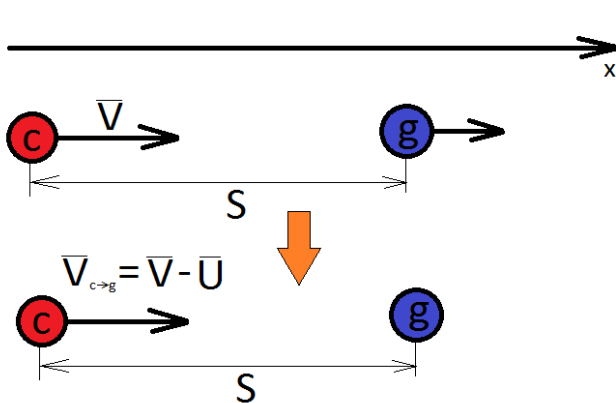A cheetah can run approx 100km/hr and a gazelle at 80km/hr , if both animals are running at full speed with gazelle 60m ahead. How long before cheetah catches its prey?

Solution:

$$V = 100\frac{km}{hr} = \frac{250}{9}\frac{m}{s} - speed\ of\ the\ cheetah;$$

$$U = 80\frac{km}{hr} = \frac{200}{9}\frac{m}{s} - speed\ of\ the\ gazelle;$$

$$S = 60m - the\ distance\ between\ the\ animals$$

Cheetah's relatively to the speed of gazelle:

$$x: V_{c \to g} = V_c - V_g = V - U = \frac{250}{9}\frac{m}{s} - \frac{200}{9}\frac{m}{s}$$
$$= \frac{50}{9}\frac{m}{s}$$

Now the gazelle is fixed and cheetah runs with speed $V_{c \to g} = \frac{50}{9}\frac{m}{s}$. Time after which the cheetah will catch the gazelle:

$$t = \frac{S}{V_{c \to g}} = \frac{60m}{\frac{50}{9}\frac{m}{s}} = \frac{9 \cdot 60m \cdot s}{50m} = 10.8s$$

Answer: Time after which the cheetah will catch the gazelle $t = 10.8s$.