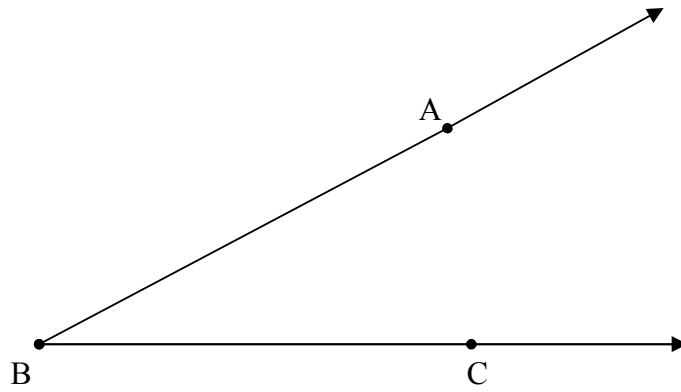## Geometry Constructions
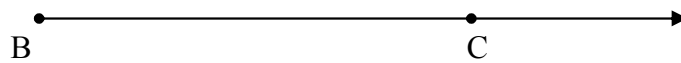
1. Bisect angle ABC.
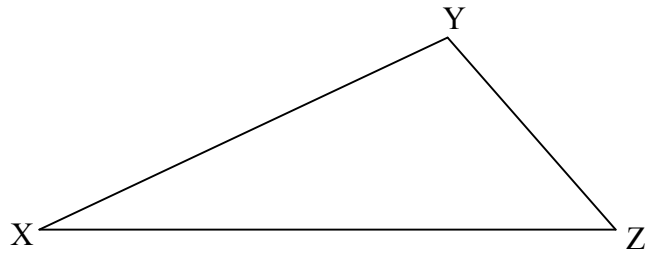
A

B   C

2. Copy angle ABC.

B   C

3. Double angle ABC.

B   C
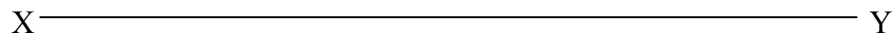
4. Copy triangle XYZ.

Y

X

Z

5. Construct:
    a. the perpendicular bisector of $\overline{XY}$.
    b. divide $\overline{XY}$ into 4 congruent segments.

X ——————————————————— Y

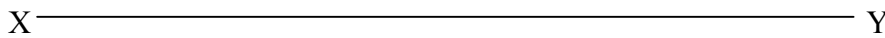6. Construct a line perpendicular to L through P.

•P

L ←————————————————————→

7. Construct a line perpendicular to m through Q.

Q
●
m
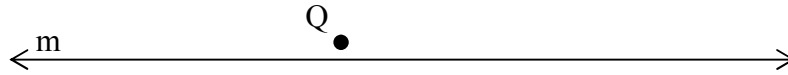
8. Construct a line parallel to L through P.

P
●

L
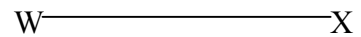
9. Trisect segment $\overline{XY}$.

X——————————————Y

10. Construct an equilateral triangle with sides length MN.

M————————N
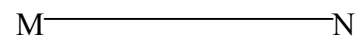
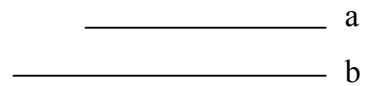11. Construct angles with measures 60, 30, 15, and 75 degrees.

12. Construct angles with measures 90, 45, 22.5, and 135 degrees.
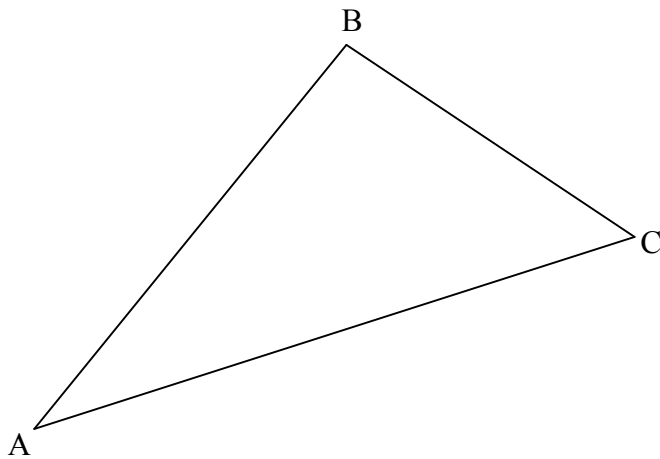
13. Construct a regular hexagon with side length WX.

W⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯X

14. Construct a regular octagon.

15. Construct a rhombus with diagonals of length a and b.

—————————— a

—————————— b

16. Construct the circumcenter of triangle ABC and then draw the circumscribing circle. (Circumcenter is the intersect of the three perpendicular bisectors of the sides of the triangle.)
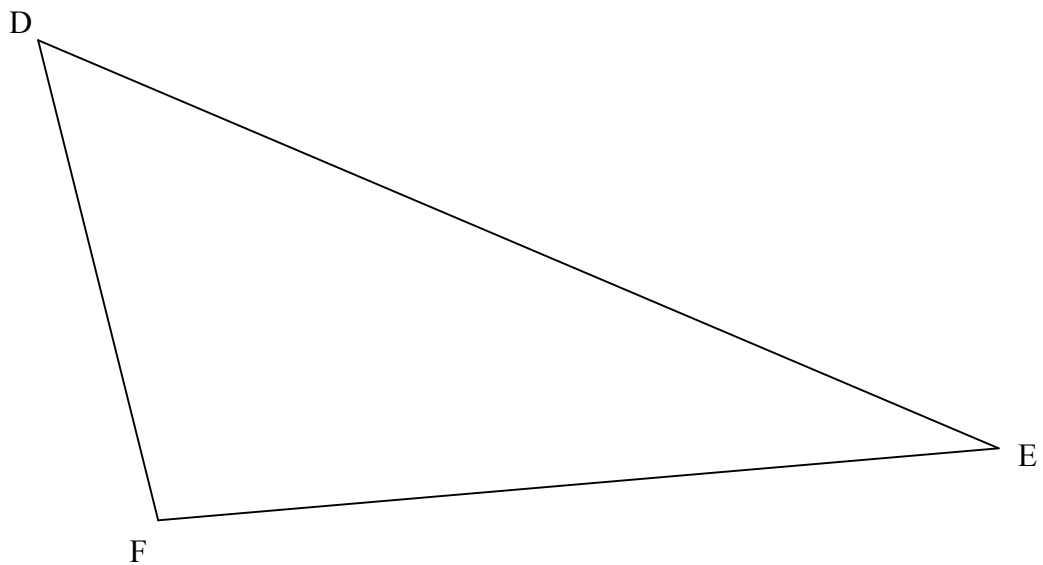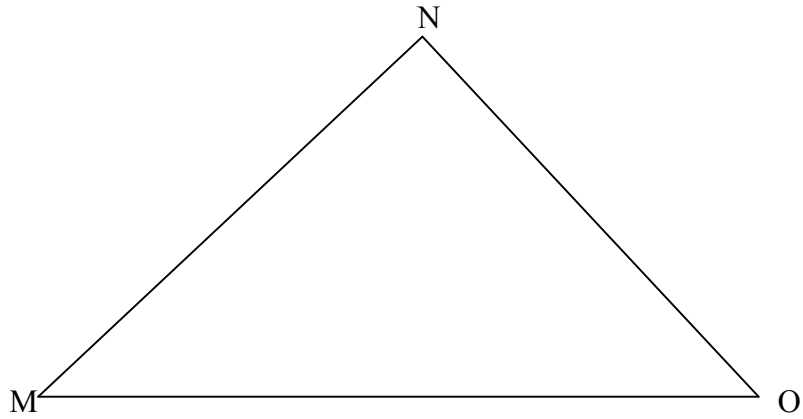
B

C

A

17. Construct the incenter of triangle of XYZ and draw the inscribed circle. (Incenter is the intersection of three angle bisectors.)
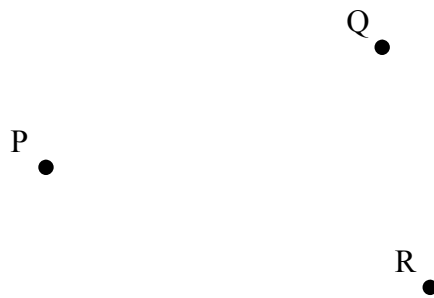
X

Z

Y
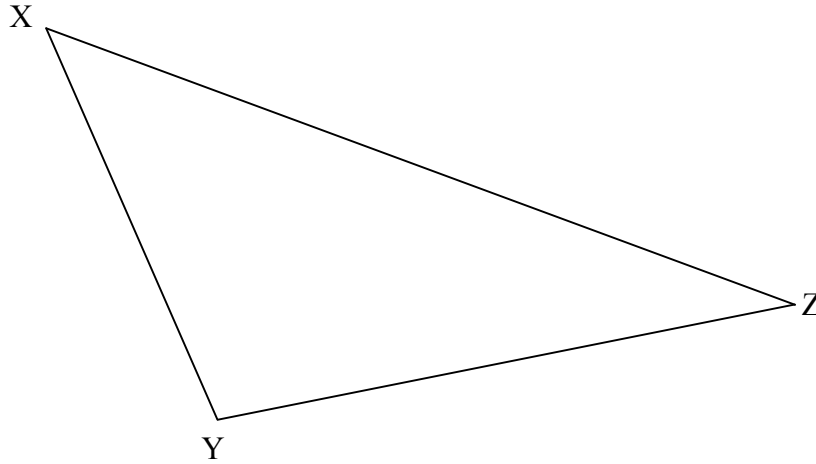
18. Construct the centroid of triangle of PRQ. (The centroid is the intersection of the three medians.)
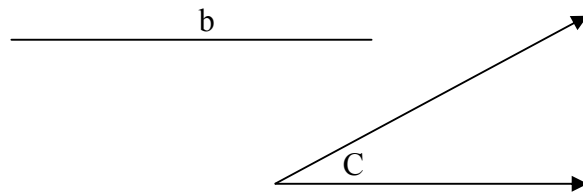
P

Q

R
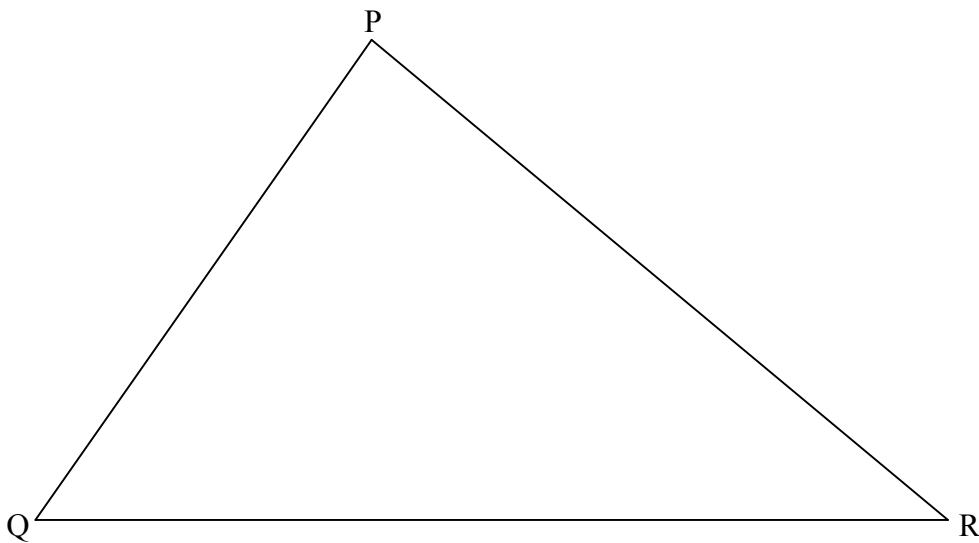
19. Construct the orthocenters for triangle MNO and triangle DEF. (Orthocenter is the intersection of altitudes.)

20. Construct the circle that passes through points P, Q, and R

Q
●

P
●
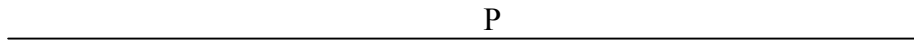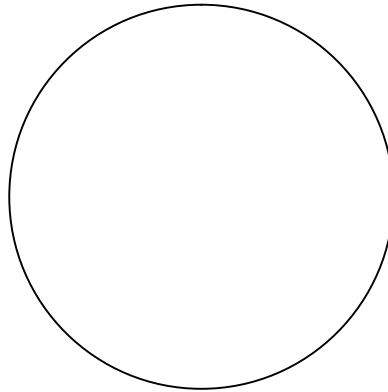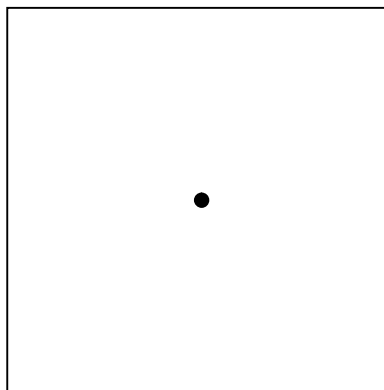
R
●

21. Construct a rhombus with side length b and angle C.

b

C

22. Construct a square with perimeter P.
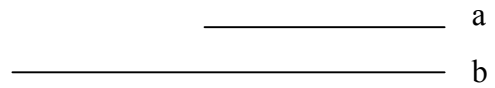
_____ P _____

23. Construct a circumscribing square for the given circle.

24. Construct a circumscribing circle for the given square.

25. Given the lengths a and b, construct the following and label it.

_____ a

_____ b

     a. $\dfrac{a+b}{2}$

     b. $\sqrt{a^2 + b^2}$

     c. $\sqrt{b^2 - a^2}$

     d. $3a - b$

     e. $a\sqrt{2}$

     f. $a\sqrt{3}$

Bonus Constructions:

————————— a

————————————— b
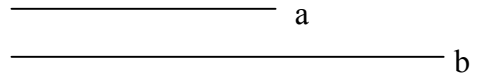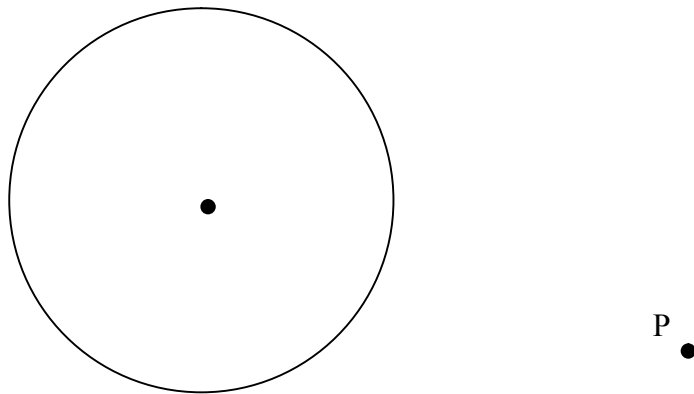
1. $a\sqrt{6}$

2. $\sqrt{ab}$

3. Construct a tangent to the circle that passes through P.

P

4. Draw a scalene triangle. Construct the incenter, the circumcenter, orthocenter, and centroid. Three of these points are collinear. Which one is not? What is Euler's line?

5. Construct the nine-point circle described below.
    *   Draw a large scalene triangle.
    *   Construct the orthocenter H.
    *   Construct midpoints of the three sides and call them L, M, and N.
    *   Label the points where the altitudes intersect the sides of triangle ABC, and call these R, S, and T.
    *   Construct the midpoints of AH, BH, and CH, and call them X, Y, and Z.
    *   Then L, M, N, R, S, T, X, Y, and Z are all on the same circle!