

## Straight Lines — CBSE Pattern Test 1

Class 11 Mathematics · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

### Test 1 — CBSE Pattern (90 minutes, 40 marks)

Class 11 Mathematics · Straight Lines · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A ( $1 \times 10$ ), Section B ( $2 \times 4$ ), Section C ( $3 \times 4$ ) and Section D ( $5 \times 2$ ) — total 40 marks. Time allowed: 90 minutes.  
(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.  
(3) For MCQ questions choose the single correct option; for VSA answers write a single line.  
(4) Take  $g = 10 \text{ m/s}^2$ . All symbols carry their usual meaning. Use of a calculator is not permitted.

#### Section A — MCQ & VSA ( $10 \times 1 = 10$ marks)

- The slope of the line joining the points  $(0, -4)$  and  $(8, 0)$  is
  - $1/2$
  - $2$
  - $-1/2$
  - $4$
- The slope of the line  $3x + 4y = 12$  is
  - $-3/4$
  - $3/4$
  - $-4/3$
  - $4/3$
- If two non-vertical lines are perpendicular, the product of their slopes is
  - $-1$
  - $1$
  - $0$
  - undefined
- The perpendicular distance of the origin from the line  $3x + 4y - 10 = 0$  is
  - $2$
  - $10$
  - $1/2$
  - $5/2$
- The angle between the x-axis and the line joining  $(3, -1)$  and  $(4, -2)$  is
  - $45^\circ$
  - $135^\circ$
  - $30^\circ$
  - $90^\circ$
- The x-intercept of the line  $x/2 + y/3 = 1$  is
  - $2$
  - $3$
  - $6$
  - $1$
- Write the equation of the x-axis.
- Write the normal form of the equation of a line in terms of  $p$  and the angle of the normal  $\alpha$ .

9. Find the area of the triangle with vertices (0, 0), (4, 0) and (0, 3).  
 10. When are the two lines  $ax + by + c = 0$  and  $a'x + b'y + c' = 0$  parallel (give the ratio condition)?

### Section B — Short Answer I ( $4 \times 2 = 8$ marks)

11. Reduce  $6x + 3y - 5 = 0$  to slope-intercept form and find its slope and y-intercept.  
 12. Find the distance between the parallel lines  $15x + 8y - 34 = 0$  and  $15x + 8y + 31 = 0$ .  
 13. Find the equation of the line passing through the point  $(-4, 3)$  with slope  $1/2$ .  
 14. Find the value of  $x$  for which the points  $(x, -1)$ ,  $(2, 1)$  and  $(4, 5)$  are collinear.

### Section C — Short Answer II ( $4 \times 3 = 12$ marks)

15. Reduce  $4x - 3y = 6$  into intercept form, write its intercepts on the axes, and then express it in slope-intercept form.  
 16. Find the equation of the line passing through  $(-2, 3)$  and parallel to the line  $3x - 4y + 2 = 0$ .  
 17. Find the angle between the lines  $\sqrt{3}x + y = 1$  and  $x + \sqrt{3}y = 1$ .  
 18. Find the area of the triangle formed by the lines  $y - x = 0$ ,  $x + y = 0$  and  $x - k = 0$ .

### Section D — Long Answers ( $2 \times 5 = 10$ marks)

19. (a) Using slopes, prove that the points  $(-2, -1)$ ,  $(4, 0)$ ,  $(3, 3)$  and  $(-3, 2)$  are the vertices of a parallelogram. (b) Find the area of this parallelogram.  
 20. (a) Find the equation and length of the altitude from A to the side BC of triangle ABC, where  $A(2, 3)$ ,  $B(4, -1)$  and  $C(1, 2)$ . (b) Find the distance between the parallel lines  $3x + 4y + 7 = 0$  and  $3x + 4y + 5 = 0$ , and the angle between the lines  $x + y = 1$  and  $x - y = 1$ .

### Answer Key (Marking Scheme)

- Q1 — (A)  $1/2$  ( $m = (0+4)/(8-0) = 4/8$ ). Q2 — (A)  $-3/4$ . Q3 — (A)  $-1$ .  
 Q4 — (A)  $2$  ( $| -10|/5$ ). Q5 — (A)  $45^\circ$  (slope  $-1$ , but angle of  $-45^\circ$  with positive x-axis  $\Rightarrow$  acute angle  $45^\circ$ ). Q6 — (A)  $2$ .  
 Q7 — x-axis:  $y = 0$ . Q8 —  $x \cos \alpha + y \sin \alpha = p$ .  
 Q9 — Area =  $|0(0-3)+4(3-0)+0(0-0)|/2 = 12/2 = 6$  sq units. Q10 — Parallel when  $a/a' = b/b' \neq c/c'$  (equal slope, unequal constant ratio).  
 Q11 —  $y = -2x + 5/3$ : slope  $-2$ , y-intercept  $5/3$ . Q12 —  $d = |31 - (-34)|/\sqrt{15^2+8^2} = 65/17$  units.  
 Q13 —  $y - 3 = (1/2)(x + 4) \Rightarrow -2y + 10 = 0$ . Q14 — Slopes equal:  $(1+1)/(2-x) = (5-1)/(4-2) \Rightarrow 2/(2-x) = 2 \Rightarrow 1$ .  
 Q15 —  $x/(3/2) + y/(-2) = 1$ : intercepts  $3/2$  and  $-2$ ;  $y = (4/3)x - 2$ . Q16 —  $3x - 4y + 18 = 0$ .  
 Q17 — Slopes  $-\sqrt{3}$  and  $-1/\sqrt{3}$   $\Rightarrow \tan \theta = |(-1/\sqrt{3} + \sqrt{3})/(1+1)| = 1/\sqrt{3} \Rightarrow \theta = 30^\circ$ . Q18 — Vertices  $(k, -k)$ ,  $(k, k)$  and  $(0, 0)$ : base  $2k$ , height  $k \Rightarrow$  area  $k^2$  sq units.  
 Q19 — (a) Slope AB =  $1/6$  = slope DC; slope BC =  $-3$  = slope AD  $\Rightarrow$  opposite sides parallel. (b) Shoelace:  $\sum x_i y_{i+1} = 21$ ,  $\sum y_i x_{i+1} = -17 \Rightarrow$  area =  $1/2|21 - (-17)| = 19$  sq units.  
 Q20 — (a) Slope BC =  $-1 \Rightarrow$  altitude slope  $1$ :  $x - y + 1 = 0$ ; foot =  $C(1, 2)$ ; length =  $|2+3-3|/\sqrt{2} = \sqrt{2}$  units. (b)  $d = |7 - 5|/\sqrt{3^2+4^2} = 2/5$  units; lines have slopes  $-1$  and  $1 \Rightarrow$  perpendicular  $\Rightarrow 90^\circ$ .