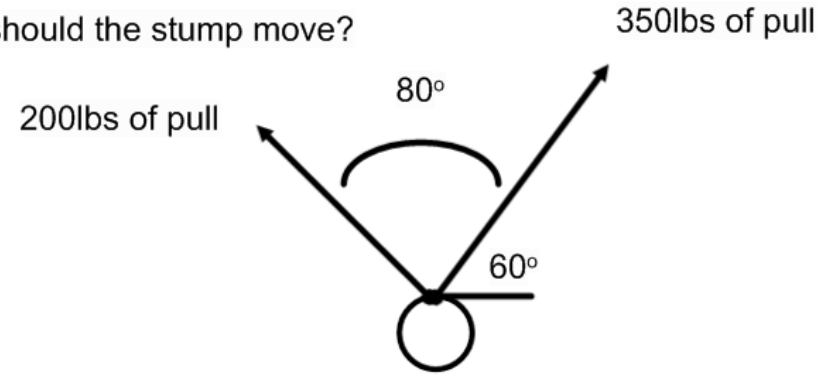
1

A farmer is trying to pull out a tree stump.
Two mules are pulling on the stump, as per the picture.
How much force are they applying to the stump?

In which direction should the stump move?



2

A Ultralight pilot tries to land at the airport on a hot day.
Unfortunately, he runs into an updraft from the tarmac and a headwind.
In a huge coincidence the force of his engine and gravity trying to land him, and the head wind, and the updraft all perfectly offset and for a moment he sits perfectly still.

Without the wind, his engine and gravity would be moving him at a speed of 20mph descending at a 25° angle to the ground.
The updraft is vertical. The headwind is towards him, perfectly horizontal.
What is the speed of the headwind and the updraft?

1) $v = 200(cos(140^o)i + sin(140^o)j)$

$w = 350(cos(60^o)i + sin(60^o)j)$

V= -153.2089i + 128.5575j

W = 175i + 303.1089j

Total = 21.7911i+ 431.6664j

T = 432.2161(cos(87.1101^o)i+sin(87.1101^o)j)

It moves along an 87.1101 degree line.

2) His flight: V=20(cos(200^o)i+sin(200^o)j)

Head wind: H=M_H(cos(0^o)i+sin(0^o)j)

Updraft: U=M_U(cos(90^o)i+sin(90^o)j)

V= -18.7939i-6.8404j

H= M_Hi+0j

U= 0i+M_Uj

V+H+U = 0i+0j

-18.7939i-6.8404j + M_Hi+0j+0i+M_Uj=0

i equation: -18.7939i+ M_Hi=0

j equation: -6.8404j+M_Uj=0

M_H=18.7939 = Speed of headwind.

M_Uj=6.8404 = Speed of updraft