EXPRESSWALA ACADEMY

Maths 1B: Straight Lines

MCQ Test, Set 02

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 $(3, 6)$ and $(-2, 0)$ is

A. $-\frac{6}{5}$ **B.** 6 **C.** $\frac{5}{6}$ **D.** $\frac{6}{5}$

2. The line through $(-2, 1)$ and $(3, -2)$ and the line through $(0, 6)$ and $(5, 3)$ are

A. parallel **B.** perpendicular

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

3. The point on the x-axis equidistant from $(-4, -5)$ and $(-2, -6)$ is

A. $(\frac{1}{4}, 0)$ **B.** $(-\frac{1}{4}, 0)$ **C.** $(0, -\frac{1}{4})$ **D.** $(-3, 0)$

4. The y-axis divides the join of $(2, 3)$ and $(3, 4)$ in the ratio

A. $3 : 2$ externally **B.** $2 : 3$ internally

C. $3 : 2$ internally **D.** $2 : 3$ externally

5. The point dividing the join of $(-6, 1)$ and $(-6, -5)$ internally in the ratio $3 : 2$ is

A. $(-6, 13)$ **B.** $(-6, -17)$ **C.** $(-6, -\frac{13}{5})$ **D.** $(-6, -\frac{7}{5})$

6. The harmonic conjugate of $(-1, 4)$ with respect to $A(-1, -2)$ and $B(-1, 7)$ is

A. $(-1, -11)$ **B.** $(-1, 1)$ **C.** $(-1, 16)$ **D.** $(-1, 10)$

7. The midpoints of the sides BC, CA, AB of a triangle are $D(-1, 4)$, $E(6, 4)$, $F(0, -3)$. The vertex A is

A. $(5, 11)$ **B.** $(7, -3)$ **C.** $(-7, -3)$ **D.** $(5, 5)$

8. The area of the triangle with vertices $(-5, 7)$, $(4, 3)$, $(-1, 2)$ is

A. $\frac{31}{2}$ **B.** $\frac{29}{2}$ **C.** 29 **D.** $\frac{29}{4}$

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

A. $-2x - 4y - 9 = 0$ **B.** $2x - 4y - 27 = 0$ **C.** $2x - 4y - 9 = 0$ **D.** $2x + 4y - 9 = 0$

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

A. $5x - y + 17 = 0$ **B.** $5x - y - 17 = 0$ **C.** $x + 5y - 19 = 0$ **D.** $5x + y - 23 = 0$

11. The line with x-intercept 4 and y-intercept 3 is

A. $3x + 4y - 12 = 0$ **B.** $3x - 4y - 12 = 0$ **C.** $4x + 3y - 12 = 0$ **D.** $3x + 4y + 12 = 0$

12. When $\sqrt{3}\,x + y - 6 = 0$ is written as $x\cos\alpha + y\sin\alpha = p$, the value of α is

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

13. The distance of $(-2, -6)$ from the line $3x + y - 5 = 0$ measured along a line of inclination 0° is

A. $\frac{17}{3}$ **B.** $\frac{17\sqrt{10}}{10}$ **C.** $\frac{34}{3}$ **D.** 17

14. The perpendicular distance from $(-3, -2)$ to $12x + 5y + 9 = 0$ is

A. $\frac{9}{13}$ **B.** $\frac{37}{169}$ **C.** 37 **D.** $\frac{37}{13}$

15. The distance between the parallel lines $3x + 4y - 12 = 0$ and $9x + 12y - 6 = 0$ is

A. 2 **B.** 10.0 **C.** $\frac{14}{5}$ **D.** $\frac{6}{5}$

16. $(1, -3)$ and $(4, -4)$ are the ends of the hypotenuse of a right-angled isosceles triangle. The third vertex is

A. $(3, -2)$ or $(2, -5)$

B. $(4, -2)$ or $(1, -5)$

C. $(3, -5)$ or $(2, -2)$

D. $(\frac{7}{2}, -\frac{1}{2})$ or $(\frac{3}{2}, -\frac{13}{2})$

17. The line $5x - 3y - 8 = 0$ divides the join of $(4, -1)$ and $(6, 3)$ in the ratio

A. $13 : 15$ externally **B.** $15 : 13$ externally

C. $15 : 13$ internally **D.** $13 : 15$ internally

18. The point of intersection of $2x + y + 3 = 0$ and $5x + 2y + 10 = 0$ is

A. $(5, -4)$ **B.** $(-4, -5)$ **C.** $(4, -5)$ **D.** $(-4, 5)$

19. The orthocentre of a triangle is $(22, 15)$ and its circumcentre is $(-\frac{13}{2}, -\frac{13}{2})$. Its centroid is

A. $(-\frac{127}{2}, -\frac{99}{2})$ **B.** $(3, \frac{2}{3})$

C. $(\frac{31}{4}, \frac{17}{4})$ **D.** $(\frac{25}{2}, \frac{47}{6})$

20. The acute angle between $2x + 3y - 2 = 0$ and $5x + y - 3 = 0$ is

A. 30° **B.** 135° **C.** 45° **D.** 60°

21. For the lines $3x - 4y + 8 = 0$ and $5x + 12y + 8 = 0$, the bisector of the angle containing the origin is

A. $x + y + 2 = 0$ **B.** $x + 8y = 0$ **C.** $8x + y + 18 = 0$ **D.** $7x - 56y + 32 = 0$

22. The area of the parallelogram formed by $3x + y + 3 = 0$, $3x + y - 8 = 0$, $x - y + 8 = 0$, $x - y - 7 = 0$ is

A. $\frac{165}{4}$ **B.** 165 **C.** $\frac{165}{8}$ **D.** $\frac{165}{2}$

23. The image of $(-5, 1)$ in the line $y = -x$ is

A. $(5, -1)$ **B.** $(-5, -1)$ **C.** $(-1, 5)$ **D.** $(1, -5)$

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24. P is a point on the x-axis, $A = (-2, 3)$ and $B = (1, 5)$. The least value of $PA + PB$ is

A. $\sqrt{13}$ **B.** $1 + \sqrt{13}$ **C.** 8 **D.** $\sqrt{73}$

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25. The equation $-3x^2 + 12xy - 4y^2 - 2y - 3 = 0$ represents

A. a pair of straight lines **B.** a circle

C. a hyperbola **D.** a parabola

Key sheet

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

Solutions

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

$m = \frac{0-6}{-2-3} = \frac{6}{5}$

Ans: (D) $\frac{6}{5}$

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2. The line through $(-2, 1)$ and $(3, -2)$ and the line through $(0, 6)$ and $(5, 3)$ are

$m_1 = -\frac{3}{5},\ m_2 = -\frac{3}{5}$

$m_1 = m_2$, so the lines are parallel.

Ans: (A) parallel

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3. The point on the x-axis equidistant from $(-4, -5)$ and $(-2, -6)$ is

Let it be $(h, 0)$: $(h-(-4))^2 + 25 = (h-(-2))^2 + 36$

$h = -\frac{1}{4}$

Ans: (B) $(-\frac{1}{4}, 0)$

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4. The y-axis divides the join of $(2, 3)$ and $(3, 4)$ in the ratio

The y-axis divides it in the ratio $-x_1 : x_2 = -2 : 3$

$= 2 : 3$, externally

Ans: (D) $2 : 3$ **externally**

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5. The point dividing the join of $(-6, 1)$ and $(-6, -5)$ internally in the ratio $3 : 2$ is

$\frac{mB+nA}{m+n} = (-6, -\frac{13}{5})$

Ans: (C) $(-6, -\frac{13}{5})$

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6. The harmonic conjugate of $(-1, 4)$ with respect to $A(-1, -2)$ and $B(-1, 7)$ is

P divides AB internally in the ratio $2 : 1$.

Q divides it externally in $2 : 1$: $Q = \frac{2B-1A}{1} = (-1, 16)$

Ans: (C) $(-1, 16)$

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7. The midpoints of the sides BC, CA, AB of a triangle are $D(-1, 4)$, $E(6, 4)$, $F(0, -3)$. The vertex A is

$AFDE$ is a parallelogram, so $A = E + F - D = (7, -3)$

Ans: (B) $(7, -3)$

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8. The area of the triangle with vertices $(-5, 7)$, $(4, 3)$, $(-1, 2)$ is

$\frac{1}{2}\,|-5(1) + 4(-5) + (-1)(4)| = \frac{29}{2}$

Ans: (B) $\frac{29}{2}$

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

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

$2x - 4y - 9 = 0$

This is the perpendicular bisector of AB.

Ans: (C) $2x - 4y - 9 = 0$

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

A parallel line is $5x - y = k$

$k = 17$

$5x - y - 17 = 0$

Ans: (B) $5x - y - 17 = 0$

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11. The line with x-intercept 4 and y-intercept 3 is

$\frac{x}{4} + \frac{y}{3} = 1$

$3x + 4y - 12 = 0$

Ans: (A) $3x + 4y - 12 = 0$

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12. When $\sqrt{3}\,x + y - 6 = 0$ 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 $\sqrt{a^2 + b^2} = 2$

$x\cos 30^\circ + y\sin 30^\circ = 3$

Ans: (B) 30°

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13. The distance of $(-2, -6)$ from the line $3x + y - 5 = 0$ measured along a line of inclination 0° is

$\left|\frac{ax_1 + by_1 + c}{a\cos\theta + b\sin\theta}\right| = \left|\frac{-17}{3}\right| = \frac{17}{3}$

Ans: (A) $\frac{17}{3}$

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14. The perpendicular distance from $(-3, -2)$ to $12x + 5y + 9 = 0$ is

$\frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}} = \frac{|-37|}{\sqrt{169}} = \frac{37}{13}$

Ans: (D) $\frac{37}{13}$

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15. The distance between the parallel lines $3x + 4y - 12 = 0$ and $9x + 12y - 6 = 0$ is

Write the second line with the same x, y coefficients: $3x + 4y - 2.0 = 0$

$\frac{|c_1 - c_2|}{\sqrt{a^2 + b^2}} = \frac{|-10.0|}{\sqrt{25}} = 2$

Ans: (A) 2

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16. $(1, -3)$ and $(4, -4)$ are the ends of the hypotenuse of a right-angled isosceles triangle. The third vertex is

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

$(3, -2)$ or $(2, -5)$

Ans: (A) $(3, -2)$ or $(2, -5)$

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17. The line $5x - 3y - 8 = 0$ divides the join of $(4, -1)$ and $(6, 3)$ in the ratio

$L_{11} = 15,\ L_{22} = 13$

$-L_{11} : L_{22} = 15 : 13$ externally

Ans: (B) $15 : 13$ **externally**

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18. The point of intersection of $2x + y + 3 = 0$ and $5x + 2y + 10 = 0$ is

Solve the two equations together (cross-multiplication).

$(-4, 5)$

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

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19. The orthocentre of a triangle is $(22, 15)$ and its circumcentre is $(-\frac{13}{2}, -\frac{13}{2})$. Its centroid is

$OG : GS = 2 : 1$, so $G = \frac{2S+O}{3} = (3, \frac{2}{3})$

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

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20. The acute angle between $2x + 3y - 2 = 0$ and $5x + y - 3 = 0$ is

$m_1 = -\frac{2}{3},\ m_2 = -5$

$\tan\theta = \left|\frac{m_1 - m_2}{1 + m_1 m_2}\right| = 1$

$\theta = 45^\circ$

Ans: (C) 45°

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21. For the lines $3x - 4y + 8 = 0$ and $5x + 12y + 8 = 0$, the bisector of the angle containing the origin is

$\frac{3x-4y+8}{5} = \pm\frac{5x+12y+8}{13}$

The required bisector is $7x - 56y + 32 = 0$

Ans: (D) $7x - 56y + 32 = 0$

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22. The area of the parallelogram formed by $3x + y + 3 = 0$, $3x + y - 8 = 0$, $x - y + 8 = 0$, $x - y - 7 = 0$ is

$\left|\frac{(c_1 - c_2)(d_1 - d_2)}{a_1 b_2 - a_2 b_1}\right| = \frac{165}{4}$

Ans: (A) $\frac{165}{4}$

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23. The image of $(-5, 1)$ in the line $y = -x$ is

Reflect across $y = -x$: $(-1, 5)$

Ans: (C) $(-1, 5)$

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24. P is a point on the x-axis, $A = (-2, 3)$ and $B = (1, 5)$. The least value of $PA + PB$ is

A and B are on the same side of the x-axis; reflect B to $B'(1, -5)$.

$PA + PB \geq AB' = \sqrt{73} = \sqrt{73}$

Equality when $P = (-\frac{7}{8}, 0)$.

Ans: (D) $\sqrt{73}$

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25. The equation $-3x^2 + 12xy - 4y^2 - 2y - 3 = 0$ represents

$a = -3,\ h = 6,\ b = -4,\ g = 0,\ f = -1,\ c = -3$

$\Delta = abc + 2fgh - af^2 - bg^2 - ch^2 = 75,\ h^2 - ab = 24$

So it is a hyperbola.

Ans: (C) a hyperbola
