EXPRESSWALA ACADEMY

Maths 1B: Straight Lines

MCQ Test, Set 07

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 a line perpendicular to the line through $(4, 5)$ and $(2, 4)$ is

A. -2 **B.** 2 **C.** $\frac{3}{2}$ **D.** $-\frac{1}{2}$

2. The slope of a line with inclination 120° is

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

3. The distance between $(-4, 2)$ and $(0, -6)$ is

A. 80 **B.** 12 **C.** $4\sqrt{2}$ **D.** $4\sqrt{5}$

4. The x-axis divides the join of $(-4, -2)$ and $(-1, 7)$ in the ratio

A. $2 : 7$ externally **B.** $7 : 2$ externally
C. $7 : 2$ internally **D.** $2 : 7$ internally

5. The point dividing the join of $(-3, 2)$ and $(-2, 0)$ externally in the ratio $3 : 4$ is

A. $(-\frac{18}{7}, \frac{8}{7})$ **B.** $(1, -6)$
C. $(-6, 8)$ **D.** $(-\frac{17}{7}, \frac{6}{7})$

6. The harmonic conjugate of $(7, -1)$ with respect to $A(-2, -1)$ and $B(10, -1)$ is

A. $(16, -1)$ **B.** $(-8, -1)$ **C.** $(-16, 1)$ **D.** $(4, -1)$

7. The midpoints of the sides BC, CA, AB of a triangle are $D(5, -2)$, $E(6, -6)$, $F(5, 5)$. The vertex A is

A. $(6, 1)$ **B.** $(6, -13)$ **C.** $(4, 9)$ **D.** $(16, -3)$

8. The area of the triangle with vertices $(1, 4)$, $(1, -3)$, $(7, 0)$ is

A. 42 **B.** $\frac{21}{2}$ **C.** 21 **D.** 22

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

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

10. The line through $(3, -2)$ and $(-2, 7)$ is

A. $9x + 5y + 17 = 0$ **B.** $9x + 5y - 18 = 0$ **C.** $5x - 9y - 33 = 0$ **D.** $9x + 5y - 17 = 0$

11. The line with x-intercept 6 and y-intercept -3 is

A. $2x - y + 6 = 0$ **B.** $x - 2y - 6 = 0$ **C.** $x - 2y + 6 = 0$ **D.** $x + 2y - 6 = 0$

12. When $x + y + 8 = 0$ is written as $x\cos\alpha + y\sin\alpha = p$, the value of α is

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

13. The distance of $(6, 7)$ from the line $4x - 5y - 9 = 0$ measured along a line of inclination 0° is

A. 20 **B.** $\frac{20\sqrt{41}}{41}$ **C.** 10 **D.** 5

14. The perpendicular distance from $(5, -6)$ to $2x - y + 11 = 0$ is

A. $\frac{27\sqrt{5}}{5}$ **B.** $\frac{27}{5}$ **C.** 27 **D.** $\frac{11\sqrt{5}}{5}$

15. The distance between the parallel lines $5x + 12y + 6 = 0$ and $15x + 36y + 3 = 0$ is

A. $\frac{7}{13}$ **B.** 5.0 **C.** $\frac{5}{13}$ **D.** $\frac{3}{13}$

16. $(0, 0)$ and $(2, -1)$ are the ends of the hypotenuse of a right-angled isosceles triangle. The third vertex is

A. $(\frac{5}{2}, \frac{1}{2})$ or $(-\frac{1}{2}, -\frac{3}{2})$
B. $(\frac{3}{2}, \frac{1}{2})$ or $(\frac{1}{2}, -\frac{3}{2})$
C. $(2, \frac{3}{2})$ or $(0, -\frac{5}{2})$
D. $(\frac{3}{2}, -\frac{3}{2})$ or $(\frac{1}{2}, \frac{1}{2})$

17. The line $4x - 2y + 5 = 0$ divides the join of $(-3, 3)$ and $(-6, 1)$ in the ratio

A. $21 : 13$ internally **B.** $13 : 21$ externally
C. $21 : 13$ externally **D.** $13 : 21$ internally

18. The point of intersection of $3x + 4y - 9 = 0$ and $y - 3 = 0$ is

A. $(3, -1)$ **B.** $(-1, -3)$ **C.** $(1, -3)$ **D.** $(-1, 3)$

19. The orthocentre of a triangle is $(0, 2)$ and its circumcentre is $(\frac{3}{2}, \frac{5}{2})$. Its centroid is

A. $(1, \frac{7}{3})$ **B.** $(\frac{1}{2}, \frac{13}{6})$
C. $(\frac{9}{2}, \frac{7}{2})$ **D.** $(\frac{3}{4}, \frac{9}{4})$

20. The slopes of the lines making an angle of 45° with a line of slope $\frac{2}{3}$ are

A. $\frac{1}{5},\ -5$ **B.** $-\frac{1}{5},\ -5$ **C.** $-\frac{1}{5},\ 5$ **D.** $-5,\ \frac{1}{5}$

21. For the lines $8x + 15y + 7 = 0$ and $5x - 12y + 5 = 0$, the bisector of the angle containing the origin is

A. $189x - 9y + 176 = 0$ **B.** $19x + 399y + 6 = 0$ **C.** $3x + 27y + 2 = 0$ **D.** $13x + 3y + 12 = 0$

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

A. $\frac{50}{3}$ **B.** $\frac{100}{3}$ **C.** $\frac{25}{3}$ **D.** $\frac{25}{6}$

23. The image of $(6, 6)$ in the line $x + 2y - 3 = 0$ is

A. $(12, 18)$ **B.** $(-6, 0)$ **C.** $(0, -6)$ **D.** $(3, 0)$

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24. A line through $(4, 2)$ cuts off a triangle from the positive axes. The least area of the triangle is

A. 32 **B.** 16 **C.** 8 **D.** 4

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25. The locus of the point $(1 + 5\cos\theta, -2 + 5\sin\theta)$, θ a parameter, is

A. $x^2 + y^2 - 2x + 4y = 0$ **B.** $x^2 + y^2 + 4x - 2y - 20 = 0$

C. $x^2 + y^2 + 2x - 4y - 20 = 0$ **D.** $x^2 + y^2 - 2x + 4y - 20 = 0$

Key sheet

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

Solutions

1. The slope of a line perpendicular to the line through $(4,5)$ and $(2,4)$ is

$m = \frac{4-5}{2-4} = \frac{1}{2}$

A perpendicular line has slope $-\frac{1}{m} = -2$

Ans: (A) -2

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2. The slope of a line with inclination 120° is

$m = \tan 120^\circ = -\sqrt{3}$

Ans: (C) $-\sqrt{3}$

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3. The distance between $(-4,2)$ and $(0,-6)$ is

$\sqrt{(0-(-4))^2 + (-6-2)^2} = \sqrt{80} = 4\sqrt{5}$

Ans: (D) $4\sqrt{5}$

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4. The x-axis divides the join of $(-4,-2)$ and $(-1,7)$ in the ratio

The x-axis divides it in the ratio $-y_1 : y_2 = 2 : 7$

$= 2 : 7$, internally

Ans: (D) $2 : 7$ **internally**

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5. The point dividing the join of $(-3,2)$ and $(-2,0)$ externally in the ratio $3 : 4$ is

$\frac{mB-nA}{m-n} = (-6,8)$

Ans: (C) $(-6,8)$

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6. The harmonic conjugate of $(7,-1)$ with respect to $A(-2,-1)$ and $B(10,-1)$ is

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

Q divides it externally in $3 : 1$: $Q = \frac{3B-1A}{2} = (16,-1)$

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

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7. The midpoints of the sides BC, CA, AB of a triangle are $D(5,-2)$, $E(6,-6)$, $F(5,5)$. The vertex A is

$AFDE$ is a parallelogram, so $A = E + F - D = (6,1)$

Ans: (A) $(6,1)$

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8. The area of the triangle with vertices $(1,4)$, $(1,-3)$, $(7,0)$ is

$\frac{1}{2}\,|1(-3) + 1(-4) + 7(7)| = 21$

Ans: (C) 21

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

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

$x^2 + y^2 - x - y - 4 = 0$

This is a circle.

Ans: (B) $x^2 + y^2 - x - y - 4 = 0$

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10. The line through $(3, -2)$ and $(-2, 7)$ is

$m = -\frac{9}{5}$

$y + (2) = -\frac{9}{5}(x - 3)$

$9x + 5y - 17 = 0$

Ans: (D) $9x + 5y - 17 = 0$

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11. The line with x-intercept 6 and y-intercept -3 is

$\frac{x}{6} + \frac{y}{-3} = 1$

$x - 2y - 6 = 0$

Ans: (B) $x - 2y - 6 = 0$

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12. When $x + y + 8 = 0$ 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 $\sqrt{a^2 + b^2} = \sqrt{2}$

$x\cos 225^\circ + y\sin 225^\circ = 4\sqrt{2}$

Ans: (B) 225°

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13. The distance of $(6, 7)$ from the line $4x - 5y - 9 = 0$ measured along a line of inclination 0° is

$\left|\frac{ax_1 + by_1 + c}{a\cos\theta + b\sin\theta}\right| = \left|\frac{-20}{4}\right| = 5$

Ans: (D) 5

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14. The perpendicular distance from $(5, -6)$ to $2x - y + 11 = 0$ is

$\frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}} = \frac{|27|}{\sqrt{5}} = \frac{27\sqrt{5}}{5}$

Ans: (A) $\frac{27\sqrt{5}}{5}$

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15. The distance between the parallel lines $5x + 12y + 6 = 0$ and $15x + 36y + 3 = 0$ is

Write the second line with the same x, y coefficients: $5x + 12y + 1.0 = 0$

$\frac{|c_1 - c_2|}{\sqrt{a^2 + b^2}} = \frac{|5.0|}{\sqrt{169}} = \frac{5}{13}$

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

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16. $(0, 0)$ and $(2, -1)$ are the ends of the hypotenuse of a right-angled isosceles triangle. The third vertex is

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

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

Ans: (B) $(\frac{3}{2}, \frac{1}{2})$ or $(\frac{1}{2}, -\frac{3}{2})$

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17. The line $4x - 2y + 5 = 0$ divides the join of $(-3, 3)$ and $(-6, 1)$ in the ratio

$L_{11} = -13,\ L_{22} = -21$

$-L_{11} : L_{22} = 13 : 21$ externally

Ans: (B) $13 : 21$ **externally**

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18. The point of intersection of $3x + 4y - 9 = 0$ and $y - 3 = 0$ is

Solve the two equations together (cross-multiplication).

$(-1, 3)$

Ans: (D) $(-1, 3)$

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19. The orthocentre of a triangle is $(0, 2)$ and its circumcentre is $(\frac{3}{2}, \frac{5}{2})$. Its centroid is

$OG : GS = 2 : 1$, so $G = \frac{2S+O}{3} = (1, \frac{7}{3})$

Ans: (A) $(1, \frac{7}{3})$

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20. The slopes of the lines making an angle of 45° with a line of slope $\frac{2}{3}$ are

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

$-\frac{1}{5},\ 5$

Ans: (C) $-\frac{1}{5},\ 5$

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21. For the lines $8x + 15y + 7 = 0$ and $5x - 12y + 5 = 0$, the bisector of the angle containing the origin is

$\frac{8x+15y+7}{17} = \pm\frac{5x-12y+5}{13}$

The required bisector is $19x + 399y + 6 = 0$

Ans: (B) $19x + 399y + 6 = 0$

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

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

$\frac{2c^2}{|ab|} = \frac{50}{3}$

Ans: (A) $\frac{50}{3}$

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23. The image of $(6, 6)$ in the line $x + 2y - 3 = 0$ is

$\frac{h-x_1}{a} = \frac{k-y_1}{b} = \frac{-2(ax_1+by_1+c)}{a^2+b^2} = -6$

$(0, -6)$

Ans: (C) $(0, -6)$

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24. A line through $(4, 2)$ cuts off a triangle from the positive axes. The least area of the triangle is

The area is least when $(4, 2)$ is the midpoint of the intercepted segment: intercepts 8 and 4.

$\text{Least area} = 2|x_1 y_1| = 16$

Ans: (B) 16

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25. The locus of the point $(1 + 5\cos\theta, -2 + 5\sin\theta)$, θ a parameter, is

$(x-1)^2 + (y+2)^2 = 5^2(\cos^2\theta + \sin^2\theta)$

A circle of radius 5.

Ans: (D) $x^2 + y^2 - 2x + 4y - 20 = 0$
