Warm - Up

1) $4\langle -7, 1, 0\rangle$

$\langle (4)(-7), (4)(1), (4)(0)\rangle$

$\langle -28, 4, 0\rangle$

2) $\langle 1, 2, -5\rangle + \langle -3, 9, 2\rangle$

$\langle -2, 11, -3\rangle$

$\langle 1-3, 2+9, -5+2\rangle$

3) $|3, 4, -5|$

$\sqrt{3^2+4^2+-5^2}$

$\sqrt{9+16+25}$

$\sqrt{50}$ ☺

4) $\langle 6, 0, -4\rangle \bullet \langle -5, 8, 1\rangle$

$6(-5)+0(8)+(-4)(1)$

$-30+(-4)$

-34

SWBAT graph a three dimensinoal plane

Agenda:

- Warm-Up
- Graph planes
- Equations with 3D
- Exit Card

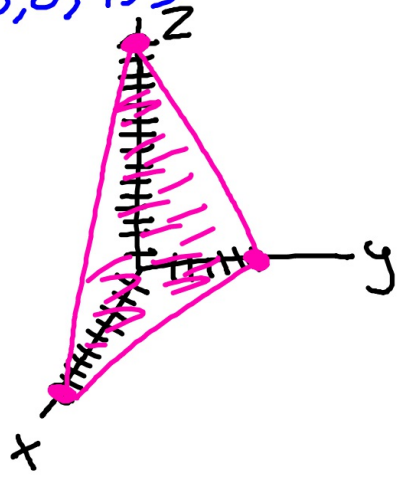
Every plane can be written as

$$Ax + By + Cz + D = 0$$

where A, B, C are not all zero.

Sketch the graph of $3x + 5y + 2z - 30 = 0$

$(10,0,0)$
$(0,6,0)$
$(0,0,15)$



$$\frac{3x+5y+2z=30}{30}$$

$$\frac{x}{10}+\frac{y}{6}+\frac{z}{15}=1$$

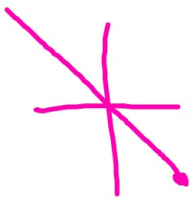
$$\frac{x}{10}+\frac{0}{6}+\frac{0}{15}=1$$

$$\frac{x}{10}=1$$

$$x=10$$

Real World Problem:

A jet just after takeoff is pointed due east. Its air velocity vector makes an angle of 30° with flat ground with an airspeed of 250mph. If the wind is out of the southeast at 32mph, calculate a vector that represents the plan'es velocity relative to the point of takeoff.



$250\langle\cos 30, 0, \sin 30\rangle$

$32\langle\cos 135, \sin 135, 0\rangle$

$250\left\langle \frac{\sqrt{3}}{2}, 0, \frac{1}{2}\right\rangle$

$+\langle 216.5, 0, 125\rangle$

$\langle -22.6, 22.6, 0\rangle$

$\langle 193.9, 22.6, 125\rangle$

Equations for a line in space:

If l is a line through the point $P_0(x_0, y_0, z_0)$ in the direction of a nonzero vector $v = \langle a,b,c\rangle$, then a point $P(x,y,z)$ is on l if and only if

Vector form: $r = r_0 + tv$, where $r = \langle x,y,z\rangle$ and $r_0 = \langle x_0,y_0,z_0\rangle$

Parametric Form: $x = x_0 + at$, $y = y_0 + bt$, $z = z_0 + ct$

where t is a real number

Find the line that goes through the point $P_0(4,3,-1)$ with direction vector v = <-2, 2, 7> in both forms.

$r = (4,3,-1) + \langle -2,2,7 \rangle t$

$x = 4 - 2t$
$y = 3 + 2t$
$z = -1 + 7t$

Using the standard unit vector i, j, k, write a vector equation for a line containing the point A(3,0,-2) and B(-1, 2, -5), and compare it to the parametric equation for the line.

Exit Card

Sketch a graph of the equation:

$$x + y + 2z = 8$$