

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF PHYSICS
Term 032

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Physics 212 – Quiz #1b
Chapter 1

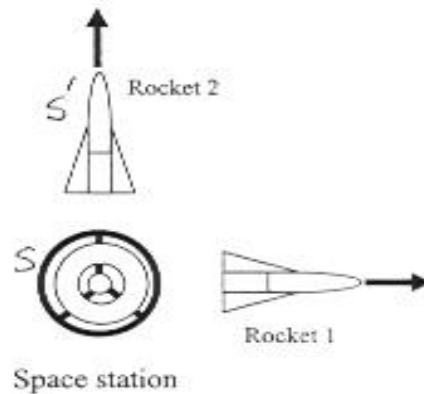
Two rockets are leaving their space station along perpendicular paths, as seen measured by an observer on the stationary space station. Rocket 1 moves at $0.60c$ and rocket 2 moves at $0.80c$, both measured relative to the space station. What is the velocity of rocket 1 as observed by rocket 2?

rocket 1

$$u_x = 0.6c \quad u_y = 0$$

rocket 2

$$u_x = 0 \quad u_y = 0.8c$$



$$\text{rocket 1} \quad \begin{cases} u'_x = \frac{u_x}{\gamma(1 - \frac{u_y v}{c^2})} \\ u'_y = \frac{u_y - v}{1 - \frac{u_y v}{c^2}} \end{cases}$$

$$u_x = 0.6c \quad \text{and} \quad v = 0.8c; \quad \gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} = \frac{1}{\sqrt{1 - (0.8)^2}} = 1.67$$

$$u'_x = \frac{0.6c}{1.67(1 - 0)} = 0.34c$$

$$u'_y = \frac{-0.8c}{1 - 0} = -0.8c$$

$$u' = 0.87c \text{ m/s}$$