EXPRESSWALA ACADEMY

Maths 1B: Straight Lines

MCQ Test, Set 10

Time: 30 minutes | Maximum marks: 25

Name: _____ Class: _____ Date: _____

1. There are 25 questions. Each has exactly one correct answer: choose A, B, C or D.
2. Each correct answer carries 1 mark. There is no negative marking.
3. The key sheet and worked solutions are at the end of this test.

1. The slope of the line through $(-6, 0)$ and $(2, 3)$ is

A. $\frac{8}{3}$ **B.** $-\frac{3}{4}$ **C.** $\frac{3}{8}$ **D.** $-\frac{3}{8}$

2. The line through $(-5, 1)$ and $(-3, 3)$ and the line through $(4, 3)$ and $(5, 2)$ are

A. perpendicular **B.** parallel

C. the same line **D.** neither parallel nor perpendicular

3. The distance between $(2, -1)$ and $(4, 3)$ is

A. 20 **B.** $2\sqrt{2}$ **C.** $2\sqrt{13}$ **D.** $2\sqrt{5}$

4. The y-axis divides the join of $(1, -1)$ and $(6, 3)$ in the ratio

A. $1 : 6$ externally **B.** $6 : 1$ externally

C. $6 : 1$ internally **D.** $1 : 6$ internally

5. The point dividing the join of $(-5, 7)$ and $(-1, -4)$ internally in the ratio $4 : 3$ is

A. $(-\frac{19}{7}, \frac{5}{7})$ **B.** $(-17, 40)$

C. $(11, -37)$ **D.** $(-\frac{23}{7}, \frac{16}{7})$

6. The points of trisection of the join of $(-1, -4)$ and $(-10, 2)$ are

A. $(-\frac{11}{2}, -4),\ (-10, -1)$ **B.** $(-4, -2),\ (-7, 0)$

C. $(2, -6),\ (-13, 4)$ **D.** $(-\frac{11}{2}, -1),\ (-7, 0)$

7. $A(-4, 1)$, $B(-2, -1)$, $C(-2, 3)$ are three vertices of the parallelogram $ABCD$. The fourth vertex D is

A. $(0, 1)$ **B.** $(-3, 2)$ **C.** $(-4, 5)$ **D.** $(-4, -3)$

8. The area of the triangle with vertices $(-1, -2)$, $(-1, 2)$, $(-4, -4)$ is

A. 6 **B.** 3 **C.** 12 **D.** 7

9. The locus of a point equidistant from $A(4, 2)$ and $B(-2, -1)$ is

A. $4x - 2y - 5 = 0$ **B.** $4x + 2y - 15 = 0$ **C.** $-4x + 2y - 5 = 0$ **D.** $4x + 2y - 5 = 0$

10. The line through $(7, -2)$ with slope $-\frac{3}{5}$ is

A. $3x + 5y - 11 = 0$ **B.** $3x + 5y + 11 = 0$ **C.** $3x - 5y - 31 = 0$ **D.** $5x - 3y - 41 = 0$

11. The line with x-intercept -5 and y-intercept -4 is

A. $4x - 5y + 20 = 0$ **B.** $4x + 5y - 20 = 0$ **C.** $5x + 4y + 20 = 0$ **D.** $4x + 5y + 20 = 0$

12. When $x - y - 14 = 0$ is written as $x\cos\alpha + y\sin\alpha = p$, the value of α is

A. 225° **B.** 45° **C.** 315° **D.** 135°

13. The distance of $(-4, 6)$ from the line $x - 3y - 10 = 0$ measured along a line of inclination 0° is

A. $\frac{16\sqrt{10}}{5}$ **B.** $\frac{32}{3}$ **C.** 32 **D.** 64

14. The perpendicular distance from $(0, 2)$ to $x - 2y = 0$ is

A. 0 **B.** $\frac{4\sqrt{5}}{5}$ **C.** 4 **D.** $\frac{4}{5}$

15. The distance between the parallel lines $x + 2y - 6 = 0$ and $x + 2y - 8 = 0$ is

A. $\frac{2\sqrt{5}}{5}$ **B.** 2.0 **C.** $\frac{14\sqrt{5}}{5}$ **D.** $\frac{4\sqrt{5}}{5}$

16. $(2, -2)$ and $(1, 4)$ are two vertices of an equilateral triangle. The third vertex is

A. $(\frac{3}{2} - 6\sqrt{3}, 1 - \sqrt{3})$ or $(\frac{3}{2} + 6\sqrt{3}, 1 + \sqrt{3})$

B. $(\frac{3}{2} - 3\sqrt{3}, \frac{\sqrt{3}}{2} + 1)$ or $(\frac{3}{2} + 3\sqrt{3}, 1 - \frac{\sqrt{3}}{2})$

C. $(\frac{3}{2} - 3\sqrt{3}, 1 - \frac{\sqrt{3}}{2})$ or $(\frac{3}{2} + 3\sqrt{3}, \frac{\sqrt{3}}{2} + 1)$

D. $(\frac{5}{2} - 3\sqrt{3}, 1 - \frac{\sqrt{3}}{2})$ or $(\frac{1}{2} + 3\sqrt{3}, \frac{\sqrt{3}}{2} + 1)$

17. The line $x + y - 1 = 0$ divides the join of $(-1, -3)$ and $(0, 3)$ in the ratio

A. $2 : 5$ externally **B.** $5 : 2$ internally

C. $2 : 5$ internally **D.** $5 : 2$ externally

18. The point of intersection of $4x + y + 5 = 0$ and $x - 3y - 2 = 0$ is

A. $(1, -1)$ **B.** $(-1, -1)$ **C.** $(-1, 1)$ **D.** $(1, 1)$

19. The centroid of the triangle with vertices $(0, 4)$, $(3, 4)$, $(-1, 1)$ is

A. $(1, \frac{9}{2})$ **B.** $(2, 9)$ **C.** $(3, \frac{2}{3})$ **D.** $(\frac{2}{3}, 3)$

20. The slopes of the lines making an angle of 45° with a line of slope 5 are

A. $\frac{2}{3},\ \frac{3}{2}$ **B.** $\frac{2}{3},\ -\frac{3}{2}$

C. $\frac{3}{2},\ -\frac{2}{3}$ **D.** $-\frac{2}{3},\ \frac{3}{2}$

21. For the lines $15x + 8y + 8 = 0$ and $3x + 4y + 3 = 0$, the bisector of the acute angle is

A. $24x - 28y - 11 = 0$ **B.** $18x + 12y + 11 = 0$ **C.** $12x + 4y + 5 = 0$ **D.** $126x + 108y + 91 = 0$

22. The area of the rhombus $3|x| + 2|y| = 12$ is

A. 12 **B.** 48 **C.** 24 **D.** 96

23. The image of $(4, 2)$ in the line $y = -x$ is

A. $(-2, -4)$ **B.** $(-4, -2)$ **C.** $(2, 4)$ **D.** $(4, -2)$

24. P is a point on the x-axis, $A = (5, 5)$ and $B = (-2, 5)$. The least value of $PA + PB$ is

A. 10 **B.** 8 **C.** $\sqrt{149}$ **D.** 7

25. The locus of the point $(5t^2, 10t)$, t a parameter, is

A. $x^2 = 20y$ **B.** $y^2 = 10x$ **C.** $y^2 = 5x$ **D.** $y^2 = 20x$

Key sheet

1. C	**2.** A	**3.** D	**4.** A	**5.** A
6. B	**7.** C	**8.** A	**9.** D	**10.** A
11. D	**12.** C	**13.** C	**14.** B	**15.** A
16. C	**17.** B	**18.** B	**19.** D	**20.** B
21. D	**22.** B	**23.** A	**24.** C	**25.** D

Solutions

1. The slope of the line through $(-6, 0)$ and $(2, 3)$ is

$m = \frac{3-0}{2-(-6)} = \frac{3}{8}$

Ans: (C) $\frac{3}{8}$

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2. The line through $(-5, 1)$ and $(-3, 3)$ and the line through $(4, 3)$ and $(5, 2)$ are

$m_1 = 1,\ m_2 = -1$

$m_1 m_2 = -1$, so the lines are perpendicular.

Ans: (A) perpendicular

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3. The distance between $(2, -1)$ and $(4, 3)$ is

$\sqrt{(4-2)^2 + (3-(-1))^2} = \sqrt{20} = 2\sqrt{5}$

Ans: (D) $2\sqrt{5}$

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4. The y-axis divides the join of $(1, -1)$ and $(6, 3)$ in the ratio

The y-axis divides it in the ratio $-x_1 : x_2 = -1 : 6$

$= 1 : 6$, externally

Ans: (A) $1 : 6$ **externally**

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5. The point dividing the join of $(-5, 7)$ and $(-1, -4)$ internally in the ratio $4 : 3$ is

$\frac{mB+nA}{m+n} = (-\frac{19}{7}, \frac{5}{7})$

Ans: (A) $(-\frac{19}{7}, \frac{5}{7})$

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6. The points of trisection of the join of $(-1, -4)$ and $(-10, 2)$ are

They divide AB in the ratios $1 : 2$ and $2 : 1$.

$(-4, -2),\ (-7, 0)$

Ans: (B) $(-4, -2),\ (-7, 0)$

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7. $A(-4, 1)$, $B(-2, -1)$, $C(-2, 3)$ are three vertices of the parallelogram $ABCD$. The fourth vertex D is

$D = A + C - B = (-4, 5)$

Ans: (C) $(-4, 5)$

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8. The area of the triangle with vertices $(-1, -2)$, $(-1, 2)$, $(-4, -4)$ is

$\frac{1}{2}|-1(6) + (-1)(-2) + (-4)(-4)| = 6$

Ans: (A) 6

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9. The locus of a point equidistant from $A(4, 2)$ and $B(-2, -1)$ is

Let $P(x, y)$ be on the locus: $PA^2 = PB^2$

$4x + 2y - 5 = 0$

This is the perpendicular bisector of AB.

Ans: (D) $4x + 2y - 5 = 0$

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10. The line through $(7, -2)$ with slope $-\frac{3}{5}$ is

$y - y_1 = m(x - x_1)$

$3x + 5y - 11 = 0$

Ans: (A) $3x + 5y - 11 = 0$

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11. The line with x-intercept -5 and y-intercept -4 is

$\frac{x}{-5} + \frac{y}{-4} = 1$

$4x + 5y + 20 = 0$

Ans: (D) $4x + 5y + 20 = 0$

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12. When $x - y - 14 = 0$ is written as $x\cos\alpha + y\sin\alpha = p$, the value of α is

Move the constant to the right so that it is positive, then divide by $\sqrt{a^2 + b^2} = \sqrt{2}$

$x\cos 315^\circ + y\sin 315^\circ = 7\sqrt{2}$

Ans: (C) 315°

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13. The distance of $(-4, 6)$ from the line $x - 3y - 10 = 0$ measured along a line of inclination 0° is

$\left|\frac{ax_1 + by_1 + c}{a\cos\theta + b\sin\theta}\right| = \left|\frac{-32}{1}\right| = 32$

Ans: (C) 32

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14. The perpendicular distance from $(0, 2)$ to $x - 2y = 0$ is

$\frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}} = \frac{|-4|}{\sqrt{5}} = \frac{4\sqrt{5}}{5}$

Ans: (B) $\frac{4\sqrt{5}}{5}$

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15. The distance between the parallel lines $x + 2y - 6 = 0$ and $x + 2y - 8 = 0$ is

$\frac{|c_1 - c_2|}{\sqrt{a^2 + b^2}} = \frac{|2.0|}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

Ans: (A) $\frac{2\sqrt{5}}{5}$

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16. $(2, -2)$ and $(1, 4)$ are two vertices of an equilateral triangle. The third vertex is

$\left(\frac{(x_1 + x_2) \pm \sqrt{3}(y_1 - y_2)}{2}, \frac{(y_1 + y_2) \mp \sqrt{3}(x_1 - x_2)}{2}\right)$

$(\frac{3}{2} - 3\sqrt{3}, 1 - \frac{\sqrt{3}}{2})$ or $(\frac{3}{2} + 3\sqrt{3}, \frac{\sqrt{3}}{2} + 1)$

Ans: (C) $(\frac{3}{2} - 3\sqrt{3}, 1 - \frac{\sqrt{3}}{2})$ or $(\frac{3}{2} + 3\sqrt{3}, \frac{\sqrt{3}}{2} + 1)$

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17. The line $x + y - 1 = 0$ divides the join of $(-1, -3)$ and $(0, 3)$ in the ratio

$L_{11} = -5,\ L_{22} = 2$

$-L_{11} : L_{22} = 5 : 2$ internally

Ans: (B) $5 : 2$ **internally**

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18. The point of intersection of $4x + y + 5 = 0$ and $x - 3y - 2 = 0$ is

Solve the two equations together (cross-multiplication).

$(-1, -1)$

Ans: (B) $(-1, -1)$

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19. The centroid of the triangle with vertices $(0,4)$, $(3,4)$, $(-1,1)$ is

$G = \frac{A+B+C}{3} = (\frac{2}{3}, 3)$

Ans: (D) $(\frac{2}{3}, 3)$

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20. The slopes of the lines making an angle of 45° with a line of slope 5 are

$\frac{m-\tan\alpha}{1+m\tan\alpha},\ \frac{m+\tan\alpha}{1-m\tan\alpha}$

$\frac{2}{3},\ -\frac{3}{2}$

Ans: (B) $\frac{2}{3},\ -\frac{3}{2}$

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21. For the lines $15x + 8y + 8 = 0$ and $3x + 4y + 3 = 0$, the bisector of the acute angle is

$\frac{15x+8y+8}{17} = \pm\frac{3x+4y+3}{5}$

The required bisector is $126x + 108y + 91 = 0$

Ans: (D) $126x + 108y + 91 = 0$

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22. The area of the rhombus $3|x| + 2|y| = 12$ is

Vertices $(\pm 4, 0)\,,\ (0, \pm 6)$

$\frac{2c^2}{|ab|} = 48$

Ans: (B) 48

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23. The image of $(4,2)$ in the line $y = -x$ is

Reflect across $y = -x$: $(-2, -4)$

Ans: (A) $(-2, -4)$

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24. P is a point on the x-axis, $A = (5,5)$ and $B = (-2,5)$. The least value of $PA + PB$ is

A and B are on the same side of the x-axis; reflect B to $B'(-2,-5)$.

$PA + PB \geq AB' = \sqrt{149} = \sqrt{149}$

Equality when $P = (\frac{3}{2}, 0)$.

Ans: (C) $\sqrt{149}$

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25. The locus of the point $(5t^2, 10t)$, t a parameter, is

$t = \frac{y}{10}$, so $x = 5 \cdot \frac{y^2}{100}$:

$y^2 = 20x$

Ans: (D) $y^2 = 20x$
