Coordinate Geometry (Advanced)

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. The slope of the line through (−5, 2) and (−4, 9) is:
(a) 1/7 **(b)** −7 **(c)** −11/9 **(d)** 7

2. P(9, 8) is reflected in the y-axis, then moved 6 units right and 4 units down. It ends at:
(a) (−4, 4) **(b)** (−15, 12) **(c)** (−3, 4) **(d)** (15, 4)

3. A line with a negative slope:
(a) is horizontal **(b)** is vertical
(c) rises from left to right **(d)** falls from left to right

4. The line through A(5, k) and B(k, −39) is parallel to the line through C(2, 5) and D(4, 11). Then k is:
(a) −6 **(b)** 6 **(c)** −8 **(d)** −5

5. The y-intercept of the line −x − y + 11 = 0 is:
(a) 1/11 **(b)** −11 **(c)** −1 **(d)** 11

6. Reflecting a point in the y-axis changes:
(a) nothing **(b)** the sign of its y-coordinate
(c) the signs of both coordinates **(d)** the sign of its x-coordinate

7. The slope of a line perpendicular to −3x − 5y + 10 = 0 is:
(a) 3/5 **(b)** −3/5 **(c)** 5/3 **(d)** −5/3

8. The area of the triangle that the line −x + y + 1 = 0 makes with the coordinate axes is:
(a) 1/4 square units **(b)** 3/2 square units
(c) 1 square units **(d)** 1/2 square units

Section B — Short answer — 8 × 2 = 16 marks

9. Find the equation, in slope-intercept form, of the line through (−5, 5) and (−3, 7). Where does it cut the y-axis?

10. Write 4x + 8y − 7 = 0 in slope-intercept form, and give its slope and y-intercept.

11. A line with slope 3/4 passes through A(x, −1), B(4, 2) and C(8, y). Find x and y.

12. The coefficients of the line Ax + By + C = 0 always satisfy −5A + 4B + C = 0. Show that every such line passes through one fixed point, and find it.

13. A line through (6, −4) makes intercepts on the axes that are equal in size but opposite in sign. Find its equation.

14. Point M(a, b) lies in quadrant I. Its perpendicular distance from the x-axis is 11 units and from the y-axis is 8 units. Find (a) the coordinates of M (b) the value of (b − a)/(b + a).

15. Line p has slope 3. Line q passes through M(−a, 2) and N(a, 1). If p and q are perpendicular, find a.

16. For the line −5x + 4y + 10 = 0, find the slope and both intercepts, and name the quadrant it never passes through.

Section C — Word problems — 4 × 4 = 16 marks

17. A line passes through (10, 3). Its x-intercept and y-intercept are both positive and add up to 24. Find all possible equations of the line in intercept form.

18. The line kx + 2y − 10 = 0 makes a right-angled triangle of area 5 square units with the coordinate axes. Find the possible values of k and the slope of the line in each case.

19. P(3, 4), Q(7, 6) and R(3, k) are three consecutive vertices of a rectangle PQRS. Find (a) k (b) the fourth vertex S.

20. Find the equation of the line through (2, 1) perpendicular to 6x + 4y + 6 = 0, in slope-intercept form. Where does it cut each axis?

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Answer key

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Q	Answer	Working
1	**(d) 7**	(9 − 2) ÷ (−4 − (−5)) = 7 ÷ 1 = 7
2	**(c) (−3, 4)**	reflection gives (−9, 8); then (−9 + 6, 8 − 4)
3	**(d) falls from left to right**	the rise is negative for a positive run
4	**(a) −6**	slope CD = 3; (−39 − k) ÷ (k − 5) = 3, so 4k = −24
5	**(d) 11**	put x = 0: y = −11/−1
6	**(d) the sign of its x-coordinate**	the y-axis is the mirror: left and right swap
7	**(c) 5/3**	slope of the line = −A/B = −3/5; perpendicular slope = −1 ÷ (−3/5) = 5/3
8	**(d) 1/2 square units**	intercepts 1 and −1; area = ½ × 1 × 1
9	**y = x + 10; at (0, 10)**	m = 2 ÷ 2 = 1; c = 5 − (1) × (−5) = 10
10	**y = −(1/2)x + 7/8; slope −1/2, y-intercept 7/8**	8y = −4x + 7, then divide by 8
11	**x = 0, y = 5**	(2 − (−1)) ÷ (4 − x) = 3/4 gives x = 0; (y − 2) ÷ (8 − 4) = 3/4 gives y = 5
12	**(−5, 4)**	A(−5) + B(4) + C = 0, which is the line's equation at x = −5, y = 4
13	**x − y = 10**	x/a + y/(−a) = 1, so x − y = a; 6 − (−4) = 10
14	**(a) (8, 11); (b) 3/19**	|b| = 11, |a| = 8; signs from the quadrant; (11 − 8) ÷ (11 + 8)
15	**a = 3/2**	slope of q = (1 − 2) ÷ (a − (−a)) = −1 ÷ (2a); (slope of p) × (slope of q) = −1 gives −3 = −2a
16	**slope 5/4, x-intercept 2, y-intercept −5/2; it misses quadrant II**	slope = −A/B; x-intercept = −C/A; y-intercept = −C/B; a line through (2, 0) and (0, −5/2) passes through the other three quadrants
17	**x/15 + y/9 = 1 or x/16 + y/8 = 1**	x/a + y/(24 − a) = 1 through (10, 3): $a^2 - 31a + 240 = 0$, so a = 15 or 16
18	**k = 5 or k = −5; slope −5/2 or 5/2**	intercepts 10/k and 5; ½ × |10/k| × 5 = 5 gives |k| = 5; slope = −k/2
19	**(a) k = 14; (b) (−1, 12)**	slope PQ = 1/2, so QR has slope −2: (k − 6) ÷ (3 − 7) = −2; S = P + R − Q
20	**y = (2/3)x − 1/3; y-axis at (0, −1/3), x-axis at (1/2, 0)**	given slope −3/2, so the perpendicular slope is 2/3; c = 1 − (2/3) × 2 = −1/3

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