

well ok friends now this is the last session of straight line and we are discussing various types of problems as we have already discussed in earlier session

so we continue with that session

so again we have some problem two vertices of a triangle are b five minus one and c minus two three if the ortho center of the triangle is at origin find the third vertex

so here information is given like this that in the triangle abc we have two vertices b and c is given and the ortho center of the triangle is at origin now question is what is ortho center ortho center is a point of intersection of altitudes of a triangle means suppose this is a triangle abc and these are the altitudes drawn from a to bc altitude drawn from b to ac and altitude drawn from c to ab then this point of intersection of altitude is called ortho center and this ortho center o in this problem is given at origin

so we have three information is given that is two vertices is given and one ortho center is given then we have to find the third vertex a ok let us start problem

so say this be is the altitude drawn from b to ac and this cf is the altitude drawn from c to ab now these two altitude intersect each other at o means origin and this is ortho center of this triangle now since this ob is perpendicular to ac and this oc is perpendicular to ab

so slope of this ob is what slope of ob

so this is zero zero

so slope of ob is zero plus one by zero minus five equal to minus one by five that is slope of be is equal to minus one by five

so slope of b is equal to minus one by five and this b is perpendicular on ac

so slope of ac is equal to minus one by minus one by five is equal to five as b perpendicular to ac slope of oc it means slope of cf slope of cf is equal to zero minus three by zero plus two means minus three by two since cf perpendicular to ab this implies slope of ab is equal to minus one minus three by two means two by three

so now we have slope of ac and slope of ab

so for this two line we have two information slope of s is known and this ac is passing through point c minus two three and for the line ab again we have slope of ab is known and this line passing through point b five minus one

so find the equation of these two line

so equation of equation of ac with slope five and passing through c minus two three

so y minus three is equal to five x plus two this implies $5x$ minus y plus 13 equal to zero say this is equation one again equation of line ab with slope two by three and passing through b five minus one

so y plus one is equal to two by three x minus five

so this implies three y plus three $2x$ minus 10

so $2x$ minus 3 y minus thirteen equal to zero

so this is equation second

so from one and two $5x$ minus y plus thirteen equal to zero this implies y is equal to $5x$ plus 13 put y equal to $5x$ plus 13 in two

so two x minus three $5x$ plus thirteen minus thirteen equal to zero this implies minus fifteen x

so minus thirteen x and minus fifty two equal to zero

so x is equal to minus four

so y is equal to five x plus thirteen

so five into minus four plus thirteen is equal to minus 7 third vertex a minus four minus seven answer another problem that is a straight line is drawn through

about 15 degree

so fifteen remains we rotate this line like this in fifteen degree

so new position of line is this and this rotation is about this point a two zero means this is a to zero we rotate like this

so this point a will not change but point b will certainly change then we have to find the equation of new position of line let the line makes angle theta with x axis

so of line is equal to tan theta and we also know that this line passing through two points

so slope of line is $y_2 - y_1 / x_2 - x_1$

so $1 - 0 / 3 - 2 = \tan \theta$ this implies $\tan \theta = 1$

so $\tan \theta = 1$ implies $\theta = 45$ degree now this line rotate about 15 degree

so the new position of line will makes angle theta plus fifteen degree

so in new position when line rotates about a two zero in anticlockwise then resultant angle with x axis equal to theta plus 15 degree means 45 degree plus 15 degree equal to 60 degree

so slope of line in new position equal to $\tan 60$ degree equal to $\sqrt{3}$

so equation of line with slope $\sqrt{3}$ and passing through the point a to zero

so $y - 0 = \sqrt{3}(x - 2)$

so y is equal to

$\sqrt{3}x - 2\sqrt{3}$

so this is the equation of this line which turned about fifteen degree at point a two zero now another problem that is find the equation of bisector of angle of triangle abc whose vertices are a four three b zero zero and c two three

so vertices of this angle is given and we have to find the equation of bisector of this angle a

so we have to find the this a d which bisect angle a

so we have already know that one very important property say if in any triangle say a b c if a d is angle bisector then $\frac{ab}{ac} = \frac{bd}{dc}$ this is very important property

so if in any triangle if a d is angle bisector then $\frac{ab}{ac} = \frac{bd}{dc}$ this is very important theorem that you have already learnt in class 10 by using basic proportionality theorem

so by using this concept we can find the find this point d

so $\frac{ab}{ac} = \frac{bd}{dc}$ equal to what a b means distance

so $\frac{4}{5} = \frac{bd}{dc}$ means $4dc = 5bd$

and ac is equal to four minus two s square plus three minus three square is equal to two s square is equal to two

so $\frac{bd}{dc} = \frac{4}{5}$ is equal to $\frac{bd}{dc}$ is equal to $\frac{4}{5}$ is equal to $\frac{bd}{dc}$ is equal to $\frac{4}{5}$

so this is five and this is two

so by using now by using section formula we can find this point d

so in this line this b zero zero and this is point d this is 5 this is 2 and this c 2 3

so point d two into zero plus five into 2 by 5 plus 2 3 into 5 into 3 plus 2 into 0 by 5 plus 2 that is 10 by 7 and this is 15 by 7 and we have to find the equation of this bisector and this a is given as four three

so a d equation of a d equation of a d is $y - y_1 = m(x - x_1)$ $y - 3 = \frac{10}{7}(x - 4)$ this is slope of a d and this is x minus four

so this implies $y - 3 = \frac{10}{7}(x - 4)$

so when you simplify it

so $7(y - 3) = 10(x - 4)$ and $7y - 21 = 10x - 40$

so this is 6 by 8 means s minus 18

so we have 1 by 3

so this is 1 by 3 x minus 4

so 3 y minus 9 is equal to x minus 4 this implies x minus 3 y plus 5 equal to zero

so in this way you can find the equation of bisector of line now this is again very good problem a ray of light passing through the point p one two reflects on x axis at the point a and the reflected a passes through the point q five three find the coordinate of a suppose this x axis will be treated as mirror

so if this line this ray when strike this point a will reflected and passing through this point q five three this is q five three let this reflected ray let reflected ray aq max angle theta with the x-axis this whole angle becomes 90 degree this whole angle is 90 degree

so this ray a p

so ray a p max

so slope of slope of a q equal to tan theta now a p max angle pi minus theta with x axis if this makes angle theta then a p max angle pi minus theta with the x axis

so slope of a p equal to $\tan(\pi - \theta)$

so $\tan(\pi - \theta)$ means minus tan theta

so slope of this a q and slope of this a p slope of aq is tan theta and slope of p is minus tan theta

so we have relation slope of aq is equal to minus slope of a p this implies $3 - \theta$ phi minus a equal to minus 2 minus θ by 1 minus a this implies $3 - 1$ minus a is equal to minus 2 5 minus a this implies $3 - 3a$ is equal to minus 10 plus 2a is equal to minus 5a is equal to minus thirteen is equal to five a is equal to thirteen

so a is equal to thirteen by five

so required point a a θ that is thirteen by five zero find the equation of straight line which cut off intercept on x axis which is twice that one y axis and is at unit distance from the origin

so what is given problem

so given this line cutter cuts off intercept on y x axis which is twice that on y axis

so say if this line cut intercept x intercept as two a then y intercept as a and the distance of this line from origin is one

so say this is a means two a zero and this is zero a this is b

so let the equation of line be x by two a plus y by a equal to one as x intercept is 2 and y y intercept is a

so this implies x plus 2 y is equal to 2 a this implies x plus 2 i minus 2 a equal to 0 according to question distance of line say this is one distance of line one from origin is one unit

so zero plus two into zero minus 2 a by root under 1 square plus 2 s square is equal to 1 this implies minus two a by root five equal to one

so this implies two a by root five is equal to plus minus one

so two a is equal to plus minus root five

so a is equal to plus minus root five by two

so equation of line

so required equation of line are x plus 2y equal to 2a it means x plus 2y equal to plus minus 2 into root 5 by 2 equal to x plus 2 i plus minus root five equal to zero

so we have many more problems and

so let us solve you will enjoy the problem ok we will discuss next topic in next session thank you you