

# Let's Review: ConstructionsI

How to ...

## Copy a Line Segment

1. Draw a reference point.
2. Put the needle of your compass on one endpoint of the original line segment.
3. Open your compass so that the pencil is on the other endpoint (spanning the width of the line segment).
4. **Without changing the size of the compass**, put the needle on your reference point and make a small arc.
5. Using your straightedge, draw a line from your reference point to a point on your arc.
6. Label the point on your arc.

## Create an Equilateral Triangle

1. Draw a reference point and label it.
2. Put the needle of your compass on one endpoint of the side length.
3. Open your compass so that the pencil is on the other endpoint (spanning the width of the line segment).
4. **Without changing the size of the compass**, put the needle on your reference point and make a small arc.
5. Using your straightedge, draw a line from your reference point to a point on your arc. Label that point.
6. Since this is an equilateral triangle, each side must be the same length.
7. **Without changing the size of the compass**, put the needle on your reference point and now make a large arc.
8. **Without changing the size of the compass**, put the needle on the other endpoint (the one you created in step 5) and make a large arc.
9. Both of your arcs should intersect. Place a point on that intersection and label it.
10. Using your straightedge connect both of your endpoints to the intersection point to form your equilateral triangle.

## Create an Isosceles Triangle

1. Draw a reference point and label it.
2. Put the needle of your compass on the endpoint of the base length.
3. Open your compass so that the pencil is on the other endpoint (spanning the width of the base length).
4. **Without changing the size of the compass**, put the needle on your reference point and make a small arc.
5. Using your straightedge, draw a line from your reference point to a point on your arc.
6. Label the point on your arc.
7. Put the needle of your compass on the endpoint of the leg length.
8. Open your compass so that the pencil is on the other endpoint (spanning the width of the leg length).
9. **Without changing the size of the compass**, put the needle on your reference point and make a large arc.
10. **Without changing the size of the compass**, put the needle on the other endpoint of your base

- and make a large arc. (The two large arcs should intersect)
11. Make a point at the intersection of the two large arcs and label it.
  12. Using your straightedge connect the endpoints of your base to the intersection point of your large arcs.

### Copy an Angle

1. Draw a reference point. Using your straightedge extend a line from your reference point.
2. Put the needle of your compass on the vertex of the original angle.
3. Make an arc that intersects both rays of the original angle.
4. **Without changing the size of the compass**, put the needle on your reference point and make the same arc.
5. Put your needle on one of the intersection points on the original angle.
6. Measure the width of the arc by placing the pencil of your compass on the other intersection point on the original angle.
7. **Without changing the size of the compass**, put the needle on the intersection point on your new angle.
8. Make a small arc with your pencil that intersects the big arc.
9. Draw a line from your reference point that goes through the intersection of your small and big arcs.

### Bisect . . .

#### An Angle:

1. Put the needle of your compass on the vertex of the angle.
2. Draw an arc of any size so that it intersects both rays of the angle.
3. Put the needle of your compass on the point where your arc meets one ray of the angle.
4. Open your compass so that it is **more than half of the width of the angle** and make a large arc.
5. Put the needle of your compass on the other point where your first arc met the other ray of the angle.
6. **Without changing the size of your compass**, make another large arc. (Your two arcs should intersect at two points.)
7. Using your straightedge, draw a line that goes through both intersection points and the vertex. (If your bisector does not go through the vertex, something went wrong. Start over.)

#### A Line Segment:

1. Put the needle of your compass on one endpoint of the line segment.
2. Open your compass **more than half the length of the line segment** and make a large arc.
3. **Without changing the size of your compass**, put the needle of your compass on the other endpoint of the line segment.
4. Draw a large arc (Both arcs should intersect twice).
5. Using your straightedge, draw a line that goes through both intersection points.

### Create Perpendicular Lines

#### Through Points on the Line:

1. Put the needle of your compass on point P.

#### Through Points off the Line:

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<ol style="list-style-type: none"> <li>Open your compass wide enough such that when you draw a large arc, it intersects the line twice.</li> <li>Put the needle of your compass on one of the intersection points.</li> <li>Open the compass so it is <b>more than half the distance between the intersection points</b> and make a large arc.</li> <li><b>Without changing the size of the compass</b>, put the needle of your compass on the other intersection point and draw a large arc. (Your two arcs should intersect twice).</li> <li>Using your straightedge, draw a line that goes through the two intersection points of your arcs (The line should go through point P. If it doesn't, start over.)</li> </ol>	<ol style="list-style-type: none"> <li>Open your compass wide enough such that when you draw a large arc, it intersects the line twice.</li> <li>Put the needle of your compass on one of the intersection points.</li> <li>Open the compass so it is <b>more than half the distance between the intersection points</b> and make a large arc.</li> <li><b>Without changing the size of the compass</b>, put the needle of your compass on the other intersection point and draw a large arc. (Your two arcs should intersect twice).</li> <li>Using your straightedge, draw a line that goes through the two intersection points of your arcs (The line should go through point P. If it doesn't, start over.)</li> </ol>
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### Construct Parallel Lines

<ol style="list-style-type: none"> <li>Draw a transversal line that goes through point P and intersects the first line segment.</li> <li>Put the needle of your compass on the intersection of the transversal and the line segment and draw a small arc.</li> <li><b>Without changing the size of your compass</b>, put the needle of your compass on point P and draw that same small arc.</li> <li>Put the needle of your compass on the intersection between the transversal and the first arc, then open your compass so it measures the width of the angle.</li> <li><b>Without changing the size of your compass</b>, put the needle of your compass on point P and make a small arc (this small arc should intersect the other arc made in step 3)</li> <li>Using your straightedge, draw a line through point P and the intersection point so that it is parallel to the original line segment.</li> </ol>
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### Construct Points of Concurrency

**All of my children are bringing in peanut butter cookies!**

All of : Altitudes - orthocenter  
 My children: Medians - centroid  
 Are bringing in: Angle bisectors - incenter  
 Peanut butter cookies: perpendicular bisectors - circumcenter

<b>Incenter</b> <ol style="list-style-type: none"> <li>Construct 3 angle bisectors</li> </ol>	<b>Circumcenter</b> <ol style="list-style-type: none"> <li>Construct 3 perpendicular bisectors</li> </ol>
<b>Centroid</b> <ol style="list-style-type: none"> <li>Construct the 3 perpendicular bisectors to find the midpoint of each side</li> <li>Connect the midpoints to their opposite vertex. (These are called medians)</li> </ol>	<b>Orthocenter</b> <ol style="list-style-type: none"> <li>Construct 3 altitudes (perpendicular lines) to each side of the triangle.</li> </ol>