Unit-4 Co-ordinate Geometry - 14 Marks

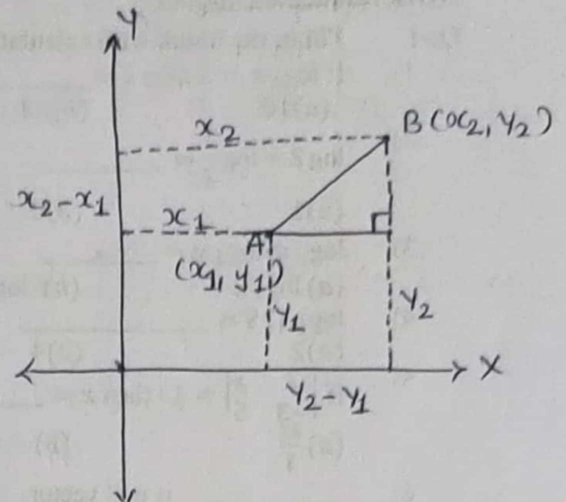
*** Distance Formula**

If $A(x_1, y_1)$ and $B(x_2, y_2)$ then

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$AB^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

$$d(AB) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



* Find the distance between the points (4,5) and (7,3).

* Find the distance between the points (1,3) and (0,-4).

* Find the distance between the points (1,1) and (2,-1).

* Find the distance between the points (7,-5) and (3,-2).

* Find the distance between the points (-1,2) and (-7,6).

* d[(3,2), (-1,1)] = ______

* If p is the mid point of a line segment AB for the points A(-2,-1) and B(4,3) then find P.

* If the mid point of line segment AB is (1,1) and B(4,3) then find co-ordinate of A.

* If the distance between the point (5,7) and (-3, m) is 10 then find the value of m.

*** co-linearity**

$$D = \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$

If D=0 then given three vertices are co-linear.

(3,2) (5,4) (7,6)

(1,0) (0,1) (-1,2)

→ Using Distance Formula

(-3,-2) (5,2) (9,4)

AB = AC + BC

AC = AB + BC

BC = AB + AC

* Prove that $(3,2)$, $(5,4)$ and $(7,6)$ are co-linear.
* prove that $(1,0)$, $(0,1)$ and $(-1,2)$ are co-linear.
* prove that $(-3,-2)$, $(5,2)$ and $(9,4)$ are co-linear.
* prove that $(a, b+c)$, $(b, c+a)$, and $(c, a+b)$ are co-linear.
* If three point $(-k,1)$, $(k,3)$ and $(6,5)$ are co-linear then find value of k.

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* Generized equation of line $ax+by+c=0$

→ x-intercept $= -\frac{c}{a}$

→ y-intercept $= -\frac{c}{b}$

* To find slope (m)

→ Given two points (x_1, y_1) & (x_2, y_2).

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

→ Given angle θ then $m = \tan\theta$

→ Given line $ax+by+c=0$ then $m = -\frac{a}{b}$.

* Find the slope of line passing through the point $(3,2)$ and $(1,4)$.
* Find the slope of line passing through the point $(8,5)$ and $(1,-2)$.
* Find the slope of line passing through the point $(1,3)$ and $(4,-5)$.
* Find slope and intercepts of the line $4x+3y-7=0$.
* Find slope and intercepts of the line (i) $2x-3y+5=0$

(ii) $3x+5=0$

(iii) $2y-3x+4=0$

* Find slope and intercepts of line (i) $2x+y-8=0$

(ii) $2x-5y+3=0$ (iii) $2x+3y-4=0$

* Find slope of a line $(\cos\alpha)x + (\sin\alpha)y = 5$.
* To find Equation of line :-

→ Given two points (x_1, y_1) & (x_2, y_2) then eq^n $\begin{vmatrix} x & y & 1 \\ x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \end{vmatrix} = 0.$

* $(2,1)$ $(-1,3)$ * $(2,3)$ $(3,-1)$ * $(1,6)$ $(-2,5)$

$2x+3y-7=0$ $4x+y-11=0$

→ Given point (x_1, y_1) and slope (m) then eq^n $(-2,-3)$, $3/2$

$y - y_1 = m(x - x_1)$ (point-slope equation)

→ Given slope (m) and Intercept (c) on Y-axis, then eq^n

$y = mx + c$.

* Find the eq^n of line passing through the points $(2,1)$ & $(-1,3)$.

$(2x+3y-7=0)$

* Find the eq^n of line passing through the points $(2,3)$ & $(3,-1)$.

$(4x+y-11=0)$

* Find the eq^n of line passing through the points $(1,6)$ & $(-2,5)$.
* Find the eq^n of line passing through the point $(-2,-3)$ and having slope $3/2$.

$(3x-2y=0)$

* Find the eq^n of line passing through the point $(2,5)$ and having slope $-1/2$.
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* **Angle between two lines:-**

$$\tan\theta = \left|\frac{m_1-m_2}{1+m_1m_2}\right|$$

$$\therefore \theta = \tan^{-1}\left|\frac{m_1-m_2}{1+m_1m_2}\right|,$$

where m_1 = slope of first line
m_2 = slope of second line
θ = Angle between two lines.

* The angle between two line is 45°. If the slope of first line is $\frac{2}{3}$. Find slope of other line. $(m_2 = 5$ or $-1/5)$
* Find the angle between two straight line $x+y=0$ and $x-y=0$. $(\theta = \pi/2)$
* Find the angle between two Straight line $\sqrt{3}x-y+1=0$ and $x-\sqrt{3}y+2=0$. $(\theta=\frac{\pi}{6})$
* Find the angle between two straight line $x+y+1=0$ and $2x+3y+7=0$. $(\theta=\frac{\pi}{4})$

* Condition of two parallel line $m_1 = m_2$

* Condition of two perpendicular line $m_1 \cdot m_2 = -1$.

* Prove that line $3x+2y+1=0$ and $6x+4y+3=0$ are parallel.

* Prove that line $7x+y-1=0$ and $3x-21y+2=0$ are perpendicular.

* Check the line $3x+2y+1=0$ and $2x-3y+7=0$ are parallel or perpendicular.

* If two lines $3x+4my+8=0$ and $3my-9x+10=0$ are perpendicular to each other then find value of m.

* If two lines $5x-py=3$ and $2x+3y=4$ are perpendicular to each other then find value of p.
parallel then find p

* If two lines $3mx-2my-10=0$ and $(5m+2)x-4my-28=0$ are parallel to each other then find value of m. $(m=2)$

* General eq^n of line parallel to line $ax+by+c=0$ is $ax+by+k=0$

* General eq^n of line perpendicular to line $ax+by+c=0$ is
$bx-ay+k=0$

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* Find the equation of line parallel to the line $2x+y-1=0$ and passing through the point $(4,5)$. $(2x+y-13=0)$

* Find the equation of line parallel to the line $4x-3y+7=0$ and passing through the point $(4,3)$. $(4x-3y-7=0)$

* Find the equation of line perpendicular to the line $4x-y+5=0$ and passing through the point $(1,-2)$. $(x+4y+7=0)$

* Find the equation of line perpendicular to the line $x-3y+3=0$ and passing through the point $(-1,2)$. $(3x+y+1=0)$

* Find the equation of line perpendicular to the line $-3x+4y+7=0$ and passing through the point $(4,3)$. $(4x+3y-25=0)$

* Find the equation of line perpendicular to the line $3x-2y+4=0$ and passing through the point $(1,3)$. $(2x+3y-11=0)$

* Find the equation of line perpendicular to the line $y-4x+1=0$ and passing through the point $(2,1)$. $(x+4y-6=0)$

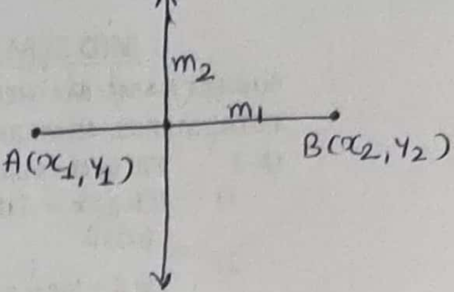
* perpendiculer Bisector

→ Mid point $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

→ slope $\frac{y_2-y_1}{x_2-x_1}$

→ $\perp^{lar}$ line slope

→ point-slope equation $y-y_1=m(x-x_1)$.



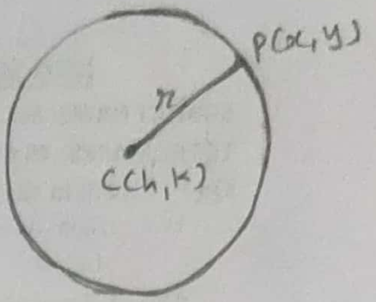
* Find the equation of line which is perpendicular bisector of line joining points $(8,-2)$ and $(6,4)$. $(x-3y-4=0)$

* Find the equation of line which is perpendicular bisector of line joining points $(3,5)$ and $(1,1)$ $(x+2y-8=0)$

* Find the equation of line which is perpendicular bisector of Line joining points $(-1,2)$ and $(1,-2)$. $(x-2y=0)$

* Find the equation of line which is perpendicular bisector of line joining points $(5,6)$ and $(-1,1)$. $(12x+10y-59=0)$.

CIRCLE



$CP = r$

$\therefore CP^2 = r^2$

$\therefore (x-h)^2 + (y-k)^2 = r^2$

Centre point $C(h,k)$ and radius r then eqⁿ of circle is

$$(x-h)^2 + (y-k)^2 = r^2$$

→ If centre point $C(0,0)$ and radius r then eqⁿ of circle is

$$x^2 + y^2 = r^2$$

* Find equation of circle having centre (6,7) and radius 5. $(x^2+y^2-12x-14y+60=0)$
* Find equation of circle having centre (−2,5) and radius 4. $(x^2+y^2+4x-10y+13=0)$
* Find the equation of circle having centre (−4,3) and tangent to x-axis. $(r=3)$ $(x^2+y^2+4x-6y+4=0)$
* Find the equation of circle having centre (3,−4) and tangent to y-axis. $(r=3)$ $(x^2+y^2-6x+8y+16=0)$
* Find the equation of circle having centre (1,1) and passing through (−2,4). $(x^2+y^2-2x-2y-16=0)$
* Find the equation of circle having centre (4,3) and passing through (7,−2). $(x^2+y^2-8x-6y-9=0)$
* Find the equation of circle having centre (2,3) and passing through (3,4). $(x^2+y^2-4x-6y+11=0)$
* Find the equation of circle having centre (3,4) and passing through origin. $(x^2+y^2-6x-8y=0)$
* Centre (−2,5) passing through the intersection of lines $2x+y-3=0$ $x-3y+2=0$

$x=1, y=1,$ $r^2=25$ $x^2+y^2+4x-12y+4=0.$

* **General equation of circle**

$x^2+y^2+2gx+2fy+c=0.$

centre $= (-g, -f)$ radius $r = \sqrt{g^2+f^2-c}$

$\rightarrow x^2+y^2+2gx+2fy+c=0$

$\therefore x^2+2gx+g^2+y^2+2fy+f^2+c-g^2-f^2=0.$

$\therefore (x+g)^2+(y+f)^2 = g^2+f^2-c$

$\therefore (x-(-g))^2+(y-(-f))^2 = g^2+f^2-c.$

comparing with $(x-h)^2+(y-k)^2 = r^2$

then we have $C(h,k) = C(-g,-f)$

$r^2 = g^2+f^2-c$

* Find centre and radius of circle $x^2+y^2-2x+4y-1=0.$
  (centre $(1,-2)$, $r=\sqrt{6}$)
* Find centre and radius of circle $x^2+y^2-4x-6y-4=0$
  (centre $(2,3)$, $r=\sqrt{17}$)
* Find centre and radius of circle $4x^2+4y^2+8x-12y-3=0$
  (centre $(-1, 3/2)$, $r=2$)
* Find centre and radius of circle $2x^2+2y^2+4x+6y-7=0$
  (centre $(-1, -3/2)$, $r=\sqrt{\frac{27}{4}}$)
* Find centre and radius of circle $36x^2+36y^2+24x-36y-23=0.$
  (centre $(-1/3, 1/2)$, $r=1$)
* If radius of a circle $x^2+y^2-4x-8y+k=0$ is 4 unit. then find value of K. $(k=4)$
* If radius of a circle $2x^2+2y^2-4x-8y+k=0$ is 4 unit. then find value of K. $(k=-22)$.
* If radius of a circle $x^2+y^2-4x-4y+k=0$ is 4 unit then find value of K. $(k=-8)$.
* Find the eq^n of circle having centre $(-2,5)$ and passing through the intersection of lines $2x+y-3=0$ and $x-3y+2=0.$
  ($x=1, y=1$, $r^2=25$
  $x^2+y^2+4x-12y+4=0$)

* Equation of tangent and Normal to the circle $x^2+y^2=r^2$

Equation of tangent $xx_1+yy_1=r^2$

Equation of Normal $\frac{x}{x_1}=\frac{y}{y_1}$

* Equation of tangent and Normal to the circle $x^2+y^2+2gx+2fy+c=0$

→ Equation of tangent

$$xx_1+yy_1+g(x+x_1)+f(y+y_1)+c=0.$$

→ Equation of Normal

$$\frac{x-x_1}{x_1+g}=\frac{y-y_1}{y_1+f}$$

* Find the eq^n of tangent and Normal to the circle $x^2+y^2=52$ at point $(-6,4)$. [Tangent $6x-4y+52=0$
$2x+3y=0$]

* Find the eq^n of tangent and Normal to the circle $x^2+y^2-6x+10y+21=0$ at point $(1,-2)$.
[Tangent $2x-3y-8=0$
Normal $3x+2y+1=0$]

* Find the eq^n of tangent and Normal to the circle $x^2+y^2-4x+2y+3=0$ at point $(1,-2)$.
[Tangent $x+y+1=0$, Normal $x-y-3=0$]

* Find the eq^n of tangent and Normal to the circle $x^2+y^2-2x+4y-20=0$ at point $(-2,2)$.
[Tangent $3x-4y+14=0$, Normal $4x+3y+2=0$]

* Find the eq^n of tangent and Normal to the circle $x^2+y^2-2x-7=0$ at point $(2,3)$.
[Tangent $x+y-5=0$, Normal $x-y+1=0$]

* Find the eq^n of tangent and Normal to the circle $2x^2+2y^2+3x-4y+1=0$ at point $(-1,2)$.
[Tangent $x-4y+9=0$, Normal $4x+y+2=0$]