MATHS

NCERT - FULL MARKS MATHEMATICS(TAMIL)

STRAIGHT LINES

Examples

1. Find the slope of the lines :

Passing through the points $(3, \, -2)$ and $(-1, 4)$

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2. Find the slope of the lines :

Passing through the points $(3, -2)$ and $(7, -2)$

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3. Find the slope of the lines :

Passing through the points $(3, -2)$ and $(3, 4)$

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4. Find the slope of the lines :

Making inclination of $60°$ with the positive direction of x- axis.

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5. If the angle between two lines is $\dfrac{\pi}{4}$ and slope of one the lines is $\dfrac{1}{2}$, find the slope of the other line.

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6. Line through the points $(-2, 6)$ and $(4, 8)$ is perpendicular to the line through the points (8, 12) and (x, 24) . Find the value of x.

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7. Three points $P(h, k), Q(x_1, y_1)$ and $R(x_2, Y_2)$ lie on a line. Show that $(h - x_1)(y_2 - y_1) = (k - y_1)(x_2 - x_1)$.

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8. Find the equations of the lines parallel to axes and passing through $(-2, 3)$.

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9. Find the equation of the line through $(-2, 3)$ with slope -4.

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10. Write the equation of the line through the points $(1, -1)$ and $(3, 5)$.

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11. Write the equation of the lines for which $\tan \theta = \dfrac{1}{2}$, where θ is the inclination of the line and (i) y-intercept is $-\dfrac{3}{2}$ (ii) x - interecept is 4.

12. Find the equation of the line, which makes intercepts -3 and 2 on the x - and y- axes respectvely.

13. Find the equation of the line whose perpendicular distance from the origin is 4 units and the angle which the normal makes with positive direction of x - axis is $15°$.

14. The Fahrenheit remperature F and absolute temperature K satisfy a linear equation. Given that $K = 273$ when $F = 32$ and that K = 373 when F = 212.

Express K in terms of F and find the value of F, when K = 0 .

15. Equation of a line is $3x - 4y + 10 = 0$. Find its (i) slope , (ii) x - and y - intercepts.

16. Reduce the equation of the line $\sqrt{3}x + y - 8 = 0$ into normal form. Find the values of p and ω.

17. Find angle between the lines

$y - \sqrt{3}x - 50$ and $\sqrt{3}y - x + 6 = 0$.

18. Show that two lines

$a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ where $b_1, b_2 \neq 0$

are :

(i) Parallel if $\dfrac{a_1}{b_1} = \dfrac{a_2}{b_2}$, and (ii) Perpendicular if

$a_1a_2 + b_1b_2 = 0$.

19. Find the equation of a line perpendicular to the line $x - 2y + 3 = 0$ and passing through the point $(1, -2)$.

20. Find the distance of the point $(3, -5)$ from the line $3x - 4y - 26 = 0$.

21. Find the distance between the parallel lines 3x – 4y + 5 = 0 and 3x – 4y + 7 = 0

22. If the lines

$$2x + y - 3 = 0, 5x + ky - 3 = 0 \text{ and } 3x - y - 2 = 0 \text{ are}$$

concurrent , find the value of k.

23. Find the distance of the line $4x - y = 0$ from the point P

$(4, 1)$ measured along the line making an angle of $135°$ with

the positive x- axis.

24. Assuming that straight lines work as the plane mirror for a

point, find the image of the point $(1, 2)$ in the line

$x - 3y + 4 = 0$.

25. Show that the area of the triangle formed by the lines $y = m_1 x + c_1$, $y = m_2 x + c_2$ and $x = 0$ is $\dfrac{(c_1 - c_2)^2}{2|m_1 - m_2|}$

26. A line is such that its segment between the lines $5x - y + 4 = 0$ and $3x + 4y - 4 = 0$ is bisected at the point $(1, 5)$. Obtain its equation.

27. Show that the path of a moving point such that its distances from two lines $3x - 2y = 5$ and $3x + 2y = 5$ are

equal is a straight line.

Exercise 10 1

1. Draw a quadrilateral in the Cartesian plane, whose vertices are (-4,5), (0,7), (5,-5) and (-4,-2). Also, find its area.

2. The base of an equilateral triangle with side 2a lies along the y-axis such that the mid-point of the base is at the origin. Find vertices of the triangle.

3. Find the distance between $P(x_1, y_1)$ and $Q(x_2, y_2)$ when :

i. PQ is parallel to the y-axis, ii. PQ is parallel to the x-axis.

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4. Find a point on the x-axis, which is equidistant from the points (7,6) and $(3, 4)$.

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5. Find the slope of a line, which passes through the origin, and the mid-point of the line segment joining the points $P(0, -4)$ and B (8,0).

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6. Without using the Pythagoras theorem, show that the points (4,4), (3, 5) and (-1,-1) are the vertices of a right angled triangle.

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7. Find the slope of the line, which makes an angle of $30°$ with the positive direction of y-axis measured anticlockwise.

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8. Find the value of x for which the points $(x, -1)$ (2,1) and (4, 5) are collinear.

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9. Without using distance formula, show that points $(-2, -1), (4, 0), (3, 3)$ and $(-3, 2)$ are the vertices of a parallelogram.

10.. Find the angle between the x-axis and the line joining the points $(3, -1)$ and $(4, -2)$.

11. The slope of a line is double of the slope of another line. Iftangent of the angle between them $\dfrac{1}{3}$, find the slopes of the lines.

12. A line passes through (x_1, y_1) and (h, k). If slope of the line is m, show that $k - y_1 = m(h - x_1)$.

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13. If three points (h, 0),(a, b) and (0, k) lie on a line, show that $\frac{a}{h} + \frac{b}{k} = 1$.

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Exercise 10 2

1. Write the equations for the x-and y-axes.

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2. Passing through the point $(-4, 3)$ with slope $\dfrac{1}{2}$.

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3. Passing through $(0, 0)$ with slope m.

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4. Passing through $(2, 2\sqrt{3})$ and inclined with the x-axis at an angle of $75°$.

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5. Intersecting the x-axis at a distance of 3 units to the left of origin with slope -2.

6. Intersecting the y-axis at a distance of 2 units above the origin and making an angle of $30°$ with positive direction of the x-axis.

7. Passing through the points $(-1, 1)$ and $(2, -4)$.

8. Find the equation of line which is at Perpendicular distance from the origin is 5 units and the angle made by the perpendicular with the positive x-axis is $30°$.

9. The vertices of ΔPQR are $P(2, 1), Q(-2, 3)$ and $R(4, 5)$. Find equation of the median through the vertex R.

10. Find the equation of the line passing through $(-3, 5)$ and perpendicular to the line through the points $(2, 5)$ and $(-3, 6)$.

11. A line perpendicular to the line segment joining the points (1, 0) and (2, 3) divides it in the ratio 1: n. Find the equation of the line.

12. Find the equation of a line that cuts off equal intercepts on the coordinate axes and passes through the point (2, 3).

13. Find equation of the line passing through the point (2, 2) and cutting off intercepts on the axes whose sum is 9.

14. Find equation of the line through the point$(0, 2)$ making an angle $\dfrac{2\pi}{3}$ with the positive x-axis. Also, find the equation of line parallel to it and crossing the y-axis at a distance of 2 units below the origin.

15. The perpendicular from the origin to a line meets it at the point $(-2, 9)$ find the equation of the line.

16. The length L (in centimetrs) of a copper rod is a linear function of its Celsius temperature C. In an experiment, if L = 124.942 when C = 20 and L= 125.134 when C = 110, express L in terms of C.

17. The owner of a milk store finds that, he can sell 980 litres of milk each week at ₹14/litres and 1220 litres of milk each week at ₹16/litre. Assuming a linear relationship between selling price and demand, how many litres could he sells weekly at ₹17/litres?

18. P (a, b) is the mid-point of a line segment between axes. Show that equation of the line is $\dfrac{x}{a} + \dfrac{y}{b} = 2$

19. Point R (h, k) divides a line segment between the axes in the ratio 1: 2. Find equation of the line.

20. By using the concept of equation of a line, prove that the three points (3,0), (-2, - 2) and (8, 2) are collinear.

1. Reduce the following equations into slope - intercept form and find their slopes and the y-intercepts.

$(i) x + 7y = 0,$ $\qquad (ii) 6x + 3y - 5 = 0,$ $\qquad (iii) y = 0$

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2. Reduce the following equations into intercept form and find their intercepts on the axes.

$(i) 3x + 2y - 12 = 0, (ii) 4x - 3y = 6,$ $\qquad (iii) 3y + 2 = 0.$

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3. Reduce the following equations into normal form. Find their perpendicular distances from the origin and angle between perpendicular and the positive X-axis.

$(i) x - \sqrt{3}y + 8 = 0, (ii) y - 2 = 0, (iii) 3t + 2 = 0.$

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4. Find the distance of the point $(-1, 1)$ from the line $12(x + 6) = 5(y - 2)$.

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5. What are the points on the y-axis whose distance from the line $\frac{x}{3} + \frac{y}{4} = 1$ is 4 units.

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6. Find the distance between parallel lines

i. 15x+8y-34= 0 and 15x+8y+31=0

ii. l(x + y) + p = 0 and l(x + y) - r = 0.

7. Find equation of the line parallel to the line $3x - 4y + 2 = 0$ and passing through the point $(-2, 3)$.

8. Find equation of the line perpendicular to the line $x - 7y + 5 = 0$ and having x intercept 3.

9. Find angles between the lines

$$\sqrt{3}x + y = 1 \quad \text{and} \quad x + \sqrt{3}y = 1.$$

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10. The line through the points (h, 3) and (4,1) intersects the line $7x - 9y - 19 = 0$.at right angle. Find the value of h.

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11. Prove that the line through the point (x_1, y_1) and parallel to the line

$$Ax + By + C = 0 \quad \text{is} \quad A(x - x_1) + B(y - y_1) = 0.$$

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12. Two lines passing through the point (2, 3) intersects each other at an angle of $60°$. If slope of one line is 2, find equation of the other line.

13. Find the equation of the right bisector of the line segment joining the points $(3, 4)$ and $(-1, 2)$.

14. Find the coordinates of the foot of perpendicular from the point $(-1, 3)$ to the line $3x - 4y - 16 = 0$.

15. The perpendicular from the origin to the line y = mx + c meets it at the point $(-1, 2)$. Find the values of m and c.

16. If p and q are the lengths of perpendiculars from the origin to the lines

$$x \cos \theta - y \sin \theta = k \cos 2\theta \quad \text{and} \quad x \sec \theta + y \cos ec\theta = k,$$

respectively, prove that $p^2 + 4q^2 = k^2$.

17. In the triangle ABC with vertices $A(2, 3), B(4, -1)$ and $C(1, 2)$, find the equation and

length of altitude from the vertex A.

18. If p is length of perpendicular from the origin to the line whose intercepts on the axes are a and b, then show that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.

Miscellaneous Exercise On Chapter 10

1. Find the values of k for which the line $(k - 3)x - (4 - k^2)y + k^2 - 7k + 6 = 0$ is

(a) Parallel to the x-axis,

(b) Parallel to the y-axis,

(c) Passing through the origin.

2. Find the value of α and p if the equation $x \cos \alpha + y \sin \alpha = p$ is the normal form of the line $\sqrt{3}x + y + 2 = 0.$

3. Find the equations of the lines, whose sum and product of intercepts are 1 and -6 respectively.

4. What are the points on the y-axis whose distance from the line $\dfrac{x}{3} + \dfrac{y}{4} = 1$ is 4 units.

5. Find perpendicular distance from the origin of the line joining the points $(\cos\theta, \sin\theta)$ and $(\cos\phi, \sin\phi)$.

6. Find the equation of the line parallel to y-axis and drawn through the point of intersection of the lines $x - 7y + 5 = 0$ and $3x + y = 0$.

7. Find the equation of a line drawn perpendicular to the line $\dfrac{x}{4} + \dfrac{y}{6} = 1$ through the point , where it meets the y-axis.

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8. Find the area of the triangle formed by the lines $y - x = 0, x + y = 0$ and $x - k = 0$.

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9. Find the value of p so that the three lines $3x + y - 2 = 0, px + 2y - 3 = 0$ and $2x - y - 3 = 0$ may intersect at one point.

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10. If three lines whose equations are

$y = m_1x + c_1, y = m_2x + c_2$ and $m_3x + c_3$ are

concurrent, then show that

$m_1(c_2 - c_3) + m_2(c_3 - c_1) + m_3(c_1 - c_2) = 0.$

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11. The equations of the lines through the point (3, 2) which

makes an angle of $45°$ with the line x - 2y = 3 are

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12. Find the equation of a line passing through the point of

intersection of the lines

$4x + 7y - 3 = 0$ and $2x - 3y + 1 = 0$ that has equal

intercepts on the axes.

13. Show that the equation of the line passing through the origin and making an angle θ with the line $y = mx + c$ is $\dfrac{y}{x} = \dfrac{m \pm \tan}{1 \pm m \tan}$.

14. In what ratio, the line joining $(-1, 1)$ and $(5, 7)$ is divided by the line $x + y = 4$?

15. Find the distance of the line $4x + 7y + 5 = 0$ from the point $(1, 2)$ along the line $2x - y = 0$.

16. Find the direction in which a straight line must be drawn through the point $(- 1, 2)$ so that its point of intersection with the line $x + y = 4$ may be at a distance of 3 units from this point.

17. The hypotenuse of a right angled triangle has its ends at the points $(1, 3)$ and $(- 4, 1)$. Find an equation of the legs (perpendicular sides) of the triangle.

18. Find the image of the points $(3, 8)$ with respect to the line $x + 3y = 7$ assuming the line to be a plane mirror.

19. If the lines y = 3x + 1 and 2y = x + 3 are equally inclined to the line y = mx + 4, $\left(\dfrac{1}{2} < m < 3 \right)$, then the values of m are

20. If sum of the perpendicular distances of a variable point P(x, y) from the lines $x + y - 5 = 0$ and $3x - 2y + 6 = 0$ is always 10. Show that P must move on a line.

21. Find equation of the line which is equidistant from parallel lines $9x + 6y - 7 = 0$ and $3x + 2y + 6 = 0$.

22. A ray of light coming from the point (1,2) is reflected at a point A on the x-axis and it passes through the point (5,3). Find the co-ordinates of the point A.

23. Prove that the product of the lengths of the perpendiculars drawn from the points $\left(\sqrt{a^2 - b^2}, 0\right)$ and $\left(-\sqrt{a^2 - b^2}, 0\right)$ to the line $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ is b^2.

24. A person standing at a junction (crossing) of two straight paths represented by the equations $2x - 3y + 4 = 0$ and $3x + 4y - 5 = 0$ seek to reach the path whose equation is $6x - 7y + 8 = 0$ in the least times. Find the equation of the path that he should follow.