

## SET 4

12.4)

Neglect gravity. For the Galilean transformation

$$V_f = V_c + V_b = c/2 + c/3 = 5c/6 = 0.83c$$

For a Relativistic transformation;

$$V_f = \frac{V_c + V_b}{1 + V_c V_b / c^2} = 5c/7 = 0.71c$$

12.5)

$$t = d/c = 90 \times 10^9 / 3 \times 10^8 = 300s$$

12.8)

$$\gamma = \sqrt{\frac{1}{1 - (3d)^2}} = 5/4$$

$$\Delta t = \gamma \Delta t'$$

$$d = c\beta\gamma t$$

$$t' = d/c = \beta\gamma t$$

12.9)

$$\gamma_B = \sqrt{\frac{1}{1 - (1/2)^2}} = \sqrt{4/3}$$

$$\gamma_L = \sqrt{\frac{1}{1 - \beta_L^2}}$$

$$\frac{L/2}{\gamma_B} = \frac{L}{\gamma_L}$$

$$\beta_L = \sqrt{13/16} c$$