \cong \angle ABC$

Reflexive Prop. of $\cong$

7. $\overline{KL} \cong \overline{LK}$

Reflexive Prop. of $\cong$

8. $p = q$ and $q = -1$, so $p = -1$.

Transitive Prop. of = or Subst.

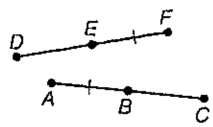
Name ______________________ Date __________ Class __________

LESSON 2-6

Practice B
Geometric Proof

Write a justification for each step.

Given: $AB = EF$, B is the midpoint of $\overline{AC}$, and E is the midpoint of $\overline{DF}$.

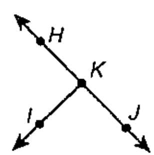


1. B is the midpoint of $\overline{AC}$, and E is the midpoint of $\overline{DF}$. — Given
2. $\overline{AB} \cong \overline{BC}$, and $\overline{DE} \cong \overline{EF}$. — Def. of mdpt.
3. $AB = BC$, and $DE = EF$. — Def. of $\cong$ segments
4. $AB + BC = AC$, and $DE + EF = DF$. — Seg. Add. Post.
5. $2AB = AC$, and $2EF = DF$. — Subst.
6. $AB = EF$ — Given
7. $2AB = 2EF$ — Mult. Prop. of =
8. $AC = DF$ — Subst. Prop. of =
9. $\overline{AC} \cong \overline{DF}$ — Def. of $\cong$ segments

Fill in the blanks to complete the two-column proof.

10. Given: $\angle HKJ$ is a straight angle. $\overrightarrow{KI}$ bisects $\angle HKJ$.

Prove: $\angle IKJ$ is a right angle.



Proof:

Statements	Reasons
1. **a.** $\angle HKJ$ is a straight angle.	1. Given
2. $m\angle HKJ = 180°$	2. **b.** Def. of straight $\angle$
3. **c.** $\overrightarrow{KI}$ bisects $\angle HKJ$	3. Given
4. $\angle IKJ \cong \angle IKH$	4. Def. of $\angle$ bisector
5. $m\angle IKJ = m\angle IKH$	5. Def. of $\cong$ $\angle$s
6. **d.** $m\angle IKJ + m\angle IKH = m\angle HKJ$	6. $\angle$ Add. Post.
7. $2m\angle IKJ = 180°$	7. **e.** Subst. (Steps 2, 5, 6)
8. $m\angle IKJ = 90°$	8. Div. Prop. of =
9. $\angle IKJ$ is a right angle.	9. **f.** Def. of right $\angle$

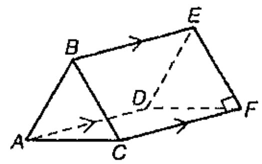
Name ______________________ Date ________ Class ________

LESSON 3-1

Practice B

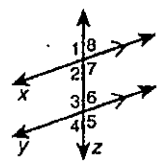
Lines and Angles

For Exercises 1–4, identify each of the following in the figure. Sample answers:



1. a pair of parallel segments — $\overline{BE} \parallel \overline{AD}$
2. a pair of skew segments — $\overline{AB}$ and $\overline{CF}$ are skew.
3. a pair of perpendicular segments — $\overline{CF} \perp \overline{EF}$
4. a pair of parallel planes — plane $ABC \parallel$ plane DEF

In Exercises 5–10, give one example of each from the figure.



5. a transversal

   line z

6. parallel lines

   lines x and y

7. corresponding angles

   Sample answer: $\angle 1$ and $\angle 3$

8. alternate interior angles

   Sample answer: $\angle 2$ and $\angle 6$

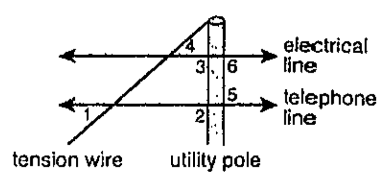
9. alternate exterior angles

   Sample answer: $\angle 1$ and $\angle 5$

10. same-side interior angles

    Sample answer: $\angle 2$ and $\angle 3$

Use the figure for Exercises 11–14. The figure shows a utility pole with an electrical line and a telephone line. The angled wire is a tension wire. For each angle pair given, identify the transversal and classify the angle pair. (*Hint:* Think of the utility pole as a line for these problems.)



11. $\angle 5$ and $\angle 6$

    transv.: utility pole; same-side interior angles

12. $\angle 1$ and $\angle 4$

    transv.: tension wire; alternate exterior angles

13. $\angle 1$ and $\angle 2$

    transv.: telephone line; corresponding angles

14. $\angle 5$ and $\angle 3$

    transv.: utility pole; alternate interior angles

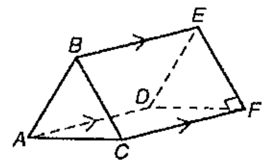
Name ______________________ Date ________ Class ________

LESSON 3-1

Practice B

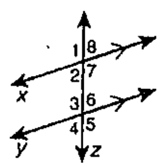
Lines and Angles

For Exercises 1–4, identify each of the following in the figure. Sample answers:



1. a pair of parallel segments — $\overline{BE} \parallel \overline{AD}$
2. a pair of skew segments — $\overline{AB}$ and $\overline{CF}$ are skew.
3. a pair of perpendicular segments — $\overline{CF} \perp \overline{EF}$
4. a pair of parallel planes — plane ABC $\parallel$ plane DEF

In Exercises 5–10, give one example of each from the figure.



5. a transversal

line z

6. parallel lines

lines x and y

7. corresponding angles

Sample answer: $\angle 1$ and $\angle 3$

8. alternate interior angles

Sample answer: $\angle 2$ and $\angle 6$

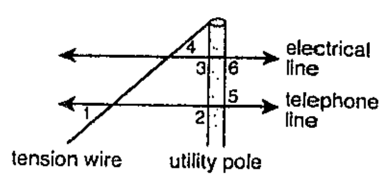
9. alternate exterior angles

Sample answer: $\angle 1$ and $\angle 5$

10. same-side interior angles

Sample answer: $\angle 2$ and $\angle 3$

Use the figure for Exercises 11–14. The figure shows a utility pole with an electrical line and a telephone line. The angled wire is a tension wire. For each angle pair given, identify the transversal and classify the angle pair. (*Hint:* Think of the utility pole as a line for these problems.)



11. $\angle 5$ and $\angle 6$

transv.: utility pole; same-side interior angles

12. $\angle 1$ and $\angle 4$

transv.: tension wire; alternate exterior angles

13. $\angle 1$ and $\angle 2$

transv.: telephone line; corresponding angles

14. $\angle 5$ and $\angle 3$

transv.: utility pole; alternate interior angles

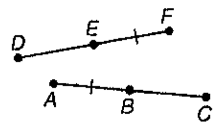
Name ______________________ Date __________ Class __________

LESSON 2-6

Practice B
Geometric Proof

Write a justification for each step.

Given: $AB = EF$, B is the midpoint of $\overline{AC}$, and E is the midpoint of $\overline{DF}$.

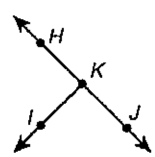


1. B is the midpoint of $\overline{AC}$, and E is the midpoint of $\overline{DF}$.	Given
2. $\overline{AB} \cong \overline{BC}$, and $\overline{DE} \cong \overline{EF}$.	Def. of mdpt.
3. $AB = BC$, and $DE = EF$.	Def. of $\cong$ segments
4. $AB + BC = AC$, and $DE + EF = DF$.	Seg. Add. Post.
5. $2AB = AC$, and $2EF = DF$.	Subst.
6. $AB = EF$	Given
7. $2AB = 2EF$	Mult. Prop. of =
8. $AC = DF$	Subst. Prop. of =
9. $\overline{AC} \cong \overline{DF}$	Def. of $\cong$ segments

Fill in the blanks to complete the two-column proof.

10. **Given:** $\angle HKJ$ is a straight angle. $\overrightarrow{KI}$ bisects $\angle HKJ$.

Prove: $\angle IKJ$ is a right angle.



Proof:

Statements	Reasons
1. a. $\angle HKJ$ is a straight angle.	1. Given
2. $m\angle HKJ = 180°$	2. b. Def. of straight $\angle$
3. c. $\overrightarrow{KI}$ bisects $\angle HKJ$	3. Given
4. $\angle IKJ \cong \angle IKH$	4. Def. of $\angle$ bisector
5. $m\angle IKJ = m\angle IKH$	5. Def. of $\cong$ $\angle$s
6. d. $m\angle IKJ + m\angle IKH = m\angle HKJ$	6. $\angle$ Add. Post.
7. $2m\angle IKJ = 180°$	7. e. Subst. (Steps 2, 5, 6)
8. $m\angle IKJ = 90°$	8. Div. Prop. of =
9. $\angle IKJ$ is a right angle.	9. f. Def. of right $\angle$

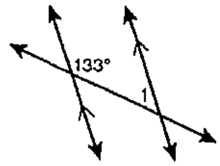
Name ______ Date ______ Class ______

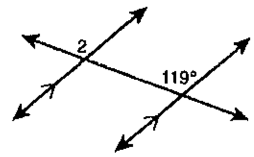
LESSON **3-2**

Practice B

Angles Formed by Parallel Lines and Transversals

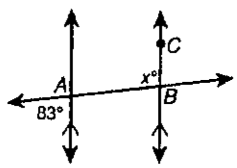
Find each angle measure.

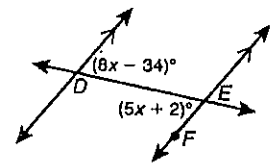




1. m∠1 47°

2. m∠2 119°





3. m∠*ABC* 97°

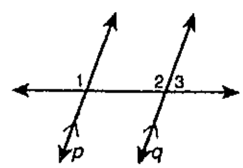
4. m∠*DEF* 62°

Complete the two-column proof to show that same-side exterior angles are supplementary.

5. **Given:** $p \parallel q$

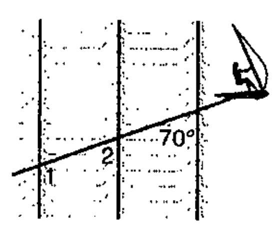
   Prove: m∠1 + m∠3 = 180°

   Proof:



Statements	Reasons
1. $p \parallel q$	1. Given
2. a. m∠2 + m∠3 = 180°	2. Lin. Pair Thm.
3. ∠1 ≅ ∠2	3. b. Corr. ∡s Post.
4. c. m∠1 = m∠2	4. Def. of ≅ ∡s
5. d. m∠1 + m∠3 = 180°	5. e. Subst.

6. Ocean waves move in parallel lines toward the shore. The figure shows Sandy Beaches windsurfing across several waves. For this exercise, think of Sandy's wake as a line. m∠1 = $(2x + 2y)°$ and m∠2 = $(2x + y)°$. Find x and y.



x = 15

y = 40

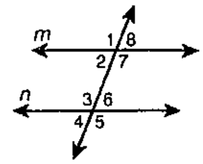
Name ______________________ Date __________ Class __________

LESSON 3-3

Practice B

Proving Lines Parallel

Use the figure for Exercises 1–8. Tell whether lines *m* and *n* must be parallel from the given information. If they are, state your reasoning. (*Hint:* The angle measures may change for each exercise, and the figure is for reference only.)



1. $\angle 7 \cong \angle 3$

   $m \parallel n$; Conv. of Alt. Int. ∠s Thm.

2. $m\angle 3 = (15x + 22)°$, $m\angle 1 = (19x - 10)°$, $x = 8$

   $m \parallel n$; Conv. of Corr. ∠s Post.

3. $\angle 7 \cong \angle 6$

   m and n are parallel if and only if $m\angle 7 = 90°$.

4. $m\angle 2 = (5x + 3)°$, $m\angle 3 = (8x - 5)°$, $x = 14$

   $m \parallel n$; Conv. of Same-Side Int. ∠s Thm.

5. $m\angle 8 = (6x - 1)°$, $m\angle 4 = (5x + 3)°$, $x = 9$

   m and n are not parallel.

6. $\angle 5 \cong \angle 7$

   $m \parallel n$; Conv. of Corr. ∠s Post.

7. $\angle 1 \cong \angle 5$

   $m \parallel n$; Conv. of Alt. Ext. ∠s Thm.

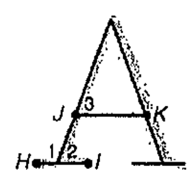
8. $m\angle 6 = (x + 10)°$, $m\angle 2 = (x + 15)°$

   m and n are not parallel.

9. Look at some of the printed letters in a textbook. The small horizontal and vertical segments attached to the ends of the letters are called *serifs.* Most of the letters in a textbook are in a serif typeface. The letters on this page do not have serifs, so these letters are in a sans-serif typeface. (*Sans* means "without" in French.) The figure shows a capital letter *A* with serifs. Use the given information to write a paragraph proof that the serif, segment $\overline{HI}$, is parallel to segment $\overline{JK}$.

   Given: $\angle 1$ and $\angle 3$ are supplementary.

   Prove: $\overline{HI} \parallel \overline{JK}$



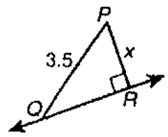
Sample answer: The given information states that $\angle 1$ and $\angle 3$ are supplementary. $\angle 1$ and $\angle 2$ are also supplementary by the Linear Pair Theorem. Therefore $\angle 3$ and $\angle 2$ must be congruent by the Congruent Supplements Theorem. Since $\angle 3$ and $\angle 2$ are congruent, $\overline{HI}$ and $\overline{JK}$ are parallel by the Converse of the Corresponding Angles Postulate.

Name ____________ Date ________ Class ________

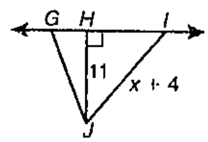
LESSON 3-4

Practice B
Perpendicular Lines

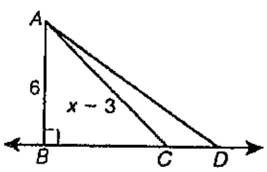
For Exercises 1–4, name the shortest segment from the point to the line and write an inequality for x. (*Hint:* One answer is a double inequality.)

1. 

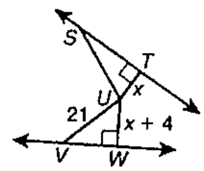
$\overline{PR}$; $x < 3.5$

2. 

$\overline{HJ}$; $x > 7$

3. 

$\overline{AB}$; $x > 9$

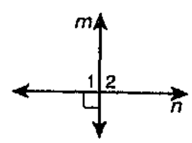
4. 

$\overline{UT}$; $x < 17$

Complete the two-column proof.

5. **Given:** $m \perp n$

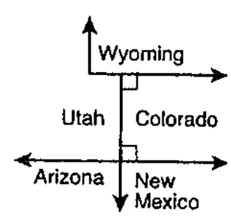
Prove: $\angle 1$ and $\angle 2$ are a linear pair of congruent angles.



Proof:

Statements	Reasons
1. a. $m \perp n$	1. Given
2. b. $m\angle 1 = 90°$, $m\angle 2 = 90°$	2. Def. of $\perp$
3. $\angle 1 \cong \angle 2$	3. c. Def. of $\cong$ $\measuredangle$s
4. $m\angle 1 + m\angle 2 = 180°$	4. Add. Prop. of =
5. d. $\angle 1$ and $\angle 2$ are a linear pair.	5. Def. of linear pair

6. The Four Corners National Monument is at the intersection of the borders of Arizona, Colorado, New Mexico, and Utah. It is called the four corners because the intersecting borders are perpendicular. If you were to lie down on the intersection, you could be in four states at the same time—the only place in the United States where this is possible. The figure shows the Colorado-Utah border extending north in a straight line until it intersects the Wyoming border at a right angle. Explain why the Colorado-Wyoming border must be parallel to the Colorado–New Mexico border. **Possible answer:**



All the borders are straight lines, and the Colorado–Utah border is a transversal to the Colorado–Wyoming and the Colorado–New Mexico borders. Because the transversal is perpendicular to both borders, the borders must be parallel.

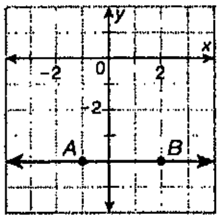
Name ______________________ Date ___________ Class ___________

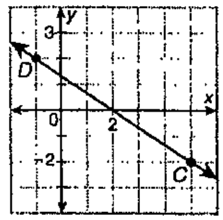
LESSON 3-5

Practice B

Slopes of Lines

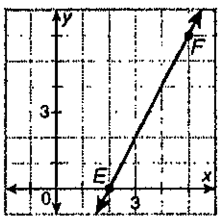
Use the slope formula to determine the slope of each line.

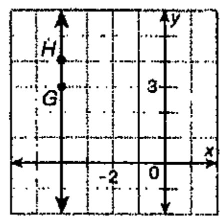




1. $\overleftrightarrow{AB}$ ____zero____

2. $\overleftrightarrow{CD}$ ____$-\frac{2}{3}$____

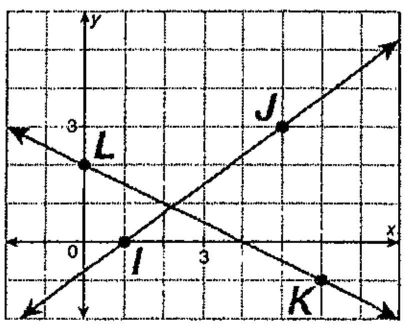


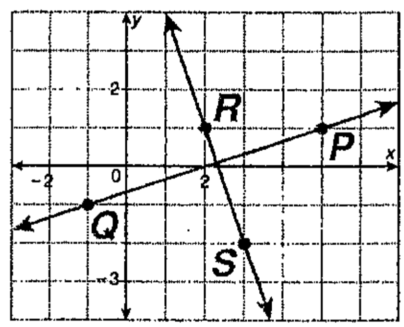


3. $\overleftrightarrow{EF}$ ____2____

4. $\overleftrightarrow{GH}$ ____undefined____

Graph each pair of lines. Use slopes to determine whether the lines are parallel, perpendicular, or neither.





5. $\overleftrightarrow{IJ}$ and $\overleftrightarrow{KL}$ for $I(1, 0)$, $J(5, 3)$, $K(6, -1)$, and $L(0, 2)$ ____neither____

6. $\overleftrightarrow{PQ}$ and $\overleftrightarrow{RS}$ for $P(5, 1)$, $Q(-1, -1)$, $R(2, 1)$, and $S(3, -2)$ ____perpendicular____

7. At a ski resort, the different ski runs down the mountain are color-coded according to difficulty. Green is easy, blue is medium, and black is hard. Assume that the ski runs below are rated only according to their slope (steeper is harder) and that there is one green, one blue, and one black run. Assign a color to each ski run.

Emerald $\left(m = \frac{4}{7}\right)$ ____green____

Diamond $\left(m = \frac{5}{4}\right)$ ____black____

Ruby $\left(m = \frac{5}{8}\right)$ ____blue____

Name _ ______________________ Date __________ Class __________

LESSON 3-6

Practice B

Lines in the Coordinate Plane

Write the equation of each line in the given form.

1. the horizontal line through (3, 7) in point-slope form

   $y - 7 = 0$

2. the line with slope $-\frac{8}{5}$ through (1, −5) in point-slope form

   $y + 5 = -\frac{8}{5}(x - 1)$

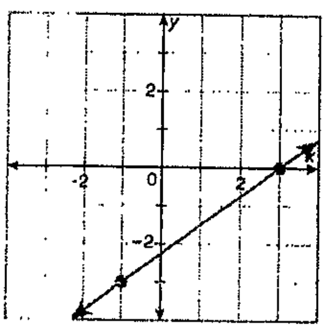
3. the line through $\left(-\frac{1}{2}, -\frac{7}{2}\right)$ and (2, 14) in slope-intercept form

   $y = 7x$

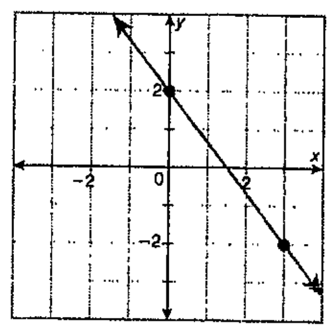
4. the line with *x*-intercept −2 and *y*-intercept −1 in slope-intercept form

   $y = -\frac{1}{2}x - 1$

Graph each line.



5. $y + 3 = \frac{3}{4}(x + 1)$



6. $y = -\frac{4}{3}x + 2$

Determine whether the lines are parallel, intersect, or coincide.

7. $x - 5y = 0$, $y + 1 = \frac{1}{5}(x + 5)$ coincide

8. $2y + 2 = x$, $\frac{1}{2}x = -1 + y$ parallel

9. $y = 4(x - 3)$, $\frac{3}{4} + 4y = -\frac{1}{4}x$ intersect

An *aquifer* is an underground storehouse of water. The water is in tiny crevices and pockets in the rock or sand, but because aquifers underlay large areas of land, the amount of water in an aquifer can be vast. Wells and springs draw water from aquifers.

10. Two relatively small aquifers are the Rush Springs (RS) aquifer and the Arbuckle-Simpson (AS) aquifer, both in Oklahoma. Suppose that starting on a certain day in 1985, 52 million gallons of water per day were taken from the RS aquifer, and 8 million gallons of water per day were taken from the AS aquifer. If the RS aquifer began with 4500 million gallons of water and the AS aquifer began with 3000 million gallons of water and no rain fell, write a slope-intercept equation for each aquifer and find how many days passed until both aquifers held the same amount of water. (Round to the nearest day.)

    RS: $y = -52x + 4500$; AS: $y = -8x + 3000$; 34 days

Key

Additional ch 3 review problems

1. Write an equation, in Standard Form, for the line parallel to 2x – 4y = 3 and passing through (–2, 4)

$m = \frac{1}{2}$

$y - 4 = \frac{1}{2}(x+2)$

$y - 4 = \frac{1}{2}x + 1$

$2y - 8 = x + 2$

$\boxed{x - 2y = -10}$

2. Write an equation, in Standard Form, for the line perpendicular to 2x – 5y = 1 and with the same y-intercept as y = 3x + 1

$(0, 1)$ $m = \frac{2}{5}$, $m_{\perp} = -\frac{5}{2}$

$y - y_1 = m(x - x_1)$

$y - 1 = -\frac{5}{2}x$

$2y - 2 = -5x$

$\boxed{5x + 2y = 2}$

3. Write an equation, in Standard Form, for the perpendicular bisector of the segment whose endpoints are (4, 5) and (2, –3)

$m = \frac{-3-5}{2-4} = 4$ $m_{\perp} = -\frac{1}{4}$

mdpt $= \left(\frac{4+2}{2}, \frac{5-3}{2}\right)$

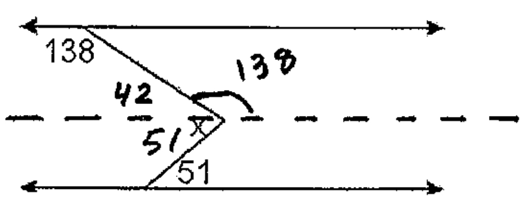
$(3, 1)$

$y - 1 = -\frac{1}{4}(x - 3)$

$4y - 4 = -x + 3$

$\boxed{x + 4y = 7}$

4. Find x



$m\angle x = 42 + 51$

$= 93^{\circ}$

pg 73 (con't)

1) $m\angle VXW = 81$

$m\angle VWX = 15$

$\angle WVR = 180 - 81 - 15$

$= 84$

$81 = \frac{1}{2}(\overset{\frown}{70} + \overset{\frown}{WV})$

$162 = 70 + \overset{\frown}{WV}$

$92 = m\overset{\frown}{WV}$

$m\overset{\frown}{TUW} = 70 + 30 + 92$

$= 192$

pg 74

1) $8x = 2 \cdot 4$

$x = 1$

$AD = 6$

$BE = 9$

3) $z = 7$

$PS = TR = 9.4$

5) $5(9.5) = 5(x+5)$

$47.5 = 5x + 25$

$22.5 = 5x$

$4.5 = x$

$BD = FD = 9.5$

7) $14(18) = 9(z+9)$

$252 = 9z + 81$

$171 = 9z$

$z = 19$

$SQ = 18$

$SU = 28$

9) $.5(x + .5) = 1^2$

$.5x + .25 = 1$

$.5x = .75$

$x = 1.5$

11) $52^2 = 26(z + 26)$

$2704 = 26z + 676$

$2028 = 26z$

$78 = z$

pg 75

2) $(x+1)^2 + (y-8)^2 = 25$

4) $r = \sqrt{(9-0)^2 + (-2-0)^2}$

$= \sqrt{81 + 4}$

$= \sqrt{85}$

$x^2 + y^2 = 85$

6) $r = \sqrt{(11+2)^2 + (4-5)^2}$

$= \sqrt{169 + 1}$

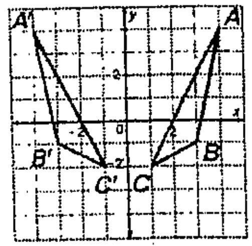
$= \sqrt{170}$

$(x-11)^2 + (x-4)^2 = 170$

(H) Ch 4 (13)

pg 76

8)



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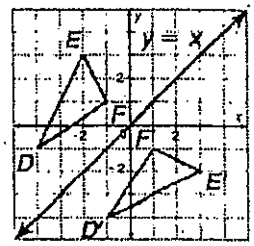

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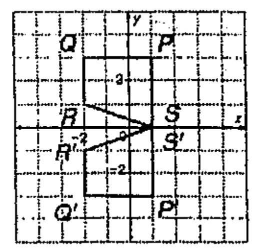

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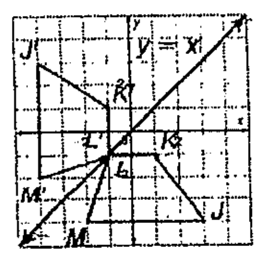
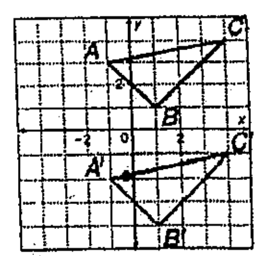


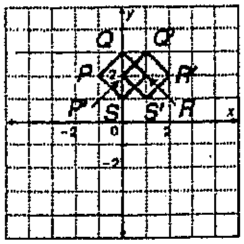
pg 77

7)



pg77 (con't)

8)



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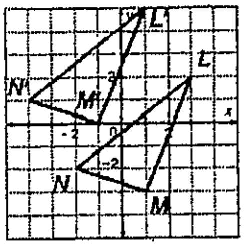

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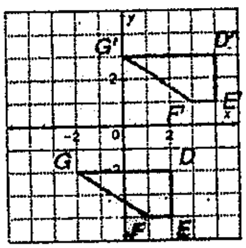
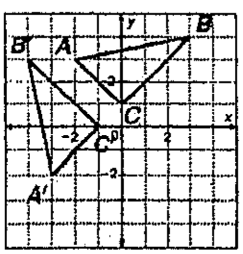


pg78

7)



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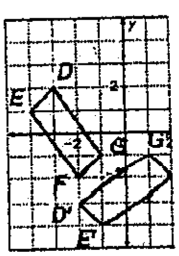
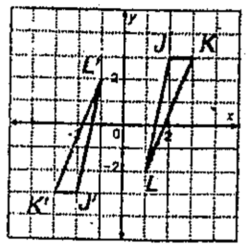


Ch 4

9)



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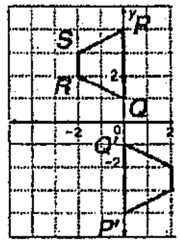
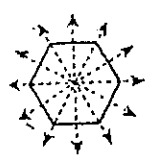


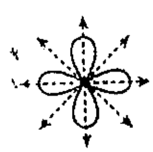
pg80

1) NO

2) yes



3) yes



4) ANNA

BOB

OTTO

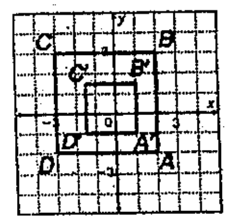
5) yes
180°
2

6) NO

7) yes
45°
8

pg82

8)



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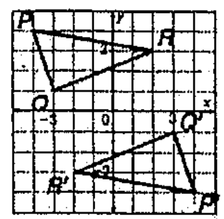

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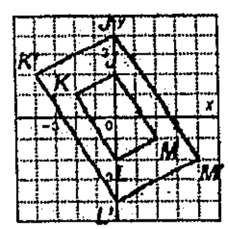

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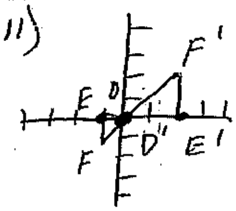


pg 82

1 no
2 ~~no~~ yes
3 ~~yes~~ no
4 yes
7 $\frac{16}{5}$ inches

pg 82

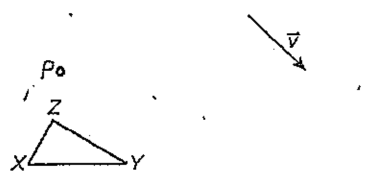
Name ______________________ Date __________ Class __________

LESSON 12-4

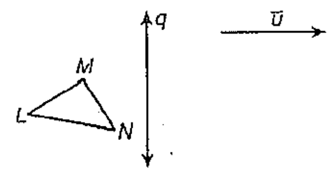
Practice B
Compositions of Transformations

Draw the result of each composition of isometries.

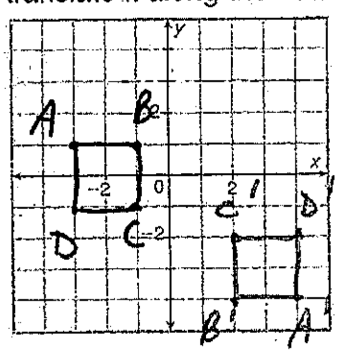
1. Rotate $\triangle XYZ$ 90° about point P and then translate it along $\vec{v}$.



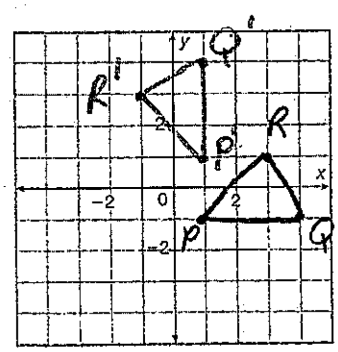
2. Reflect $\triangle LMN$ across line q and then translate it along $\vec{u}$.



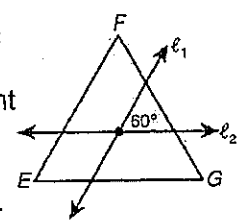
3. $ABCD$ has vertices $A(-3, 1)$, $B(-1, 1)$, $C(-1, -1)$, and $D(-3, -1)$. Rotate $ABCD$ 180° about the origin and then translate it along the vector $\langle 1, -3 \rangle$.



4. $\triangle PQR$ has vertices $P(1, -1)$, $Q(4, -1)$, and $R(3, 1)$. Reflect $\triangle PQR$ across the x-axis and then reflect it across $y = x$.



5. Ray draws equilateral $\triangle EFG$. He draws two lines that make a 60° angle through the triangle's center. Ray wants to reflect $\triangle EFG$ across ℓ_1 and then across ℓ_2. Describe what will be the same and what will be different about the image of $\triangle E''F''G''$ compared to $\triangle EFG$.



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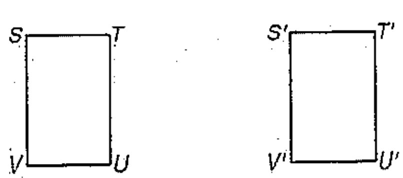
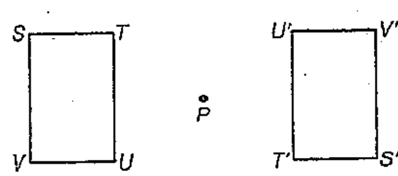
Draw two lines of reflection that produce an equivalent transformation for each figure.

6. translation: $STUV \rightarrow S'T'U'V'$



7. rotation with center P: $STUV \rightarrow S'T'U'V'$



Ch ~~4~~ 5

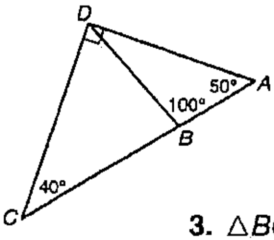
Name ______________________ Date __________ Class __________

LESSON 4-1

Practice B

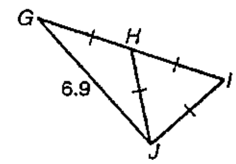
Classifying Triangles

Classify each triangle by its angle measures. (*Note:* Some triangles may belong to more than one class.)



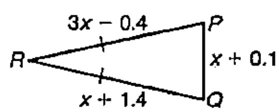
1. $\triangle ABD$ obtuse
2. $\triangle ADC$ right
3. $\triangle BCD$ acute

Classify each triangle by its side lengths. (*Note:* Some triangles may belong to more than one class.)

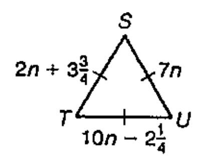


4. $\triangle GIJ$ scalene
5. $\triangle HIJ$ equilateral; isosceles
6. $\triangle GHJ$ isosceles

Find the side lengths of each triangle.

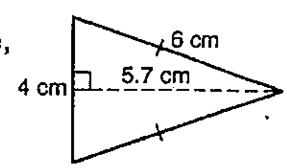
7. 

$PR = RQ = 2.3$; $PQ = 1$

8. 

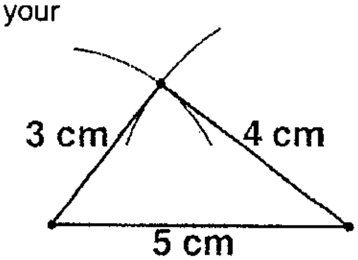
$ST = SU = TU = 5\frac{1}{4}$

9. Min works in the kitchen of a catering company. Today her job is to cut whole pita bread into small triangles. Min uses a cutting machine, so every pita triangle comes out the same. The figure shows an example. Min has been told to cut 3 pita triangles for every guest. There will be 250 guests. If the pita bread she uses comes in squares with 20-centimeter sides and she doesn't waste any bread, how many squares of whole pita bread will Min have to cut up?



22 pieces of pita bread

10. Follow these instructions and use a protractor to draw a triangle with sides of 3 cm, 4 cm, and 5 cm. First draw a 5-cm segment. Set your compass to 3 cm and make an arc from one end of the 5-cm segment. Now set your compass to 4 cm and make an arc from the other end of the 5-cm segment. Mark the point where the arcs intersect. Connect this point to the ends of the 5-cm segment. Classify the triangle by sides and by angles. Use the Pythagorean Theorem to check your answer.

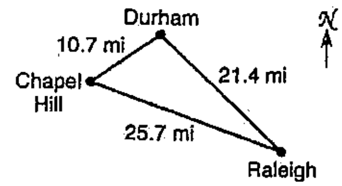


scalene, right

Name ___ Ch 5 ___ Date ________ Class ________

LESSON 4-2
Practice B
Angle Relationships in Triangles

1. An area in central North Carolina is known as the Research Triangle because of the relatively large number of high-tech companies and research universities located there. Duke University, the University of North Carolina at Chapel Hill, and North Carolina State University are all within this area. The Research Triangle is roughly bounded by the cities of Chapel Hill, Durham, and Raleigh. From Chapel Hill, the angle between Durham and Raleigh measures 54.8°. From Raleigh, the angle between Chapel Hill and Durham measures 24.1°. Find the angle between Chapel Hill and Raleigh from Durham. **101.1°**

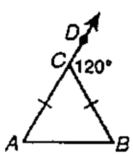


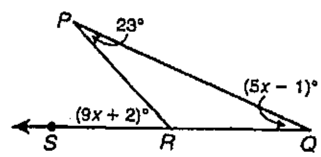
2. The acute angles of right triangle ABC are congruent. Find their measures. **45°**

The measure of one of the acute angles in a right triangle is given. Find the measure of the other acute angle.

3. 44.9° **45.1°**
4. $(90 - z)°$ **$z°$**
5. 0.3° **89.7°**

Find each angle measure.

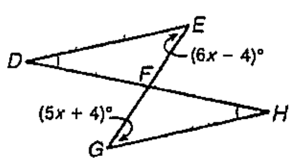


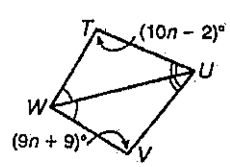


6. $m\angle B$ **60°**
7. $m\angle PRS$ **47°**

8. In $\triangle LMN$, the measure of an exterior angle at N measures 99°. $m\angle L = \frac{1}{3}x°$ and $m\angle M = \frac{2}{3}x°$. Find $m\angle L$, $m\angle M$, and $m\angle LNM$. **33°; 66°; 81°**

9. $m\angle E$ and $m\angle G$ **44°; 44°**
10. $m\angle T$ and $m\angle V$ **108°; 108°**





11. In $\triangle ABC$ and $\triangle DEF$, $m\angle A = m\angle D$ and $m\angle B = m\angle E$. Find $m\angle F$ if an exterior angle at A measures 107°, $m\angle B = (5x + 2)°$, and $m\angle C = (5x + 5)°$. **55°**

12. The angle measures of a triangle are in the ratio 3 : 4 : 3. Find the angle measures of the triangle. **54°; 72°; 54°**

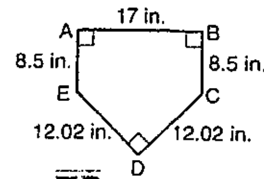
Name ch 5 Date ______ Class ______

LESSON 4-3

Practice B

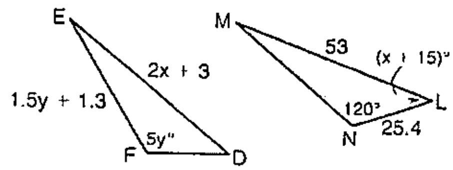
Congruent Triangles

In baseball, home plate is a pentagon. Pentagon *ABCDE* is a diagram of a regulation home plate. The baseball rules are very specific about the exact dimensions of this pentagon so that every home plate is congruent to every other home plate. If pentagon *PQRST* is another home plate, identify each congruent corresponding part.



1. $\angle S \cong$ $\angle D$
2. $\angle B \cong$ $\angle Q$
3. $\overline{EA} \cong$ $\overline{TP}$
4. $\angle E \cong$ $\angle T$
5. $\overline{PQ} \cong$ $\overline{AB}$
6. $\overline{TS} \cong$ $\overline{ED}$

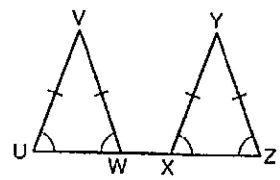
Given: $\triangle DEF \cong \triangle LMN$. Find each value.



7. $m\angle L =$ $40°$
8. $EF =$ 37.3
9. Write a two-column proof.

   Given: $\angle U \cong \angle UWV \cong \angle ZXY \cong \angle Z$, $\overline{UV} \cong \overline{WV} \cong \overline{XY} \cong \overline{ZY}$, $\overline{UX} \cong \overline{WZ}$

   Prove: $\triangle UVW \cong \triangle XYZ$



Proof: Possible answer:

Statements	Reasons
1. $\angle U \cong \angle UWV \cong \angle ZXY \cong \angle Z$	1. Given
2. $\angle V \cong \angle Y$	2. Third ⦞s Thm.
3. $\overline{UV} \cong \overline{WV}$, $\overline{XY} \cong \overline{ZY}$	3. Given
4. $\overline{UX} \cong \overline{WZ}$	4. Given
5. $UX = WZ$, $WX = WX$	5. Def. of $\cong$ segs. Reflexive Prop. of $=$
6. $UX = UW + WX$, $WZ = XZ + WX$	6. Seg. Add. Post.
7. $UW + WX = XZ + WX$	7. Subst.
8. $UW = XZ$	8. Subtr. Prop. of $=$
9. $\triangle UVW \cong \triangle XYZ$	9. Def. of $\cong$ $\triangle$s

10. **Given:** $\triangle CDE \cong \triangle HIJ$, $DE = 9x$, and $IJ = 7x + 3$. Find x and DE.

    $x = \frac{3}{2}$; $DE = 13\frac{1}{2}$

11. **Given:** $\triangle CDE \cong \triangle HIJ$, $m\angle D = (5y + 1)°$, and $m\angle I = (6y - 25)°$. Find y and $m\angle D$.

    $y = 26$; $m\angle D = 131°$

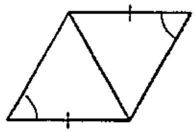
Name Ch 5 Date __________ Class __________

LESSON 4-4

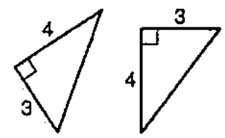
Practice B

Triangle Congruence: SSS and SAS

Write which of the SSS or SAS postulates, if either, can be used to prove the triangles congruent. If no triangles can be proved congruent, write *neither*.

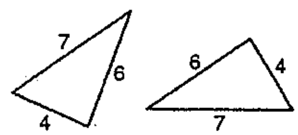


1. neither



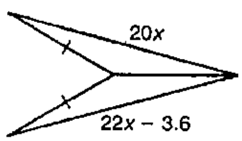
2. SAS

3. neither

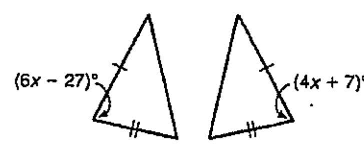


4. SSS

Find the value of x so that the triangles are congruent.



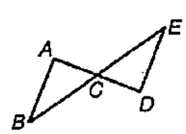
5. $x =$ 1.8



6. $x =$ 17

The Hatfield and McCoy families are feuding over some land. Neither family will be satisfied unless the two triangular fields are exactly the same size. You know that C is the midpoint of each of the intersecting segments. Write a two-column proof that will settle the dispute.

7. **Given:** C is the midpoint of $\overline{AD}$ and $\overline{BE}$.



Prove: $\triangle ABC \cong \triangle DEC$

Proof: Possible answer:

Statements	Reasons
1. C is the midpoint of $\overline{AD}$ and $\overline{BE}$.	1. Given
2. $AC = CD$, $BC = CE$	2. Def. of mdpt.
3. $\overline{AC} \cong \overline{CD}$, $\overline{BC} \cong \overline{CE}$	3. Def. of ≅ segs.
4. $\angle ACB \cong \angle DCE$	4. Vert. ∠s Thm.
5. $\triangle ABC \cong \triangle DEC$	5. SAS

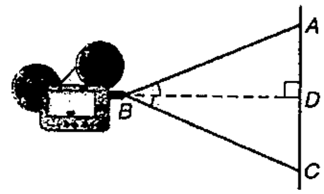
Name Ch 5 Date ________ Class ________

LESSON 4-5

Practice B

Triangle Congruence: ASA, AAS, and HL

Students in Mrs. Marquez's class are watching a film on the uses of geometry in architecture. The film projector casts the image on a flat screen as shown in the figure. The dotted line is the bisector of $\angle ABC$. Tell whether you can use each congruence theorem to prove that $\triangle ABD \cong \triangle CBD$. If not, tell what else you need to know.



1. Hypotenuse-Leg

   No; you need to know that $\overline{AB} \cong \overline{CB}$.

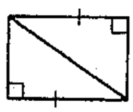
2. Angle-Side-Angle

   Yes

3. Angle-Angle-Side

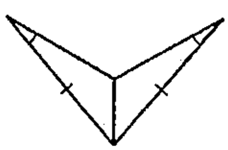
   Yes, if you use Third $\angle$s Thm. first.

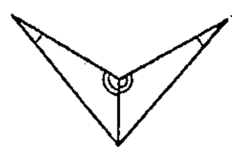
Write which postulate, if any, can be used to prove the pair of triangles congruent.



4. **HL**

5. **ASA or AAS**

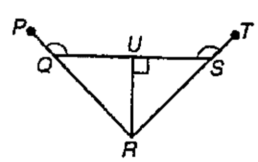




6. **none**

7. **AAS or ASA**

Write a paragraph proof.



8. **Given:** $\angle PQU \cong \angle TSU$,
   $\angle QUR$ and $\angle SUR$ are right angles.

   Prove: $\triangle RUQ \cong \triangle RUS$

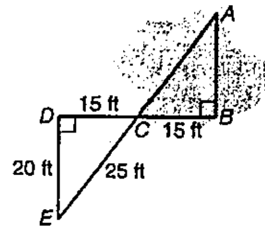
Possible answer: All right angles are congruent, so $\angle QUR \cong \angle SUR$. $\angle RQU$ and $\angle PQU$ are supplementary and $\angle RSU$ and $\angle TSU$ are supplementary by the Linear Pair Theorem. But it is given that $\angle PQU \cong \angle TSU$, so by the Congruent Supplements Theorem, $\angle RQU \cong \angle RSU$. $\overline{RU} \cong \overline{RU}$ by the Reflexive Property of $\cong$, so $\triangle RUQ \cong \triangle RUS$ by AAS.

Name Ch 5 Date ________ Class ________

LESSON **4-6**

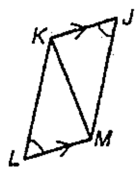
Practice B

Triangle Congruence: CPCTC



1. Heike Dreschler set the Woman's World Junior Record for the long jump in 1983. She jumped about 23.4 feet. The diagram shows two triangles and a pond. Explain whether Heike could have jumped the pond along path *BA* or along path *CA*. Possible answer: Because $\angle DCE \cong \angle BCA$ by the Vertical $\angle$s Thm. the triangles are congruent by ASA, and each side in $\triangle ABC$ has the same length as its corresponding side in $\triangle EDC$. Heike could jump about 23 ft. The distance along path *BA* is 20 ft because *BA* corresponds with *DE*, so Heike could have jumped this distance. The distance along path *CA* is 25 ft because *CA* corresponds with *CE*, so Heike could not have jumped this distance.

Write a flowchart proof.

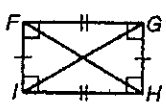


2. **Given:** $\angle L \cong \angle J$, $\overline{KJ} \parallel \overline{LM}$
   Prove: $\angle LKM \cong \angle JMK$

$\overline{KJ} \parallel \overline{LM}$ — Given → $\angle LMK \cong \angle JKM$ — Alt. Int. $\angle$s Thm.

$\angle LMK \cong \angle JKM$ (Alt. Int. $\angle$s Thm.), $\angle L \cong \angle J$ (Given), $\overline{KM} \cong \overline{KM}$ (Reflex. Prop. of $\cong$) → $\triangle LKM \cong \triangle JMK$ — AAS → $\angle LKM \cong \angle JMK$ — CPCTC

Write a two-column proof.



3. **Given:** *FGHI* is a rectangle.
   Prove: The diagonals of a rectangle have equal lengths. Possible answer:

Statements	Reasons
1. *FGHI* is a rectangle.	1. Given
2. $\overline{FI} \cong \overline{GH}$, $\angle FIH$ and $\angle GHI$ are right angles.	2. Def. of rectangle
3. $\angle FIH \cong \angle GHI$	3. Rt. $\angle \cong$ Thm.
4. $\overline{IH} \cong \overline{IH}$	4. Reflex. Prop. of $\cong$
5. $\triangle FIH \cong \triangle GHI$	5. SAS
6. $\overline{FH} \cong \overline{GI}$	6. CPCTC
7. $FH = GI$	7. Def. of $\cong$ segs.

Name ch 5 Date ______ Class ______

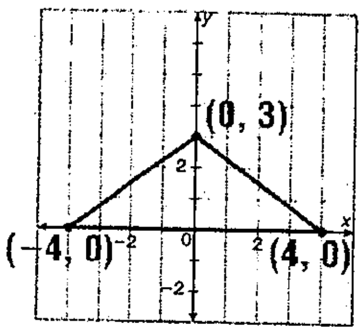
LESSON 4-7

Practice B

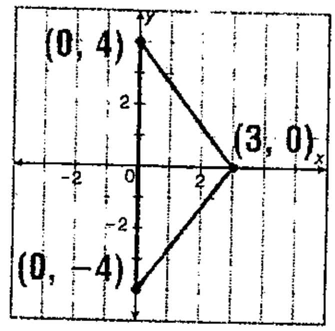
Introduction to Coordinate Proof

Position an isosceles triangle with sides of 8 units, 5 units, and 5 units in the coordinate plane. Label the coordinates of each vertex. (*Hint:* Use the Pythagorean Theorem.)

1. Center the long side on the x-axis at the origin.



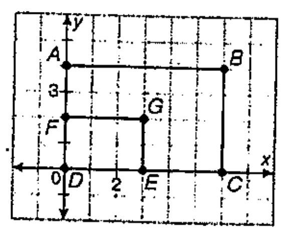
2. Place the long side on the y-axis centered at the origin.



Write a coordinate proof.

3. **Given:** Rectangle $ABCD$ has vertices $A(0, 4)$, $B(6, 4)$, $C(6, 0)$, and $D(0, 0)$. E is the midpoint of $\overline{DC}$. F is the midpoint of $\overline{DA}$.

Prove: The area of rectangle $DEGF$ is one-fourth the area of rectangle $ABCD$.



Possible answer: $ABCD$ is a rectangle with width AD and length DC. The area of $ABCD$ is $(AD)(DC)$ or $(4)(6) = 24$ square units. By the Midpoint Formula, the coordinates of E are $\left(\frac{0+6}{2}, \frac{0+0}{2}\right) = (3, 0)$ and the coordinates of F are $\left(\frac{0+0}{2}, \frac{0+4}{2}\right) = (0, 2)$. The x-coordinate of E is the length of rectangle $DEGF$, and the y-coordinate of F is the width. So the area of $DEGF$ is $(3)(2) = 6$ square units. Since $6 = \frac{1}{4}(24)$, the area of rectangle $DEGF$ is one-fourth the area of rectangle $ABCD$.

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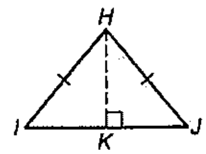
LESSON 4-8

Practice B

Isosceles and Equilateral Triangles

An altitude of a triangle is a perpendicular segment from a vertex to the line containing the opposite side. Write a paragraph proof that the altitude to the base of an isosceles triangle bisects the base.



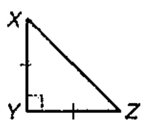
1. **Given:** $\overline{HI} \cong \overline{HJ}$, $\overline{HK} \perp \overline{IJ}$

   Prove: $\overline{HK}$ bisects $\overline{IJ}$.

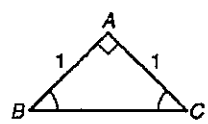
Possible answer: It is given that $\overline{HI}$ is congruent to $\overline{HJ}$, so $\angle I$ must be congruent to $\angle J$ by the Isosceles Triangle Theorem. $\angle IKH$ and $\angle JKH$ are both right angles by the definition of perpendicular lines, and all right angles are congruent. Thus by AAS, $\triangle HKI$ is congruent to $\triangle HKJ$. $\overline{IK}$ is congruent to $\overline{KJ}$ by CPCTC, so $\overline{HK}$ bisects $\overline{IJ}$ by the definition of segment bisector.

2. An *obelisk* is a tall, thin, four-sided monument that tapers to a pyramidal top. The most well-known obelisk to Americans is the Washington Monument on the National Mall in Washington, D.C. Each face of the pyramidal top of the Washington Monument is an isosceles triangle. The height of each triangle is 55.5 feet, and the base of each triangle measures 34.4 feet. Find the length, to the nearest tenth of a foot, of one of the two equal legs of the triangle. **58.1 ft**

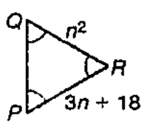
Find each value.



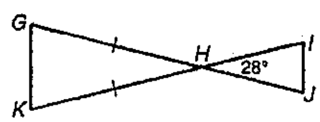
3. m$\angle X$ = **45°**



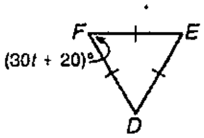
4. BC = $\mathbf{\sqrt{2}}$



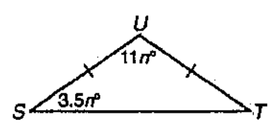
5. PQ = **36 or 9**



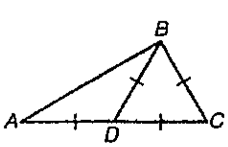
6. m$\angle K$ = **76°**



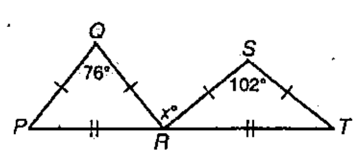
7. t = $\mathbf{\frac{4}{3}}$



8. n = **10**



9. m$\angle A$ = **30°**



10. x = **89**

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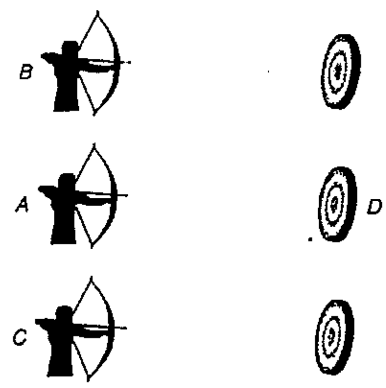
Name ______________________ Date __________ Class __________

LESSON 5-1

Practice B

Perpendicular and Angle Bisectors

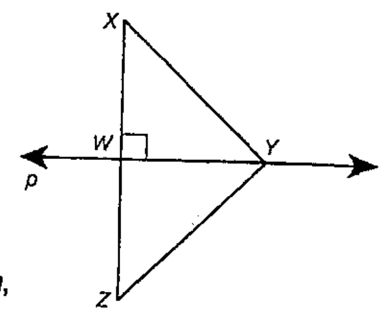
Diana is in an archery competition. She stands at A, and the target is at D. Her competitors stand at B and C.



1. The distance from each of her competitors to her target is equal. Explain whether the flight path of Diana's arrow, $\overline{AD}$, must be a perpendicular bisector of $\overline{BC}$.

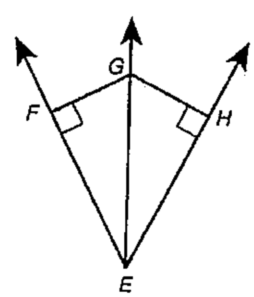
   Possible answer: The flight path of Diana's arrow does not have to be a perpendicular bisector of $\overline{BC}$. For that to be true, Diana must be equidistant from each of her competitors.

Use the figure for Exercises 2–5.



2. Given that line p is the perpendicular bisector of $\overline{XZ}$ and $XY = 15.5$, find ZY. 15.5
3. Given that $XZ = 38$, $YX = 27$, and $YZ = 27$, find ZW. 19
4. Given that line p is the perpendicular bisector of $\overline{XZ}$; $XY = 4n$, and $YZ = 14$, find n. $\frac{7}{2}$ or 3.5
5. Given that $XY = ZY$, $WX = 6x - 1$, and $XZ = 10x + 16$, find ZW. 53

Use the figure for Exercises 6–9.



6. Given that $FG = HG$ and $m\angle FEH = 55°$, find $m\angle GEH$. 27.5°
7. Given that $\overrightarrow{EG}$ bisects $\angle FEH$ and $GF = \sqrt{2}$, find GH. $\sqrt{2}$
8. Given that $\angle FEG \cong \angle GEH$, $FG = 10z - 30$, and $HG = 7z + 6$, find FG. 90
9. Given that $GF = GH$, $m\angle GEF = \frac{8}{3}a°$, and $m\angle GEH = 24°$, find a. 9

Write an equation in point-slope form for the perpendicular bisector of the segment with the given endpoints.

10. $L(4, 0)$, $M(-2, 3)$

    $y - \frac{3}{2} = 2(x - 1)$

11. $T(0, -3)$, $U(0, 1)$

    $y + 1 = 0(x - 0)$ or $y + 1 = 0$

12. $A(-1, 6)$, $B(-3, -4)$

    $y - 1 = -\frac{1}{5}(x + 2)$

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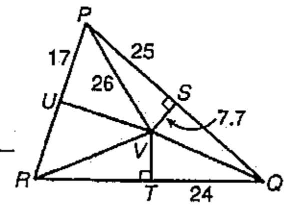
Name ______________________ Date __________ Class __________

LESSON 5-2

Practice B

Bisectors of Triangles

Use the figure for Exercises 1 and 2. $\overline{SV}$, $\overline{TV}$, and $\overline{UV}$ are perpendicular bisectors of the sides of $\triangle PQR$. Find each length.



1. RV 26

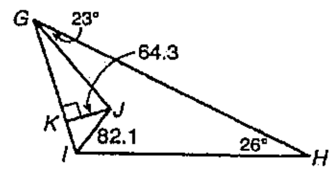
2. TR 24

Find the circumcenter of the triangle with the given vertices.

3. $A(0, 0)$, $B(0, 5)$, $C(5, 0)$
(2.5 , 2.5)

4. $D(0, 7)$, $E(-3, 1)$, $F(3, 1)$
(0 , 3.25)

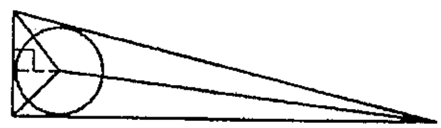
Use the figure for Exercises 7 and 8. $\overline{GJ}$ and $\overline{IJ}$ are angle bisectors of $\triangle GHI$. Find each measure.



5. the distance from J to $\overline{GH}$ 64.3

6. $m\angle JGK$ 23°

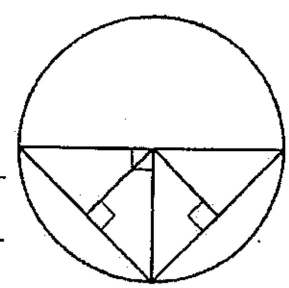
Raleigh designs the interiors of cars. He is given two tasks to complete on a new production model.



7. A triangular surface as shown in the figure is molded into the driver's side door as an armrest. Raleigh thinks he can fit a cup holder into the triangle, but he'll have to put the largest possible circle into the triangle. Explain how Raleigh can do this. Sketch his design on the figure.

Possible answer: Raleigh needs to find the incircle of the triangle. The incircle just touches all three sides of the triangle, so it is the largest circle that will fit. The incenter can be found by drawing the angle bisector from each vertex of the triangle. The incircle is drawn with the incenter as the center and a radius equal to the distance to one of the sides.

8. The car's logo is the triangle shown in the figure. Raleigh has to use this logo as the center of the steering wheel. Explain how Raleigh can do this. Sketch his design on the figure.



Possible answer: Raleigh needs to find the circumcircle of the triangle. The circumcircle just touches all three vertices of the triangle, so it fits just around it. The circumcenter can be found by drawing the perpendicular bisectors of the sides of the triangle. The circumcircle is drawn with the circumcenter as center and a radius equal to the distance from the center to one of the vertices.

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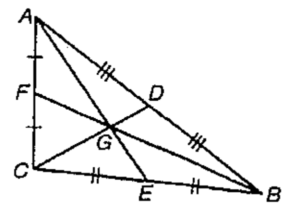
Name ______________________ Date __________ Class __________

LESSON 5-3

Practice B

Medians and Altitudes of Triangles

Use the figure for Exercises 1–4. $GB = 12\frac{2}{3}$ and $CD = 10$. Find each length.



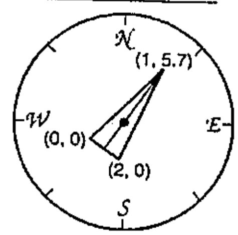
1. FG $6\frac{1}{3}$

2. BF 19

3. GD $3\frac{1}{3}$

4. CG $6\frac{2}{3}$

5. A triangular compass needle will turn most easily if it is attached to the compass face through its centroid. Find the coordinates of the centroid.



(1 , 1.9)

Find the orthocenter of the triangle with the given vertices.

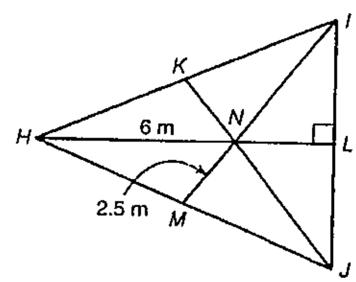
6. $X(-5, 4)$, $Y(2, -3)$, $Z(1, 4)$

(2 , 5)

7. $A(0, -1)$, $B(2, -3)$, $C(4, -1)$

(2 , −3)

Use the figure for Exercises 8 and 9. $\overline{HL}$, $\overline{IM}$, and $\overline{JK}$ are medians of $\triangle HIJ$.

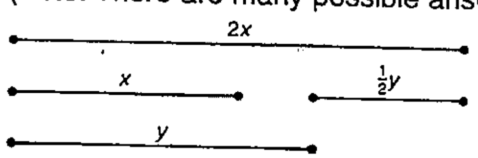


8. Find the area of the triangle. $36\ m^2$

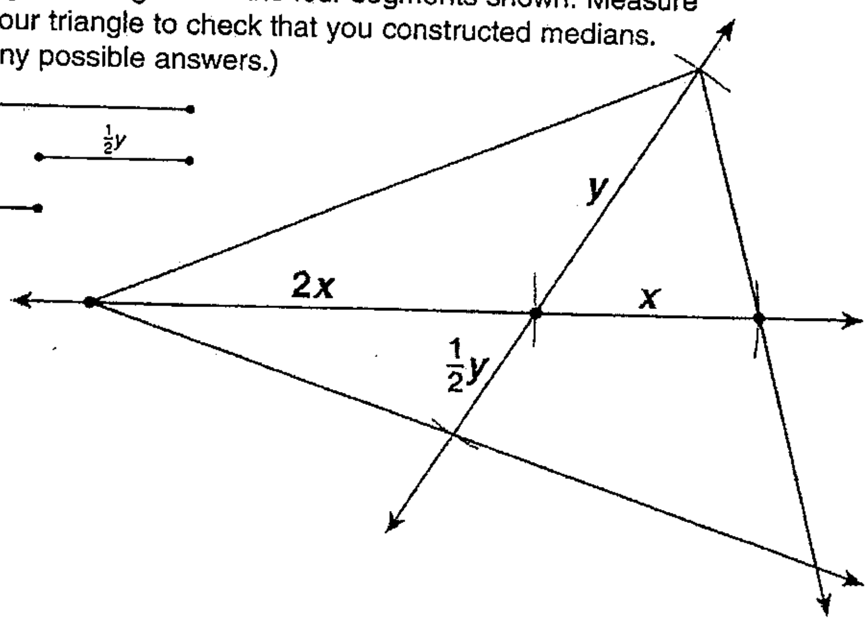
9. If the perimeter of the triangle is 49 meters, then find the length of $\overline{MH}$. (*Hint:* What kind of a triangle is it?)

10.25 m

10. Two medians of a triangle were cut apart at the centroid to make the four segments shown below. Use what you know about the Centroid Theorem to reconstruct the original triangle from the four segments shown. Measure the side lengths of your triangle to check that you constructed medians. (*Note:* There are many possible answers.)



Possible answer:



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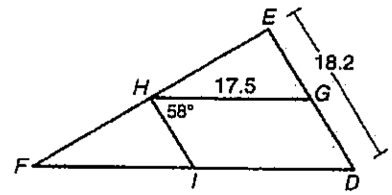
LESSON 5-4

Practice B

The Triangle Midsegment Theorem

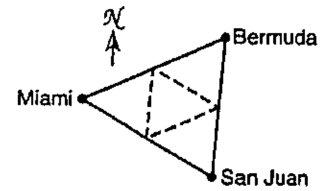
Use the figure for Exercises 1–6. Find each measure.



1. HI 9.1
2. DF 35
3. GE 9.1
4. $m\angle HIF$ 58°
5. $m\angle HGD$ 122°
6. $m\angle D$ 58°

The Bermuda Triangle is a region in the Atlantic Ocean off the southeast coast of the United States. The triangle is bounded by Miami, Florida; San Juan, Puerto Rico; and Bermuda. In the figure, the dotted lines are midsegments.

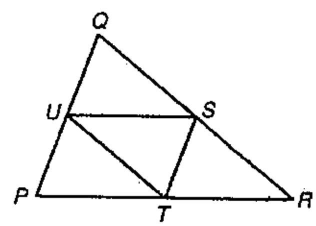
	Dist. (mi)
Miami to San Juan	1038
Miami to Bermuda	1042
Bermuda to San Juan	965



7. Use the distances in the chart to find the perimeter of the Bermuda Triangle. 3045 mi
8. Find the perimeter of the midsegment triangle within the Bermuda Triangle. 1522.5 mi
9. How does the perimeter of the midsegment triangle compare to the perimeter of the Bermuda Triangle?

   It is half the perimeter of the Bermuda Triangle.

Write a two-column proof that the perimeter of a midsegment triangle is half the perimeter of the triangle.



10. **Given:** $\overline{US}$, $\overline{ST}$, and $\overline{TU}$ are midsegments of $\triangle PQR$.

    Prove: The perimeter of $\triangle STU = \frac{1}{2}(PQ + QR + RP)$.

Possible answer:

Statements	Reasons
1. $\overline{US}$, $\overline{ST}$, and $\overline{TU}$ are midsegments of $\triangle PQR$.	1. Given
2. $ST = \frac{1}{2}PQ$, $TU = \frac{1}{2}QR$, $US = \frac{1}{2}RP$	2. Midsegment Theorem
3. The perimeter of $\triangle STU = ST + TU + US$.	3. Definition of perimeter
4. The perimeter of $\triangle STU = \frac{1}{2}PQ + \frac{1}{2}QR + \frac{1}{2}RP$.	4. Substitution
5. The perimeter $\triangle STU = \frac{1}{2}(PQ + QR + RP)$	5. Distributive Property of =

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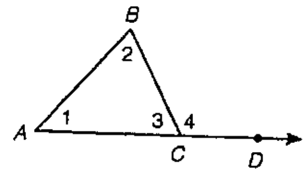
LESSON **5-5**

Practice B

Indirect Proof and Inequalities in One Triangle

Write an indirect proof that the angle measures of a triangle cannot add to more than 180°.



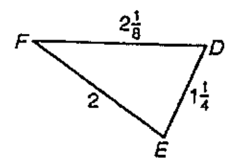
1. State the assumption that starts the indirect proof.

   $m\angle 1 + m\angle 2 + m\angle 3 > 180°$

2. Use the Exterior Angle Theorem and the Linear Pair Theorem to write the indirect proof.

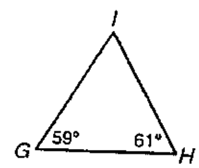
   Possible answer: Assume that $m\angle 1 + m\angle 2 + m\angle 3 > 180°$. $\angle 4$ is an exterior angle of $\triangle ABC$, so by the Exterior Angle Theorem, $m\angle 1 + m\angle 2 = m\angle 4$. $\angle 3$ and $\angle 4$ are a linear pair, so by the Linear Pair Theorem, $m\angle 3 + m\angle 4 = 180°$. Substitution leads to the conclusion that $m\angle 1 + m\angle 2 + m\angle 3 = 180°$, which contradicts the assumption. Thus the assumption is false, and the sum of the angle measures of a triangle cannot add to more than 180°.

3. Write the angles of $\triangle DEF$ in order from smallest to largest.

   $\angle F$; $\angle D$; $\angle E$

4. Write the sides of $\triangle GHI$ in order from shortest to longest.

   $\overline{HI}$; $\overline{GH}$; $\overline{GI}$

Tell whether a triangle can have sides with the given lengths. If not, explain why not.

5. 8, 8, 16 **no; $8 + 8 = 16$**
6. 0.5, 0.7, 0.3 **yes**
7. $10\frac{1}{2}$, 4, 14 **yes**
8. $3x + 2$, x^2, $2x$ when $x = 4$ **yes**
9. $3x + 2$, x^2, $2x$ when $x = 6$ **no; $12 + 20 < 36$**

The lengths of two sides of a triangle are given. Find the range of possible lengths for the third side.

10. 8.2 m, 3.5 m

    $4.7 \text{ m} < s < 11.7 \text{ m}$

11. 298 ft, 177 ft

    $121 \text{ ft} < s < 475 \text{ ft}$

12. $3\frac{1}{2}$ mi, 4 mi

    $\frac{1}{2} \text{ mi} < s < 7\frac{1}{2} \text{ mi}$

13. The annual Cheese Rolling happens in May at Gloucestershire, England. As the name suggests, large, 7–9 pound wheels of cheese are rolled down a steep hill, and people chase after them. The first person to the bottom wins cheese. Renaldo wants to go to the Cheese Rolling. He plans to leave from Atlanta and fly into London (4281 miles). On the return, he will fly back from London to New York City (3470 miles) to visit his aunt. Then Renaldo heads back to Atlanta. Atlanta, New York City, and London do not lie on the same line. Find the range of the total distance Renaldo could travel on his trip.

    Renaldo could travel between 8562 miles and 15,502 miles.

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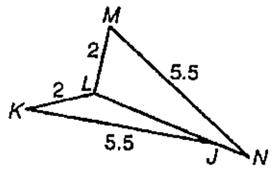
LESSON 5-6

Practice B

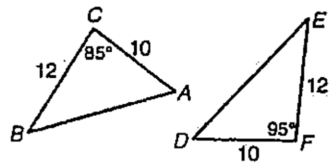
Inequalities in Two Triangles

Compare the given measures.



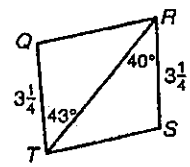
1. m∠K and m∠M

$m\angle K < m\angle M$



2. *AB* and *DE*

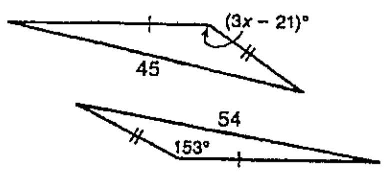
$AB < DE$



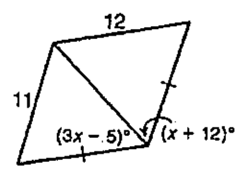
3. *QR* and *ST*

$QR > ST$

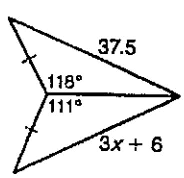
Find the range of values for *x*.

4. 

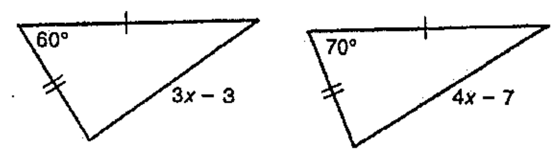
$7 < x < 58$

6. 

$\frac{5}{3} < x < \frac{17}{2}$

5. 

$-2 < x < 10.5$

7. 

$x > 4$

8. You have used a compass to copy and bisect segments and angles and to draw arcs and circles. A compass has a drawing leg, a pivot leg, and a hinge at the angle between the legs. Explain why and how the measure of the angle at the hinge changes if you draw two circles with different diameters.

Possible answer: The legs of a compass and the length spanned by it form a triangle, but the lengths of the legs cannot change. Therefore any two settings of the compass are subject to the Hinge Theorem. To draw a larger-diameter circle, the measure of the hinge angle must be made larger. To draw a smaller-diameter circle, the measure of the hinge angle must be made smaller.