

Straight Lines — Assignment 1

Class 11 Mathematics · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

Slope of a Line

MCQ Questions (choose the correct option)

- The slope of the line joining the points $P(0, -4)$ and $B(8, 0)$ is
 - 2
 - $\frac{1}{2}$
 - $-\frac{1}{2}$
 - 4
- A line makes an angle of 30° with the positive direction of the y-axis measured anticlockwise. Its slope is
 - $\frac{1}{3}$
 - 1
 - $\sqrt{3}$
 - $1/\sqrt{3}$
- The slope of a line perpendicular to a vertical line is
 - 0
 - 1
 - 1
 - undefined
- If three points A, B, C are collinear, then slope of AB compared to slope of BC is
 - equal
 - reciprocal
 - negative
 - product equal to 1

1 Mark Questions

- Define the slope of a line. What does it measure in terms of the angle of inclination?
- State the slope of a horizontal line and of a vertical line.
- What is the slope of the line that makes an angle of 45° with the positive direction of the x-axis?
- Write the formula for the slope of the line through (x_1, y_1) and (x_2, y_2) .

2 Mark Questions

- Find the slope of the line joining the points $(5, 4)$ and $(2, -3)$.
- Find the slope of a line passing through the origin and the mid-point of the segment joining $P(0, -4)$ and $B(8, 0)$.
- Find the slope of the line which makes an angle of 30° with the positive direction of the y-axis measured anticlockwise.
- Using slopes, show that the points $A(4, 4)$, $B(3, 5)$ and $C(-1, -1)$ are the vertices of a right angled triangle (without using Pythagoras' theorem).

3 Mark Questions

1. Find the value of x for which the points $(x, -1)$, $(2, 1)$ and $(4, 5)$ are collinear.
2. If the three points $(h, 0)$, (a, b) and $(0, k)$ lie on a straight line, then show that $a/h + b/k = 1$.
3. The slope of a line is double of the slope of another line. If the tangent of the angle between them is $\frac{1}{3}$, find the slopes of the two lines.

Parallel and Perpendicular Lines

MCQ Questions (choose the correct option)

1. Two non-vertical lines are parallel if and only if their slopes are
 - (A) equal
 - (B) reciprocal
 - (C) negative of each other
 - (D) product equal to 1
2. Two lines are perpendicular if and only if the product of their slopes is
 - (A) 1
 - (B) -1
 - (C) 0
 - (D) undefined
3. The slope of a line perpendicular to a line of slope $\frac{3}{4}$ is
 - (A) $\frac{4}{3}$
 - (B) $-\frac{4}{3}$
 - (C) $\frac{3}{4}$
 - (D) $-\frac{3}{4}$
4. The lines $2x + 3y = 1$ and $3x - 2y = 4$ are
 - (A) parallel
 - (B) perpendicular
 - (C) coincident
 - (D) neither parallel nor perpendicular

1 Mark Questions

1. State the condition for two non-vertical lines to be parallel.
2. State the condition for two lines to be perpendicular.
3. Find the slope of a line perpendicular to a line whose slope is -5 .
4. Are the lines $y = 2x + 3$ and $y = 2x - 5$ parallel or perpendicular?

2 Mark Questions

1. Find the equation of the line passing through $(-3, 5)$ and perpendicular to the line through the points $(2, 5)$ and $(-3, 6)$.
2. Find the equation of the line parallel to the line $3x - 4y + 2 = 0$ and passing through the point $(-2, 3)$.
3. Find the value of k so that the lines $2x + 3y - 5 = 0$ and $kx - 6y + 7 = 0$ are perpendicular.
4. Find the equation of a line that passes through the point $(0, 2)$ and is perpendicular to the line $x + y = 4$.

3 Mark Questions

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

2. 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.
3. Find the equation of the line through the point (2, 3) that is perpendicular to the line joining (1, -2) and (4, 4), and hence find its distance from the origin.

Forms of the Equation of a Line

MCQ Questions (choose the correct option)

1. The equation of a line with slope m and passing through the point (x_1, y_1) is
 - (A) $y - y_1 = m(x - x_1)$
 - (B) $y = mx + c$
 - (C) $x/a + y/b = 1$
 - (D) $y - y_1 = (x - x_1)/m$
2. A line cutting intercepts a and b on the x - and y -axes respectively has the equation
 - (A) $x/a + y/b = 1$
 - (B) $x/a - y/b = 1$
 - (C) $y = ax + b$
 - (D) $a/x + b/y = 1$
3. The equation of a line with slope m and y -intercept c is
 - (A) $y = mx + c$
 - (B) $x = my + c$
 - (C) $y = cx + m$
 - (D) $y + c = mx$
4. The equation of a vertical line at a distance b from the y -axis is
 - (A) $x = b$ or $x = -b$
 - (B) $y = b$ or $y = -b$
 - (C) $y = x + b$
 - (D) $x = y + b$

1 Mark Questions

1. Write the equations of the x -axis and the y -axis.
2. Write the point-slope form of the equation of a line.
3. Write the slope-intercept form of the equation of a line.
4. Write the equation of a horizontal line at a distance 5 above the x -axis.

2 Mark Questions

1. Find the equation of the line passing through the point $(-4, 3)$ with slope $\frac{1}{2}$.
2. Find the equation of the line passing through $(2, 2\sqrt{3})$ and inclined with the x -axis at an angle of 75° .
3. Find the equation of a line that cuts off equal intercepts on the coordinate axes and passes through the point $(2, 3)$.
4. Find the equation of the line which intersects the x -axis at a distance of 3 units to the left of the origin and has slope -2 .

3 Mark Questions

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

- Find the equation of the line through the point (0, 2) making an angle $2\pi/3$ with the positive x-axis. Also find the equation of the line parallel to it and crossing the y-axis at a distance of 2 units below the origin.
- A line with slope m makes an x-intercept d . Show that its equation is $y = m(x - d)$, and use it to find the equation of a line of slope 3 whose x-intercept is 2.

General Equation and Converting Between Forms

MCQ Questions (choose the correct option)

- The slope of the line $ax + by + c = 0$ is
 - $-a/b$
 - a/b
 - $-b/a$
 - $-c/a$
- The x-intercept of the line $ax + by + c = 0$ is
 - $-c/a$
 - $-c/b$
 - a/c
 - b/c
- Converting $3x + 4y = 12$ into intercept form gives
 - $x/4 + y/3 = 1$
 - $x/3 + y/4 = 1$
 - $x/12 + y/12 = 1$
 - $4x + 3y = 1$
- A line with both coefficients a, b zero in $ax + by + c = 0$ would imply
 - no equation at all (invalid line)
 - the x-axis
 - the y-axis
 - a point

1 Mark Questions

- Write down the general (linear) form of the equation of a line.
- Find the slope of the line $2x + 3y - 6 = 0$.
- Write the intercepts made by the line $x/2 + y/3 = 1$ on the axes.
- Express $3x - 4y + 7 = 0$ in slope–intercept form.

2 Mark Questions

- Reduce the equation $x + 7y = 0$ into slope–intercept form and find its slope and y-intercept.
- Reduce the equation $3x + 2y - 12 = 0$ into intercept form and find its intercepts on the axes.
- Reduce $6x + 3y - 5 = 0$ into slope–intercept form and find its slope and y-intercept.
- Find the equation of a vertical line passing through the point (2, 3).

3 Mark Questions

- Reduce $4x - 3y = 6$ into intercept form and find its intercepts on the axes; then write its slope–intercept form.
- Show that the equation of the line passing through the origin and making an angle θ with the line $y = mx + c$ is $y/x = (\tan \theta \pm m)/(1 \mp m \tan \theta)$.

3. 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.

Angle Between Two Lines

MCQ Questions (choose the correct option)

- If two lines with slopes m_1 and m_2 are parallel, the acute angle between them is
 - 0°
 - 90°
 - 180°
 - 45°
- The acute angle θ between two lines with slopes m_1 and m_2 satisfies
 - $\tan \theta = |(m_2 - m_1)/(1 + m_1 m_2)|$
 - $\tan \theta = |(m_2 + m_1)/(1 - m_1 m_2)|$
 - $\tan \theta = |m_1 m_2|$
 - $\tan \theta = |(m_2 - m_1)/m_1 m_2|$
- If $1 + m_1 m_2 = 0$ for two lines, then the lines are
 - perpendicular
 - parallel
 - coincident
 - inclined at 45°
- The slope of the line joining the points $(3, -1)$ and $(4, -2)$ is
 - -1
 - 1
 - 3
 - 7

1 Mark Questions

- Write the formula for the tangent of the acute angle between two lines with slopes m_1 and m_2 .
- What is the angle between the two lines $y = 2x + 1$ and $y = 2x - 4$?
- If the product of the slopes of two lines is -1 , what is the angle between them?
- Find the acute angle between the line $y = x$ and the x-axis.

2 Mark Questions

- Find the angle between the x-axis and the line joining the points $(3, -1)$ and $(4, -2)$.
- Find the acute angle between the lines $\sqrt{3}x + y = 1$ and $x + \sqrt{3}y = 1$.
- Find the acute angle between lines with slopes 1 and 2 (give $\tan \theta$ and hence θ).
- Two lines passing through the point $(2, 3)$ intersect each other at an angle of 60° . If the slope of one line is 2, find the slope(s) of the other line.

3 Mark Questions

- Two lines passing through the point $(2, 3)$ intersect each other at an angle of 60° . If the slope of one line is 2, find the equation of the other line.
- Find the equations of the lines passing through the point $(3, 2)$ which make an angle of 45° with the line $x - 2y = 3$.

3. Show, using the angle-between-lines formula, that the lines $12x + 5y = 13$ and $5x - 12y = 26$ are perpendicular to each other, and hence find the angle between them.

Distance Formulas

MCQ Questions (choose the correct option)

- The perpendicular distance of the point $(3, -5)$ from the line $3x - 4y - 26 = 0$ is
 - $3/5$
 - 5
 - 1
 - 13
- The distance between the parallel lines $15x + 8y - 34 = 0$ and $15x + 8y + 31 = 0$ is
 - $65/17$
 - $17/65$
 - 3
 - 5
- The perpendicular distance of the origin from the line $3x + 4y - 10 = 0$ is
 - 2
 - 10
 - 5
 - $\sqrt{10}$
- The perpendicular distance d of a point (x_1, y_1) from the line $Ax + By + C = 0$ is given by
 - $|Ax_1 + By_1 + C|/\sqrt{A^2 + B^2}$
 - $|Ax_1 + By_1 + C|/(A^2 + B^2)$
 - $\sqrt{(x_1^2 + y_1^2)}$
 - $|Ax_1 + By_1 + C|$

1 Mark Questions

- State the formula for the perpendicular distance of the point (x_1, y_1) from the line $Ax + By + C = 0$.
- State the formula for the distance between the parallel lines $Ax + By + C_1 = 0$ and $Ax + By + C_2 = 0$.
- Write the distance of the origin from the line $Ax + By + C = 0$.
- Find the distance of the line $4x + 3y = 5$ from the origin.

2 Mark Questions

- Find the distance of the point $(-1, 1)$ from the line $12(x + 6) = 5(y - 2)$.
- Find the distance between the parallel lines $15x + 8y - 34 = 0$ and $15x + 8y + 31 = 0$.
- Find the points on the x -axis whose distances from the line $x/3 + y/4 = 1$ are 4 units.
- Find the distance between the parallel lines $3x - 4y + 7 = 0$ and $3x - 4y + 5 = 0$.

3 Mark Questions

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

Area of a Triangle

MCQ Questions (choose the correct option)

- The area of the triangle with vertices $(-1, 0)$, $(0, 4)$ and $(3, 0)$ is
 - 8 sq units
 - 6 sq units
 - 12 sq units
 - 16 sq units
- Three points with area-form value 0 are
 - collinear
 - perpendicular
 - parallel
 - equidistant from origin
- The area of the triangle with vertices $(0, 0)$, $(4, 0)$ and $(0, 3)$ is
 - 6 sq units
 - 12 sq units
 - 7 sq units
 - 24 sq units
- The value of x for which the points $(x, -1)$, $(2, 1)$ and $(4, 5)$ are collinear is
 - 1
 - 2
 - 3
 - 5

1 Mark Questions

- Write the formula for the area of a triangle with vertices (x_1, y_1) , (x_2, y_2) and (x_3, y_3) .
- What does a zero area from the three-vertices formula signify?
- Find the area of the triangle with vertices $(0, 0)$, $(4, 0)$ and $(0, 3)$.
- State the collinearity condition of three points in terms of area.

2 Mark Questions

- Draw a quadrilateral in the Cartesian plane, whose vertices are $(-4, 5)$, $(0, 7)$, $(5, -5)$ and $(-4, -2)$. Also find its area.
- Find the area of the triangle formed by the lines $y - x = 0$, $x + y = 0$ and $x - k = 0$.
- By using the concept of the equation of a line (or the area formula), prove that the points $(3, 0)$, $(-2, -2)$ and $(8, 2)$ are collinear.
- Find the area of the triangle formed by the lines $2x + y - 5 = 0$, $x - y + 2 = 0$ and the x -axis.

3 Mark Questions

- The hypotenuse of a right angled triangle has its ends at the points $(1, 3)$ and $(-4, 1)$. Find the equations of the legs (perpendicular sides) of the triangle which are parallel to the axes, and hence the area of the triangle.
- Show that the area of the triangle formed by the lines $y = m_1x + c_1$, $y = m_2x + c_2$ and $x = 0$ equals $(c_1 - c_2)^2 / (2|m_1 - m_2|)$ square units, and verify it for $m_1 = 2$, $m_2 = 3$, $c_1 = 5$, $c_2 = -1$.
- Show that the area of the triangle with vertices $(2, 3)$, $(5, 7)$ and $(0, 2)$ equals the area of the triangle with vertices $(0, 0)$, $(2, 3)$, $(5, 7)$. Interpret this using translation of the origin.