Class 11 Maths Chapter 9: Straight Lines - Notes, Important Questions and MCQs (2026-27)

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Class 11 Maths Chapter 9, Straight Lines, uses coordinate geometry to describe lines algebraically through their slopes and equations.

These notes cover a recap of coordinate geometry, slope of a line, conditions for parallel and perpendicular lines, angle between two lines, collinearity, the various forms of the equation of a line and the distance of a point from a line.

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Chapter Overview

Coordinate geometry links algebra and geometry. A straight line can be described by its inclination (angle with the x-axis), its slope, or by points through which it passes.

Once a line’s equation is known, we can find intersections, distances, angles and test whether points are collinear.

Important Topics and Concepts

Recap of Coordinate Geometry

- Distance between (x_1, y_1) and (x_2, y_2): $\sqrt{((x_2 - x_1)^2 + (y_2 - y_1)^2)}$.
- Section formula (internal, ratio m : n): $((mx_2 + nx_1)/(m + n), (my_2 + ny_1)/(m + n))$.
- Mid-point: $((x_1 + x_2)/2, (y_1 + y_2)/2)$.

- Area of triangle: ½ |$x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)$|.

Slope of a Line

- If a line makes angle θ with the positive x-axis (inclination), slope $m = \tan\theta$, $\theta \neq 90°$.
- Slope through two points: $m = (y_2 - y_1)/(x_2 - x_1)$, $x_1 \neq x_2$.
- Slope of x-axis is 0; slope of y-axis is not defined.
- Parallel lines: $m_1 = m_2$.
- Perpendicular lines: $m_1 \times m_2 = -1$.

Angle Between Two Lines and Collinearity

- If θ is the angle between lines with slopes m_1 and m_2: $\tan\theta = |(m_2 - m_1)/(1 + m_1m_2)|$, $1 + m_1m_2 \neq 0$.
- Three points A, B, C are collinear if slope of AB = slope of BC (or the area of triangle ABC is zero).

Various Forms of the Equation of a Line

- Horizontal and vertical lines: $y = a$ (parallel to x-axis), $x = b$ (parallel to y-axis).
- Point-slope form: $y - y_0 = m(x - x_0)$.
- Two-point form: $y - y_1 = ((y_2 - y_1)/(x_2 - x_1))(x - x_1)$.
- Slope-intercept form: $y = mx + c$ (c = y-intercept); or $y = m(x - d)$ for x-intercept d.
- Intercept form: $x/a + y/b = 1$, where a and b are the x- and y-intercepts.

Distance of a Point from a Line

- Perpendicular distance of (x_1, y_1) from $Ax + By + C = 0$: $d = |Ax_1 + By_1 + C|/\sqrt{(A^2 + B^2)}$.
- Distance between parallel lines $Ax + By + C_1 = 0$ and $Ax + By + C_2 = 0$: $d = |C_1 - C_2|/\sqrt{(A^2 + B^2)}$.
- Example: distance of $(3, -5)$ from $3x - 4y - 26 = 0$ is $|9 + 20 - 26|/5 = 3/5$.

Forms of the Equation of a Line – When to Use

Given information	Form	Equation
A point and slope	Point-slope	$y - y_0 = m(x - x_0)$
Two points	Two-point	$y - y_1 = ((y_2-y_1)/(x_2-x_1))(x - x_1)$
Slope and y-intercept	Slope-intercept	$y = mx + c$
Both intercepts	Intercept	$x/a + y/b = 1$
Parallel to x-axis at distance a	Horizontal	$y = a$
Parallel to y-axis at distance b	Vertical	$x = b$

Important Definitions and Terms

Term	Meaning
Inclination	Angle θ a line makes with the positive x-axis.
Slope	$m = \tan\theta$; rate of change of y with x.

Term	Meaning
Collinear points	Points lying on the same line.
x-intercept	Point where the line meets the x-axis.
y-intercept	Point where the line meets the y-axis.
Perpendicular distance	Shortest distance from a point to a line.

Short Answer Questions

Q1. Find the slope of the line through (3, −2) and (−1, 4).

m = (4 + 2)/(−1 − 3) = 6/(−4) = −3/2.

Q2. Find the slope of a line inclined at 60°.

tan 60° = √3.

Q3. Are lines with slopes 2 and −1/2 perpendicular?

Yes, since 2 × (−1/2) = −1.

Q4. Write the equation of the line through (−2, 3) with slope −4.

y − 3 = −4(x + 2), i.e. 4x + y + 5 = 0.

Q5. Find the equation of the line with intercepts 3 and 2.

x/3 + y/2 = 1, i.e. 2x + 3y = 6.

Q6. Show that (4, 4), (3, 5), (−1, −1) are vertices of a right triangle.

Slope AB = −1, slope AC = 1; product = −1, so AB ⊥ AC.

Q7. Find the distance of (0, 0) from 3x + 4y − 10 = 0.

|−10|/5 = 2.

Q8. Find the angle between lines with slopes 1/√3 and √3.

tan θ = |(√3 − 1/√3)/(1 + 1)| = 1/√3, so θ = 30°.

Long Answer Questions

Q1. Find the equation of the line through (2, 2) cutting off intercepts whose sum is 9.

Let intercepts be a and 9 − a: x/a + y/(9 − a) = 1.

Through (2, 2): 2/a + 2/(9 − a) = 1 ⇒ 18 = a(9 − a) ⇒ $a^2 - 9a + 18 = 0$ ⇒ a = 3 or 6.

Lines: x/3 + y/6 = 1 (2x + y = 6) and x/6 + y/3 = 1 (x + 2y = 6).

Q2. Find the distance between the parallel lines 3x − 4y + 7 = 0 and 3x − 4y + 5 = 0.

Here A = 3, B = −4, $C_1 = 7$, $C_2 = 5$.

d = |7 − 5|/√(9 + 16) = 2/5.

The distance is 2/5 units.

Q3. Using slopes, show that (−2, −1), (4, 0), (3, 3) and (−3, 2) form a parallelogram.

Slope AB = 1/6, slope DC = 1/6 ⇒ AB ∥ DC.

Both pairs of opposite sides are parallel, so ABCD is a parallelogram.

MCQs with Answers

1. Slope of a line at 45°:(a) 0 (b) 1 (c) √3 (d) UndefinedAnswer: (b) 1

2. Slope of y-axis:(a) 0 (b) 1 (c) ∞ / undefined (d) −1Answer: (c) ∞ / undefined

3. Parallel lines have:(a) $m_1m_2 = -1$ (b) $m_1 = m_2$ (c) $m_1 + m_2 = 0$ (d) $m_1 = 0$Answer: (b) $m_1 = m_2$

4. Intercept form:(a) $y = mx + c$ (b) $x/a + y/b = 1$ (c) $y - y_1 = m(x - x_1)$ (d) $ax + by = 0$Answer: (b) $x/a + y/b = 1$

5. Distance of (1,1) from $x + y = 0$:(a) √2 (b) 1/√2 (c) 2 (d) 0Answer: (a) √2

6. Line parallel to x-axis through (2, 5):(a) $x = 2$ (b) $y = 5$ (c) $y = 2$ (d) $x = 5$Answer: (b) $y = 5$

7. y-intercept of $y = 3x - 7$:(a) 3 (b) −7 (c) 7 (d) −3Answer: (b) −7

8. Perpendicular slope to 3/4:(a) 4/3 (b) −4/3 (c) −3/4 (d) 3/4Answer: (b) −4/3

9. Collinear points have triangle area:(a) 1 (b) 0 (c) Negative (d) InfiniteAnswer: (b) 0

10. tan θ for angle between lines uses:(a) $(m_1+m_2)/(1-m_1m_2)$ (b) $|(m_2-m_1)/(1+m_1m_2)|$ (c) m_1m_2 (d) m_1/m_2Answer: (b) $|(m_2-m_1)/(1+m_1m_2)|$

Quick Revision Points

- Distance, section and mid-point formulas.
- $m = \tan\theta = (y_2 - y_1)/(x_2 - x_1)$.
- Parallel: $m_1 = m_2$; perpendicular: $m_1m_2 = -1$.
- $\tan\theta = |(m_2 - m_1)/(1 + m_1m_2)|$.
- Collinearity via equal slopes or zero area.
- Point-slope: $y - y_0 = m(x - x_0)$.
- Two-point and slope-intercept forms.
- Intercept form: $x/a + y/b = 1$.
- Distance of point from line: $|Ax_1 + By_1 + C|/\sqrt{(A^2 + B^2)}$.
- Distance between parallel lines: $|C_1 - C_2|/\sqrt{(A^2 + B^2)}$.

Chapter Summary

A straight line is described by its slope, the tangent of its inclination. Slopes decide whether lines are parallel (equal) or perpendicular (product −1) and give the angle between lines. Equal slopes also test collinearity.

The equation of a line can be written in point-slope, two-point, slope-intercept or intercept form depending on the data. Distance formulas give the perpendicular distance from a point to a line and between parallel lines.

Exam Tips and PYQ Pattern

- Choose the form of the line based on what is given – use the table.
- Convert all equations to $Ax + By + C = 0$ before applying distance formulas.
- For perpendicular lines, remember $m_2 = -1/m_1$.
- Draw a rough sketch to check signs of intercepts.
- Simplify final equations to integer coefficients.
- Normal form and general equation transformations are outside the rationalised scope.

Frequently Asked Questions

Is this chapter in the 2026-27 CBSE syllabus?

Yes. It is part of the NCERT Class 11 Mathematics textbook, prescribed in the CBSE 2026-27 syllabus.

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Yes. Use the free PDF link at the top of this page – no signup needed.

What are the forms of the equation of a straight line?

Horizontal/vertical, point-slope, two-point, slope-intercept and intercept forms.

What is the condition for perpendicular lines?

The product of their slopes is -1.

How do you find the distance of a point from a line?

Use $d = |Ax_1 + By_1 + C|/\sqrt{(A^2 + B^2)}$.

Conclusion

Straight Lines is formula-based and scoring. Use the when-to-use table, practise distance and angle problems, and download the free PDF.

More Notes: Class 11 Maths Chapter 8: Sequences and Series notes | Class 11 Maths Chapter 10: Conic Sections notes | All Class 11 Maths notes

Author Bio: Written and reviewed by the Nextoper Editorial Team, a group of CBSE maths educators who build chapter notes directly from the NCERT textbook and past board paper patterns.

Freshness Note: These notes follow the NCERT Class 11 Maths textbook, Mathematics (Class XI) (NCERT reprint 2026-27, rationalised syllabus), and the CBSE syllabus for the 2026-27 session. Last checked on 28 November 2026.