

# GEOMETRIC CONSTRUCTION

## OVERVIEW

All work done in the drafting room involves the principles of geometric construction. Every person engaged in technical work must be familiar with solutions to common problems in this area.

Geometric construction involves accurate construction of circles, arcs, triangles, quadrilaterals, pentagons, hexagons, and octagons. It requires an understanding of the meanings of the following relationships: parallel, perpendicular, intersecting, bisecting, inscribed, circumscribed, and tangent.

Accuracy is important in drawing geometric shapes. Any carelessness in laying out a problem could result in costly errors in the final solution. Make sure you have a sharp 2H or 4H lead in your lead holder and compass lead. All construction lines must be made sharp and very light. Check all dimensions three times for accuracy.

## BASIC GEOMETRIC TERMS

<b>POINT</b>	represents a location in space or on a drawing.
<b>LINE</b>	shortest connection between two known points. The included angle is 180 degrees.
<b>ANGLES</b>	are formed by two intersecting lines. Examples include: Right, Acute, Obtuse, Complementary, and Supplementary.
<b>BISECT</b>	to divide a line or angle into 2 equal parts.
<b>PARALLEL</b>	two or more lines in the same plane which will never intersect.
<b>PERPENDICULAR</b>	two intersecting lines forming a 90 degree angle. Other common names used to describe this condition are: right-angle, perp, square, or 90 degrees.

# GEOMETRIC CONSTRUCTION

- TRIANGLES** figures bounded by three straight sides. The sum of the interior angles is always 180 degrees. Examples include: Equilateral, Isosceles, Scalene, and Right.
- QUADRILATERALS** figures bounded by four straight sides. The sum of the interior angles is always 360 degrees. Examples include: Square, Parallelogram, Rectangle, Rhombus, Rhomboid, Trapezoid, and Trapezium.
- POLYGONS** any plane figure bounded by straight sides. Regular polygons have equal sides and angles. Examples include: Triangle, Square, Pentagon, Hexagon, Heptagon, and Octagon.
- INSCRIBED** any plane figure constructed within a circle. Intersection points touch the base circle.
- CIRCUMSCRIBED** any plane figure constructed on the circumference of a circle. All straight lines are tangent to the base circle.
- CIRCLE** a **closed** curve all points of which are the same distance from the center. Always dimensioned as a **diameter**. Circles have 360 degrees.
- ARC** an **open** curve all points of which are the same distance from the center. Always dimensioned as a **radius**.

# GEOMETRIC CONSTRUCTION

## **DUTY**

Basic Procedure

## **TASK**

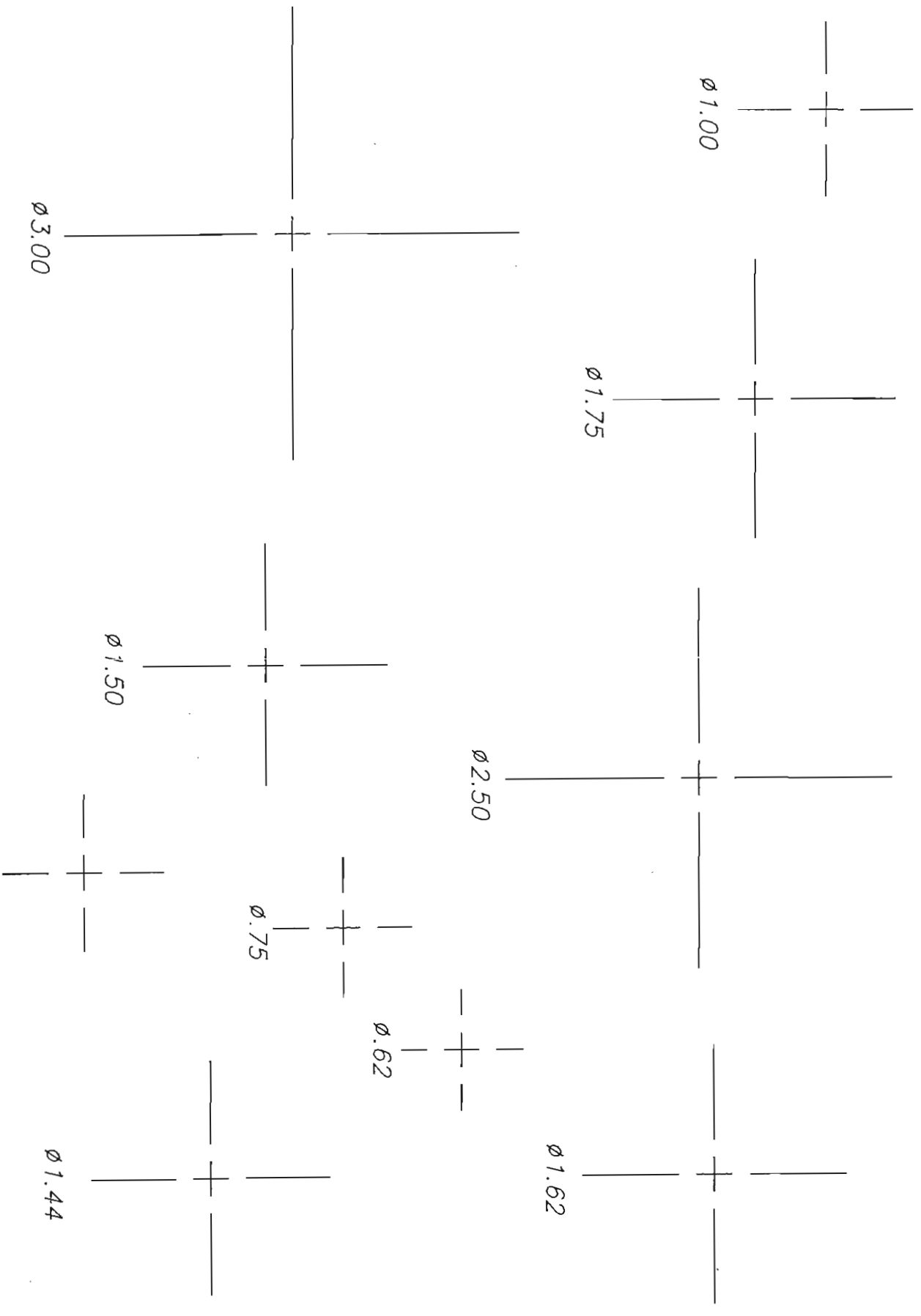
Geometric Construction

## **EXPECTED STUDENT PERFORMANCE**

Upon passing the geometric terms test with a score of 100%, completion of the student work sheets, and given necessary drawing instruments, the students will be able to complete the exit test on geometric construction with a passing score of 85%.

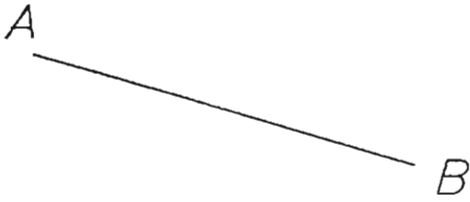
## **LEARNING ACTIVITIES**

- 1) Read overview.
- 3) 100% Test of Geometric Terms.
- 4) Take notes during lectures.
- 5) Complete worksheet HOSO.
- 6) Complete worksheet CIRCLES.
- 7) Complete problems 1-6.
- 8) Complete problems 7-12.
- 9) Complete problems 13-18.
- 10) Complete worksheet Tangent Arcs.
- 11) Measure Angles.
- 12) Exit Test.

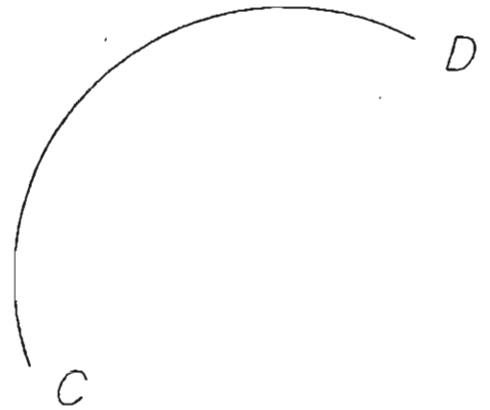


CONSTRUCT A CIRCLE TO THE SPECIFIC SIZE NOTED AT THE BOTTOM OF EACH CENTERLINE

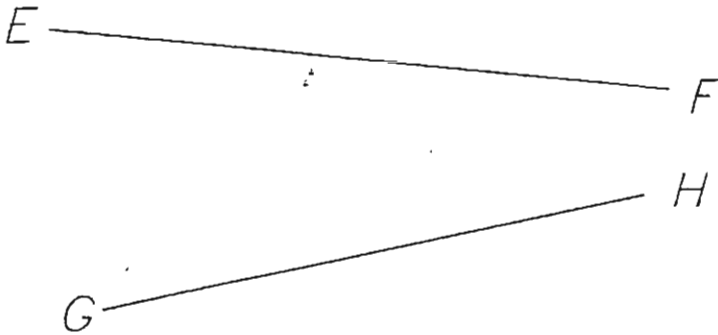
1) BISECT LINE AB (USE COMPASS)



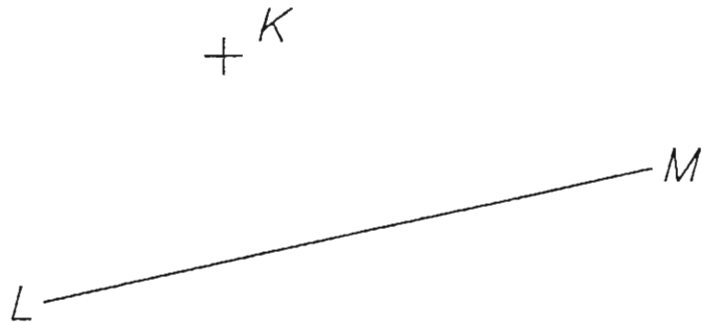
2) BISECT ARC CD (USE COMPASS)



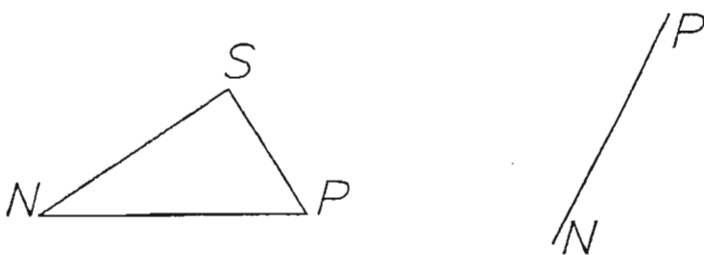
3) DIVIDE LINE EF INTO 3 EQUAL PARTS AND LINE GH INTO 4 EQUAL PARTS



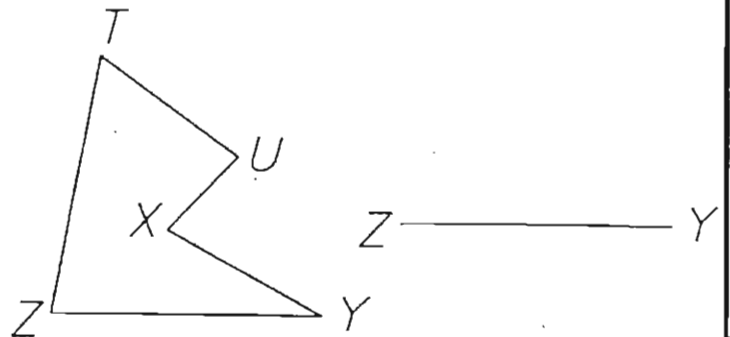
4) DROP A PERPENDICULAR LINE FROM POINT K TO LINE LM



5) TRANSFER POINT S WITH THE COMPASS FROM POINTS N & P TO TRANSFER TRIANGLE NSP



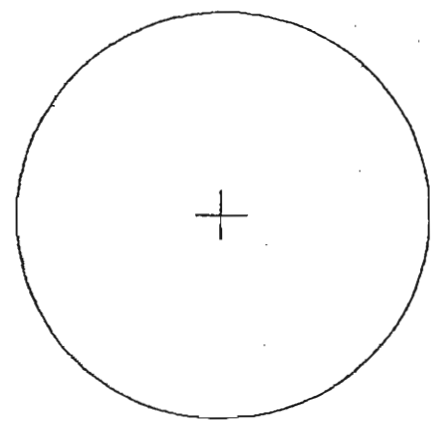
6) TRANSFER POINTS TUX WITH A COMPASS TO COPY THE FIGURE TUXYZ



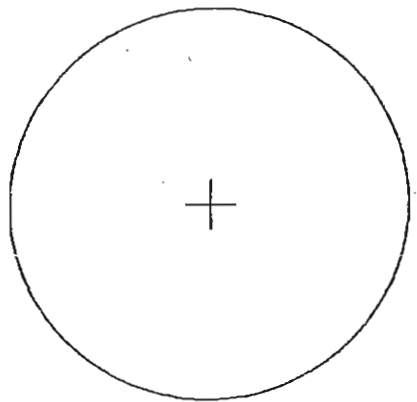
7) CONSTRUCT AN EQUILATERAL TRIANGLE WITH AB AS THE BASE



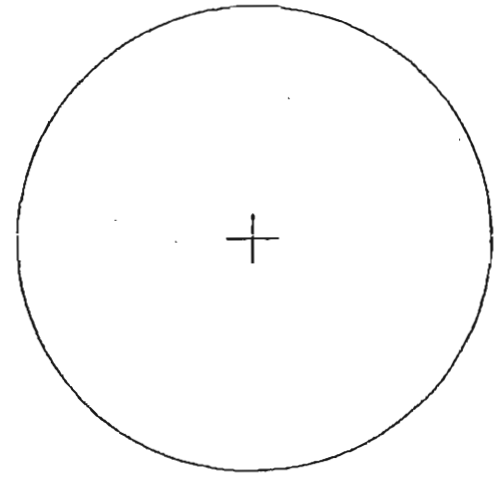
8A) INSCRIBE A SQUARE  
8B) CIRCUMSCRIBE A SQUARE



9) INSCRIBE A REGULAR HEXAGON



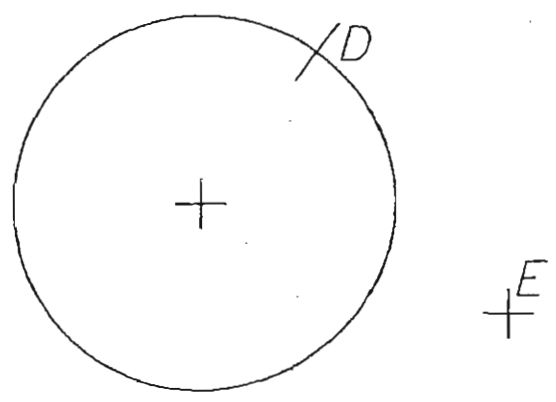
10) CIRCUMSCRIBE A REGULAR HEXAGON (USE TRIANGLES)



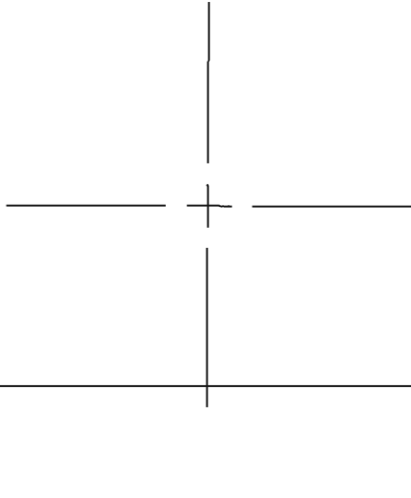
11) DRAW A REGULAR HEXAGON  
50 mm ACROSS THE FLATS



12) DRAW A LINE TANGENT TO THE CIRCLE AT POINT D AND ANOTHER LINE TANGENT TO THE LOWER HALF OF THE CIRCLE FROM POINT E







DRAW A  $\varnothing 2.00$  CIRCLE ON THE CENTER  
DRAW 2 R.50 ARCS TANGENT TO BOTH THE CIRCLE AND THE STRAIGHT LINE



DRAW A  $\varnothing 2.00$  CIRCLE AT EACH CENTER  
DRAW A R1.00 TANGENT ARC TO THE CIRCLES



NAME \_\_\_\_\_

DATE \_\_\_\_\_

LINCOLN HIGH SCHOOL

ANGLES

