# Straight Lines

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 (8, 8) is:
**(a)** 13/6 **(b)** −6/13 **(c)** 19/13 **(d)** 6/13

**2.** The equation of the line through (7, 6) with slope −2 is:
**(a)** x − 2y + 20 = 0 **(b)** 2x + y + 20 = 0
**(c)** 2x − y − 20 = 0 **(d)** 2x + y − 20 = 0

**3.** A line has slope −5/4. The slope of a line perpendicular to it is:
**(a)** 4/5 **(b)** −5/4 **(c)** 5/4 **(d)** −4/5

**4.** The intercepts of the line 2x − 3y − 12 = 0 on the x- and y-axes are:
**(a)** −2 and 3 **(b)** −4 and 6 **(c)** −6 and 4 **(d)** 6 and −4

**5.** Two non-vertical lines are parallel if and only if their slopes are:
**(a)** both 1 **(b)** negative reciprocals
**(c)** both zero **(d)** equal

**6.** The distance of the point (1, −8) from the line 20x − 21y − 362 = 0 is:
**(a)** 6 **(b)** 12 **(c)** 7 **(d)** 174

**7.** A line makes an angle of 30° with the positive direction of the x-axis. Its slope is:
**(a)** 0 **(b)** $-1/\sqrt{3}$ **(c)** −1 **(d)** $1/\sqrt{3}$

**8.** Assertion (A): A line with slope 3/5 is perpendicular to a line with slope −5/3.
Reason (R): Two lines are perpendicular when the product of their slopes is 1.
**(a)** Both A and R are true, and R is the correct explanation of A.
**(b)** Both A and R are true, but R is not the correct explanation of A.
**(c)** A is true, but R is false.
**(d)** A is false, but R is true.

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

**9.** Find the equation of the line through (5, 7) and (8, 8).

**10.** Find the equation of the line that makes intercepts 1 and 3 on the x- and y-axes.

**11.** Find the distance of the point (5, 7) from the line $15x - 8y - 21 = 0$.

**12.** Find the distance between the parallel lines $12x + 5y - 13 = 0$ and $12x + 5y + 8 = 0$.

**13.** Use slopes to decide whether the points (7, 0), (11, 0) and (23, 0) are collinear.

**14.** Find the equation of the line through (0, −8) that is perpendicular to $5x - 4y - 3 = 0$.

**15.** Write $8x - 8y - 7 = 0$ in slope-intercept form, and find its slope and its intercepts on the axes.

**16.** Find the tangent of the acute angle between two lines with slopes 1 and 3/2.

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

**17.** The vertices of a triangle are P(5, −7), Q(1, 2) and R(6, −5). Find the equations of (a) side QR, (b) the median from P, (c) the altitude from P.

**18.** Find the foot of the perpendicular from (5, 7) to the line $4x - 5y - 7 = 0$, and the length of the perpendicular.

**19.** Find the point of intersection of $4x - 3y + 24 = 0$ and $2x - y + 12 = 0$. Then find the line through this point with slope $-4$, and the line through it and the origin.

**20.** Find the equation of the perpendicular bisector of the segment joining A$(-8, 6)$ and B$(-6, -2)$. Check that the midpoint lies on it.

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# Answer key

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| Q | Answer | Working |
|---|---|---|
| 1 | **(d) 6/13** | (8 − 2) ÷ (8 − (−5)) |
| 2 | **(d) 2x + y − 20 = 0** | y − 6 = −2(x − 7) |
| 3 | **(a) 4/5** | $m_1m_2 = -1$ |
| 4 | **(d) 6 and −4** | put y = 0, then x = 0 |
| 5 | **(d) equal** | — |
| 6 | **(a) 6** | $\lvert -20 \times 1 + 21 \times (-8) + 362\rvert \div \sqrt{(20^2 + 21^2)} = 174 \div 29$ |
| 7 | **(d) 1/√3** | tan 30° |
| 8 | **(c) A is true, but R is false.** | A is true: 3/5 × −5/3 = −1. R is false. |
| 9 | **x − 3y + 16 = 0** | slope 1/3; y − 7 = m(x − 5) |
| 10 | **3x + y − 3 = 0** | x/1 + y/3 = 1 |
| 11 | **2/17** | $\lvert -2\rvert \div 17$ |
| 12 | **21/13** | $\lvert C_1 - C_2\rvert \div \sqrt{(A^2 + B^2)} = 21 \div 13$ |
| 13 | **Slope AB = 0, slope BC = 0: equal, so they are collinear** | — |
| 14 | **4x + 5y + 40 = 0** | slope −4/5 (negative reciprocal of 5/4) |
| 15 | **y = x − 7/8; slope 1; x-intercept 7/8, y-intercept −7/8** | y = (−a/b)x − c/b |
| 16 | **tan θ = 1/5** | $\tan\theta = \lvert(m_2 - m_1) \div (1 + m_1m_2)\rvert$ |
| 17 | **(a) 7x + 5y − 17 = 0; (b) 11x + 3y − 34 = 0; (c) 5x − 7y − 74 = 0** | midpoint of QR (7/2, −3/2); altitude ⊥ QR |
| 18 | **Foot (293/41, 177/41); length 22√41/41** | foot = $(x_1 + ak, y_1 + bk)$ with $k = -(ax_1 + by_1 + c) \div (a^2 + b^2) = 22/41$ |
| 19 | **(−6, 0); 4x + y + 24 = 0; y = 0** | solve the two equations together |
| 20 | **x − 4y + 15 = 0; midpoint (−7, 2) satisfies it** | points equidistant from A and B: $(x - (-8))^2 + (y - 6)^2 = (x - (-6))^2 + (y - (-2))^2$ |



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