Foundation GCSE: Constructions

Name: _____ Class: _____

Instructions: Answer all questions. Questions are ordered from easiest (1) to hardest (20). Use a ruler and a pair of compasses. All construction arcs must be left visible.

1. Construct the perpendicular bisector of a line segment of length 8 cm using a pair of compasses and a ruler.

2. Construct an angle of 60° using a ruler and a pair of compasses.

3. Construct a 90° angle at the endpoint of a 6 cm line segment using a pair of compasses and a ruler.

4. Construct the angle bisector of a 60° angle to create a 30° angle using a pair of compasses.

5. Construct a 45° angle by first constructing a 90° angle and then bisecting it using a pair of compasses.

6. Construct a perpendicular line from a point P to a given straight line AB, where P is a point located above the line.

7. Construct a line parallel to a given line segment at a perpendicular distance of 4 cm using a pair of compasses and a ruler.

8. Construct a rhombus with side length 6 cm and an interior angle of 60° using a ruler and a pair of compasses.

9. Draw a line segment $AB = 10$ cm. Use a perpendicular bisector to divide it into two equal parts, and verify the midpoint.

10. Construct an equilateral triangle with side lengths of 7 cm, and construct the perpendicular bisectors of all three sides.

11. Construct an angle of 120° using a pair of compasses and a ruler by extending a standard 60° construction.

12. Construct a rhombus with side lengths of 5 cm and a major diagonal of length 8 cm using a ruler and a pair of compasses.

13. Draw a straight line L and mark a point P directly on line L. Construct a perpendicular line to L passing through P using only a pair of compasses.

14. Construct a 15° angle by starting with a 60° angle and successively bisecting it twice.

15. Construct a parallelogram with side lengths 7 cm and 5 cm and an included angle of 60° using a ruler and compasses.

16. Construct triangle XYZ with $XY = 8$ cm, and construct the perpendicular bisectors of sides XY and YZ to find their intersection point.

17. Construct a kite with side lengths 5 cm and 8 cm and a main diagonal of 10 cm using a ruler and a pair of compasses.

18. Construct an angle of 135° by combining a 90° angle and a 45° angle using a ruler and compasses.

19. Construct a regular hexagon inscribed perfectly inside a circle of radius 5 cm using a pair of compasses.

20. Construct a line segment $AB = 9$ cm, construct its perpendicular bisector, and then construct an angle bisector of one of the resulting 90° angles to create a 45° construction line relative to AB.

Answers & Worked Solutions

1. Set compasses to greater than half the length, draw intersecting arcs above and below the line from both endpoints, and join the intersection points.

2. Draw base line, set compasses to the line length, swing arcs from both ends to intersect above, and connect vertices.

3. Place compass point on endpoint, swing an arc across the line, use intersection points to construct a perpendicular at 90°.

4. Construct a 60° angle, place compass point at the vertex to draw an arc across both arms, then draw intersecting arcs from those points to bisect it.

5. Construct a 90° angle first, then use compasses to bisect the right angle into two equal 45° angles.

6. Place compass point on P, draw an arc crossing the line at two points, then draw intersecting arcs below the line from those points to drop the perpendicular.

7. Measure two points along the line at distance 4 cm using compasses set to 4 cm, draw arcs from those points, and draw a tangent line across them.

8. Draw a base of 6 cm, construct a 60° angle at one end, measure 6 cm along the arms, and complete the rhombus using compasses.

9. Draw $AB = 10$ cm, construct perpendicular bisector; the intersection point M divides the segment into two equal 5 cm lengths.

10. Construct an equilateral triangle of side 7 cm; construct perpendicular bisectors for all sides, which intersect at a single point (the circumcenter).

11. Construct a 60° angle, extend the base line through the vertex, and construct another 60° adjacent to it, totaling 120°.

12. Draw diagonal of 8 cm, use compasses set to 5 cm to swing arcs from both ends of the diagonal above and below to form the rhombus vertices.

13. Place compass point on P, swing two arcs cutting the line equidistant from P, extend arcs from those two points to find the perpendicular line through P.

14. Construct a 60° angle, bisect once to get 30°, and bisect that result to get 15°.

15. Draw base 7 cm, construct 60° angle, measure 5 cm along the arm, and use compasses with radii 7 cm and 5 cm to complete the parallelogram.

16. Draw $XY = 8$ cm, construct its perpendicular bisector, construct another side YZ, and find the circumcenter using perpendicular bisectors.

17. Draw main diagonal 10 cm, use compasses set to 5 cm and 8 cm from the ends to locate the two side vertices of the kite.

18. Construct a straight line with a 90° perpendicular at one end, and add a 45° sector by bisecting an adjacent right angle ($90 + 45 = 135°$).

19. Draw a circle of radius 5 cm, step out chords of length 5 cm continuously around the circumference to form 6 vertices, and connect them.

20. Draw $AB = 9$ cm, construct its perpendicular bisector to get a 90° intersection, then bisect that 90° angle to get a 45° construction line.