CHAPTER-10

STRAIGHT LINES

02 MARK TYPE QUESTIONS

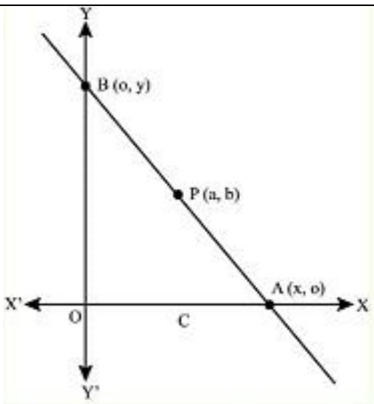
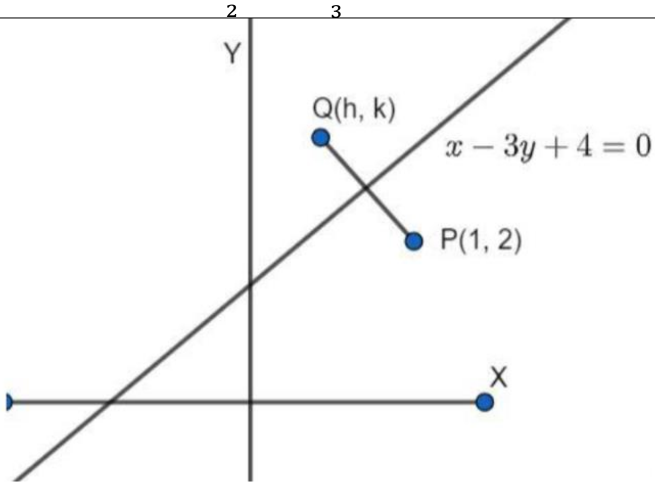
Q. NO	QUESTION	MARK
1.	Find the equation of the line passing through the point (5,2) and perpendicular to the line joining the points (2, 3) and (3, -1)	2
2.	Find the angle between the lines $y = (2 - \sqrt{3})x + 5$ and $y = (2 + \sqrt{3})x - 7$	2
3.	What is the equation of the line that has y−intercept 4 and is perpendicular to the line $y=3x-2$?	2
4.	Let A(1, 0), B(6, 2), C(3/2, 6) be the vertices of a triangle ABC. If P is a point inside the triangle ABC such that the triangles APC, APB and BPC have equal areas, then find the length of the line segment PQ, where Q is the point (-7/6, -1/3).	2
5.	Find the value of x so that the points (x,−1),(2,1) and (4,5) are collinear.	2
6.	Two sides of a square lie on the lines $x + y = 1$ and $x + y + 2 = 0$. What is the area?	2
7.	Show that the straight lines given by $x(a + 2b) + y(a + 3b) = a + b$ for different values of a and b passes through a fixed point.	2
8.	Find the equation of the straight line which makes an angle of $\tan^{-1}\sqrt{2}$ with the x-axis and cuts off an intercept of $\frac{-3}{\sqrt{2}}$ with the y-axis.	2
9.	Find the slope of the lines which makes an angle of 45˚with the line $3x - y + 5 = 0$.	2
10.	Determine x so that 2 is the slope of the line through (2, 5) and (x,3).	2
11.	Find the equation of the straight line making an angle of 135^0 with x- axis and cutting the y-axis at a distance 2 below the origin.	2
12.	Find the equation of the line X-intercept –3 units and passing through (3,2) .	2
13.	Find the angle between the lines $y - \sqrt{3}x - 5 = 0$ and $\sqrt{3}y - x + 6 = 0$.	2
14.	Let P(a,b) is the mid point of a line segment between axes. Show that the equation of the line is $\frac{x}{a} + \frac{y}{b} = 2$.	2
15.	Convert the equation $2x-3y-5=0$ into (a) slope- intercept form (b) intercept form.	2
16.	Assuming that straight lines work as the plane mirror for a point, find the image of the point (1,2), in the line $x-3y+4=0$	2
17.	A person standing at the junction (crossing) of two straight paths represented by the equations $2x-3y+4=0$ and $3x+4y-5=0$ wants to reach the path whose equation is $6x-7y+8=0$ in the least time. Find the equation of the path that he should follow.	2
18.	Assertion The equation of the straight line which passes through the point (2, -3) and the point of the intersection of the lines	2

	$x+y+4=0$ and $3x-y-8=0$ is $2x-y-7=0$ Reason Product of slopes of two perpendicular straight lines is -1. (a)Both Assertion and Reason are correct and Reason is the correct explanation for Assertion. (b) Both Assertion and Reason are correct but Reason is not correct explanation for Assertion (c) Assertion is correct but Reason is incorrect. (d) Assertion is incorrect but Reason is correct	
19.	Assertion: If θ is the inclination of a line l, then the slope or gradient of the line l is $tan\theta$. Reason: The slope of a line whose inclination is 90^0 , is not defined. (a)Assertion is correct, reason is correct; reason is a correct explanation for assertion. (b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion. (c) Assertion is correct, reason is incorrect;. (d) Assertion is incorrect, reason is correct.	2
20.	Assertion: The inclination of the line l may be acute or obtuse. Reason: Slope of x-axis is zero and slope of y-axis is not defined . (a)Assertion is correct, reason is correct; reason is a correct explanation for assertion. (b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion. (c) Assertion is correct, reason is incorrect;. (d) Assertion is incorrect, reason is correct.	2
21.	If three points (h,0), (a,b), and (0,k) lies on the line, then the value of $\frac{a}{h}+\frac{b}{h}$ is (a) 0 (b) 1 (c) 2 (d) 3	2
22.	In what ratios does the line y-x+2=0 cuts thje line joining (3,-1) and (8,9)? (a) 2:3 (b) 3:2 (c) 3:-2 (d) 1:2	2
23.	The straight lines x+2y−9,3x+5y−5=0 and ax+by−1=0 are concurrent, if the straight line 35x−22y+1=0 passes through the point (a) (a,b) (b) (b,a) (c) (a,-b) (d) (-a,b)	2
24.	The reflection of the point (4,−13) in the line 5x+y+6=0 a) (-1,-14) b) (3,4) c) (0,0) d) (1,2)	2
25.	If the coordinates of points A,B,C be (−1,5),(0,0) and (2,2) respectively and D be the middle point of BC, then the equation of the perpendicular drawn from B to the line AD is: a) x+2y=0 b) 2x+y=0 c) x-2y=0 d) 2x-y=0	2
26.	Find the equation of the line passing through (2, 3) and perpendicular to the line 3x+4y – 5=0	2
27.	If the line x/a + y/b = 1, passes through the points (2, -3) and (4, -5), then find $a+b$	2
28.	Find the equation of the line passes through the points (-1, 1) and (2, 4)	2
29.	Find angles between the lines $\sqrt{3}x+y=1$ and $x+\sqrt{3}y=1$	2
30.	If the lines 3x – 4y+4 =0 and 6x – 8y -7 =0 are tangents to a circle, find the radius of the circle.	2

ANSWERS:

Q. NO	ANSWER	MARKS
1.	**Slope of line joining points (2 , 3) & (3,-1) is $\frac{-1-3}{3-2}$ = -4** **Now, slope of line through point (5,2) . (-4) = -1** **Slope of line through point (5,2) = ¼** **Equation of line having slope ¼ & point (5,2) is** **y-2 = $\frac{1}{4}$ $(x-5)$** **X – 4Y + 3 = 0**	**2**
2.	**Slopes are,** **m1=2−$\sqrt{3}$,m2= 2 + $\sqrt{3}$** **Angle between two lines,** **tanθ=$\left\|\frac{(2+\sqrt{3})-(2-\sqrt{3})}{1+(2+\sqrt{3})(2-\sqrt{3})}\right\|$** **⇒tanθ=|$\sqrt{3}$ |** **i.e., tanθ=$\sqrt{3}$ and tanθ=−$\sqrt{3}$** **∴θ=π/3 or 2π/3**	**2**
3.	**The given equation of is y=3x−2** **Express the given equation as slope-intercept form y=mx+c** **where,** **(Slope)m = coefficient of x** **m1 = 3** **When the lines are perpendicular. Then the product of the slope is −1** **∴m1.m2 =−1** **3.m2=−1** **m2=−13** **Given, the y−intercept of the other line is 4.** **Therefore, the required equation of the line using the slope-intercept form y=mx+c** **y = −13x+4**	**2**
4.	**Since point P is the centroid, so its coordinates are** **{(1+6+3/2) / 3, (1+5+2/3) / 3 }** **= (17/6, 8/3)** **and coordinates of point Q : (-7/6, -1/3)** **Now, PQ = √[(-7-17/6)2+ (-1/3 - 8/3)2] = 5 (using distance formula)**	**2**
5.	**Let A(x,−1)B(2,1) and C(4,5)**	**2**

	They are collinear if slope of AB= slope BC **Slope of AB = {1–(–1)} / (2–x) = 2 / (2 – x)** **Slope of BC=(5–1) / (4 - 2) = 4/2** **so, 2 / (2 – x) = 4/2** **x=1**	
6.	Clearly, the length of the sides of the square is equal to the distance between the parallel lines X + y - 1 = 0→(i) x + y + 2 = 0→(ii) Putting x = 0 in (i), we get y = 1. So (0, 1) is a point on line (i) Distance between the parallel lines = {Length of the perpendicular from (0, 1) to x + y + 2= 0} = $\frac{\lvert 0+1+2 \rvert}{\sqrt{1^2+1^2}} = \frac{3}{\sqrt{2}}$ Thus, the length of the side of the square is $\frac{3}{\sqrt{2}}$ and hence the Area is $(\frac{3}{\sqrt{2}})^2$ = $\frac{9}{2}$ sq. units.	2
7.	The given equation can be written as a (x + y - 1) + b (2x +3y - 1) = 0 (x + y - 1) + λ (2x + 3y -1) = 0, where λ =b/a This is of the form $L_1 + \lambda L_2$= 0. So, it represents a line passing through the intersection of x + y -1 = 0 and 2x + 3y- 1 = 0. Solving these two equations, we get the point (2, -1), which is the fixed point.	2
8.	Here m= tan ($\tan^{-1}\sqrt{2}$) = $\sqrt{2}$ and c = $\frac{-3}{\sqrt{2}}$. Putting the values in y = mx + c, we obtain the equation of the required line is y = $\sqrt{2}$x - $\frac{3}{\sqrt{2}}$ or, we get $\sqrt{2}$y = 2x – 3.	2
9.	Let m be the slope line which make an angle of 45˚with the line 3x–y +5=0 Then, tan 45˚= $\left\lvert\frac{m-3}{1+3m}\right\rvert$ or, 1= $\left\lvert\frac{m-3}{1+3m}\right\rvert$ or, 1+3m =±(m-3) or, m= -2, ½.	2
10.	The slope of the line through (2, 5) and (x, 3) is $\frac{3-5}{x-2}$. But the slope of the line is given as 2. ∴ $\frac{3-x}{x-2}$= 2 or 2x – 4= - 2 or x = 1	2
11.	Here m = tan135° = tan(180°–45°) = –tan45° = –1 y-Intercept c = –2 ∴ Equation of line $y = mx + c$ Implies that $y = -x - 2$ ∴ $\boldsymbol{x + y + 2 = 0}$ is the required equation of line.	2

12.	Let the line be $\frac{x}{a}+\frac{y}{b}=1$ ……(i) Given a = –3 and (i) passes through (3,2) $\therefore \frac{3}{-3}+\frac{2}{b}=1$ implies that b = 1 Put a = –3 and b = 1 in (i) ,we have $\frac{x}{-3}+\frac{y}{1}=1$ Implies that $\boldsymbol{x-3y+3=0}$,which is the required equation of line .	2
13.	Slopes of two lines are $m_1 = \sqrt{3}$ and $m_2 = 1/\sqrt{3}$. Let α be the angle between two lines. $\tan\alpha = \left\lvert\frac{m_2 - m_1}{1+m_1m_2}\right\rvert = \frac{1}{\sqrt{3}}$ which gives $\alpha = 30^0$ .Hence angle between two lines is either 30^0 or $180^0 - 30^0 = 150^0$.	2
14.	 Let P(a,b) is the mid point of AB where A(x,0) and B(0,y) therefor $(\frac{x+0}{2},\frac{0+y}{2})=(a,b)$ which gives x = 2 a and y = 2 b Equation of line passing through (2a,0) and (0,2b) is $y-0=\frac{2b-0}{0-2a}(x-2a)$ which gives $\boldsymbol{\frac{x}{a}+\frac{y}{b}=2}$	2
15.	(a) Slope intercept form :$y=\frac{2}{3}x-\frac{5}{3}$ Intercept form : $\frac{x}{\frac{5}{2}} + \frac{y}{\frac{-5}{3}} = 1$	2
16.	 Let Q(h, k) is the image of the point P(1, 2) in the line x−3y+4=0……(i) Coordinate of midpoint of PQ=$(\frac{h+1}{2},\frac{k+2}{2})$	2

	This point will satisfy the eq. ....(i) Therefore, h−3k=−3…….(ii) Since, the object and the line are perpendicular. Therefore, (Slope of line PQ)X (slope of line x−3y+4=0)=− 1 $$\left(\frac{k-2}{h-1}\right)\left(\frac{-1}{-3}\right) = -1$$ 3h+k=5…….(iii) On solving (ii) and (iii) h= $\frac{6}{5}$ and k $=\frac{7}{5}$	
17.	The given equations of parallel lines are, 2x−3y−4=0....... (i) 3x+4y−5=0……(ii) Person wants to reach the path whose equation is, 6x−7y+8=0……(iii) On solving eq. (i) and (ii) we get $(\frac{31}{17},\frac{-2}{17})$ To reach the line (iii) in least time the man must move along the perpendicular from crossing point $(\frac{31}{17},\frac{-2}{17})$ to (iii) line, Slope of the line is given by m = $\frac{-(co-efficient\ of\ x)}{(co-efficient\ of\ y)}$ Slope of line(iii) is $\frac{6}{7}$ Therefore, the slope of the required path, Slope of the required path ×Slope of line(iii) =−1=−1 Slope of the required path $\times\frac{6}{7}$=−1 Slope of the required path = $\frac{7}{6}$ Therefore, the equation of the lie using one-point form, y−y1=m(x−x1) 119x+102y=205	2
18.	Correct option is b) Given lines $$\boldsymbol{x+y+4=0}$$ $$\boldsymbol{x=-y-4} \ldots\ldots\ldots\ldots (\boldsymbol{1})$$ $$\boldsymbol{3x-y-8=0} \ldots\ldots\ldots\ldots\ldots\ldots (\boldsymbol{2})$$ from eq (1) and (2) $$\boldsymbol{3(-y-4)-y-8=0}$$ $$\boldsymbol{-3y-12-y-8=0}$$ $$\boldsymbol{-4y=20}$$ $$\boldsymbol{y=-5}$$ from eq(1)	2

	$$x = 5 - 4$$ $$x = 1$$ point of intersection P(1,–5) eq of line from point A(2,–3) and P(1,–5) $$y + 3 = 1 - 2 - 5 + 3(x - 2)$$ $$y + 3 = -1 - 2(x - 2)$$ $$y + 3 = 2x - 4$$ $$2x - y - 7 = 0$$ if two line are perpendicular then $$m1m2 = -1$$ But the reason is not correct for statement	
19.	b	2
20.	b	2
21.	(b)	2
22.	Given the equation of line y–x+2=2 Let the points be denoted as A(3,–1)≡(x_2,y_2) and B(8,9)≡(x_1,y_1) Let the line segments joining the points A and B be of ratio K:1 at point C. Here m=K and n=1 By section formula, ∴CoordinatesofC=(K+18/K+3,K+19/K−1) C[K+18/K+3,K+19/K−1] lies on the line y–x+2=0 ⇒K+19K−1−K+18K+3+2=0 ⇒9K−1−8K−3+2K+2=0 3K−2=0⇒K=32 ∴The ratio =2:3	2
23.	Correct option is A) x+2y–9=0.....(i) 3x+5y–5=0....(ii) ax+by–1=0......(iii) Intersection of (i) and (ii) is y=22 and x=–2(22)+9=–35 Putting this point in ax+by–1=0, we get 35a–22b+1=0 For the three lines to be concurrent 35x–22y+1=0 should pass through (a,b)	2
24.	Correct option is A) 5x+y+6=0......(1)	2

	Take a circle of zero radius at (4,-13) $(x-4)^2+(y-13)^2=0$.....(2) With radical axis as (1) find a co axial circle $(x-4)^2+(y-13)^2-2\lambda(5x+y+6)=0$......(3) We can resolve λ by 2 means. (A) The circle (3) has 0 radius. (B) The center of (2) and (3) have opposite powers w.r.t. the line (1) (A) involves more calculations than (B). So we adopt (B) Center of (3)=$(5\lambda+4,\lambda-13)$ applying (B) $5(5\lambda+4)+(\lambda+3)+6=-(5\times4-13+6)\Rightarrow$ $\lambda=-1\lambda=-1$ So the image point required is $(5\times-1+4,-1-13)=(-1,-14)$	
25.	Correct option is C) Given that D is the mid point of B $\Rightarrow D=(20+2,20+2)$ $\Rightarrow D=(1,1)$ Slope of line joining $(x_1,y_1),(x_2,y_2)$ is given by m= x_1-x_1/ y_1 -,y_2 Let Slope of AD be m1 $\Rightarrow m=1+11-5=2-4=-2$ Let the slope of required line be m2 Required line is perpendicular to AD . Therefore, $m_1,m_2=-1$ $\Rightarrow(-2)\ m_2=-1$ $\Rightarrow\ m_2=21$ This line passes through B $\Rightarrow y-y1=m(x-x1)$ $\Rightarrow y-0=21(x-0)$ $\Rightarrow y=21x$ $\Rightarrow x-2y=0$ Hence the required line is $\Rightarrow x-2y=0$	2
26.	Given equation of the line is 3x+4y – 5=0 The line perpendicular to the given line is 4x – 3y=k This line passes through (2, 3) So, k= - 1 And the equation of desire line is 4x – 3y+1=0	2
27.	Line x/a + y/b = 1, passes through the points (2, -3) and (4, -5), then 2/a – 3/b = 1 and 4/a -5/b = 1 Solving a = - 1, b = -1	2

	hence, a+b = -2	
28.	$y - y_1 = \frac{y2 - y1}{x2 - x1}\ (x - x1)$ Putting the values of (x1, y1) and (x2, y2) we get 5x +3y+ 2 =0	2
29.	Slope of the lines $\sqrt{3}x + y = 1\ and\ x + \sqrt{3}y = 1$ are -$\sqrt{3}$ and -1/$\sqrt{3}$ $tan\alpha = \left\|\frac{m1 - m2}{1 + m1m2}\right\|$ After solving we get α =30^0	2
30.	Since, lines 3x – 4y+4 =0 and 6x – 8y -7 =0 are parallel to the same circle. So, radius = (Distance between parallel lines)/2 $= \frac{1}{2}\frac{\left\|4+\frac{7}{2}\right\|}{\sqrt{3^2+4^2}}$ = ¾	2