Al Mahdi High Schools	Mathematics	10^{th}-Grade
Name:	"Lines in a Plane"	W.S-8

I- Consider the following table:

a. Complete on the same sheet the following table.

No.	*Straight line*	*Name the given form*	Director vectors $\vec{S}$	*Slant* m	x *-intercept*	y *-intercept*	Normal vectors $\vec{N}$	*Write equation in*
1.	$(d_1): 3x-5y+7=0$							<u>Reduced form</u>
2.	$(d_2): \begin{cases} x=-3t+4 \\ y=2t-1 \end{cases}$							<u>Cartesian form</u>
3.	$(d_3): y=\frac{-2}{3}x+1$							<u>Parametric form</u>
4.	$(d_4): 3y+9=0$							<u>Parametric form</u>
5.	$(d_5): 2x-14=0$							<u>Parametric form</u>
6.	$(d_6): \frac{3x-1}{2}=\frac{2y+3}{5}$							<u>Reduced form</u>

b. Find the coordinates of E the intersection point between straight lines $(d_1)\&(d_2)$.

c. Calculate the numerical value of α & β if the points $C(\alpha;2)$ and $D(1,\beta)$ belong to $(d_2)\&(d_4)$ respectively.

II- Consider the equations of the two straight lines, $(D_1): -mx + y = 1$ & $(D_2): 2x - y = 2 + m$ (where m is a parameter)

a. Calculate m so that straight lines $(D_1)\&(D_2)$ are parallel.

b. If $m \neq 2$, then determine the coordinates of A the intersection point of $(D_1)\&(D_2)$ in terms of m.

III- Given the straight lines $(D): mx + (2m-7)y = 5m - 2$.

What is the value of m if:

a. Slant of (D) is equal to -1.

b. (D) cuts $x-axis$ at point $A(-5;0)$.

IV- The following parts are independent:

1. Determine the value of m in each of the following cases:

a. The vector $\vec{u}(+1;-1)$ is the directing vector of the straight line $(d_m): (m-1)x - 2y + m - 3 = 0$.

b. The straight lines $(d): (m+4)x - (m+1)y + 1 = 0$ & $(\Delta): \begin{cases} x = t - 1 \\ y = 2t + 3 \end{cases}$ are parallel.

2. Consider the equations $(d_n): (n+3)x + 2(n+1)y - 2n + 1 = 0$. Calculate the value of n ***if***:

a. (d_n) Passes through:

i. Origin.

ii. The point $A(1;1)$.

iii. The centroid of triangle ABC, where $A(1;1), B(1;2)\&C(4;0)$.

b. (d_n) is parallel to the:

i. Abscissa axis.

ii. Ordinate axis.

c. (d_n) is perpendicular to a straight line of equation $(\lambda): 3x - 2y + 4 = 0$.

V- Find the equation of straight line (Δ) the perpendicular bisector of $[AB]$ where $A(-2;2)\&B(-6;5)$.

i. Find the measure of $[AB]$.

ii. Write the parametric equations of the straight line (d) passing through point B and parallel to (Δ).

VI- For what values of m & n are the straight lines: $(d_1):(2m-2)x+5my=15$ & $(d_2):mx-(2n-1)y=9$, concurrent.

VII- Consider the following equations of straight lines $(d):(m+1)x+(m-2)y+m+3=0$ and $(d'):2mx+my+m-7=0$, where m is a non-zero real parameter.

1) Show that (d) passes through a fixed point N whose coordinates are to be determined.
2) Prove that straight line (d') has a fixed direction.
3) Compute the value of m, so that straight lines (d) and (d') are parallel.
4) Let $\vec{V}(3;y_o)$ be a vector of the plane. Calculate m such that (d) admits $\vec{V}(3;y_o)$ as a director vector.

VIII- In the plane of orthonormal system $(O;\vec{i},\vec{j})$, given the points: $A(2;-3), B(9;-4)$ & $C(5;m)$ where m is a real parameter.

i. Calculate the value of m so that the triangle ABC is right at C.
ii. Calculate $\cos A\hat{B}C$ *for* $m=2$.

IX- Consider points A, B & C of the plane and the straight lines $(AC):\begin{cases} x=3t-5 \\ y=t+2 \end{cases}$ such that $t\in$ IR

$(AB): y=-\dfrac{3}{2}x+\dfrac{11}{2}$, knowing that (BC) is parallel to (OA) *and* $y_B=1$.

a. Trace straight lines (AC) & (AB).
b. Determine a normal vector $\vec{N}$ and a directing vector $\vec{V}$ of straight line (AC).
c. Calculate the coordinates point of A and the abscissa of point B.
d. i) Find a directing vector of (OB). Deduce that (OB) & (AC) are parallel.
ii) What is the nature of quadrilateral $OBCA$? Justify.
e. Give a Cartesian equation of straight line (BC).
f. Let (d) be a line of equation $3x-2y=k, (k\in$ □ $)$. Determine k for (d) passes through the point C.

X- Solve and discuss according to the values of m, each of the following:

1) $\begin{cases} 4x-my=6+m \\ mx-y=2m \end{cases}$ 2) $m^2(x-1)+m(x-2)=2x.$