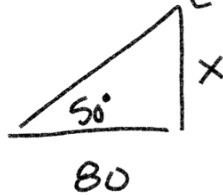


Nate is infinitely afraid of the Bungan. Given the following diagram, how tall is the Bungan?

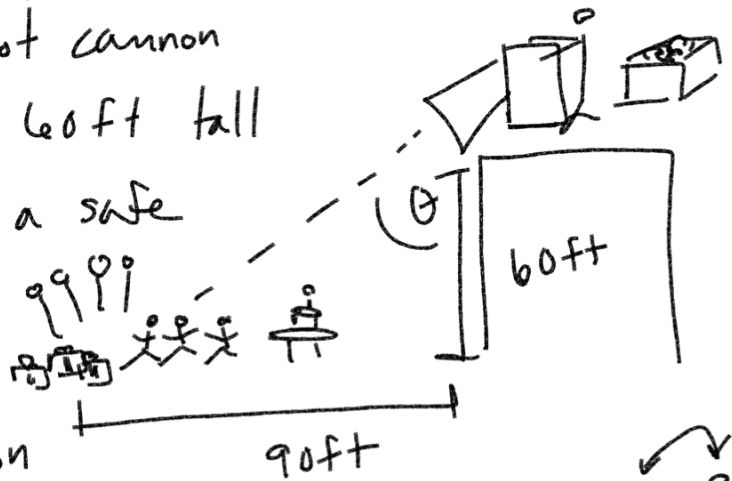
$\tan \theta = \frac{\text{opp}}{\text{adj}}$
 $(80) \tan 50^\circ = \left(\frac{x}{80}\right)(80)$



$$x = 80 \tan 50$$

$$= \boxed{95.3 \text{ ft}}$$

Nate is spreading birthday joy with his fun tetti dip n' dot cannon. If he rains joy from a 60ft tall building, with children a safe distance of 90ft away from the base, what is the angle of the cannon from the building?



$$\tan \theta = \frac{90}{60} \quad \tan \theta = \frac{3}{2}$$

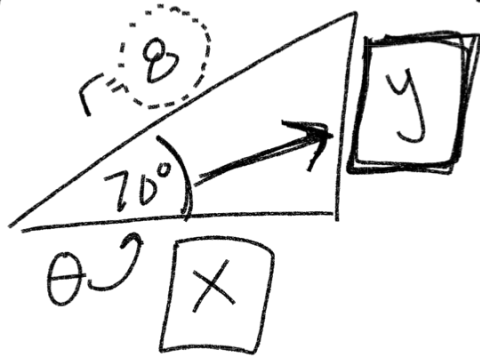
$$\theta = \tan^{-1}\left(\frac{3}{2}\right) = \boxed{56.3^\circ}$$

Polar Coordinates \rightarrow Rectangular

r θ
 $(8, 70^\circ)$

$(2.7, 7.5)$ Coordinates
 x y

(x, y)



$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\cos \theta = \frac{x}{r}$$

~~SOH~~ CAH TOA

$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\sin \theta = \frac{y}{r}$$

$$y = r \sin \theta$$

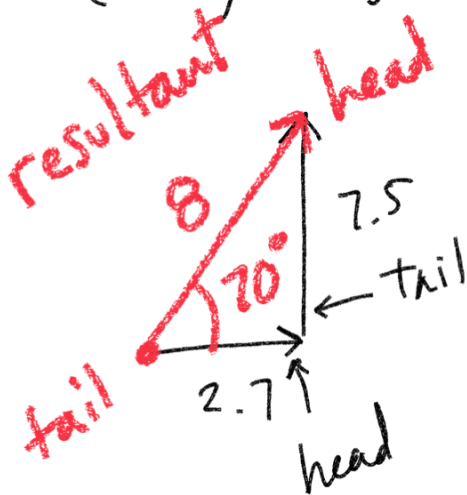
$$8 \sin 70^\circ = 7.5$$

$$r \cos \theta = x$$

$$\downarrow$$

$$8 \cos 70^\circ = 2.7$$

$(2.7, 7.5)$ \rightarrow $(8, 70^\circ)$

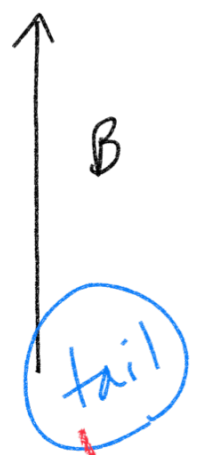
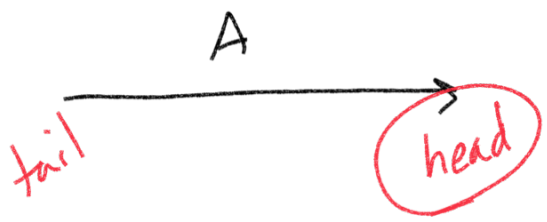


Convert $(4, 135^\circ)$ \rightarrow rectangular coordinates

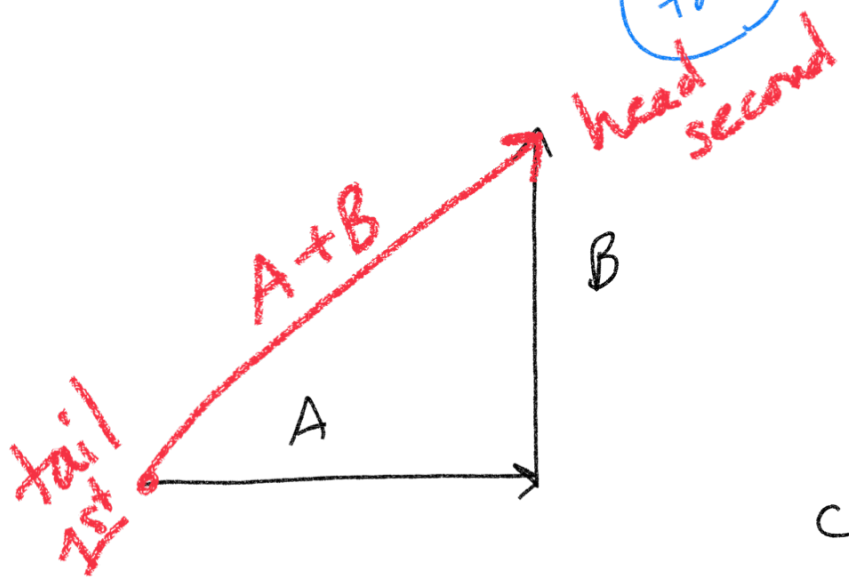
$$x = r \cos \theta = 4 \cos 135^\circ = -2.8$$

$$y = r \sin \theta = 4 \sin 135^\circ = 2.8$$

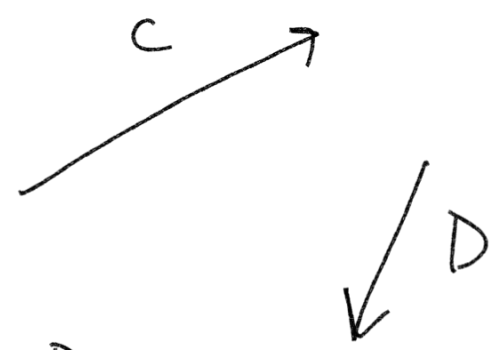
$(-2.8, 2.8)$



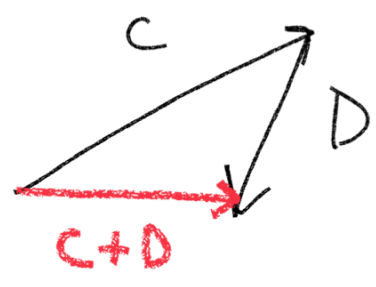
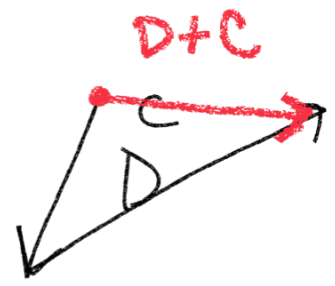
$A + B$

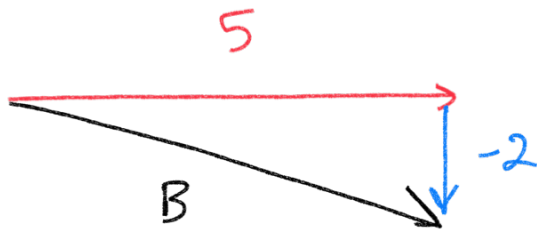
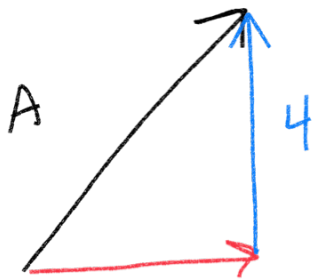
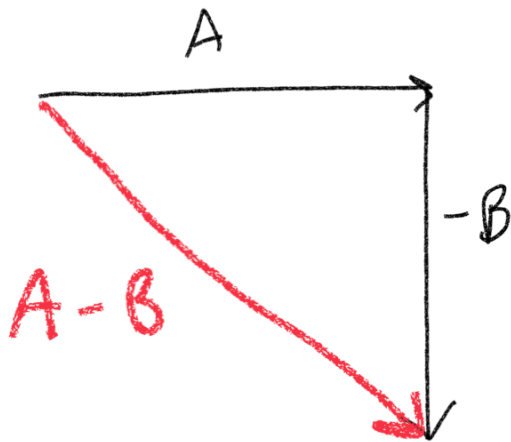
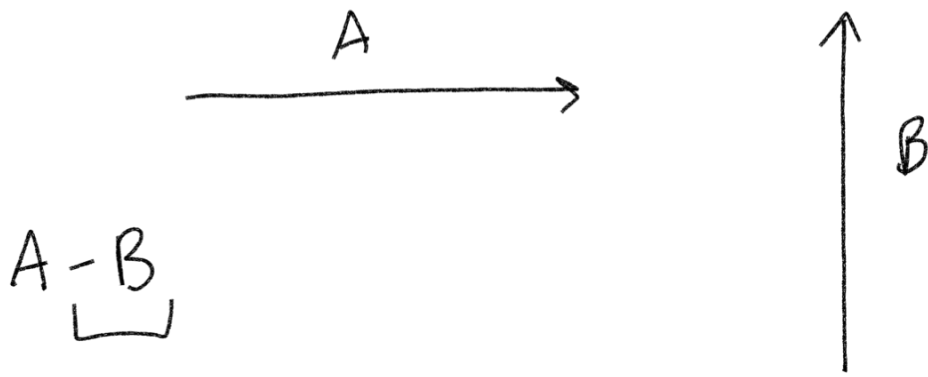


$D + C$



$C + D$

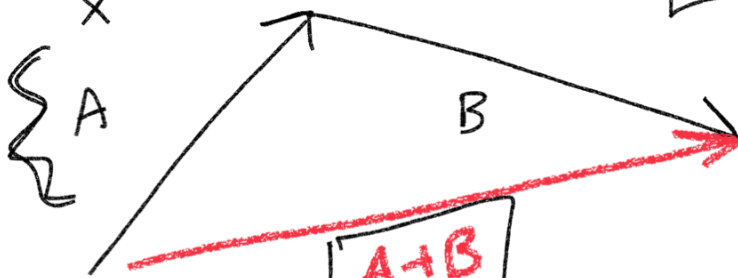




$A+B$

$$\theta = \tan^{-1} \frac{y}{x} = \tan^{-1} \left(\frac{2}{8} \right) = 14^\circ$$

$$\boxed{Ax} + \underline{Ay} + \boxed{Bx} + \underline{By}$$



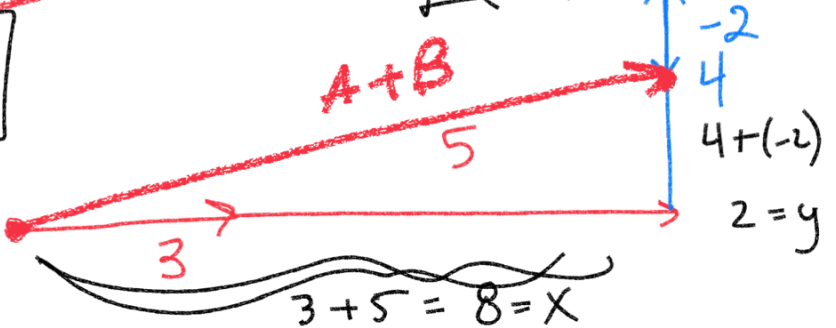
$$(r, \theta) \begin{pmatrix} 2\sqrt{17}, 14^\circ \\ 8.2, 14^\circ \end{pmatrix}$$

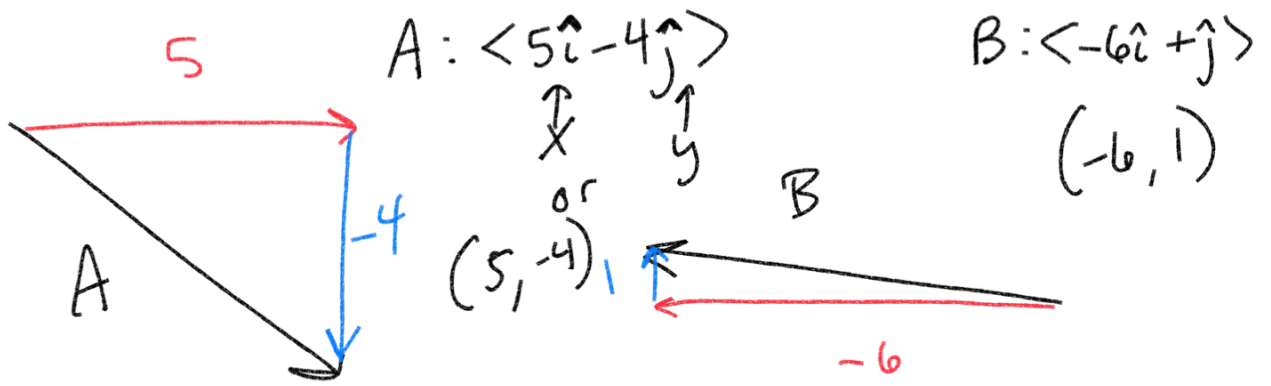
$$r = \sqrt{x^2 + y^2}$$

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

$$\sqrt{64+4} = \sqrt{68}$$

$$2\sqrt{17}$$





Find $A+B$ in (r, θ)

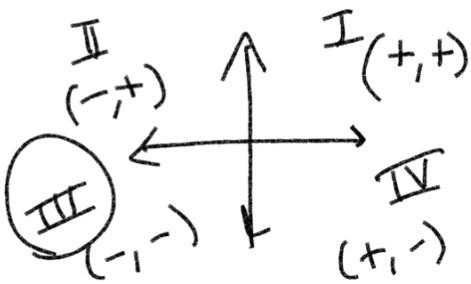
$$x: \begin{matrix} \textcircled{A} & \textcircled{B} \\ 5 & + & (-6) \end{matrix} = -1 \leftarrow$$

$$y: \begin{matrix} \textcircled{A} & \textcircled{B} \\ -4 & + & 1 \end{matrix} = -3 \leftarrow$$

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

$$\sqrt{(-1)^2 + (-3)^2}$$

$$\sqrt{1+9} = \sqrt{10} = 3.2$$



$$\theta = \tan^{-1} \frac{y}{x} = \tan^{-1} \frac{-3}{-1}$$

$$\theta = 71.5$$

$$+180$$

$$\hline 251.5^\circ$$

$$(3.2, 251.5^\circ)$$