CORONA RECESS SERIES 2020

GEOMETRY ONE:

INTERCEPTS

1. Find the equation of a straight line of gradient 3 which cuts the y-axis at $(0,1)$. $(y=3x+1)$
2. Find the gradient of the straight line $7x+4y+2=0$, and its intercepts on the axes. $(m=-7/4,)$ **intercepts are** $-2/7$ **and** $-1/2$**.**

POINTS OF INTERSECTION:

1. Find the equation to the line which passes through the point $(3,2)$ and the point of intersection of the lines $2x+3y-1=0$ and $3x-4y-6=0$. $(43x-29y=71)$

PARALLEL AND PERPENDICULAR LINES

1. Find the equation to the straight line which passes through the point $(-2,3)$ and is parallel to the line $7x-y-6=0$. $(3x+y=5)$
2. Find the equation to the line through the intersection of the lines $3x-2y+14=0, x+y=6$ and perpendicular to the line $5x-6y=0$. $(30x+25y=148)$
3. Find the equation of the line through the origin which is perpendicular to the line $3x-4y+2=0$.

COORDINATES OF FOOT OF THE PERPENDICULAR

1. Find the length of the perpendicular from the origin on to the straight line passing through the two points $(6,4)$ and $(9,8)$. $(12/5)$
2. Find the distance of the points $(2,-1)$ and $(1,1)$ from the line $3x+4y=6$. $(4/5, 1/5)$
3. Find the equation of a straight line joining the feet of the perpendiculars drawn from the point (1,1) to the lines $3x-3y=4$ and $3x+y=6$. $(13x+y=22)$

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4. A triangle has vertices at A(0,8),B(1,1) and C(5,3). Find the coordinates of the foot of the perpendicular from B to AC. Hence find the length of the perpendicular from B to AC. (4,4),$3\sqrt{2}$
5. Prove that the lines OA and OB are perpendicular where A,B are points (4,3) ,(3,-4) respectively.

APPLICATION IN PARALLELOGRAM

Parallelogram

1. Prove that the four points (4,0),(7,-3),(-2,-2), (-5,1) are the vertices of a parallelogram and the equations of its diagonals.
2. ABCD is a quadrilateral where A,B,C and D are the points (3,-1),(6,0), (7,3) and (4,2). Prove that the diagonals bisect each other at right angles and hence find the area of ABCD. (8 sq. units)
3. ABCD is a parallelogram in which the coordinates of A,B and C are (1,2),(7,-1) and (-1,-2) respectively.
   (a) Find the coordinates of D. (-7,1)
   (b) Calculate the area of the parallelogram. 30 sq. units
   (c) Find the length of the perpendicular from A to BC, leaving your answer in surd form. $\frac{6}{13}\sqrt{65}$ units.

Rhombus

1. ABCD is a rhombus. A is the point (2,-1), and C is a point (4,7). Find the equation of diagonal BD. $(x+4y=15)$
2. One side of the rhombus is the line $y=2x,$ and two opposite vertices are (0,0) and $\left(\frac{9}{2},\frac{9}{2}\right)$. Find the equations of the diagonals , the coordinates of the other two vertices and length of the side.
   $\left(x=y, 2x+2y=9, \left(\frac{3}{2},3\right), \left(3,\frac{3}{2}\right), \frac{3}{2}\sqrt{5}\right)$
3. The equations of two adjacent sides of a rhombus are $y=2x+4, y=-\frac{1}{3}x+4.$ If (12,0) is one vertex and all vertices have positive coordinates, find the coordinates of the other three vertices.
   $\left((0,4), \left(12+4\sqrt{2}, 8\sqrt{2}\right), \left(4\sqrt{2}, 4+8\sqrt{2}\right)\right)$
4. One side of a rhombus lies along the line $5x+7y=1$ and one of the vertices is $(3,-2).$ One diagonal of the rhombus is the line $3y=x+1.$ Find

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the coordinates of the other vertices and the equations of the three remaining sides. $\left(-\frac{2}{11},\frac{3}{11}\right),(1,4),\left(4\frac{2}{11},1\frac{8}{11}\right),$
$13y-41x=11, 7y+5x=33, 13y-41x=-149$.

Square

1. Prove that the points (-5,4),(-1,-2), (5,2) lie at the three corners of a square. Find the coordinates of the fourth corner and area of the square. (1,8) , 52 units^2.

Rectangle :

1. The points A(-7,-7),B(8,-1),C(4,9),D are the vertices of a parallelogram ABCD. Find the coordinates of D. Prove that ABCD is a rectangle and find its area. $(-11,3), 174$.
2. A(1,3),B(5,7),C(4,8) ,D(a,b) form a rectangle ABCD. Find a and b. (0,4)

APPLICATION IN A TRIANGLE

Medians of a triangle

1. Show that the point $(-6/7,0)$ is on the median through A of triangle ABC where A,B,C are points $(2,4),(-2,3)$ and $(1,-2)$.
2. P,Q and R are the points (3,4),(7,-2) and (-2,-1) respectively. Find the equation of median through R of the triangle PQR. $(2x-7y=3)$
3. The three straight lines $x=y, 2y=7x$ and $x+4y=60$ form a triangle. Find the equations of the three medians, and calculate the coordinates of their point of intersection.
   $\left(13x=18y, 4x+y=30, 10x+3y=45, \left(\frac{16}{3},\frac{26}{3}\right)\right)$
4. In the triangle ABC, A,B and C are points (0,2), (1,5) and (-1,4). Find the coordinates of the point D such that AD is a median and find the length of this median. $(0,9/2),\frac{5}{2}$.
5. The line $4x-5y+20=0$ cuts the x-axis at A and y-axis at B. Find the equation of median through O of triangle OAB. $(5y+4x=0)$

Altitudes of a triangle

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1. The line $4x - 5y + 20 = 0$ cuts the x-axis at A and y-axis at B. Find the equation of altitude through O of triangle OAB. $(4y + 5x = 0)$
2. The sides of a triangle are the lines $y = 0, x - 3y + 5 = 0$ and $2x + y - 7 = 0$. Find the coordinates of the vertices of the triangle.
   $(-5,0), \left(\frac{7}{2}, 0\right), \left(\frac{16}{7}, \frac{17}{7}\right)$

Perpendicular bisectors of a triangle

1. Find the equation of a perpendicular bisector of the line joining the points $A(2,-3)$ and $B(6,5)$. $(2y + x = 6)$
2. A,B and C are the points $(0,4),(2,3)$ and $(-2,-1)$ respectively. Find the circumcentre of triangle ABC. $(-1/6, 7/6)$
3. Find the circumcentre of a triangle with vertices (-3,0),(7,0) and (9,-6).
   (2,-5)
4. A,B,C are points (1,6),(-5,2),(3,4) respectively. Find the equations of the perpendicular bisectors of AB and BC. Hence find the coordinates of the circumcenter of the triangle ABC. $\left(3x + 2y = 2, 4x + y = -1, \left(-\frac{4}{5}, \frac{11}{5}\right)\right)$

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