EXPRESSWALA ACADEMY

Maths 1B: Straight Lines

MCQ Test, Set 06

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 $(-1, -5)$ and $(7, 6)$ is

A. $\frac{1}{6}$ **B.** $\frac{8}{11}$ **C.** $\frac{11}{8}$ **D.** $-\frac{11}{8}$

2. The inclination of a line with slope $-\frac{\sqrt{3}}{3}$ is

A. 330° **B.** 30° **C.** 150° **D.** 60°

3. The point on the x-axis equidistant from $(0, 7)$ and $(-4, 0)$ is

A. $(\frac{33}{8}, 0)$ **B.** $(-2, 0)$ **C.** $(0, \frac{33}{8})$ **D.** $(-\frac{33}{8}, 0)$

4. The x-axis divides the join of $(5, -2)$ and $(5, 6)$ in the ratio

A. $3 : 1$ internally **B.** $1 : 3$ externally

C. $1 : 3$ internally **D.** $3 : 1$ externally

5. The point dividing the join of $(0, 2)$ and $(-5, 1)$ internally in the ratio $1 : 3$ is

A. $(-\frac{5}{4}, \frac{7}{4})$ **B.** $(\frac{5}{2}, \frac{5}{2})$

C. $(-\frac{15}{4}, \frac{5}{4})$ **D.** $(-\frac{15}{2}, \frac{1}{2})$

6. The harmonic conjugate of $(2, 5)$ with respect to $A(2, -4)$ and $B(2, 8)$ is

A. $(-2, -14)$ **B.** $(2, -10)$ **C.** $(2, 2)$ **D.** $(2, 14)$

7. The midpoints of the sides BC, CA, AB of a triangle are $D(5, 3)$, $E(3, -1)$, $F(7, 0)$. The vertex A is

A. $(5, -4)$ **B.** $(15, 2)$ **C.** $(1, 2)$ **D.** $(9, 4)$

8. The area of the triangle with vertices $(6, 3)$, $(1, -2)$, $(2, -4)$ is

A. $\frac{15}{2}$ **B.** $\frac{17}{2}$ **C.** 15 **D.** $\frac{15}{4}$

9. The locus of a point P at which the segment joining $A(4, -2)$ and $B(-1, 3)$ subtends a right angle is

A. $x^2 + y^2 + 3x - y - 10 = 0$ **B.** $x^2 + y^2 + 3x + y - 10 = 0$

C. $x^2 + y^2 - 3x + y - 10 = 0$ **D.** $x^2 + y^2 - 3x - y - 10 = 0$

10. The line through $(4, -2)$ perpendicular to $2x - 3y - 5 = 0$ is

A. $3x + 2y + 8 = 0$ **B.** $2x + 3y - 2 = 0$ **C.** $3x + 2y - 8 = 0$ **D.** $2x - 3y - 14 = 0$

11. The line with x-intercept -1 and y-intercept -2 is

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

12. When $\sqrt{3}\,x + y - 12 = 0$ is written as $x\cos\alpha + y\sin\alpha = p$, the value of α is

A. 150° **B.** 210° **C.** 330° **D.** 30°

13. The distance of $(2, 2)$ from the line $3x + 2y + 6 = 0$ measured along a line of inclination 90° is

A. $\frac{16\sqrt{13}}{13}$ **B.** 8 **C.** $\frac{16}{3}$ **D.** 16

14. The perpendicular distance from $(-3, 2)$ to $6x - 8y - 15 = 0$ is

A. 49 **B.** $\frac{49}{10}$ **C.** $\frac{49}{100}$ **D.** $\frac{3}{2}$

15. The distance between the parallel lines $x - y - 2 = 0$ and $x - y - 9 = 0$ is

A. $\frac{7\sqrt{2}}{2}$ **B.** $\frac{11\sqrt{2}}{2}$ **C.** $7\sqrt{2}$ **D.** 7.0

16. $(-2, 2)$ and $(5, -4)$ are the ends of the hypotenuse of a right-angled isosceles triangle. The third vertex is

A. $(\frac{11}{2}, \frac{5}{2})$ or $(-\frac{5}{2}, -\frac{9}{2})$
B. $(\frac{9}{2}, -\frac{9}{2})$ or $(-\frac{3}{2}, \frac{5}{2})$
C. $(\frac{15}{2}, 6)$ or $(-\frac{9}{2}, -8)$
D. $(\frac{9}{2}, \frac{5}{2})$ or $(-\frac{3}{2}, -\frac{9}{2})$

17. The line $5x + y - 9 = 0$ divides the join of $(0, -5)$ and $(-3, -4)$ in the ratio

A. $1 : 2$ internally **B.** $2 : 1$ internally
C. $2 : 1$ externally **D.** $1 : 2$ externally

18. The point of intersection of $3x - 2y + 5 = 0$ and $4x + y + 14 = 0$ is

A. $(-2, -3)$ **B.** $(-3, -2)$ **C.** $(3, 2)$ **D.** $(-3, 2)$

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

A. $(4, 1)$ **B.** $(\frac{1}{3}, \frac{4}{3})$
C. $(\frac{4}{3}, \frac{1}{3})$ **D.** $(2, \frac{1}{2})$

20. The slopes of the lines making an angle of 45° with a line of slope 2 are

A. $-\frac{1}{3},\ 3$ **B.** $\frac{1}{3},\ -3$ **C.** $\frac{1}{3},\ 3$ **D.** $3,\ -\frac{1}{3}$

21. For the lines $5x - 12y + 2 = 0$ and $15x + 8y + 6 = 0$, the bisector of the acute angle is

A. $5x + 14y + 2 = 0$ **B.** $5x - y + 2 = 0$ **C.** $70x - 25y + 28 = 0$ **D.** $5x + 10y + 2 = 0$

22. The area of the rhombus $5|x| + |y| = 3$ is

A. $\frac{9}{10}$ **B.** $\frac{36}{5}$ **C.** $\frac{18}{5}$ **D.** $\frac{9}{5}$

23. The image of $(5, -5)$ in the line $y = 2$ is

A. $(5, 5)$ **B.** $(5, 9)$ **C.** $(5, -5)$ **D.** $(-5, 5)$

24. P is a point on the x-axis, $A = (-3, 1)$ and $B = (3, 6)$. The least value of $PA + PB$ is

A. 7 **B.** $1 + \sqrt{61}$ **C.** $\sqrt{61}$ **D.** $\sqrt{85}$

25. The locus of the point $(9t^2, 18t)$, t a parameter, is

A. $x^2 = 36y$ **B.** $y^2 = 36x$ **C.** $y^2 = 9x$ **D.** $y^2 = 18x$

Key sheet

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

Solutions

1. The slope of the line through $(-1, -5)$ and $(7, 6)$ is

$m = \frac{6-(-5)}{7-(-1)} = \frac{11}{8}$

Ans: (C) $\frac{11}{8}$

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2. The inclination of a line with slope $-\frac{\sqrt{3}}{3}$ is

$\tan\theta = -\frac{\sqrt{3}}{3},\ 0 \le \theta < 180^\circ$

$\theta = 150^\circ$

Ans: (C) 150°

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3. The point on the x-axis equidistant from $(0, 7)$ and $(-4, 0)$ is

Let it be $(h, 0)$: $(h-0)^2 + 49 = (h-(-4))^2 + 0$

$h = \frac{33}{8}$

Ans: (A) $(\frac{33}{8}, 0)$

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4. The x-axis divides the join of $(5, -2)$ and $(5, 6)$ in the ratio

The x-axis divides it in the ratio $-y_1 : y_2 = 2 : 6$

$= 1 : 3$, internally

Ans: (C) $1 : 3$ **internally**

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5. The point dividing the join of $(0, 2)$ and $(-5, 1)$ internally in the ratio $1 : 3$ is

$\frac{mB+nA}{m+n} = (-\frac{5}{4}, \frac{7}{4})$

Ans: (A) $(-\frac{5}{4}, \frac{7}{4})$

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6. The harmonic conjugate of $(2, 5)$ with respect to $A(2, -4)$ and $B(2, 8)$ is

P divides AB internally in the ratio $3 : 1$.

Q divides it externally in $3 : 1$: $Q = \frac{3B-1A}{2} = (2, 14)$

Ans: (D) $(2, 14)$

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7. The midpoints of the sides BC, CA, AB of a triangle are $D(5, 3)$, $E(3, -1)$, $F(7, 0)$. The vertex A is

$AFDE$ is a parallelogram, so $A = E + F - D = (5, -4)$

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

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8. The area of the triangle with vertices $(6, 3)$, $(1, -2)$, $(2, -4)$ is

$\frac{1}{2}\,|6(2) + 1(-7) + 2(5)| = \frac{15}{2}$

Ans: (A) $\frac{15}{2}$

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9. The locus of a point P at which the segment joining $A(4, -2)$ and $B(-1, 3)$ subtends a right angle is

Let $P(x, y)$ be on the locus: $PA \perp PB$: $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$

$x^2 + y^2 - 3x - y - 10 = 0$

This is a circle.

Ans: (D) $x^2 + y^2 - 3x - y - 10 = 0$

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10. The line through $(4, -2)$ perpendicular to $2x - 3y - 5 = 0$ is

A perpendicular line is $-3x - 2y = k$

$k = -8$

$3x + 2y - 8 = 0$

Ans: (C) $3x + 2y - 8 = 0$

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11. The line with x-intercept -1 and y-intercept -2 is

$\frac{x}{-1} + \frac{y}{-2} = 1$

$2x + y + 2 = 0$

Ans: (B) $2x + y + 2 = 0$

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12. When $\sqrt{3}\,x + y - 12 = 0$ 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 $\sqrt{a^2 + b^2} = 2$

$x\cos 30^\circ + y\sin 30^\circ = 6$

Ans: (D) 30°

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13. The distance of $(2, 2)$ from the line $3x + 2y + 6 = 0$ measured along a line of inclination 90° is

$\left|\frac{ax_1 + by_1 + c}{a\cos\theta + b\sin\theta}\right| = \left|\frac{16}{2}\right| = 8$

Ans: (B) 8

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14. The perpendicular distance from $(-3, 2)$ to $6x - 8y - 15 = 0$ is

$\frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}} = \frac{|-49|}{\sqrt{100}} = \frac{49}{10}$

Ans: (B) $\frac{49}{10}$

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15. The distance between the parallel lines $x - y - 2 = 0$ and $x - y - 9 = 0$ is

$\frac{|c_1 - c_2|}{\sqrt{a^2 + b^2}} = \frac{|7.0|}{\sqrt{2}} = \frac{7\sqrt{2}}{2}$

Ans: (A) $\frac{7\sqrt{2}}{2}$

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16. $(-2, 2)$ and $(5, -4)$ are the ends of the hypotenuse of a right-angled isosceles triangle. The third vertex is

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

$(\frac{9}{2}, \frac{5}{2})$ or $(-\frac{3}{2}, -\frac{9}{2})$

Ans: (D) $(\frac{9}{2}, \frac{5}{2})$ or $(-\frac{3}{2}, -\frac{9}{2})$

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17. The line $5x + y - 9 = 0$ divides the join of $(0, -5)$ and $(-3, -4)$ in the ratio

$L_{11} = -14,\ L_{22} = -28$

$-L_{11} : L_{22} = 1 : 2$ externally

Ans: (D) $1 : 2$ **externally**

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18. The point of intersection of $3x - 2y + 5 = 0$ and $4x + y + 14 = 0$ is

Solve the two equations together (cross-multiplication).

$(-3, -2)$

Ans: (B) $(-3, -2)$

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

$G = \frac{A+B+C}{3} = (\frac{4}{3}, \frac{1}{3})$

Ans: (C) $(\frac{4}{3}, \frac{1}{3})$

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20. The slopes of the lines making an angle of 45° with a line of slope 2 are

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

$\frac{1}{3},\ -3$

Ans: (B) $\frac{1}{3},\ -3$

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21. For the lines $5x - 12y + 2 = 0$ and $15x + 8y + 6 = 0$, the bisector of the acute angle is

$\frac{5x-12y+2}{13} = \pm\frac{15x+8y+6}{17}$

The required bisector is $5x + 14y + 2 = 0$

Ans: (A) $5x + 14y + 2 = 0$

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22. The area of the rhombus $5|x| + |y| = 3$ is

Vertices $\left(\pm\frac{3}{5}, 0\right),\ (0, \pm 3)$

$\frac{2c^2}{|ab|} = \frac{18}{5}$

Ans: (C) $\frac{18}{5}$

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23. The image of $(5,-5)$ in the line $y = 2$ is

Reflect across $y = 2$: $(5, 9)$

Ans: (B) $(5, 9)$

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24. P is a point on the x-axis, $A = (-3, 1)$ and $B = (3, 6)$. The least value of $PA + PB$ is

A and B are on the same side of the x-axis; reflect B to $B'(3, -6)$.

$PA + PB \geq AB' = \sqrt{85} = \sqrt{85}$

Equality when $P = (-\frac{15}{7}, 0)$.

Ans: (D) $\sqrt{85}$

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25. The locus of the point $(9t^2, 18t)$, t a parameter, is

$t = \frac{y}{18}$, so $x = 9 \cdot \frac{y^2}{324}$:

$y^2 = 36x$

Ans: (B) $y^2 = 36x$
