Question 4 – Relative Speeds of Trains and a Passenger

(a) Determine the speed of train B relative to train A

✔ 1 mark

Given:

- Speed of A (relative to platform): $v_A = 3.5\,\mathrm{m/s}$

- Speed of B (relative to platform): $v_B = 4.0\,\mathrm{m/s}$

Relative speed of B from A's point of view:
$v_{B/A} = v_B - v_A = 4.0 - 3.5 = 0.5\,\mathrm{m/s}$

✅ **Answer: 0.5 m/s**

(b) Determine the speed of the passenger relative to the platform

✔ 2 marks

Passenger walks toward the **rear** of train A at $1.3\,\mathrm{m/s}$
Relative to train A: $-1.3\,\mathrm{m/s}$

Using relative velocity:
$v_{P/PF} = v_{P/A} + v_{A/PF} = (-1.3) + 3.5 = 2.2\,\mathrm{m/s}$

✅ **Answer: 2.2 m/s**

🧠 **Revision Tips**

- Use **relative motion**:
$v_{A/B} = v_A - v_B$

- Motion toward the rear = **negative velocity**

- Total velocity from another frame: **add vectors** carefully, accounting for direction