During the exam, you will be provided with a copy of this cheat sheet. In your exam solutions, you may use any of the following theorems without proof:

- It is possible to use a compass and straightedge to:
  - find the midpoint of a segment
  - construct the perpendicular bisector of a segment
  - construct a right angle with a given point as its vertex
  - construct the angle bisector of a given angle
  - construct a tangent line to a circle at a given point

Note: You do not need to know the details of these constructions for our exam.

- Vertical angles are congruent.

- Congruence conditions for triangles:
  - SAS
  - ASA
  - SSS

Note: SSA does NOT guarantee congruence except in the case of a right triangle!

- If two parallel lines are cut by a transversal, then:
  - alternate interior angles are congruent
  - alternate exterior angles are congruent
  - corresponding angles are congruent

- Triangle inequality: The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

- Pythagorean theorem: Suppose a triangle has leg lengths $a$, $b$, $c$. Then the triangle is a right triangle with the right angle opposite the leg of length $c$ if and only if $a^2 + b^2 = c^2$.

- The perpendicular bisector to a segment is the set of points which are equidistant from the endpoints of the segment.

- If $D$ is any point in the interior of $\triangle ABC$, then $AD + DC < AB + BC$.

- In $\triangle EPF$, if $K$ is a point on the line segment $\overline{EF}$, then $\overrightarrow{PK}$ is the angle bisector of $\angle EPF$ if and only if $\frac{EK}{EP} = \frac{FK}{FP}$.

- Suppose an ellipse has foci $F_1 = (-c,0)$ and $F_2 = (c,0)$, where $c > 0$ and equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, where $b^2 = a^2 - c^2$. Then if $P = (x_0, y_0)$ is any point on the ellipse, $PF_1 = a + \frac{cx_0}{a}$ and $PF_2 = a - \frac{cx_0}{a}$.

- Sum and difference formulas for tangents of angles:
  $$\tan(\alpha + \beta) = \frac{\tan(\alpha) + \tan(\beta)}{1 - \tan(\alpha)\tan(\beta)}$$
  $$\tan(\alpha - \beta) = \frac{\tan(\alpha) - \tan(\beta)}{1 + \tan(\alpha)\tan(\beta)}$$