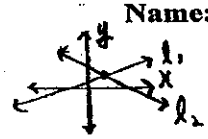
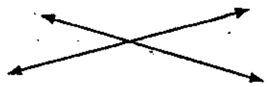
IB Math 2: Relationship between Lines Name: ______________ Period: _____

2-Dimentions ($l_1: A_1x + B_1y = C_1$ and $l_2: A_2x + B_2y = C_2$)

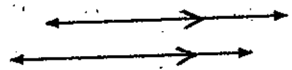


Intersecting – Unique Solution



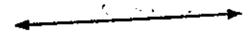
$$\frac{A_1}{A_2} \neq \frac{B_1}{B_2} \quad \text{OR} \quad \frac{A_1}{B_1} \neq \frac{A_2}{B_2}$$

Parallel- No Solution



$$\frac{A_1}{A_2} = \frac{B_1}{B_2} \neq \frac{C_1}{C_2}$$

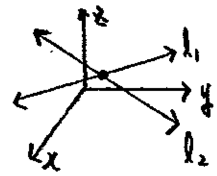
Coincident – Infinitely many solution



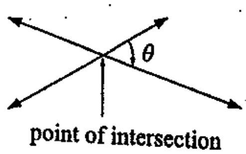
$$\frac{A_1}{A_2} = \frac{B_1}{B_2} = \frac{C_1}{C_2}$$

3-Dimentions

$$l_1;\begin{cases} x = a_1 + x_1 t \\ y = b_1 + y_1 t \\ z = c_1 + z_1 t \end{cases} \quad \text{and} \quad l_2;\begin{cases} x = a_2 + x_2 \lambda \\ y = b_2 + y_2 \lambda \\ z = c_2 + z_2 \lambda \end{cases}$$



Intersecting – Unique Solution (coplanar)

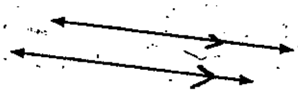


$$\begin{pmatrix} x_1 \\ y_1 \\ z_1 \end{pmatrix} \neq k \begin{pmatrix} x_2 \\ y_2 \\ z_2 \end{pmatrix} \Rightarrow$$

Find the intersection by solving $l_1 = l_2$

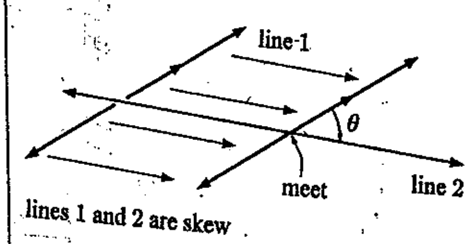
(Three pairs' coordinates are coincident)

Parallel- No Solution (coplanar)



$$\begin{pmatrix} x_1 \\ y_1 \\ z_1 \end{pmatrix} = k \begin{pmatrix} x_2 \\ y_2 \\ z_2 \end{pmatrix}$$

Skewed –No solution (not coplanar)

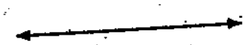


$$\begin{pmatrix} x_1 \\ y_1 \\ z_1 \end{pmatrix} \neq k \begin{pmatrix} x_2 \\ y_2 \\ z_2 \end{pmatrix} \Rightarrow$$

Show skewed by solving $l_1 = l_2$

(Two pairs' coordinates are coincident but one pair is not equal)

Coincident – Infinitely many solution (coplanar)



$$\begin{pmatrix} x_1 \\ y_1 \\ z_1 \end{pmatrix} = k \begin{pmatrix} x_2 \\ y_2 \\ z_2 \end{pmatrix} \quad \text{and} \quad \begin{pmatrix} a_1 \\ b_1 \\ c_1 \end{pmatrix} = k \begin{pmatrix} a_2 \\ b_2 \\ c_2 \end{pmatrix}$$

IB Math 2: Intersection or skewed lines **Name:** ______________ **Period:** _____

Classify the following line pairs as intersecting, slew, or parallel.

a. $l_1; \begin{cases} x = 1+3t \\ y = -2-2t \\ z = 0.5+2t \end{cases}$ **and** $l_2; x = 2 - y = z + 2$

b. $l_1; r = (1i + 2j + 3k) + (1i - j + 2)\lambda$ **and** $l_2; \frac{x-2}{3} = \frac{3-y}{2} = z + 5$

c. $l_1; r = (1i + 8j + 5k) + (2i - j + 3)\lambda$ **and** $l_2; \frac{2-x}{4} = \frac{y+1}{2} = \frac{4-z}{6}$

Exam review HW: P 474 Review set 15 B #1-#6 all, #8 a, 15, P 477 #6, p 478 #15 (a and c)