MATHS

NCERT - NCERT MATHEMATICS(BENGALI)

STRAIGHT LINES

Examples

---

1. Find the slope of the lines :

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

▶ **Watch Video Solution**

---

2. Find the slope of the lines :

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

▶ **Watch Video Solution**

3. Find the slope of the lines :

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

4. Find the slope of the lines :

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

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.

**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.

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

8. In fig 10.9 , time and distance graph of a linear motion is given.

Two positions of time and distance are recorded as, when $T = 0, D = 2$ and when $T = 3, D = 8$. Using the concept of slope, find law of motion ,

i.e., how distance depends upon time.
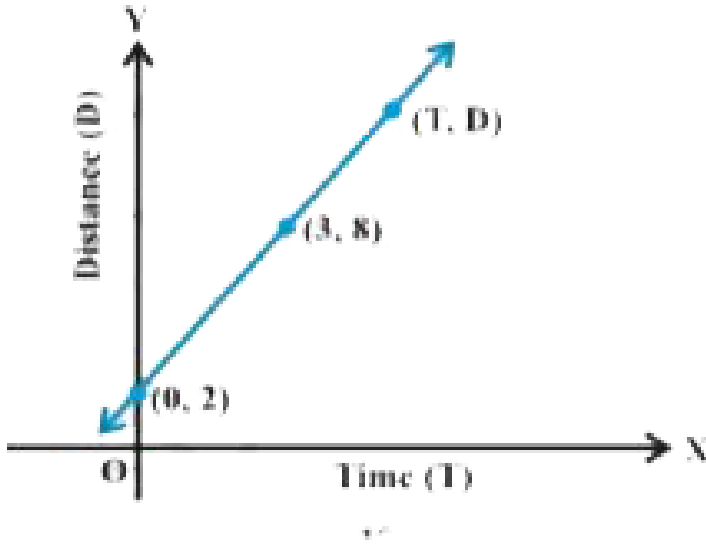
9. Find the equations of the lines parallel to axes and passing through $(-2, 3)$.

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

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

12. 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.

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

14. 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 $15°$.

15. 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 .

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

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

18. Find angle between the lines $y - \sqrt{3}x - 50$ and $\sqrt{3}y - x + 6 = 0$.

19. 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 $a_1a_2 + b_1b_2 = 0$.

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

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

▶ Watch Video Solution

22. Find the distance between the parallel lines $3x - 4y + 7 = 0$ and $3x - 4y + 5 = 0$

▶ Watch Video Solution

23. If the lines $2x + y - 3 = 0, 5x + ky - 3 = 0$ and $3x - y - 2 = 0$ are concurrent , find the value of k.

▶ Watch Video Solution

24. 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.

25. Assuming that straight lines work as the plane mirror for a point, find the image of the point $(1, 2)$ in the line $x - 3y + 4 = 0$.

26. 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 $\dfrac{(c_1 - c_2)^2}{2|m_1 - m_2|}$

27. 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.

28. 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.

> ▶ **Watch Video Solution**

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

> ▶ **Watch Video Solution**

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.

> ▶ **Watch Video Solution**

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.

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

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).

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.

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

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

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. If tangent of the angle between them is $\dfrac{1}{3}$, find the slopes of the lines.

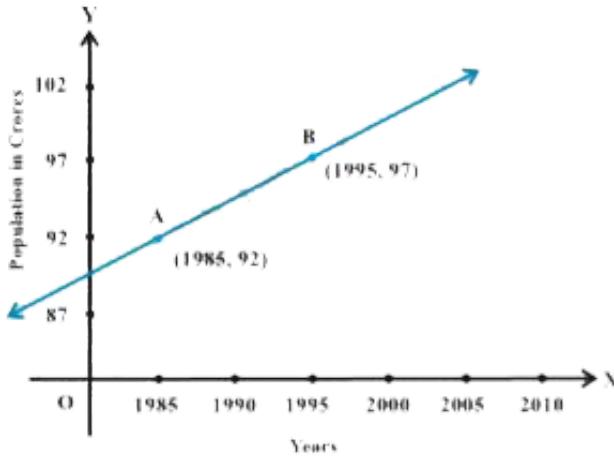**12.** A line passes through (x_1, y_1) and (h, k) . If slope of the line is m, show that $k - y_1 = m(h - x_1)$.

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

14. Consider the following population and year graph (Fig 10.10), find the slope of the line AB and using it, find what will be the population in the year 2010?

Exercise 10 2

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

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

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

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

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. Find the equation of the line Passing through the points $(-1, 1)$ and $(2, -4)$.

8. Find the equation of the line 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 $\triangle PQR$ 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 centimetre) 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 Rs 14/litre and 1220 litres of milk each week at Rs 16/ litre. Assuming a linear relationship between selling price and demand, how many litres could he sell weekly at Rs 17/litre?

18. $P(h, k)$ 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.

Exercise 10 3

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

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

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

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

▶ Watch Video Solution

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

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

▶ Watch Video Solution

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

▶ Watch Video Solution

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

▶ Watch Video Solution

6. Find the distance between parallel lines

$(i) 15x + 8y - 34 = 0$ and $15x + 8y + 31 = 0 (ii) l(x + y) + p = 0$ and

.

▶ Watch Video Solution

7. Find equation of the line parallel to the line $3x - 4y + 2 = 0$ and

passing through the point $(-2, 3)$.

▶ Watch Video Solution

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

> ▶ Watch Video Solution

9. Find angles between the lines $\sqrt{3}x + y = 1$ and $x + \sqrt{3}y = 1$.

> ▶ Watch Video Solution

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.

> ▶ Watch Video Solution

11. Prove that the line through the point (x_1, y_1) and parallel to the line $Ax + By + C = 0$ is $A(x - x_1) + B(y - y_1) = 0$.

> ▶ Watch Video Solution

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.

▶ **Watch Video Solution**

16. If p and q are the lengths of perpendiculars from the origin to the lines $\qquad x\cos\theta - y\sin\theta = k\cos 2\theta$ and $x\sec\theta + y\cos ec\theta = k$, respectively, prove that $p^2 + 4q^2 = k^2$.

▶ **Watch Video Solution**

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.

▶ **Watch Video Solution**

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

▶ Watch Video Solution

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.

▶ Watch Video Solution

2. Find the values of and p, if the equation x cos thita+ y sin theta = p is

the normal form of the line $\sqrt{3}x + y + 2 = 0$.

3. Find the equations of the lines, which cut-off intercepts on the axes whose sum and product are 1 and -6, respectively.

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

5. Find perpendicular distance from the origin to 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 $3x + y = 0$.

▶ Watch Video Solution

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

▶ Watch Video Solution

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

▶ Watch Video Solution

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.

10. If three lines whose equations are

$y = m_1 x + c_1, y = m_2 x + c_2$ and $m_3 x + c_3$ are concurrent, then

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

11. Find the equation of the lines through the point (3, 2) which make an

angle of $45°$ with the line $x - 2y = 3$.

12. Find the equation of the 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 point (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 $y = mx + 4$,find the value of m.

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. Aray of light passing through the point (1, 2) reflects on the x-axis at point and the reflected ray passes through the point (5,3). Find the coordinates of 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 the junction (crossing) of two straight paths represented by the equations $2x - 3y + 4 = 0$ and $3x + 4y - 5 = 0$ wants to reach the path whose equation is $6x - 7y + 8 = 0$ in the least time. Find equation of the path that he should follow.