



MATHS

NCERT - NCERT MATHEMATICS (ENGLISH)

STRAIGHT LINES

Solved Examples

1. Find the distance between the parallel lines

$$3x - 4y + 7 = 0 \text{ and } 3x - 4y + 5 = 0?$$

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

3. 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° .



[Watch Video Solution](#)

4. Find the equation of the line, which makes intercepts 3 and 2 on the x and y axes respectively.



[Watch Video Solution](#)

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



[Watch Video Solution](#)

6. The Fahrenheit temperature 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 $K = 0$.



[Watch Video Solution](#)

7. Find the angle between the lines $y - \sqrt{3}x - 5 = 0$ and $\sqrt{3}y - x + 6 = 0$.



[Watch Video Solution](#)

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



[Watch Video Solution](#)

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

 [Watch Video Solution](#)

10. 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 $\frac{a_1}{b_1} = \frac{a_2}{b_2}$, and (ii) perpendicular if $a_1a_2 + b_1b_2 = 0$.

 [Watch Video Solution](#)

11. 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](#)

12. 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 axis.

 [Watch Video Solution](#)

13. Find the image of the point $(1, 2)$ in the line $x - 3y + 4 = 0$.

 [Watch Video Solution](#)

14. Show that the area of the triangle formed by the lines $y = m_1x + c_1$, $y = m_2x + c_2$ and $x = 0$ is $\frac{(c_1 - c_2)^2}{2|m_1 - m_2|}$

 [Watch Video Solution](#)

15. 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.

 [Watch Video Solution](#)

16. 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

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



Watch Video Solution

18. Write the equation of the line for which $\tan \theta = \frac{1}{2}$, where θ is the inclination of the line and y-intercept is $-\frac{3}{2}$



Watch Video Solution

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



[Watch Video Solution](#)

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



[Watch Video Solution](#)

21. If the points $P(h, k)$, $Q(x_1, y_1)$ and $R(x_2, y_2)$ lie on a line. Show that:

$$(h - x_1)(y_2 - y_1) = (k - y_1)(x_2 - x_1).$$



[Watch Video Solution](#)

22. In the following figure, the time-distance graph is shown for a linear motion. As time $T = 0$, distance is 2 units and at $T = 3$, distance = 8 units. Using slopes, find the relation between distance and time.



[Watch Video Solution](#)

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

 [Watch Video Solution](#)

24. If the points $(-2,6)$ and $(4,8)$ is perpendicular to the line joining the points $(8,12)$ and $(x,24)$ then the value of x is

 [Watch Video Solution](#)

25. Find the slope of the lines:(a) Passing through the points $(3, 2)$ and $(1, 4)$,(b) Passing through the points $(3, 2)$ and $(7, 2)$,(c) Passing through the points $(3, 2)$ and $(3, 4)$,(d) Making inclination of 60° with the p

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

27. Find the new coordinates of point $(3, 4)$ if the origin is shifted to $(1, 2)$ by a translation.

 [Watch Video Solution](#)

28. Find the transformed equation of the straight line $2x - 3y + 5 = 0$, when the origin is shifted to the point $(3, -1)$ after translation of axes.

 [Watch Video Solution](#)

1. 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](#)

2. 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](#)

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

 [Watch Video Solution](#)

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



 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

6. 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](#)

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

 [Watch Video Solution](#)

8. 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

9. 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 $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.



Watch Video Solution

10. 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) $x - y = 4$.



Watch Video Solution

11. Reduce the following equations into intercept form and find their intercepts on the axes. (i) $3x + 2y - 12 = 0$, (ii) $4x - 3y = 6$, (iii) $3y + 2 = 0$.

 [Watch Video Solution](#)

12. 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) $y = 0$.

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

14. Find the distance between parallel lines (i) $15x + 8y - 34 = 0$ and $15x + 8y + 31 = 0$ (ii) $l(x + y) + p = 0$ and $l(x + y) - r = 0$.

 [Watch Video Solution](#)

15. Find the points of the axis, whose distances from the line $\frac{x}{3} + \frac{y}{4} = 1$ are 4 unit.

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

Miscellaneous Exercise

1. 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 equation that he should follow.

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

3. If sum of the perpendicular distances of a variable point $P(x, y)$ from the lines $x + y - 5 = 0$ and $3x - 2y + 7 = 0$ is always 10. Show that P must move on a line.

 Watch Video Solution

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

 Watch Video Solution

5. A ray of light passing through the point $(1, 2)$ reflects on the x-axis at point A and the reflected ray passes through the point $(5, 3)$. Find the coordinates of A.

 Watch Video Solution

6. 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.

 [Watch Video Solution](#)

7. The hypotenuse of a right isosceles triangle has its ends at the points $(1, 3)$ and $(-4, 1)$. Find the equations of the legs (perpendicular sides) of the triangle.

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

10. Find the conditions that the straight lines $y = m_1x + c_1$, $y = m_2x + c_2$ and $y = m_3x + c_3$ may meet in a point.

 [Watch Video Solution](#)

11. Find the equation of the lines through the point $(3, 2)$ which make an angle of 45° with the line $x - 2y = 3$.

 [Watch Video Solution](#)

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 intercept to axes.



Watch Video Solution

13. Show that the equation of the straight line through the origin angle φ

with the line $y = mx + b$ is $\frac{y}{x} = \frac{m \pm \tan \varphi}{1 \pm m \tan \varphi}$



Watch Video Solution

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



Watch Video Solution

15. If the lines $y = 3x + 1$ and $2y = x + 3$ are equally inclined to the line $y = mx + 4$, then $m =$



Watch Video Solution

16. 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](#)

17. 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](#)

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

 [Watch Video Solution](#)

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



Watch Video Solution

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



Watch Video Solution

21. Find the values of θ and p , if the equation $x \cos \theta + y \sin \theta = p$ is the normal form of the line $\sqrt{3}x + y + 2 = 0$.



Watch Video Solution

22. 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

23. 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.

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

Exercise 10 1

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

 [Watch Video Solution](#)

2. If three points $(h, 0)$, (a, b) and (o, k) lie on a line, show that

$$\frac{a}{h} + \frac{b}{k} = 1.$$

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

4. The slope of a line is double of the slope of another line. If tangents of the angle between the is find the slopes of the other line.

 [Watch Video Solution](#)

5. Consider the following population and year graph: find the slope of the line AB and using it find what will be the population in the year 2010.

[Watch Video Solution](#)

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

[Watch Video Solution](#)

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

A. $\left(\frac{15}{2}, 0\right)$

B. $\left(\frac{17}{2}, 0\right)$

C. $\left(-\frac{17}{2}, 0\right)$

D. $\left(-\frac{15}{2}, 0\right)$

Answer: A $\left(\frac{15}{2}, 0\right)$

[Watch Video Solution](#)

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

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

10. 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](#)

11. 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.





[Watch Video Solution](#)

12. 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](#)

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



[Watch Video Solution](#)

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



[Watch Video Solution](#)

Exercise 10 2

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

 [Watch Video Solution](#)

2. Write the equations for the x- and y-axis.

 [Watch Video Solution](#)

3. Find the equation of the line which satisfy the given conditions :
Passing through the point $(-4, 3)$ with slope $\frac{1}{2}$.

 [Watch Video Solution](#)

4. Find the equation of the line which satisfy the given conditions :
Passing through $(0, 0)$ with slope m .



[Watch Video Solution](#)

5. Find the equation of the line which satisfy the given conditions :

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



[Watch Video Solution](#)

6. Find the equation of the line which satisfy the given conditions :

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



[Watch Video Solution](#)

7. Find the equation of the line which satisfy the given conditions :

Intersecting the yaxis at a distance of 2 units above the origin and making an angle of 30° with positive direction of the xaxis.



[Watch Video Solution](#)

8. Find the equation of the line which satisfy the given conditions :

Passing through the point (- 1, 1)and (2, - 4)



Watch Video Solution

9. Point R (h, k) divides a line segment between the axis in the ratio 1 : 2.

Find equation of the line.



Watch Video Solution

10. P (a, b) is the midpoint of a line segment between axes. Show that

equation of the line is $\frac{x}{a} + \frac{y}{b} = 2$.



Watch Video Solution

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



[Watch Video Solution](#)

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



[Watch Video Solution](#)

13. 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.



[Watch Video Solution](#)

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



[Watch Video Solution](#)

15. The owner of a milk store finds that, he can sell 980 litres of milk each week at $Rs. 14/\text{litre}$ and 1220 litres of milk each week at $Rs16/\text{litre}$. Assuming a linear relationship between selling price and demand, how many litre could he sell weekly at $Rs17/\text{litres}$?

 [Watch Video Solution](#)

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 .

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

19. Find the equation of the line which satisfy the given conditions :
Perpendicular distance from the origin is 5 units and the angle made by the perpendicular with the positive axis is 30° .

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

1. Find the new coordinates of the points in each of the following cases if the origin is shifted to the point $(-3, -2)$ by a translation of axes. (i) $(1, 1)$
(ii) $(0, 1)$ (iii) $(5, 0)$ (iv) $(-1, -2)$ (v) $(3, -5)$

 [Watch Video Solution](#)

2. Find what the following equations become when the origin is shifted to the point $(1, 1)$ (i) $x^2 + xy - 3y^2 - y + 2 = 0$ (ii) $xy - y^2 - x + y = 0$ (iii) $xy - x - y + 1 = 0$

 [Watch Video Solution](#)

Exercise 10 4

1. Find the equation of the line through the intersection of $5x - 3y = 1$ and $2x - 3y - 23 = 0$ and perpendicular to the line $5x - 3y - 1 = 0$.

 [Watch Video Solution](#)

2. Find the equation of the line through the intersection of lines $x + 2y + 3 = 0$ and $4x + y + 7 = 0$ and which is parallel to $5x + 4y + 20 = 0$

 [Watch Video Solution](#)

3. Find the equation of the line through the intersection of the lines $2x + 3y - 4 = 0$ and $x - 5y = 7$ that has its x-intercept equal to 4.

 [View Text Solution](#)

4. Find the equation of the line through the intersection of lines $3x + 4y = 7$ and $xy + 2 = 0$ and whose slope is 5.

 [Watch Video Solution](#)