Delhi Public School Guwahati

"Under the aegis of the Delhi Public School Society, Delhi"

CLASS IX (MATHEMATICS)

CHAPTER 1: NUMBER SYSTEMS

1. Find four rational numbers between $\frac{3}{7}$ and $\frac{5}{7}$.
2. Simplify $(256)^{-(4)^{-\frac{3}{2}}}$
3. Find the value of $\frac{2^0+7^0}{5^0}$
4. Find whether the following statements are true or false.
   i. Every real number is either rational or irrational.
   ii. π is an irrational number.
5. Simplify $(3\sqrt{5}-5\sqrt{2})(4\sqrt{5}+3\sqrt{2})$
6. Find two irrational numbers between 0.111 and 0.112.
7. Let x be rational and y be irrational .Is xy necessarily irrational? Justify your answer by an example.
8. Insert a rational and an irrational numberbetween $\sqrt{2}$ and $\sqrt{3}$.
9. Identify a rational number from the following
   i. $2+\sqrt{2}$, $2\sqrt{2}$, 0, π
   ii. $\sqrt{\frac{25}{6}}$, $\sqrt{\frac{20}{4}}$, $2.2\overline{7}$, $\sqrt{3}$, $\sqrt{2}$
10. Give an example of each, of two irrational numbers whose:
    i. Sum is an irrational number.
    ii. Difference is an irrational number.
    iii. Product is an irrational number.
    iv. Quotient is an irrational number.
11. Represent $\sqrt{4.7}$ on a number line.
12. Express the following in the form $\frac{p}{q}$, where p and q are integers and q ≠ 0.
    i. $4.3\overline{2}$ ii. $15.7\overline{12}$ iii. 0.001
13. Simplify the following:
    i. $(\sqrt{3}+\sqrt{7})^2$ ii. $(2\sqrt{5}+3\sqrt{2})^2$ iii. $(2-\sqrt{2})(2+\sqrt{2})$
14. If $a = 2$and $b = 3$, then find the values of each of the following:
    i. $a^a + b^b$ ii. $a^b + b^a$ iii. $\left(\left(\frac{1}{a}+\frac{1}{b}\right)\right)^a$
15. If $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} = a+\sqrt{15}b$, find $a$and b.
16. Simplify each of the following by rationalizing the denominators

i. $\frac{3}{\sqrt{7-\sqrt{2}}}$ ii. $\frac{7+3\sqrt{5}}{7-3\sqrt{5}}$ iii. $\frac{2\sqrt{3}-\sqrt{5}}{2\sqrt{2}+3\sqrt{3}}$

17. Express $0.6+0.\overline{7}+0.4\overline{7}$ in the form of $\frac{p}{q}$, where p and q are co-prime integers and $q \neq 0$.

18. Solve the following equations:

i. $2^{2x+1}=17.2^{x}-2^{3}$ ii. $5^{2x+1}=6.5^{x}-1$

19. Simplify each of the following by removing radical signs and negative indices whenever they occur

i. $25^{\frac{-1}{3}}\times\sqrt[3]{16}$ ii. $(\sqrt[3]{8})^{\frac{-1}{2}}$ iii. $(\sqrt{4})^{-7}\times(\sqrt{2})^{-5}$

20. Show that $0.23535353\ldots.= 0.2\overline{35}$ can be expressed in the form of $\frac{p}{q}$, where p and q are integers and $q\neq 0$.

21. If $p=\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ and $q=\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ then find p^2+q^2.

22. If $\sqrt{2}$=1.414 , $\sqrt{3}$ =1.732 ,then find the value of $\frac{4}{3\sqrt{3}+2\sqrt{2}}+\frac{3}{3\sqrt{3}-2\sqrt{2}}$.

23. If x = $2+\sqrt{3}$, find the value of $x^2+\frac{1}{x^2}$.

24. If a =$7-4\sqrt{3}$ find the value of $\sqrt{a}+\frac{1}{\sqrt{a}}$.

25. $\left(\frac{81}{16}\right)^{-\frac{3}{4}}\times\left[\left(\frac{25}{9}\right)^{-\frac{3}{2}}\div\left(\frac{5}{2}\right)^{-3}\right]$.

26. Simplify: $\frac{\sqrt{6}}{\sqrt{2}+\sqrt{3}}+\frac{3\sqrt{2}}{\sqrt{6}+\sqrt{3}}-\frac{4\sqrt{3}}{\sqrt{6}+\sqrt{2}}$.

27. If $x=1-\sqrt{2}$,find the value of $\left(x-\frac{1}{x}\right)^2$.

28. Simplify:$12\sqrt{18}-6\sqrt{20}-3\sqrt{50}+8\sqrt{45}$.

29. Prove that $\frac{2^{30}+2^{29}+2^{28}}{2^{31}+2^{30}-2^{29}}=\frac{7}{10}$.

30. Prove that $\left(x^{a-b}\right)^{(a+b)}\left(x^{b-c}\right)^{(b+c)}(x^{c-a})^{(c+a)}=1$.

ANSWERS

1) $\frac{10}{21},\frac{11}{21},\frac{12}{21},\frac{13}{21}$

2) 2^{48}

3) 2

4) i) true ii) true

5) $30 - 11\sqrt{10}$

9. i) 0 ii) $2.2\overline{7}$

12. $i)\ \frac{389}{90}$ ii) $\frac{5185}{330}$ iii) $\frac{1}{1000}$

13) i) $10+2\sqrt{21}$ ii) $38+12\sqrt{10}$

14) i) 31 ii)17 iii)$\frac{25}{36}$

15) a=4and b=1

16) i) $\frac{3}{5}\left(\sqrt{7}+\sqrt{2}\right)$ ii) $\frac{47+21\sqrt{5}}{2}$ iii) $\frac{18-3\sqrt{15}-4\sqrt{6}+2\sqrt{10}}{19}$

17. $\frac{167}{90}$

18) i) x = 3 or x = -1 ii) x = -1 or x = 0

19. i) $\frac{2}{5}\times 10^{\frac{1}{3}}$ ii) $\left(\frac{2}{2^2}\right)^{\frac{1}{2}}$ iii) $\frac{2^{\frac{1}{2}}}{2^{10}}$

21) 98

22) 1.7655

23) 14

24) 4

25)1

26) 0

27) 4

28) 1

29) $21\sqrt{2}+12\sqrt{5}$

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CHAPTER 3: COORDINATE GEOMETRY

1. In which quadrants or on which axis the following points lie?

   (A) (– 4, 2) (B) (–2, 4) (C) (4, – 2) (D) (2, – 4) (E) (0,-5)

2. In which quadrants the points (other than origin) for which abscissa is equal to the ordinate will lie?

3. What are the coordinates of the point which lies on *y*-axis at a distance of 5 units from x-axis in the negative direction of *y*-axis?

4. Into how many parts do the coordinate axes divide the Cartesian plane?

5. In which quadrants, the abscissa of a point is positive?

6. Write the coordinates of the origin.

7. On which axes do the given points lie?

   A) (0, 4) B) (-2, 0) C) (3, 0) D) (0, -1)

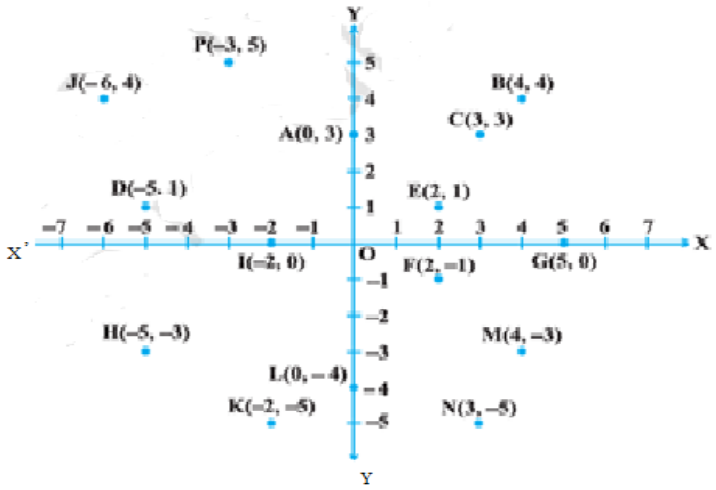
8. What is the perpendicular distance of the point P (4, 3) from *x-axis*?

9. A point lies on *x-axis* at a distance of 9 units from y-axis. What are its coordinates? What will be its coordinates if it lies on the negative side of *y-axis* at a distance of 9 units from *x-axis*.

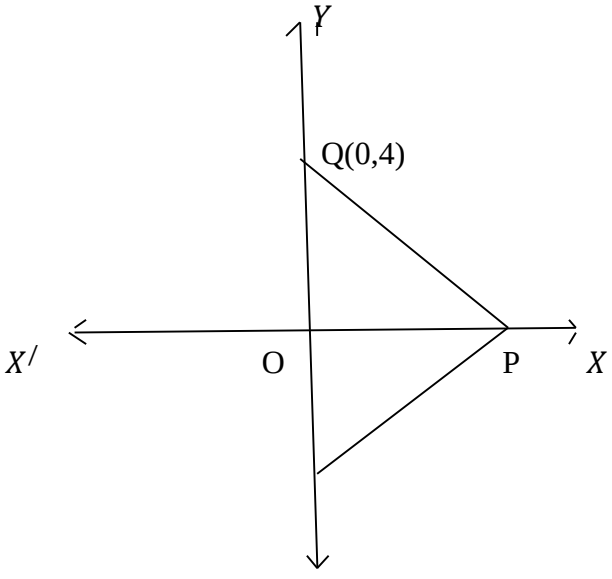
10. From the Fig., answer the following:
    i. Write the points whose abscissa is 0.

    ii. Write the points whose ordinate is 0.

    iii. Write the points whose abscissa is – 5



11. Write whether the following statements are True or False? Justify your answer.
    i. Point (3, 0) lies in the first quadrant.
    ii. Points (1, –1) and (–1, 1) lie in the same quadrant.
    iii. A point lies on y-axis at a distance of 2 units from the *x*-axis. Its coordinates are (2, 0).
    iv. (–1, 7) is a point in the II quadrant.
12. Plot the coordinates of the points
    i. whose ordinate is -5 and which lies on y axis.
    ii. which lies on *x and y* axes both.
    iii. whose abscissa is 3 and which lies on x axis in Cartesian plane.
13. Find the area of the triangle formed by the points A (2,0), B (6, 0) and C (4, 6) on a Cartesian plane.
14. What figure will be obtained on plotting the points O (0, 0), A (3, 0), B (3, 4), C (0, 4) and joining OA, AB, BC and CO.
15. Three vertices of a rectangle are (3, 2), (– 4, 2) and (– 4, 5).Plot these points and find the coordinates of the fourth vertex.
16. Plot the points P (1, 0), Q (4, 0) and S (1, 3). Find the coordinates of the point R such that PQRS is a square.
17. In given figure PQR is an equilateral triangle with the coordinates Q and R as (0,4) and (0, -4) respectively. Find the coordinates of the vertex P.



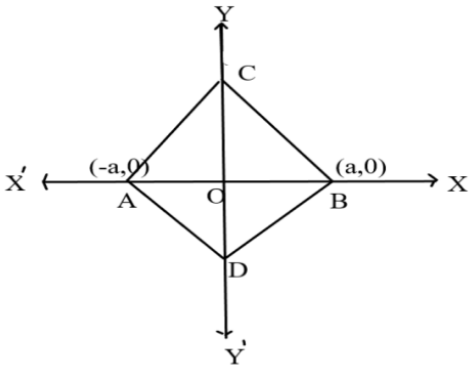
R (0,-4)

Y'

18. Draw a quadrilateral whose vertices are A(3,2),B(2, 3),C(-4,5) and D(5,-3) taken in order.

19. Plot the points A (1, 3), B (1, -1), C (7, -1) and D (7, 3) in Cartesian plane. Join them in order and name the figure so formed.

20. In the given figure,ABC and ABD are equilateral triangles.Find the coordinates of points C and D.



ANSWERS:

1.(i)2nd (ii) 2nd (iii) 4th (iv) 4th (v) on Y- axis

2. 1st and 3rd quadrant

3. (0,-5)

4. 4 parts

5.1st and 4th

6. (0,0)

7. (i)Y axis (ii) X axis iii) X axis iv)Y axis

8. 3 units

9. (9,0) ;(0,-9)

10.i) A,L ii) I,G iii) D,H

11. i) F ii) F iii) F iv) T

13. 12sq units

14.Rectangle

15. D(3,5)

16. (4,3)

17. P($4\sqrt{3}$,0)

19.Rectangle

20. C(0,$\sqrt{3}$ a) D(0,-$\sqrt{3}a$)

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CHAPTER 4: LINEAR EQUATIONS IN TWO VARIABLES

1. What is the distance between the graphs of the equations x = -3 and x = 2?
2. If the graph of the equation 4x + 3y = 12 cuts the coordinate axes at A and B, then find the length of the hypotenuse of right triangle AOB
3. Write the coordinates of any two points through which the line $y = 3x$ passes?
4. The graph of x = 15 is a straight line parallel to which axis?
5. Find the value of k for which x = 1, y = -1 is a solution of $kx - 2y = 0$.
6. How many linear equations in x and y can be satisfied by x = 1 and y = 2?
7. Write the equation $5x = \frac{7}{2}$ in the form of $ax + by + c = 0$ and specify the values of a, b and c.
8. Write the equations representing *x-axis* and *y-axis.*
9. Write the equation of a line passing through (–4, 6) and parallel to *x-axis.*
10. If $(2k-1, k)$ is a solution of the equation $10x - 9y = 12$, then find the value of k.
11. Draw the graph of the linear equation y = 2x + 3 and read from the graph, the value of y when $x = 2$ *and* $x = -1$
12. Four years before, age of a mother was 3 times the age of her daughter. Write a linear equation to represent the situation and draw its graph.
13. Draw the graph of the equation 2x + 3y = 6. Write the coordinates of the points where the graph meets x axis and y axis.
14. Let y varies directly as x. If y = 12 when x = 4, then write a linear equation. What is the value of y when x = 5?
15. Show that the points A (1, 2), B (– 1, – 16) and C (0, – 7) lie on the graph of the linear equation $y = 9x - 7$.
16. Aarushi was driving a car with uniform speed of 60 km/h. Draw the distance-time graph. From the graph, find the distance travelled by Aarushi in :

    (i) $2\frac{1}{2}$ hours (ii) $\frac{1}{2}$ hour

1. If the temperature of a liquid can be measured in Kelvin units as x °K or in Fahrenheit units as y °F, the relation between the two systems of measurement of temperature is given by the linear equation $y = \frac{9}{5}(x - 273) + 32$

    i. Find the temperature of the liquid in Fahrenheit if the temperature of the liquid is 313°K.
    ii. If the temperature is 158° F, then find the temperature in Kelvin.

17. A number is 27 more than the number obtained by reversing its digits. If its unit's and ten's digits are x and y respectively, write a linear equation representing the above statement and draw its graph.

18. The path of a train A is given by the equation $3x + 4y - 12 = 0$ and the path of another train B is given by the equation $6x + 8y - 48 = 0$. Represent the paths of both trains graphically and check whether they are parallel.

19. The force exerted to pull a cart is directly proportional to the acceleration produced in the body. Express the statement as a linear equation of two variables and draw the graph of the same by taking the constant mass equal to 6 kg. Read from the graph, the force required when the acceleration produced is: (i) 5 m/sec^2, (ii) 6 m/sec^2

ANSWERS

1. 5 units
2. 5 units
3. (0,0) , (2,6)
4. *y – axis*
5. $k = -2$
6. Infinitely many solutions
7. $10x + 0y - 7 = 0$ where $a = 10$, $b = 0$ and $c = -7$
8. $y = 0$ and $x = 0$ respectively.
9. $y = 6$
10. $k = 2$
12. $3x - y - 8 = 0$
14. $y = 3x$; when $x = 5, y = 15$
18. $x - y + 3 = 0$
20. $y = 6x$ where xrepresents acceleration and y represents force.

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Chapter 6: Lines and Angles

1. If two interior angles on the same side of a transversal intersecting two parallel lines are in the ratio 2:3 then find the larger of the two angles.
2. The measure of an angle is three times its supplement. Find the angle.
3. *l* and *m* are two lines perpendicular to the same line *t.* Are *l* and *m* also parallel to each other? Justify your answer.
4. Two straight lines AB and CD cut each other at point O. If ∠BOD = 63°, then what is the measure of ∠BOC ?
5. If the supplement of an angle is three times its complement, find the angle.
6. How many pairs of adjacent angles are formed when two lines intersect at a point
7. If one angle of a linear pair is acute, then what type of angle will the other be
8. If ∠AOB = 132°, then what is the measure of reflex ∠AOB
9. If one of the four angles formed by two intersecting lines is a right angle, then what type of angles are the remaining three.
10. If a wheel has six spokes equally spaced, then find the measure of the angle between two adjacent spokes.
11. What value of x would make XOY a line if ∠XOZ = (*7x + 20*) ° and ∠YOZ = (3*x*) ° in Fig 3?

Fig 3:

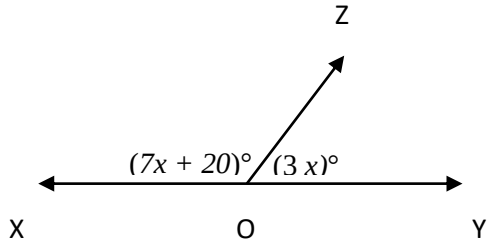
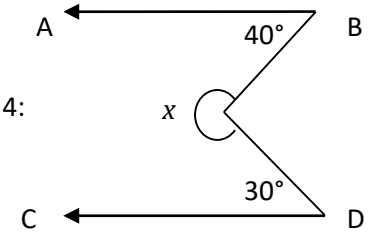
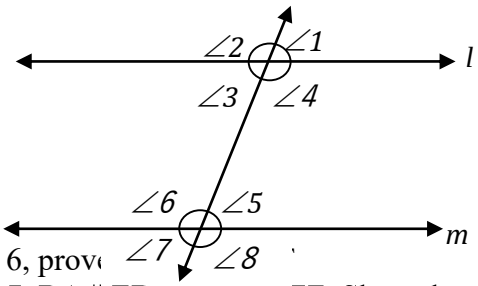


Fig 4:



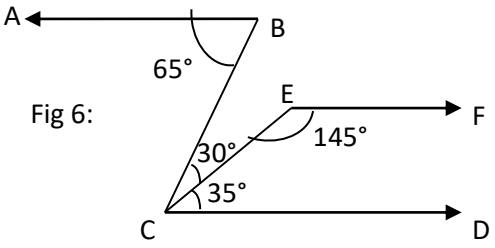
12. In Fig 4, AB ‖ CD, find the value of *x*.
13. AP and BQ are the bisectors of the two alternate interior angles formed by the intersection of a transversal *t* with parallel lines *l* and *m*. Show that AP ‖ BQ.
14. In Fig 5, if $\angle 4 = 110^0$ and $\angle 7 = 65^0$, is *l* ‖ *m*?

Fig 5:



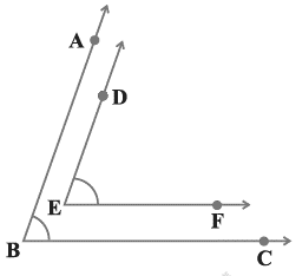
15.

Fig 6:



16. In Fig 6, prov
17. In Fig 7, BA || ED t BC || EF. Show that □ABC = □DEF.

Fig 7:

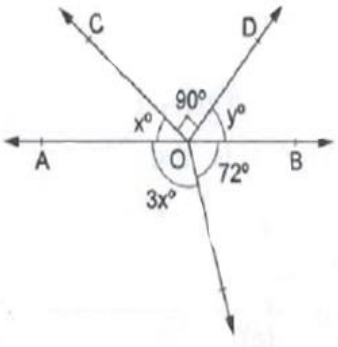


18.

19. If *l*, *m* and *n* are three lines such that *l* ‖ *m and n* ⊥ *l*, prove that *n* ⊥ *m*.

20. . In Fig. 8, find the value of x and y.

Fig 8:



21. In Fig 9,m and n are two plane mirrors perpendicular to each other. Show that incident ray CA is parallel to reflected ray BD.

Fig 11:

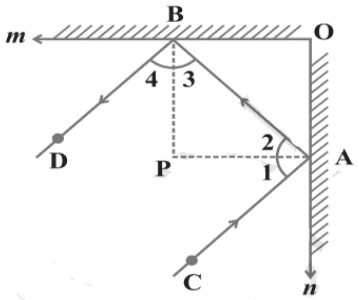
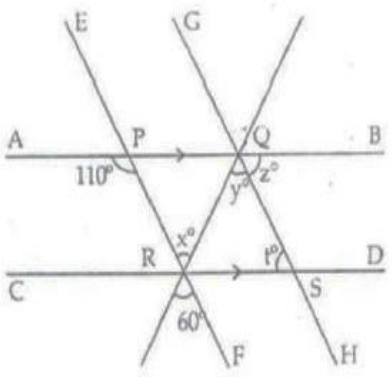


Fig 12:



22. In Fig. 10, if AB || CD and EF || GH, find the value of *x*, *y*, *z* and *t*.

ANSWERS

1. 108°
2. 135°
3. ----
4. 117°
5. 45°
6. 4 pairs
7. Obtuse
8. 228°
9. Right Angle
10. 60°
11. *x = 16*
12. *x = 290°*
14. No
17. 90°
18. *x = 36° and y = 54°*

LONG ANSWER TYPE QUESTIONS:

22. x = $60°, y = 60°, z = 70°, t = 70°$

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