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## Half Yearly Examination – (2019-20)

Class: - IX  
Subject: - MATHS

F.M.: - 80  
Duration: - 3 hr

### General Instructions:

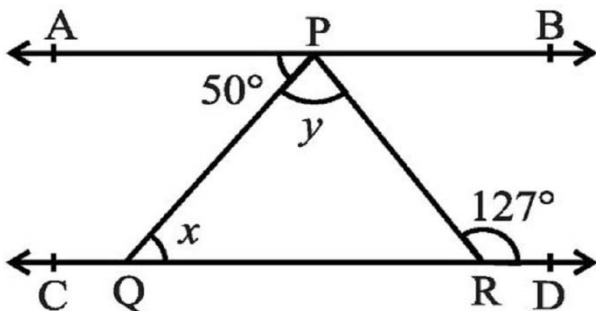
- (i). All questions are compulsory.
- (ii). This question paper contains 30 questions divided into four Sections A, B, C and D.
- (iii). Section A comprises of 6 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 10 questions of 3 marks each and Section D comprises of 8 questions of 4 marks each.
- (iv). Use of Calculators is not permitted

### SECTION – A

1. State “PLAYFAIR” axiom.
2. Rationalize the denominator of :-  $\frac{3 - \sqrt{2}}{3 + \sqrt{2}}$
3. Find the value of  $k$ , if  $x = 2$ ,  $y = 1$  is a solution of the equation  $2x + 3y = k$ .
4. One of the angles of a triangle is  $50^\circ$  and the other two angles are equal. Find the measure of each of the equal angles.
5. If  $x + 6$  is a factor of  $p(x) = x^3 + 3x^2 + 4x + k$ , find the value of  $k$ .
6. Write the coordinates of the point lying on x-axis and with x-coordinate 4.

### SECTION – B

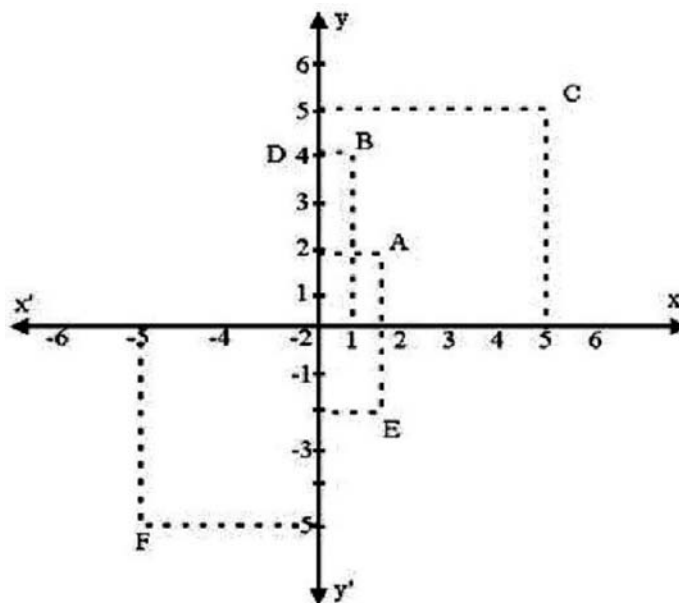
7. Show that  $1.272727\dots$  can be expressed in the form of  $\frac{p}{q}$  where  $p$  and  $q$  are integers and  $q \neq 0$ .
8. In the below figure, if  $AB \parallel CD$ ,  $\angle APQ = 50^\circ$  and  $\angle PRD = 127^\circ$ , find  $x$  and  $y$ .



9. The angles of triangle are in the ratio 3 : 5 : 2. Find all the angles of the triangle.
10. If a and b are rational numbers and  $\frac{7 - 4\sqrt{3}}{7 + 4\sqrt{3}} = a + b\sqrt{3}$ , find the value of a and b.
11. Find the value of  $5^{x-3} \times 3^{2x-8} = 225$ .
12.  $\triangle ABC$  is right angled in which  $\angle A = 90^\circ$  and  $AB = AC$ . Find  $\angle B$  and  $\angle C$ .

### SECTION – C

13. From the figure, find the coordinates of A, B, C, D, E and F. Which of the points are mirror images in (i) x – axis (ii) y – axis



14. If  $x = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$ , find  $x^2 + \frac{1}{x^2}$ .

□

15. If  $\frac{9^m \times 3^2 \times (3^{-n/2})^2 - (27)^n}{3^{3m} \times 2^3} = \frac{1}{27}$ , prove that  $m - n = 1$ .

16. Factorise :-  $(2a + 3b)^3 - (2a - 3b)^3$ .

17. The Autorikshaw fare in a city is charged Rs 10 for the first kilometer and @ Rs 4 per kilometer for subsequent distance covered. Write the linear equation to express the above statement. Draw the graph of the linear equation.

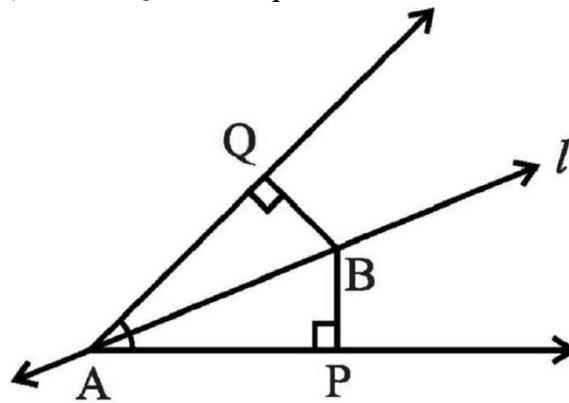
18. Without actual division, prove that  $2x^4 - 5x^3 + 2x^2 - x + 2$  is divisible by  $x^2 - 3x + 2$ .

19. Factorise:  $-27x^3 - \frac{1}{216} - \frac{9}{2}x^2 + \frac{1}{4}x$ .

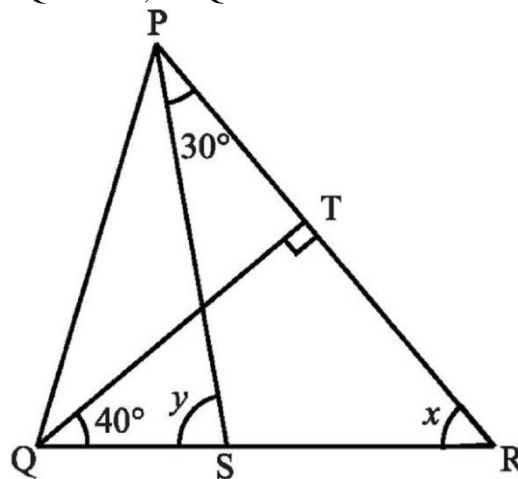
20. Represent  $\sqrt{5}$  on the number line.

21. Line  $l$  is the bisector of an angle  $\angle A$  and  $B$  is any point on  $l$ .  $BP$  and  $BQ$  are perpendiculars from  $B$  to the arms of  $\angle A$  (see the below figure). Show that:

(i)  $\triangle APB \cong \triangle AQB$  (ii)  $BP = BQ$  or  $B$  is equidistant from the arms of  $\angle A$ .



22. In the above sided figure, if  $QT \perp PR$ ,  $\angle TQR = 40^\circ$  and  $\angle SPR = 30^\circ$ , find  $x$  and  $y$ .



### SECTION – D

23. Simplify  $\frac{4 + \sqrt{5}}{4 - \sqrt{5}} + \frac{4 - \sqrt{5}}{4 + \sqrt{5}}$  by rationalizing the denominator.

24. If in two right triangles, hypotenuse and one side of a triangle are equal to the hypotenuse and one side of other triangle, prove that the two triangles are congruent

25. Solve the equation  $2x + 1 = x - 3$ , and represent the solution(s) on (i) the number line, (ii) the Cartesian plane.

26. The polynomial  $f(x) = x^4 - 2x^3 + 3x^2 - ax + b$  when divided by  $(x - 1)$  and  $(x + 1)$  leaves the remainders 5 and 19 respectively. Find the values of  $a$  and  $b$ . Hence, find the remainder when  $f(x)$  is divided by  $(x - 3)$ .

27. Expand :-  $(4a - b + 2c)^2$ .

28. Find four rational numbers between  $\frac{3}{5}$  and  $\frac{4}{5}$ .

29. Plot the following points on a graph paper:

x	1	2	3	4	5
y	5	8	11	14	17

Join these points. What do you observe?

30. In the above sided figure, the sides AB and AC of a triangle ABC are produced to points E and D respectively. If bisectors BO and CO of  $\angle CBE$  and  $\angle BCD$  respectively meet at point O, then prove that  $\angle BOC = 90^\circ - \frac{1}{2}\angle BAC$ .

