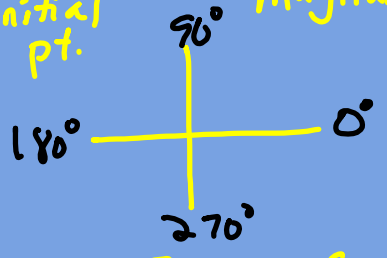
VECTORS – a directed line segment

2 components
1) magnitude
2) direction

$\vec{V}$ **v**

magitude: $|v|$ or $\|v\|$

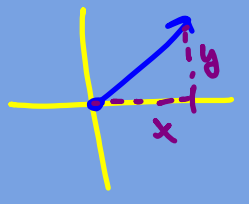


Form 1:

$|v| = 12 \quad \theta = 72°$

Form 2: Component Form

$\langle x, y \rangle$

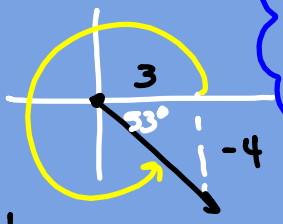


Find magnitude + direction

$\langle 3, -4 \rangle$

$|v| = \sqrt{x^2 + y^2}$

$\tan\theta = \frac{y}{x}$



$|v| = r =$

$r^2 = 9 + 16$

$r^2 = 25$

$|v| = 5$

$\tan\theta = -\frac{4}{3}$

$\tan^{-1}(4/3) = 53°$

$\theta = 307°$

Find component form.

$|v| = 8 \quad \theta = 227°$

Find $\langle x, y \rangle$

$x = |v| \cos\theta = 8 \cos 227° \approx -5.46$

$y = |v| \sin\theta = 8 \sin 227°$

$= -5.85$

$\langle -5.46, -5.85 \rangle$

Parallel Vectors

Vectors has same slope $\left(\frac{y}{x}\right)$

$\langle 7, -4 \rangle$ $\quad$ $\langle -14, 8 \rangle$

$m = \frac{\Delta y}{\Delta x} = \frac{-4}{7}$ $\quad$ $m = \frac{8}{-14} = \frac{-4}{7}$

parallel

Orthogonal (Perpendicular) Vectors

Orthogonal if dot product $= 0$

Dot product

$\langle x_1, y_1 \rangle \cdot \langle x_2, y_2 \rangle$

$= (x_1 \cdot x_2) + (y_1 \cdot y_2)$

$\langle 2, -3 \rangle \cdot \langle 6, 4 \rangle$

$= 2 \cdot 6 + -3 \cdot 4$

$= 12 + -12$

$= 0$ yes, orthogonal

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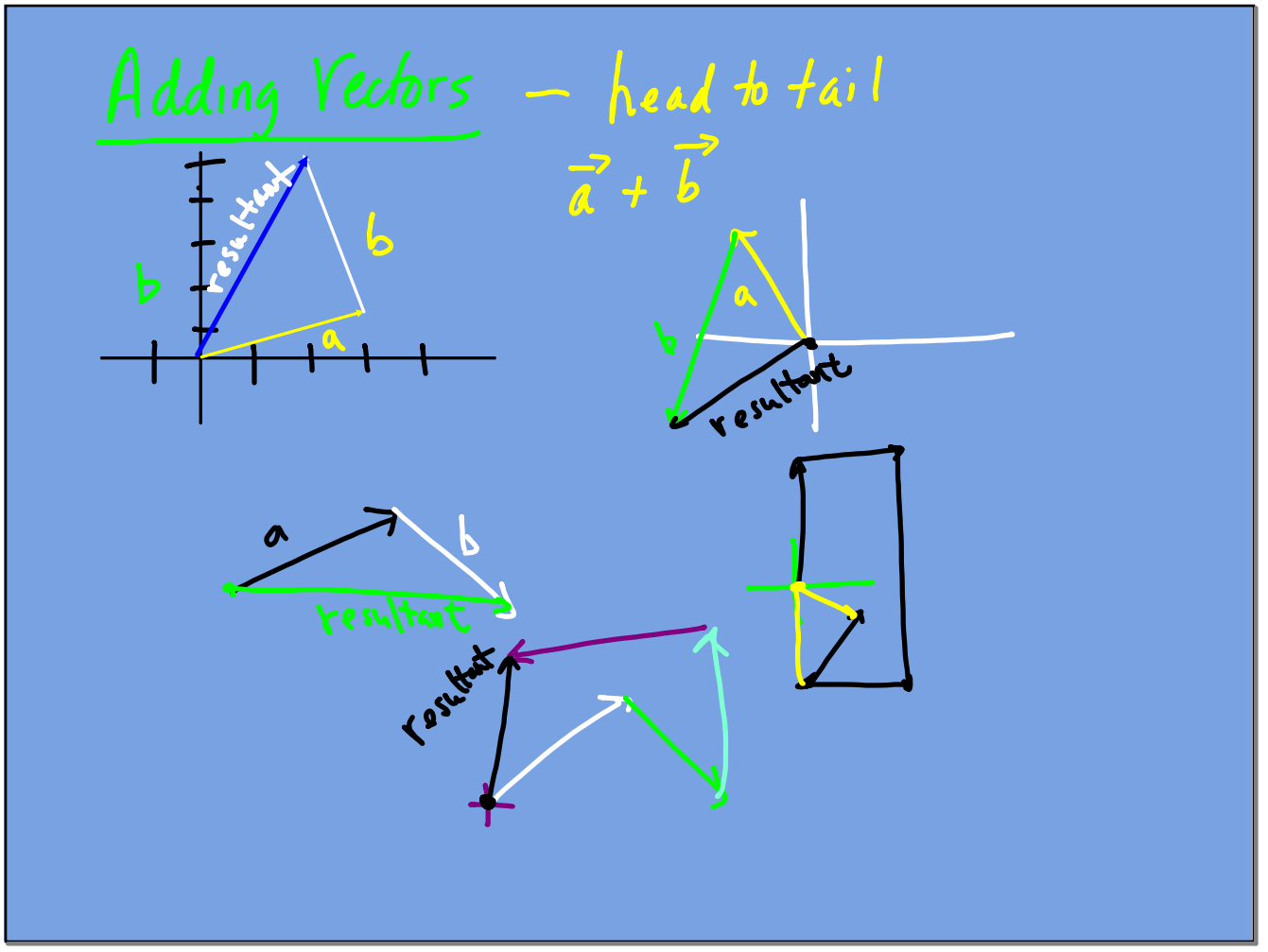
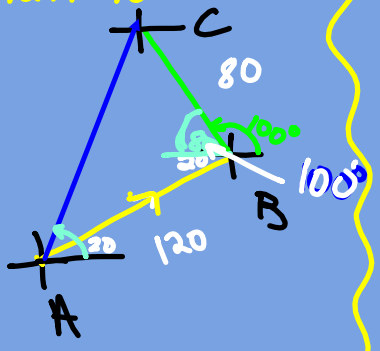

Adding Vectors – head to tail
$\vec{a} + \vec{b}$
b
resultant
b
a
a
b
resultant
a
b
resultant
resultant

120 N force acting at 20°
80 N force acting at 100°
What is the magnitude + direction of:
resultant force
3rd force that produces equilibrium.

Start to end



end back to start