STRAIGHT LINES

Some questions (Assertion–Reason type) are given below. Each question contains **Statement – 1 (Assertion)** and **Statement – 2 (Reason)**. Each question has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct. So select the correct choice :

Choices are :

(A) **Statement – 1** is True, **Statement – 2** is True; **Statement – 2 is** a correct explanation for **Statement – 1**.
(B) **Statement – 1** is True, **Statement – 2** is True; **Statement – 2 is NOT** a correct explanation for **Statement – 1**.
(C) **Statement – 1** is True, **Statement – 2** is False.
(D) **Statement – 1** is False, **Statement – 2** is True.

192. Let the equation of the line $ax + by + c = 0$
Statement-1: a, b, c are in A.P.which force $ax + by + c = 0$ to pass through a fixed point $(1, -2)$
Statement-2: **Any** family of lines always pass through a fixed point

193. **Statement-1:** The area of the triangle formed by the points A(1000, 1002), B(1001, 1004) C(1002, 1003) is same as the area formed by A′ (0, 0), B′ (1, 2), C′ (2, 1)
Statement-2: The area of the triangle is constant with respect to translation of coordinate axes.

194. **Statement-1:** The lines $(a + b)x + (a – 2b) y = a$ are concurrent at the point $\left(\frac{1}{3},\frac{2}{3}\right)$.
Statement-2: : The lines $x + y – 1 = 0$ and $x – 2y = 0$ intersect at the point $\left(\frac{1}{3},\frac{2}{3}\right)$.

195. **Statement-1:** Each point on the line $y – x + 12 = 0$ is equidistant from the lines
$4y + 3x – 12 = 0, \quad 3y + 4x – 24 = 0$.
Statement-2: : The locus of a point which is equidistant from two given lines is the angular bisector of the two lines.

196. **Statement-1:** If A(2a, 4a) and B(2a, 6a) are two vertices of a equilateral triangle ABC and the vertex C is given by $\left(2a + a\sqrt{3}\ , 5a\right)$.
Statement-2: : An equilateral triangle all the coordinates of three vertices can be rational

197. **Statement-1:** If the Point $(2a – 5, a^2)$ is on the same side of the line $x + y – 3 = 0$ as that of the origin, then the set of values of $a \in (2, 4)$
Statement-2: : The points (x_1, y_1) and (x_2 , y_2) lies on the same or opposite side of the line $ax+by+c=0$, as $ax_1 + by_1 + c$ and $ax_2 + by_2 + c$ have the same or opposite signs.

198. **Statement-1:** If a, b, c are in A.P. then every line of the form of $ax + by + c = 0$ where a, b, c are arbitrary constants pass through the point (1,-2)
Statement-2: : Every line of the form of $ax + by + c = 0$ where a, b, c are arbitrary constants pass through a fixed point if their exist a linear relation between a, b & c.

199. **Statement-1:** If the vertices of a triangle are having rational co-ordinate then its centroid, circumcenter & orthocenter are rational
Statement-2: : In any triangle, orthocenter, centroid and circum center are collinear and centroid divides the line joining orthocenter and circumcenter in the ratio 2 : 1.

200. **Statement-1:** If line $y = -\frac{1}{3}x + 4$, makes an angle θ with positive direction of x-axis, then $\tan\theta = -1/3$, $\cos\theta = \frac{3}{\sqrt{10}}, \sin\theta = -\frac{1}{\sqrt{10}}$
Statement-2: : The parametric equation of line passing through (x_1, y_1) is given by $\frac{x - x_1}{\cos\theta} = \frac{y - y_1}{\sin\theta} = r$ where r is parameter & $\theta \in [0, \pi)$

201. **Statement-1:** In ΔABC, A(1, 2) is vertex & line $x – y – 5 = 0$ is equation of bisector of ∠ABC, then (7 , – 4) is a point lying on base BC.
Statement-2: : Bisector between two lines is locus of points equi-distant from both the lines.

202. **Statement-1:** Area of the triangle formed by $4x + y + 1 = 0$ with the co-ordinate axes is $\frac{1}{2|4\times 1|} = \frac{1}{8}$ sq. units.
Statement-2: : Area of the triangle made by the line $ax + by + c = 0$ with the co-ordinate axes is $\frac{c^2}{2|ab|}$.

203. **Statement-1:** If $(a_1x + b_1y + c_1) + (a_2x + b_2y + c_2) + (a_3x + b_3y + c_3) = 0$ then lines $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$ and $a_3x + b_3y + c_3 = 0$ cannot be parallel
Statement-2: : If sum of three straight lines equations is identically zero then they are either concurrent or parallel.

204. **Statement-1:** The three non-parallel lines $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$, $a_3x + b_3y + c_3 = 0$ are concurrent if

$$\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$$

Statement-2: : The area of the triangle formed by three concurrent lines must be zero.

205. **Statement-1:** The point (α, α^2) lies inside the Δ formed by the lines $2x + 3y - 1 = 0$, $x + 2y - 3 = 0$, and $5x - 6y - 1 = 0$ for every $\alpha \in \left(-\frac{3}{2}, -1\right) \cup \left(\frac{1}{2}, 1\right)$
Statement-2: : Two points (x_1, y_1) and (x_2, y_2) lie on the same side of straight line $ax + by + c = 0$ if $ax_1 + by_1 + c$ & $ax_2 + by_2 + c$ are of opposite sign.

206. **Statement-1:** The equation of the straight line which passes through the point $(2, -3)$ and the point of the intersection of the lines $x + y + 4 = 0$ and $3x - y - 8 = 0$ is $2x - y - 7 = 0$
Statement-2: : Product of slopes of two perpendicular straight lines is -1.

207. **Statement-1:** The incentre of a triangle formed by the lines

a. $x\cos\frac{\pi}{9} + y\sin\frac{\pi}{9} = \pi$ $x\cos\frac{8\pi}{9} + y\sin\frac{8\pi}{9} = \pi$; $x\cos\frac{13\pi}{9} + y\sin\left(\frac{13\pi}{9}\right) = \pi$ is (0, 0).

Statement-2: : The point (0, 0) is equidistant from the lines

$$x\cos\frac{\pi}{9} + y\sin\frac{\pi}{9} = \pi,\ x\cos\frac{8\pi}{9} + y\cos\frac{8\pi}{9} = \pi \text{ and } x\cos\frac{13\pi}{9} + y\sin\frac{13\pi}{9} = \pi$$

208. **Statement-1:** The combined equation of lines L_1 & L_2 is $2x^2 + 6xy + y^2 = 0$ and that of L_3 & L_4 is $4x^2 + 18xy + y^2 = 0$. If the angle between L_1 & L_4 is α then angle between L_2 & L_3 is also α.
Statement-2: : If the pair of lines $L_1L_2 = 0$ & $L_3L_4 = 0$ are equally inclined lines then angle between L_1 & L_2 = angle between L_2 and L_3.

Answer Key

192. C	**193. A**	**194. A**	**195. A**	**196. C**	**197. D**	**198. A**
199. B	**200. D**	**201. A**	**202. A**	**203. D**	**204. A**	**205. C**
206. B	207. B	208. A				

IMP Que. from Compt. Exams

1. Point of intersection of the diagonals of square is at origin and coordinate axis are drawn along the diagonals. If the side is of length a, then one which is not the vertex of square is

(a) $(a\sqrt{2}, 0)$ (b) $\left(0, \frac{a}{\sqrt{2}}\right)$

(c) $\left(\frac{a}{\sqrt{2}}, 0\right)$ (d) $\left(-\frac{a}{\sqrt{2}}, 0\right)$

2. ABC is an isosceles triangle. If the coordinates of the base are B (1,3) and C (– 2, 7), the coordinates of vertex A can be
[Orrissa JEE 2002; Pb. CET 2002]

(a) (1, 6) (b) $\left(-\frac{1}{2}, 5\right)$

(c) $\left(\frac{5}{6}, 6\right)$ (d) None of these

3. If $A(at^2, 2at)$, $B(a/t^2, -2a/t)$ and $C(a, 0)$, then $2a$ is equal to **[RPET 2000]**

(a) A.M. of CA and CB (b) G.M. of CA and CB
(c) H.M. of CA and CB (d) None of these

4. If coordinates of the points A and B are (2, 4) and (4, 2) respectively and point M is such that A–M–B also $AB = 3\ AM$, then the coordinates of M are

(a) $\left(\frac{8}{3},\frac{10}{3}\right)$ (b) $\left(\frac{10}{3},\frac{14}{4}\right)$

(c) $\left(\frac{10}{3},\frac{6}{3}\right)$ (d) $\left(\frac{13}{4},\frac{10}{4}\right)$

5. The point of trisection of the line joining the points (0, 3) and (6, –3) are

(a) $(2,0)$ and $(4,-1)$ (b) $(2,-1)$ and $(4,1)$

(c) $(3,1)$ and $(4,-1)$ (d) $(2,1)$ and $(4,-1)$

6. The following points $A\ (2a,4a), B(2a,6a)$ and $C\ (2a+\sqrt{3}a, 5a)$, $(a>0)$ are the vertices of

(a) An acute angled triangle (b) A right angled triangle

(c) An isosceles triangle (d) None of these

7. If the coordinates of the vertices of a triangle be $(1,a)$, $(2,b)$ and $(c^2,3)$, then the centroid of the triangle

(a) Lies at the origin (b) Cannot lie on x-axis

(c) Cannot lie on y-axis (d) None of these

8. If the vertices of a triangle be (0,0), (6,0) and (6,8), then its incentre will be

(a) (2,1) (b) (1,2)

(c) (4,2) (d) (2,4)

9. If the middle points of the sides of a triangle be (–2, 3), (4, –3) and (4, 5), then the centroid of the triangle is

(a) (5/3, 2) (b) (5/6, 1)

(c) (2, 5/3) (d) (1, 5/6)

10. If the vertices P, Q, R of a triangle PQR are rational points, which of the following points of the triangle PQR is (are) always rational point(s) **[IIT 1998]**

(a) Centroid (b) Incentre

(c) Circumcentre (d) Orthocentre

(A rational point is a point both of whose coordinates are rational numbers)

11. The centroid of a triangle is (2, 7) and two of its vertices are (4, 8) and (–2, 6). The third vertex is **[Kerala (Engg.) 2002]**

(a) (0,0) (b) (4,7)

(c) (7,4) (d) (7,7)

12. The points $(1,1)$, $(0,\sec^2\theta)$, $(\text{cosec}^2\theta, 0)$ are collinear for

[Roorkee 1963]

(a) $\theta = \frac{n\pi}{2}$ (b) $\theta \ne \frac{n\pi}{2}$

(c) $\theta = n\pi$ (d) None of these

13. The ends of a rod of length l move on two mutually perpendicular lines. The locus of the point on the rod which divides it in the ratio 1 : 2 is **[IIT 1987; RPET 1997]**

(a) $36x^2+9y^2=4l^2$ (b) $36x^2+9y^2=l^2$

(c) $9x^2+36y^2=4l^2$ (d) None of these

14. Two fixed points are $A(a,0)$ and $B(-a,0)$. If $\angle A-\angle B=\theta$, then the locus of point C of triangle ABC will be

[Roorkee 1982]

(a) $x^2+y^2+2xy\tan\theta=a^2$ (b) $x^2-y^2+2xy\tan\theta=a^2$

(c) $x^2+y^2+2xy\cot\theta=a^2$ (d) $x^2-y^2+2xy\cot\theta=a^2$

15. Let $A(2,-3)$ and $B(-2,1)$ be vertices of a triangle ABC. If the centroid of this triangle moves on the line $2x+3y=1$, then the locus of the vertex C is the line **[AIEEE 2004]**

(a) $3x-2y=3$ (b) $2x-3y=7$

(c) $3x+2y=5$ (d) $2x+3y=9$

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1	a	2	c	3	c	4	a	5	d
6	a	7	c	8	c	9	c	10	a,c,d
11	b	12	b	13	c	14	d	15	d