

# Compass and Straightedge Constructions

## JV Practice

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### 1 Warm-Up Problems

Throughout this section, you are allowed to use only compass and straight edge for the constructions. Further, when I say that an angle or length of a segment is given, it means that a “drawing” of that angle or segment is given, and then you can copy that angle or segment anywhere using a straight edge or compass (You can copy any length using compass, and problem 3 asks you to figure out how to copy angles).

1. Construct a regular hexagon using straight edge and compass.
2. Given a circle, find its center using straight edge and compass.
3. Given an angle  $\angle ABC$ , give a straight edge and compass construction to copy this angle.
4. Given an angle  $\angle A \leq 90^\circ$  and a segment  $BC$ , construct the circle that passes through  $B, C$  such that the minor arc  $BC$  of this circle has measure twice that of  $\angle A$ . What if  $\angle A > 90^\circ$ ?
5. Construct triangle  $\triangle ABC$  given length of height of triangle from  $A$  to  $BC$ , length of segment  $BC$  and angle  $\angle A$ .

### 2 Problems

1. Given a line  $\ell$  and a point  $A$  outside it, construct two lines which are parallel and perpendicular respectively to  $\ell$  and pass through  $A$ .
2. Given triangle  $\triangle ABC$  construct its incircle.
3. Construct triangle  $\triangle ABC$  given  $\angle B$ ,  $\angle C$  and its perimeter.
4. Construct triangle  $\triangle ABC$  given length of all three of its medians.
5. Construct triangle  $\triangle ABC$  given length of the altitude from  $A$ , the median from  $A$  and the length of side  $BC$ .
6. Given a circle and a point on it, construct the tangent to the circle at that point.
7. Given a circle and a point outside it, construct both the tangents to the circle passing through the point.
8. Given a line  $\ell$ , a point  $A$  on  $\ell$  and a point  $B$  outside, construct the circle tangent to  $\ell$  at  $A$ , passing through  $B$ .
9. Given a line  $\ell$ , a point  $A$  outside line  $\ell$ , construct a circle of radius  $r$  passing through point  $A$ , tangent to line  $\ell$ .

### 3 Challenge Problems

1. Construct triangle  $\triangle ABC$  given altitudes from  $B, C$  and median from  $A$ .
2. Construct triangle  $\triangle ABC$  given its inradius, its circumradius and  $\angle A$