DELHI PUBLIC SCHOOL
SAIL TOWNSHIP, RANCHI
HALF YEARLY EXAMINATION (2017-18)

Class:- IX   **Subject:- Mathematics**
Time- 3 Hrs.   **Maximum Marks:- 80**

**General Instructions**

1. All questions are compulsory.
2. The paper is divided into 4 sections.
   - Section A : consists of 4 question of 1 marks each.
   - Section B : consists of 6 question of 2 marks each.
   - Section C : consists of 8 question of 3 marks each.
   - Section D : consists of 10 question of 4 marks each.
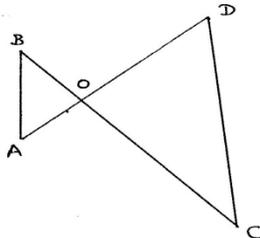
Section A

1. Express $0.12\overline{3}$ in the form *p/q*.
2. Mention the type of numbers   (i) $\frac{22}{7}$ (ii) π
3. Supply an alternate statement of Euclid's fifth postulate.
4. Two complementary angles are in the ratio 2 : 3. Find the angles.

Section B

5. If $(x+1)^3 = 27,$ find the value of $(2x-1)^3$.
6. Find the value of k, if $(x-1)$ is a factor of $4x^3 + 3x^2 - 4x + k$.
7. Prove that two distinct lines can not have more than one common point.
8. In the given figure AB || ED. Prove that $y = x - z$.
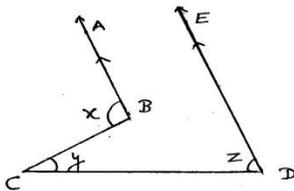
9. In the given figure $\angle B < \angle A$ and $\angle C < \angle D$. Show that AD < BC

10. Mention the quadrant or axis where these points lie (i) (-4, 5), (ii) (3, -2), (iii) (2, 0), (iv) (-5, -7) .

Section C

11. Represent $\sqrt{11}$ on the real number line.

                    Or

    Represent $\sqrt{6.4}$ on the real number line.

12. Factorize $4x^2 - 12xy + 9y^2 - 9$.

                    Or

    Evaluate $48^3 - 30^3 - 18^3$ using a suitable identity.

13. State first three of Euclid's five postulates.

14. If a transversal intersects two lines such that the bisectors of a pair of corresponding angles are parallel, then prove that the two lines are parallel.

15. Prove that the sum of two sides of a triangle is greater than the third side.

16. Plot the following points in a graph paper : A(1, 3), B(1, -1), C(7, -1). Locate D so as to complete the rectangle ABCD. Also find the area of ABCD.

17. A cylindrical pillar is 50 cm in diameter and 3.5 m in height. Find the cost of painting the curved surface area of the pillar at the rate of Rs 12.75 per m². (Use $\pi = \dfrac{22}{7}$)

18. The radius and height of a right circular cone are in the ratio 4 : 3. The area of the base is 154 cm². Find the area of the curved surface of the cone.

Section D

19. Evaluate $\dfrac{15}{\sqrt{10} + \sqrt{20} + \sqrt{40} - \sqrt{5} - \sqrt{80}}$, it being given that $\sqrt{5} = 2.236$ and $\sqrt{10} = 3.162$.

20. Factorize $x^3 - 23x^2 + 142x - 120$ using factor theorem.

21. If $x^3 + ax^2 + bx + 6$ has $x - 2$ as a factor and leaves a remainder 3 when divided by $(x - 3)$, then find the value of a and b.
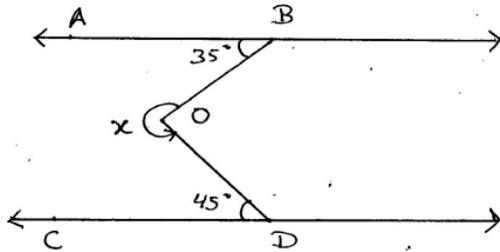
22. In the figure given below:
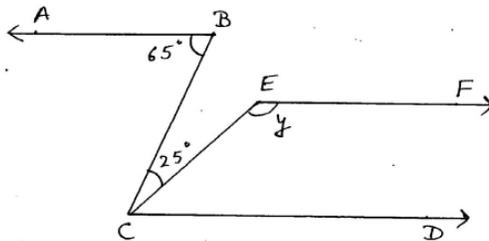   (a) AB = BC, M is the mid point of AB and N is the mid point of BC. Show that AM = NC.
    (b) BM = BN, M is the mid point of AB and N is the mid point of BC. Show that AB = BC. State relevant axioms where ever used in both (a) and (b).
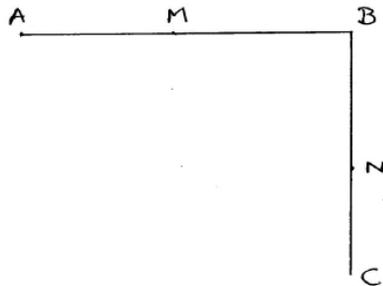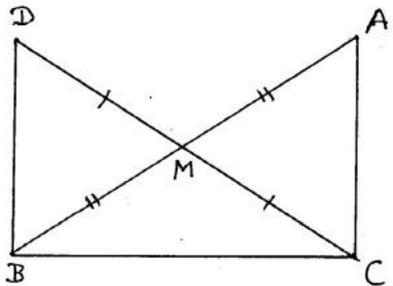
23. (a) Determine x, if AB ||CD.

(b) In the given figure, what value of y will make EF || CD if AB || CD?

24. In right triangle ABC, right angled at C, M is the mid point of hypotenuse AB. C is joined to M and produced to a point D such that DM = CM. Point D is joined to point B.


show that :

(a) Δ AMC $\cong$ Δ BMD

(b) $\angle$ DBC is a right angle

(c) Δ DBC $\cong$ Δ ACB

(d) CM = $\dfrac{1}{2}$ AB.

25. In a Δ ABC, the sides AB, AC are equal and the base BC is produced to any point D. From D, DE is drawn perpendicular to BA produced and DF perpendicular to AC produced. Prove that BD bisects $\angle$ EDF.

AB is a line segment, P and Q are points on opposite sides of AB such that each of them is equidistant from the points A and B. Show that the line PQ is the perpendicular bisector of AB.
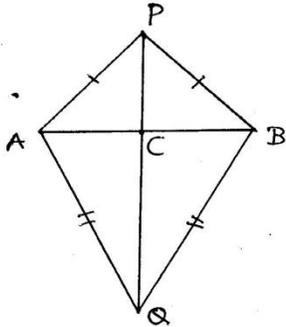
26. The perpendicular distance of a point from the x axis is 2 units and the perpendicular distance from the y axis is 3 units. Write the various possible coordinates of the point along with the quadrants in which these points lie.

27. The diameter of the moon is approximately one-fourth of the diameter of the earth.
    (a) What fraction of the volume of the earth is the volume of the moon?
    (b) What fraction of the surface area of the earth is the surface area of the moon?

28. Water flows out through a circular pipe whose internal diameter is 2 cm at the rate of 6 m/s into a cylindrical tank, the radius of whose base is 60 cm. Find the rise is the level of water in 30 min.

Or

Shanti Sweets Stall was placing an order for making cardboard boxes for packing their sweets. Two sizes of boxes are required. The bigger of dimensions 25 cm $\times$ 20 cm $\times$ 5 cm and the smaller of dimensions 15 cm $\times$ 12 cm $\times$ 5 cm. For all the overlaps 10% of the total surface area is required extra. If the cost of the cardboard is 50 paise per m^2, find the cost of cardboard required for supplying 250 boxes of each kind.