Mini-Lesson 1.1
Tips for Success in Mathematics

Learning Objectives:

1. Get ready for this course.
2. Understand some general tips for success.
3. Understand how to use the resources provided in MyMathLab and Math XL.
4. Get help as soon as you need it.
5. Learn to prepare for and take an exam.
6. Develop good time management.

Key Examples:

1. Get ready for this course.
   a) Positive attitude.
   b) Allow adequate time for class arrival.
   c) Bring all required materials.

2. General tips for success.
   a) Find a contact person.
   b) Choose to attend all classes and be on time.
   c) Do your homework.
   d) Check your work and learn from mistakes.
   e) Seek help when needed.
   f) Stay organized.
   g) Read your ebook
   h) Watch the section lecture videos before class.
   i) Ask questions.
   j) Hand in all assignments on time.

3. Understand how to use the resources provided in MyMathLab and MathXL.
   a) MathXL resources include: Help Me Solve This, View an Example, Textbook, Video, and Ask My Instructor
   b) MyMathLab resources include: Ebook, Videos, and Organizer

4. Getting help.
   a) Get help as soon as you need it. b) Form a study group with class members.
   c) Go to a math lab or tutor center.

5. Preparing for and taking an exam.
   a) Review previous assignments.
   b) Review notes and section-level quizzes.
   c) Complete Chapter Review.
   d) Work similar homework exercises online.
   e) Try taking some sample tests.
   f) Get a good night's sleep before the exam.
   g) Allow yourself plenty of time to arrive at the test location.

   When taking a test:
   h) Read the directions on the test carefully.
   i) Read each problem carefully and answer the question asked.
   j) Pace yourself. Work problems you know first. Watch your time so you do not spend too much time on one problem.
   k) If you have time, check your work and answers.
   l) Do not turn your test in early.

Mini-Lesson 1.1

Tips for Success in Mathematics

MyMathLab®

Geometry
Multimedia Lesson Resources

eText, Section 1.1 (MML)

Interactive Lecture Video Section 1.1

Interactive Lecture Video Objective 1

Interactive Lecture Video Objective 2

Interactive Lecture Video Objective 3

Interactive Lecture Video Objective 4

Interactive Lecture Video Objective 5

Interactive Lecture Video Objective 6

Video Organizer Section 1.1 (print)

Video Organizer Section 1.1 (MML)

PowerPoints, Section 1.1

6. Learn good time management.
   a) Make a list of all weekly commitments with estimated time needed.
   b) Next, estimate the time needed for each item on the list.
   c) Be sure to schedule study time. Don't forget eating, sleeping, and relaxing!

Teaching Notes:

- Most developmental students have a high anxiety level with mathematics.
- Be sure to include <u>your</u> individual expectations. Keep your expectations clear and concise.

ERROR PREVENTION

- Many developmental students are hesitant to ask questions and seek extra help. Remind them that ample online resources are available for them 24 hours a day.

Closure Questions:

- What are four things you can do to increase your likelihood for success in this course?

  Attend all classes, do my homework, seek help when needed, ask questions in class, study for tests, stay organized, …

- Explain how you would go about preparing for a chapter exam.

  Review my notes, homework assignments, and quizzes from the chapter, and practice working out the exercises in the end-of-the-chapter Review and Test.

Mini-Lesson 1.2

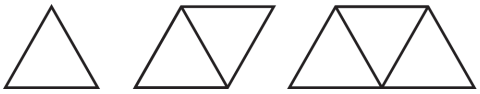
Geometry— A Mathematical System

Learning Objectives:

1. Use logic to recognize patterns.
2. Understand how a mathematical system, like geometry, is formed.
3. Key vocabulary: *geometry, logic, undefined term, defined term, postulate axiom, theorem*

Key Examples:

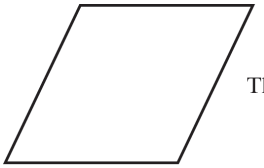
1. Sketch the next figure in this pattern.



2. Look for a pattern and predict the next number.

   a) 3, 21, 147, _____ b) –23, –12, –1, _____

3. Given the figure, can you conclude the statement? (A rhombus has four sides of equal length.)



This is a rhombus.

?

Answers: 1) *See Additional Answers at end of Mini-Lessons.* 2a) 1029 2b) 10 3) No. None of the sides are marked, so we may not conclude that they all have the same lengths.

Mini-Lesson 1.2

Geometry—A Mathematical System

MyMathLab®

Geometry
Multimedia Lesson Resources

eText, Section 1.2 (MML)

Interactive Lecture Video Section 1.2

Interactive Lecture Video Objective 1

Interactive Lecture Video Objective 2

Video Organizer Section 1.2 (print)

Video Organizer Section 1.2 (MML)

PowerPoints, Section 1.2

Teaching Notes:

- Emphasize that geometry has lots of vocabulary, and that learning it one lesson at a time is very important. Reviewing the basic vocabulary in this lesson, even if it is familiar, will help students develop good habits to use throughout the course.
- When working with a number pattern, ask students to describe in words a rule for getting from one number to the next in the list.

ERROR PREVENTION

- Many students will make unsupported assumptions from unmarked figures, such as assuming that a figure that looks like a square is a square.

Closure Questions:

- What is the difference between postulates and theorems?

  Postulates (or axioms) are statements that we accept as true and do not try to prove. Theorems are statements that we prove using logic, undefined terms, definitions, postulates, and other previously proved theorems.

- How can you mark a figure to indicate that two or more segments have equal length?

  Indicate the lengths of the segments or mark the segments with matching numbers of tick marks.

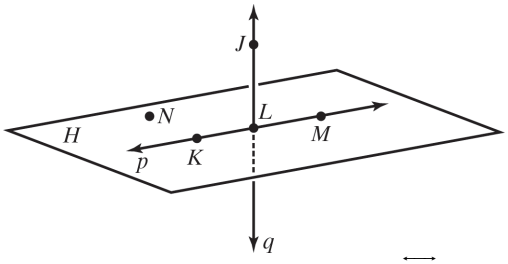
Mini-Lesson 1.3

Points, Lines, and Planes

Learning Objectives:

1. Learn the basic terms and postulates of geometry.
2. Key vocabulary: *point, line, plane, lie on, collinear, coplanar, space, geometric figure, between, segment or line segment, ray, opposite rays, intersection*

Key Examples:

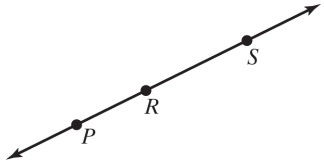
1. 

a) Write two other ways to name $\overleftrightarrow{LJ}$. b) Write two other ways to name plane *H*.

c) Name three points that are collinear. d) Name four points that are coplanar.

e) Name three points that are not collinear.

2. Use the given figure to find the following.



a) Name the segments in the figure.

b) Name the rays in the figure. c) Which of the rays in part b are opposite rays?

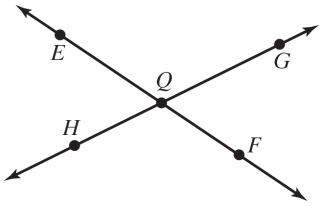
3. Draw parts a through d in order to create a single figure.

a) Draw three noncollinear points *P*, *R*, and *S*.

b) Draw $\overleftrightarrow{RS}$. c) Draw $\overline{SP}$.

d) Draw $\overrightarrow{PR}$.

4. Name two pairs of opposite rays.



Answers: 1a) T $\overleftrightarrow{JL}$, line *q* 1b) Plane *MLN*, plane *MKN*, plane *LKN* 1c) Points *K, L,* and *M* 1d) Points *K*, *L*, *M*, and *N* 1e) Points *J*, *L*, and *N* (many other correct answers are possible) 2a) $\overline{PR}$ or $\overline{RP}$, $\overline{RS}$ or $\overline{SR}$, $\overline{PS}$ or $\overline{SP}$ 2b) $\overrightarrow{PR}$ or $\overrightarrow{PS}$, $\overrightarrow{RP}$, $\overrightarrow{RS}$, $\overrightarrow{SP}$ or $\overrightarrow{SR}$ 2c) $\overrightarrow{RP}$ and $\overrightarrow{RS}$ 3) *See Additional Answers at end of Mini-Lessons.* 4) $\overrightarrow{QE}$ and $\overrightarrow{QF}$; $\overrightarrow{QG}$ and $\overrightarrow{QH}$ 5) $\overrightarrow{KL}$ 6) The plane on the bottom of the figure contains points *V*, *W*, and *X*.

Mini-Lesson 1.3

Points, Lines, and Planes

MyMathLab®

Geometry
Multimedia Lesson Resources

eText, Section 1.3 (MML)

Interactive Lecture Video Section 1.3

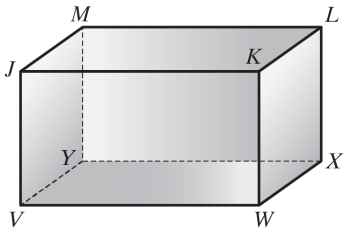
Interactive Lecture Video Objective 1

Video Organizer Section 1.3 (print)

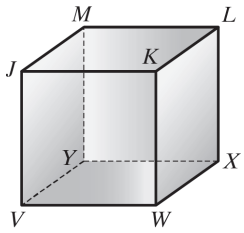
Video Organizer Section 1.3 (MML)

PowerPoints, Section 1.3

5. Each surface of the box shown represents part of a plane. What is the intersection of plane *JML* and plane *KWX*?



6. What plane contains points *V*, *W*, and *X*?



Teaching Notes:

- Emphasize that a segment has two endpoints, a ray has one endpoint, and a line has no endpoints. Remind students to use the correct symbols above the letters representing points when naming a segment, ray, or line.
- Help students learn to sketch the three-dimensional figures shown in this section.

ERROR PREVENTION

- When naming a ray, some students may write the two letters representing points in the wrong order. Remind them that, although either order is correct when naming a segment or line, the endpoint must be written first when naming a ray.

Closure Questions:

- Why do we need to have undefined terms in geometry?

  We can't define every term because every definition depends on previously defined terms, and we wouldn't have any of those to use to define the simplest terms.

- Do two distinct planes always intersect in a line?

  If two distinct planes intersect, they will intersect in exactly one line. However, some pairs of lines do not intersect at all, such as the top and bottom of a box.

Mini-Lesson 1.4

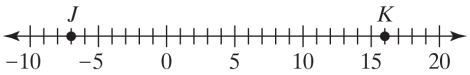
Segments and Their Measure

Learning Objectives:

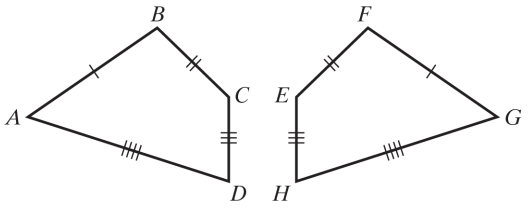
1. Understand the measure of segments.
2. Use segment postulates and algebra to find segment lengths.
3. Key vocabulary: *coordinate, distance, congruent segments, midpoint, bisect, segment bisector*

Key Examples:

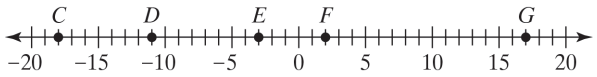
1. Find JK.



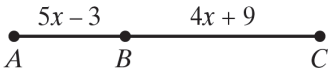
2. a) Use the figures below to write the congruent segments and the equal distances.
   b) If $AB = 6.5$ m, find FG. c) If $CD = 3.0$ m, find EH.



3. Given the figure, is $\overline{CF} \cong \overline{EG}$? Answer yes or no.



4. If $AC = 33$ units, find AB and BC.



5. Point G is the midpoint of $\overline{EF}$. Find EG, GF, and EF.

Answers: 1) 23 2a) $\overline{AB} \cong \overline{FG}$, and so $AB = FG$. $\overline{BC} \cong \overline{EF}$, and so $BC = EF$. $\overline{CD} \cong \overline{EH}$, and so $CD = EH$. $\overline{DA} \cong \overline{HG}$, and so $DA = HG$. 2b) 6.5 m 2c) 3.0 m 3) yes; $CF = EG = 20$ 4) $AB = 12$, $BC = 21$ 5) $EG = GF = 23$, $EF = 46$

Mini-Lesson 1.4

Segments and Their Measure

MyMathLab®

Geometry
Multimedia Lesson Resources

eText, Section 1.4 (MML)

Interactive Lecture Video Section 1.4

Interactive Lecture Video Objective 1

Interactive Lecture Video Objective 2

Video Organizer Section 1.4 (print)

Video Organizer Section 1.4 (MML)

PowerPoints, Section 1.4

Teaching Notes:

- Emphasize the distinction between a segment, which is a set of points, and the length of the segment, which is a number (or a number with a unit of measure attached to it).
- Use the concept of *betweenness* and the Segment Addition Postulate to illustrate that some everyday words have more precise meanings when used in geometry.

ERROR PREVENTION

- Students may write incorrect statements such as $\overline{AB} = \overline{CD}$ or $AB \cong CD$. Have them read their statements aloud to find the error. If necessary, remind them that *segments are congruent* if and only if their *lengths are equal*.

Closure Questions:

- Why is it necessary to use absolute value to calculate the distance between two points on a number line from their coordinates?

  If absolute value were not used, the answer might be a negative number. Distance can never be negative. For any two distinct points, the distance between them will always be positive.

- If *A, B,* and *C* are three collinear points such that *AB = BC,* what are two conclusions can you draw?

  1) B is the midpoint of $\overline{AC}$.

  2) $\overline{AB} \cong \overline{BC}$

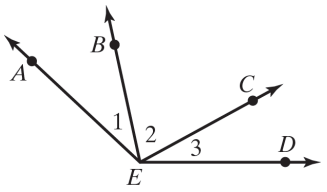
Mini-Lesson 1.5
Angles and Their Measure

Learning Objectives:

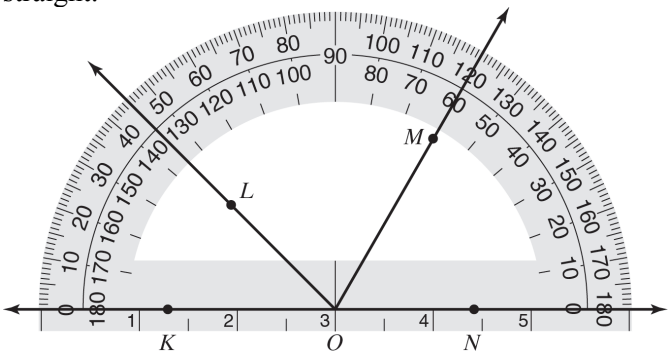
1. Understand the measure of angles.
2. Use algebra and the angle additional postulate to solve applications and find angle measures.
3. Key vocabulary: *angle, sides of an angle, vertex, interior of an angle, exterior of an angle, protractor, degrees, acute angle, right angle, obtuse angle, straight angle, congruent angles*

Key Examples:

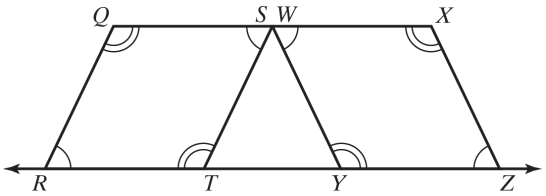
1. a) How many different angles are in the diagram?
   b) Write two other ways to name $\angle 2$.
   c) Write one other way to name $\angle AED$.



2. Find $m\angle KOL$, $m\angle KOM$, and $m\angle KON$. Then classify each angle as acute, right, obtuse, or straight.



3. a) Use the figures below to write the congruent angles and equal angle measures.
   b) If $m\angle Q = 115°$, find $m\angle Y$.
   c) If $m\angle R = 65°$, find $m\angle Z$.



4. A circular pizza is cut into 9 equal-size slices. Find the angle measure of each slice.

Answers: 1a) 6: $\angle 1$, $\angle 2$, $\angle 3$, $\angle AEC$, $\angle BED$, and $\angle AED$ 1b) $\angle BEC$ or $\angle CEB$ 1c) $\angle DEA$ 2) $m\angle KOL = 45°$, acute; $m\angle KOM = 120°$, obtuse; $m\angle KON = 180°$; straight 3a) $\angle R \cong \angle S \cong \angle W \cong \angle Z$, $m\angle R = m\angle S = m\angle W = m\angle Z$; $\angle Q \cong \angle T \cong \angle X \cong \angle Y$, $m\angle Q = m\angle T = m\angle X = m\angle Y$ 3b) 115° 3c) 65° 4) 40° 5) $m\angle WYX = 21°$; $m\angle XYZ = 69°$

Mini-Lesson 1.5

Angles and Their Measure

MyMathLab®

Geometry
Multimedia Lesson Resources

eText, Section 1.5 (MML)

Interactive Lecture Video Section 1.5

Interactive Lecture Video Objective 1

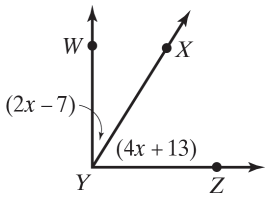
Interactive Lecture Video Objective 2

Video Organizer Section 1.5 (print)

Video Organizer Section 1.5 (MML)

PowerPoints, Section 1.5

5. If $\angle WYZ$ is a right angle, find $m\angle WYX$ and $m\angle XYZ$.



Teaching Notes:

- Emphasize:

  Congruent segments have *equal length.*

  Congruent angles have equal angle measures.

- Some students may need hands-on help in using their protractors correctly.

ERROR PREVENTION

- Warn students of two common errors in naming angles:

  1) A single letter cannot be used if there is more than one angle in the figure with the same vertex.

  2) When three letters are used to name an angle, the vertex must be written in the middle.

Closure Questions:

- Why is it necessary to use absolute value to calculate the measure of an angle from the degree measures read from a protractor?

  If absolute value were not used, the answer might be a negative number. Since an angle is always formed by two different rays, all angle measures are positive.

- How can you classify angles according to their size?

  If an angle measure is between 0° and 90°, the angle is an acute angle.

  If an angle measure is 90°, the angle is a right angle.

  If an angle measure is between 90° and 180°, the angle is an obtuse angle.

  If an angle measure is 180°, the angle is a straight angle.

Mini-Lesson 1.6

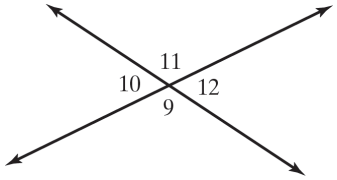
Angle Pairs and Their Relationships

Learning Objectives:

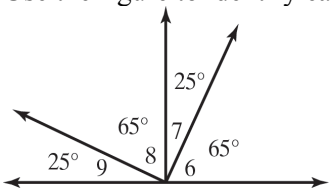
1. Learn special relationships between pairs of angles.
2. Use algebra to find angle measures.
3. Key vocabulary: *adjacent angles, vertical angles, linear pair, complementary angles, complement, supplementary angle, supplement, angle bisector*

Key Examples:

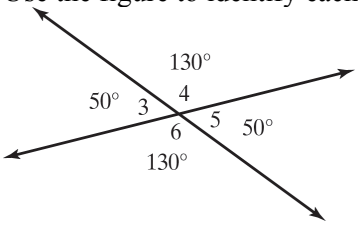
1. Use the figure to answer each statement as true or false.
   a) ∠10 and ∠11 are vertical angles.
   b) ∠10 and ∠12 are vertical angles.
   c) ∠9 and ∠11 are a linear pair.
   d) ∠11 and ∠12 are a linear pair.



2. Use the figure to identify each pair of complimentary angles.

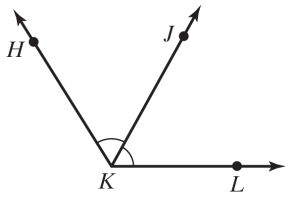


3. Use the figure to identify each pair of supplementary angles.



4. Given that $m\angle G = 57°$:
   a) If $\angle D$ and $\angle G$ are supplementary angles, find $m\angle D$.
   b) If $\angle E$ and $\angle G$ are complimentary angles, find $m\angle E$.

5. Use the figure shown to find the measure of each unknown angle. $m\angle HKL = 122°$.
   a) Find $m\angle HKJ$. b) Find $m\angle JKL$.



Answers: 1a) False 1b) True 1c) False 1d) True 2) ∠6 and ∠7; ∠7 and ∠8; ∠8 and ∠9; ∠6 and ∠9 3) ∠3 and ∠4; ∠4 and ∠5; ∠5 and ∠6; ∠3 and ∠6 4a) 123° 4b) 33° 5a) $m\angle HKJ = 61°$ 5b) $m\angle JKL = 61°$ 6) $x = 10$; $m\angle ADB = m\angle BDC = 60°$ 7) $x = 11$, $y = 8$; $m\angle VXW = m\angle YXZ = 65°$; $m\angle WXZ = m\angle VXY = 115°$

Mini-Lesson 1.6

Angle Pairs and Their Relationships

MyMathLab®

Geometry
Multimedia Lesson Resources

eText, Section 1.6 (MML)

Interactive Lecture Video Section 1.6

Interactive Lecture Video Objective 1

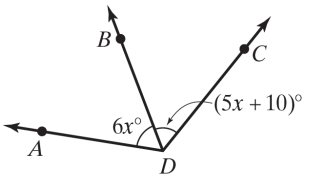
Interactive Lecture Video Objective 2

Video Organizer Section 1.6 (print)

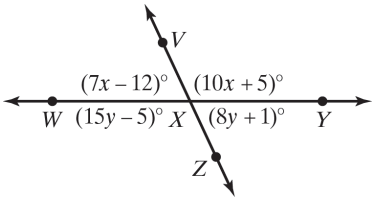
Video Organizer Section 1.6 (MML)

PowerPoints, Section 1.6

6. In the figure, $\overrightarrow{DB}$ bisects $\angle ADC$.
Find the value of x; then find $m\angle ADB$ and $m\angle BDC$.



7. Solve for x and y. Then find the measure of each angle.



Teaching Notes:

- Make sure that students understand that the terms *complementary* and *supplementary* refer only to the relationship between the measures of two angles, not their relative position. In neither case do the angles need to be adjacent.
- Two angles that form a linear pair are always supplementary, but two supplementary angles do not always form a linear pair.

ERROR PREVENTION

- Some students may be confused by the term *vertical angles,* thinking that the two angles must be "vertical" in the sense of one being above the other. Remind them that two pairs of vertical angles are formed whenever two lines intersect; if one angle is to the left of the other, they are *not* called *horizontal angles*.

Closure Questions:

- Can two angles be both supplementary and congruent? If so, what are their measures?

  Yes; The measure of each angle is 90°.

- Can a pair of vertical angles be both complementary and congruent? If so, what are their measures?

  Yes; The measure of each angle is 45°.

Mini-Lesson 1.7

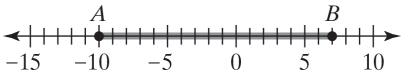
Coordinate Geometry—Midpoint and Distance Formulas

Learning Objectives:

1. Find the midpoint of a segment.
2. Find the distance between two points on the coordinate plane.
3. Key vocabulary: *Midpoint Formula, Distance Formula*

Key Examples:

1. Use the diagram and find the coordinate of the midpoint, M, of $\overline{AB}$.



2. Find the midpoint of the line segment that joins points $P(-4, 3)$ and $Q(9, 14)$.

3. The midpoint of $\overline{XY}$ has coordinates (9, 2). Endpoint X has coordinates (–5, 17). What are the coordinates of Y?

4. Find the distance between $X(-6, -11)$ and $Y(5, 9)$. Give an exact distance and a one-decimal-place approximation.

Answers: 1) –1.5 2) (2.5, 8.5) 3) (23, –13) 4) $\sqrt{521} \approx 22.8$

Mini-Lesson 1.7

Coordinate Geometry—Midpoint and Distance Formulas

MyMathLab®

Geometry
Multimedia Lesson Resources

eText, Section 1.7 (MML)

Interactive Lecture Video Section 1.7

Interactive Lecture Video Objective 1

Interactive Lecture Video Objective 2

Video Organizer Section 1.7 (print)

Video Organizer Section 1.7 (MML)

PowerPoints, Section 1.7

Teaching Notes:

- The midpoint of a segment is a *point,* not a number. For a segment on a number line, the midpoint will have just one coordinate, written as a single number, while for a segment on a coordinate plane, the midpoint will have two coordinates, written as an ordered pair.

ERROR PREVENTION

- When using the Distance Formula, some students may forget that they need to square the differences of the x- and y-coordinates before adding and taking the square root. Use the Pythagorean Theorem to illustrate why squaring the differences is necessary.

Closure Questions:

- How can you state the Midpoint Formula on the coordinate plane in words?

  The x-coordinate of the midpoint of a segment is the average of the x-coordinates of its endpoints. The y-coordinate of the midpoint is the average of the y-coordinates of the endpoints.

- Why don't use need to use absolute value when calculating the distance between two points in the coordinate plane?

  In the Distance Formula, you square the differences between the x-coordinates and the y-coordinates of the two points. If the differences are negative, their squares will positive.

Mini-Lesson 1.8

Constructions—Basic Geometry Constructions

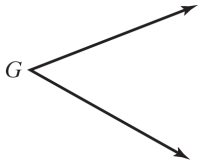
Learning Objectives

1. Make basic constructions using a straight edge and a compass.
2. Key vocabulary: *straight edge, compass, construction, perpendicular lines, perpendicular bisector*

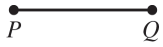
Key Examples:

1. Given $\overline{JK}$, construct $\overline{MN}$ so that $MN = 3JK$.

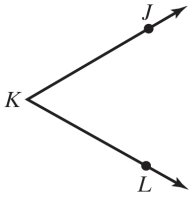
2. Given $\angle G$, construct $\angle L$ so that $\angle L \cong \angle G$.



3. Given $\overline{PQ}$, construct its perpendicular bisector $\overline{GH}$.



4. Construct the bisector $\overline{KM}$ of the given angle $\angle JKL$.



Answers: 1)–4) *See Additional Answers at end of Mini-Lessons.*

Mini-Lesson 1.8

Constructions—Basic Geometry Constructions

MyMathLab®

Geometry
Multimedia Lesson Resources

eText, Section 1.8 (MML)

Interactive Lecture Video Section 1.8

Interactive Lecture Video Objective 1

Video Organizer Section 1.8 (print)

Video Organizer Section 1.8 (MML)

PowerPoints, Section 1.8

Teaching Notes:

- Tell students that later in the course they will be able to use congruent triangles to prove that the constructions introduced in this section work.

ERROR PREVENTION

- In each of the three constructions introduced in this section, one of the steps requires drawing two arcs with the same compass setting. This is essential to creating a correct construction.

Closure Questions:

- What are the two tools allowed for basic geometry constructions? How is each of them used?

  The two tools are a compass and a straight edge (unmarked ruler). The compass is used to draw circles and arcs and to copy distances. The straight edge is used to draw lines through pairs of points.

- Why isn't a regular marked ruler allowed when doing basic constructions?

  The idea of a construction is to copy or create a figure without measuring. Using a regular ruler would allow you to measure lengths.