

93. The topic of relative motion (with constant velocity motion) in a two-dimensional setting is covered in §4-9. We note that

$$\vec{v}_{PG} = \vec{v}_{PA} + \vec{v}_{AG}$$

describes a right triangle, with one leg being \vec{v}_{PG} (east), another leg being \vec{v}_{AG} (magnitude = 20, direction = south), and the hypotenuse being \vec{v}_{PA} (magnitude = 70). Lengths are in kilometers and time is in hours. Using the Pythagorean theorem, we have

$$|\vec{v}_{PA}| = \sqrt{|\vec{v}_{PG}|^2 + |\vec{v}_{AG}|^2} \implies 70 = \sqrt{|\vec{v}_{PG}|^2 + 20^2}$$

which is easily solved for the ground speed: $|\vec{v}_{PG}| = 67 \text{ km/h}$.