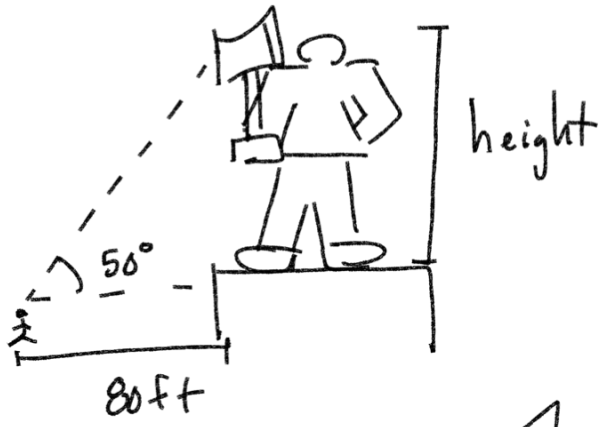
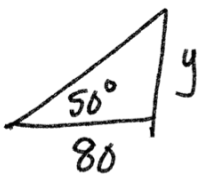
M-GP General Physics Week 13 12/11



Nate is infinitely afraid of the Bungan. Given the following diagram, how tall is the Bungan?



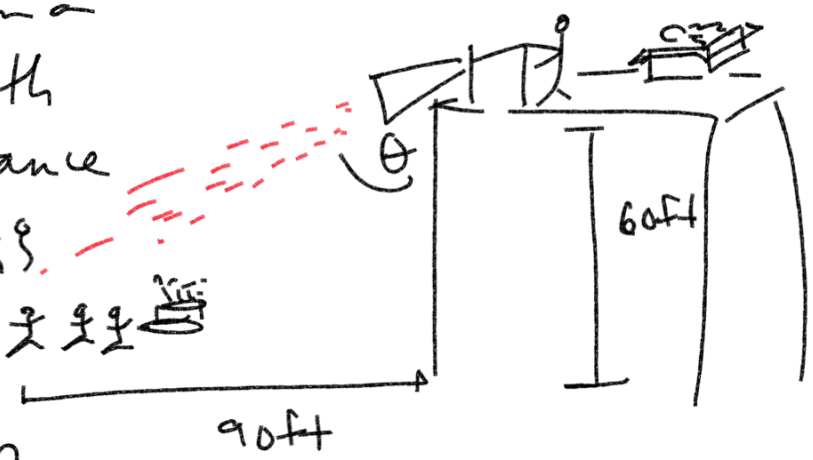
$\tan\theta = \frac{opp}{adj}$

$80(\tan 50°) = \left(\frac{y}{80}\right)80$

$80\tan 50° = 95.3\text{ ft}$

Nate is spreading birthday joy with his fun fetti dip n' dot cannon.

If he rains joy from a 60ft tall building with children a safe distance of 90 ft away, what is the angle of the cannon from the building?



$\tan\theta = \frac{opp}{adj}$

$\tan\theta = \frac{90}{60}$

$\theta = \tan^{-1}\frac{90}{60} = 56.3°$

Polar Coordinates ⟶ Rectangular Coordinates

$(8, 70°)$ ⟶ ⟶ $(2.7, 7.5)$

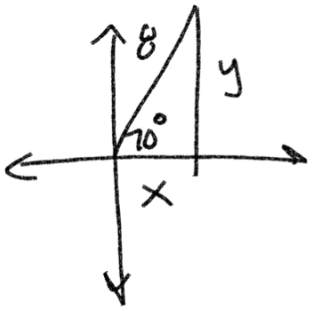
r θ

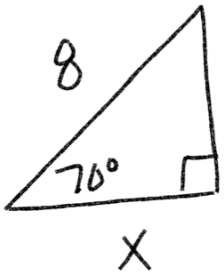
$x = r\cos\theta \rightarrow [8\cos 70]$

2.7

$y = r\sin\theta \rightarrow 8\sin 70$

7.5





$\cos 70° = \frac{x}{8}$ 8

$x = 8\cos 70$

$\sin 70° = \frac{y}{8}$ 8

$y = 8\sin 70$

$(4, 135°)$ ⟶ ⟶ (x, y)

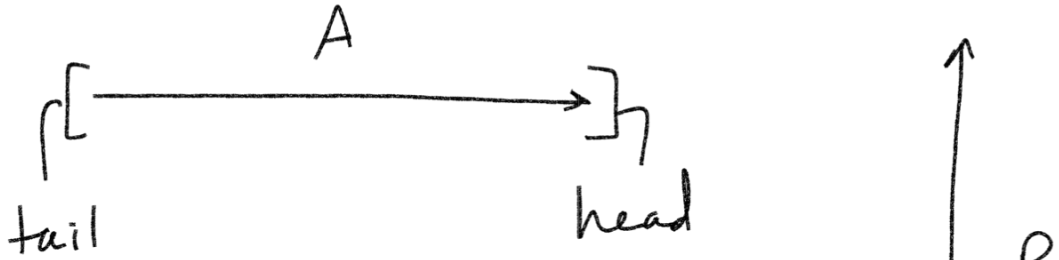
$(-2.8, 2.8)$

$x = r\cos\theta$

$x = 4\cos 135 = -2.8$

$y = r\sin\theta$

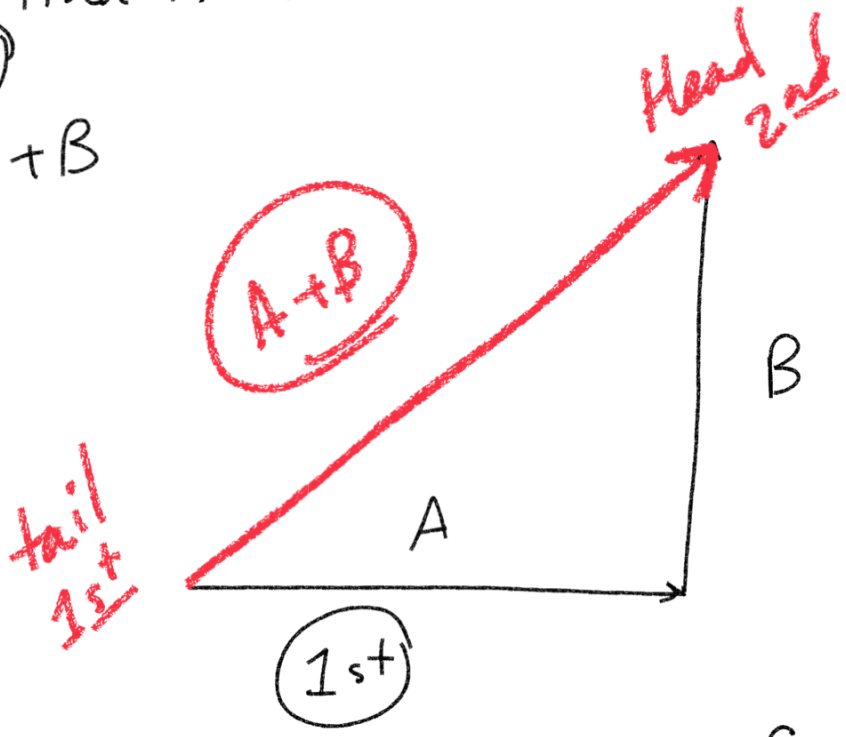
$y = 4\sin 135 = 2.8$



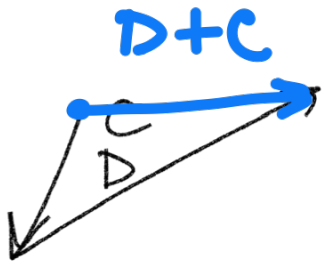
Add from to head to tail

1st

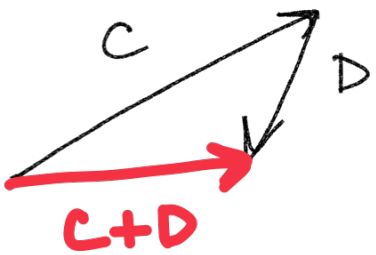
A+B

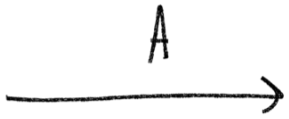


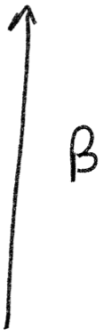
D+C



C+D



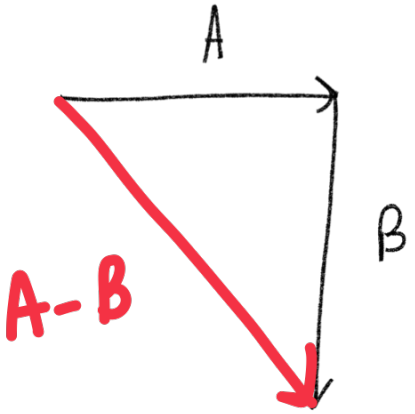


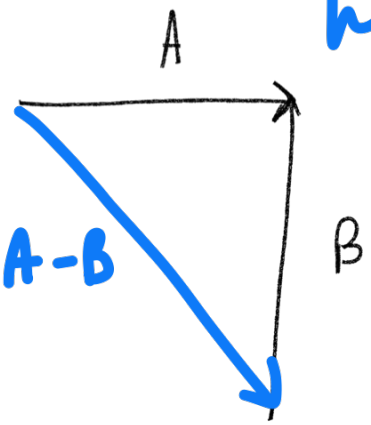


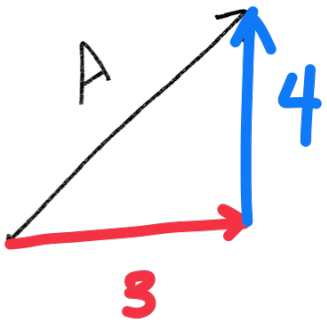
A - B

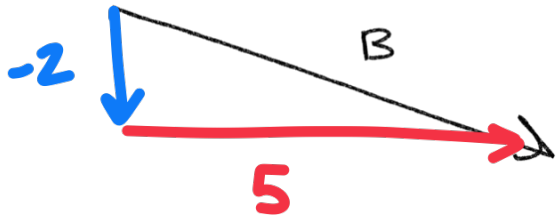
flip B

Head to head



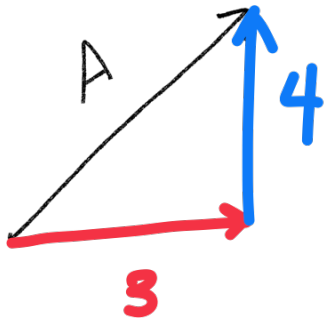


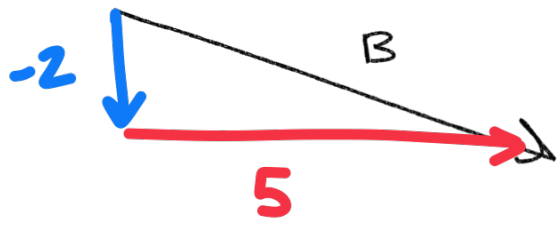




$A_x = 3 \quad B_x = 5$

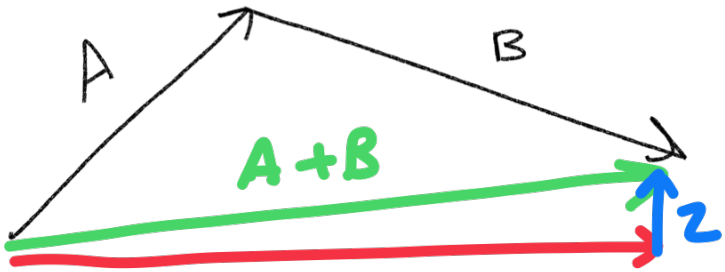
$A_y = 4 \quad B_y = -2$



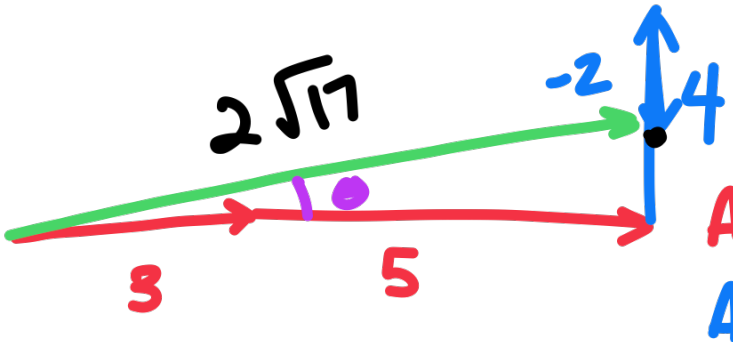


$A_x = 3 \quad B_x = 5$

$A_y = 4 \quad B_y = -2$



8



$x_{comp} = 8$

$y_{comp} = 2$

$A_x + B_x = 8$

$A_y + B_y = 2$

$4 + (-2)$

$(2\sqrt{17}, 14°)$

Resultant

$$r = \sqrt{x^2 + y^2}$$

$$\sqrt{(8)^2 + (2)^2}$$

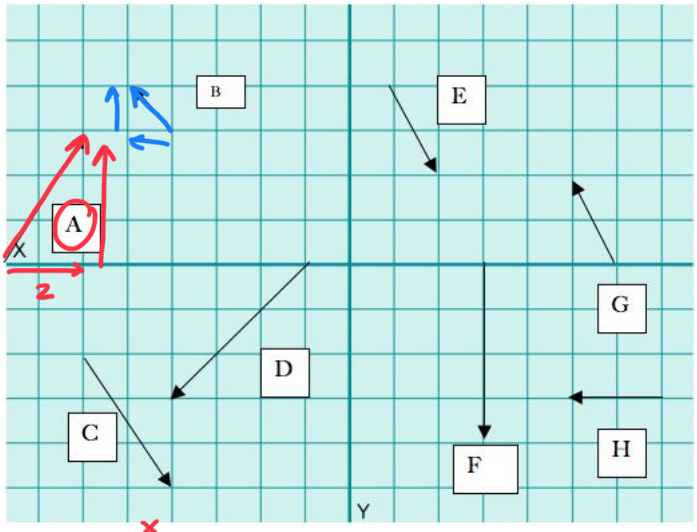
$$\sqrt{64 + 4} = \sqrt{68} = \sqrt{4} \cdot \sqrt{17} = 2\sqrt{17}$$

$$\theta = \tan^{-1}\frac{y}{x}$$

$$\tan^{-1}\frac{2}{8} = 14°$$

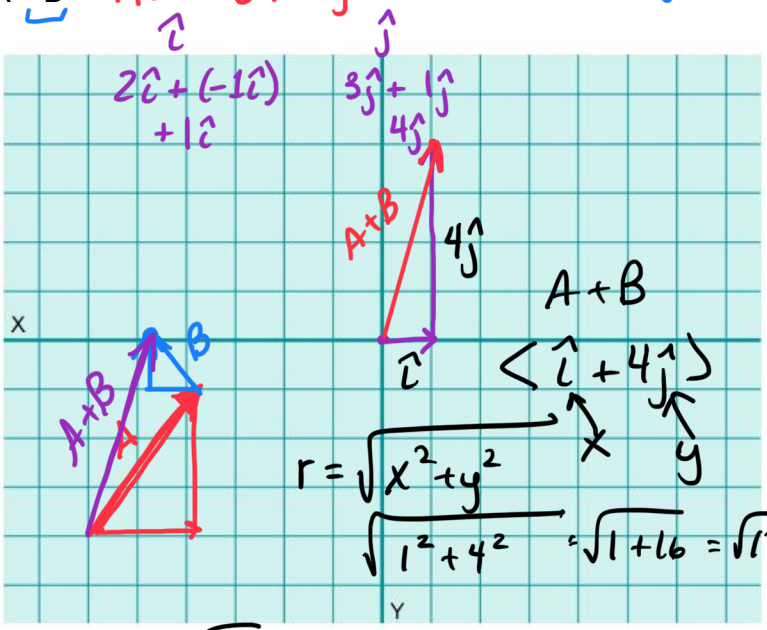
7.) Which of the following are vector quantities and which are scalar quantities?(a) your age (b) acceleration (c) velocity (d) speed (e) mass

8.) Given the following vectors, create head to tail models and find the resultant magnitude and direction. the arrows are not perfect but use the corner that they are closest to



a) A + B

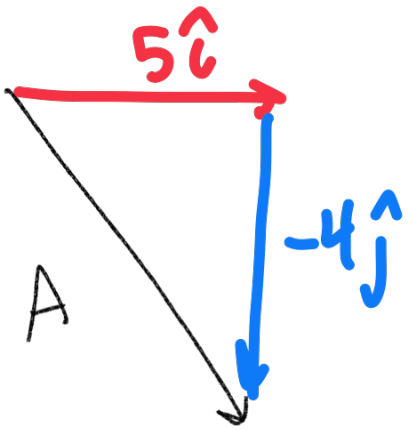
$A: \langle 2\hat{i} + 3\hat{j} \rangle$ $B: \langle -1\hat{i} + 1\hat{j} \rangle$

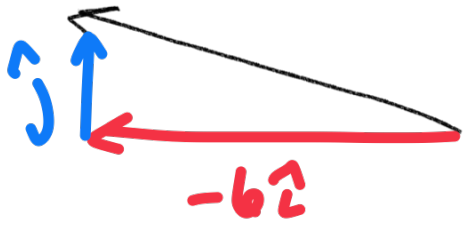


Magnitude = $\sqrt{17}$ Direction = $75°$

$\theta = \tan^{-1}\frac{y}{x}$ $\tan^{-1}\frac{4}{1} = 75°$

A: $\langle 5\hat{i} - 4\hat{j} \rangle$ B: $\langle -6\hat{i} + \hat{j} \rangle$





Find $A+B$ in (r, θ)

$5\hat{i} + (-6\hat{i})$ $\quad -4\hat{j} + \hat{j}$ (x, y)

$\langle -\hat{i} + -3\hat{j} \rangle$

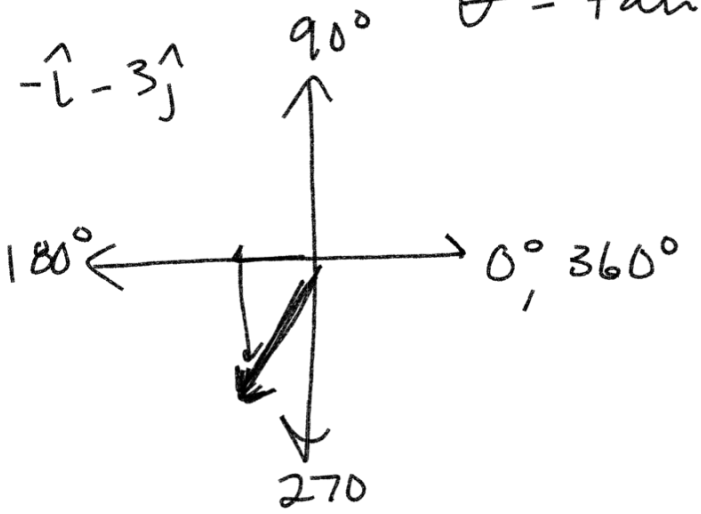
$\langle -\hat{i} - 3\hat{j} \rangle$

① Find $\langle A_x + B_x, A_y + B_y \rangle$

② Find r $\quad r = \sqrt{x^2 + y^2} = \sqrt{(-1)^2 + (-3)^2}$

$\sqrt{1+9} = \sqrt{10}$

③ Find θ $\quad \theta = \tan^{-1} \frac{-3}{-1} = \tan^{-1} 3 = 71.5°$



$71.5 + 180 = 251.5°$

(r, θ)

$(\sqrt{10}, 251.5°)$