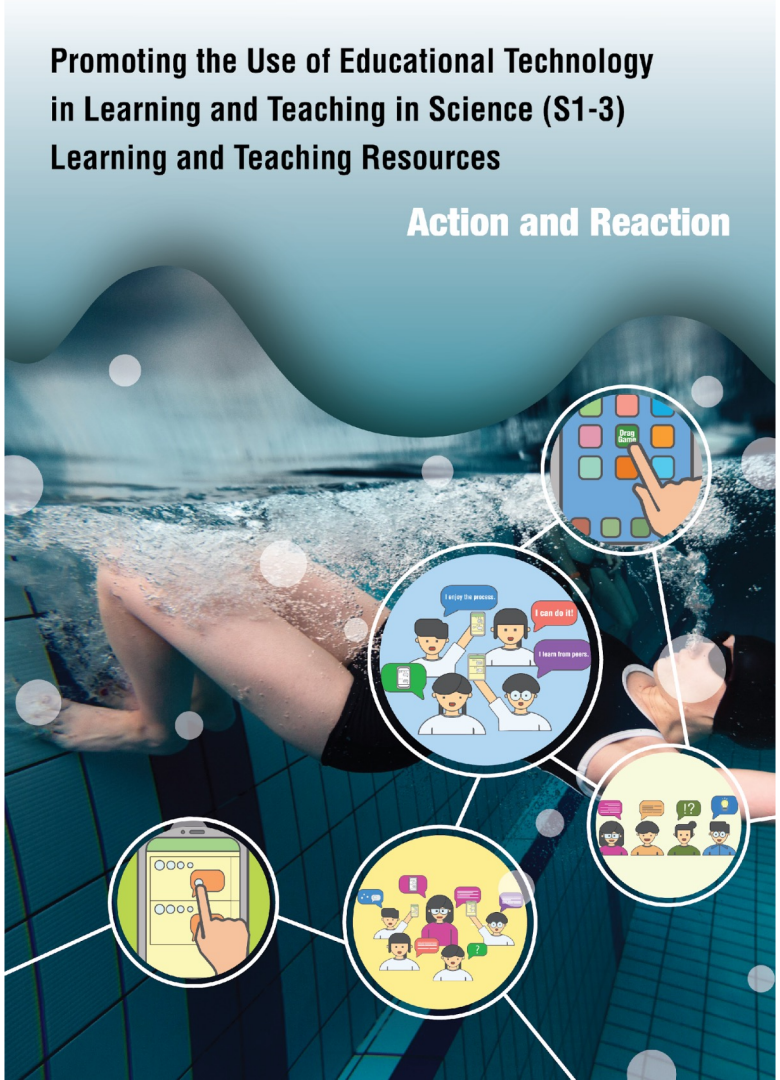
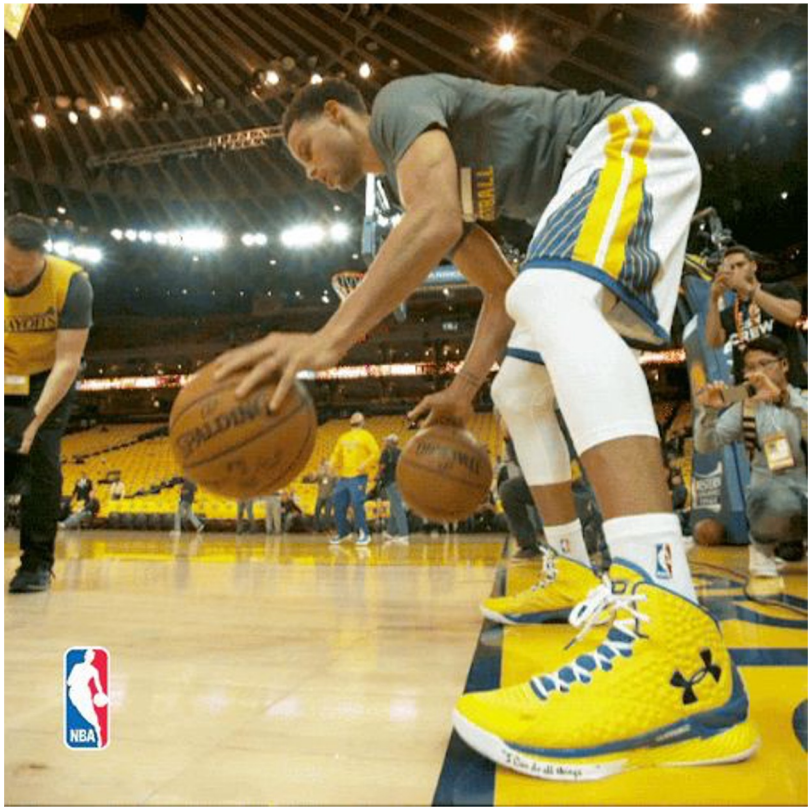
Promoting the Use of Educational Technology in Learning and Teaching in Science (S1-3) Learning and Teaching Resources

Action and Reaction

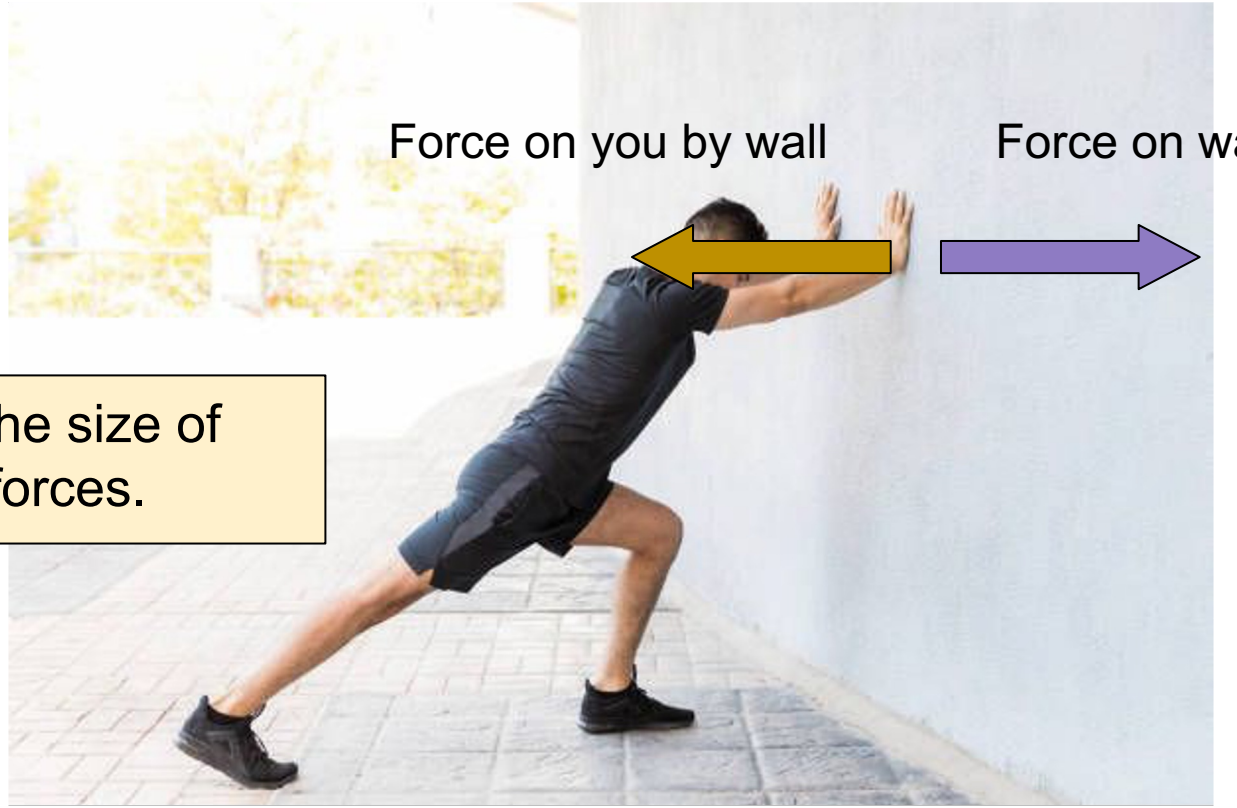


Action and Reaction
Integrated Science (S2)

Why does the basketball bounce back from the floor?



Pushing the wall - how do you feel?

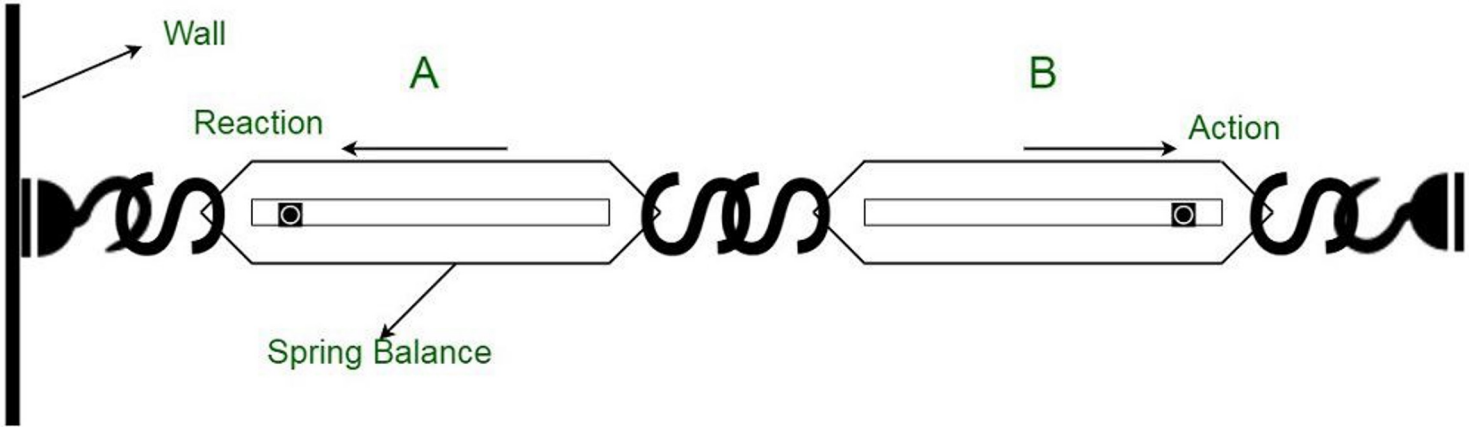


Compare the size of these two forces.

Learning objectives

- Recognise that forces always work in **action and reaction pairs**.
- Understand that action and reaction pairs are **equal in magnitude**, **opposite in direction** and **act on different objects**.
- Identify some action and reaction pairs of forces in daily life.

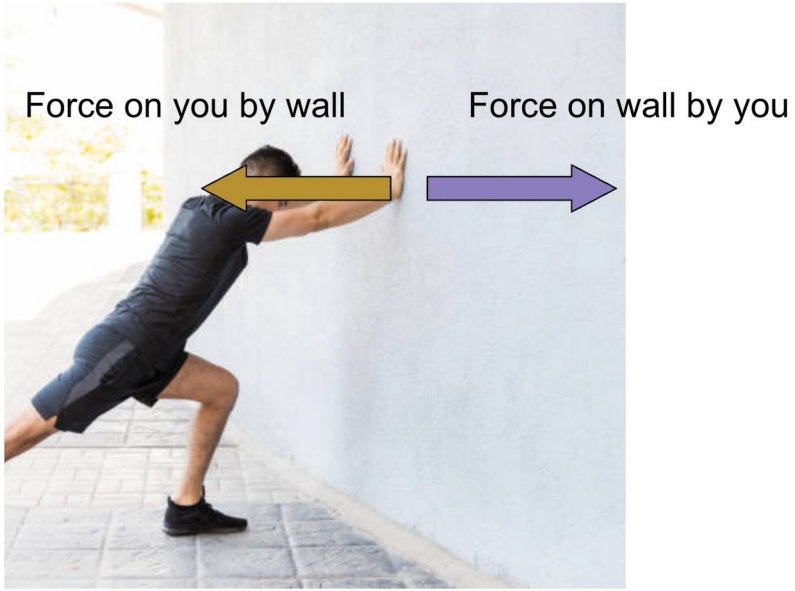
Experiment



Reading on spring balance *A* (Newton)					
Reading on spring balance *B* (Newton)					

Compare the size of the force acting on *A* by *B*, and that on *B* by *A*.

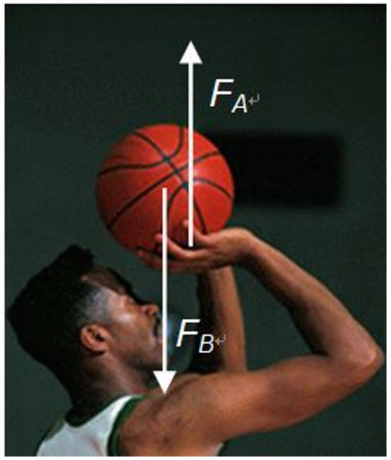
Features of action-reaction pairs



- Equal in magnitude (same size)
- Opposite in direction
- Between two objects

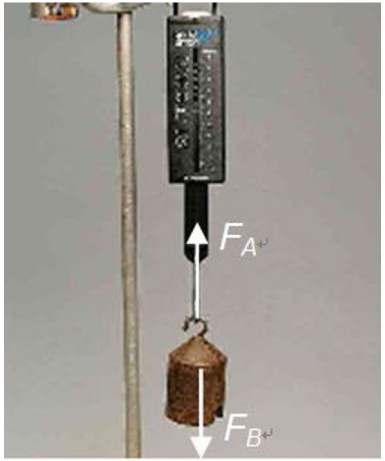
(Force on ***A*** by ***B*** and Force on ***B*** by ***A***)

Action-reaction pair or not? Why?



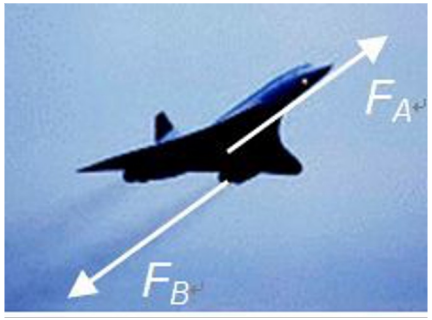
F_A = force acting on the ball by the player

F_B = weight of the ball



F_A = tension in the string that holds the object

F_B = weight of the object



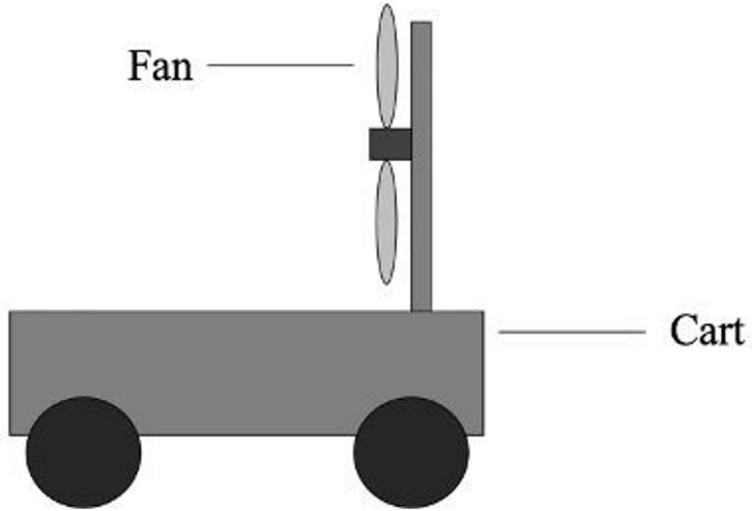
F_A = force exerted on the plane by the ejected gas

F_B = force exerted on the ejected gas by the plane

Fan Cart - Investigations 1 and 2

(a) **predict** what will happen;
(b) **record the observations;**
(c) **explain** the observations.

You are suggested to use the concept of ***action & reaction*** to explain.



Investigation 1:

Fix the fan onto the cart. Turn on the fan.

Investigation 2:

Fix the cardboard onto the back of the cart. Remove the fan.

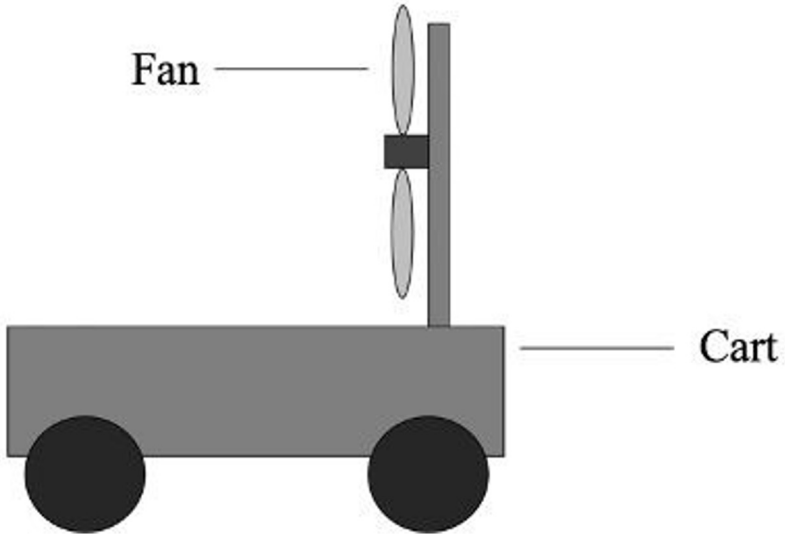
Hold the fan in your hand and blow air toward the cardboard.

DragGame Demo

https://tempcopy.draggame.e-learning.hk/338/

Aim: explain your observation in **Investigation 1**

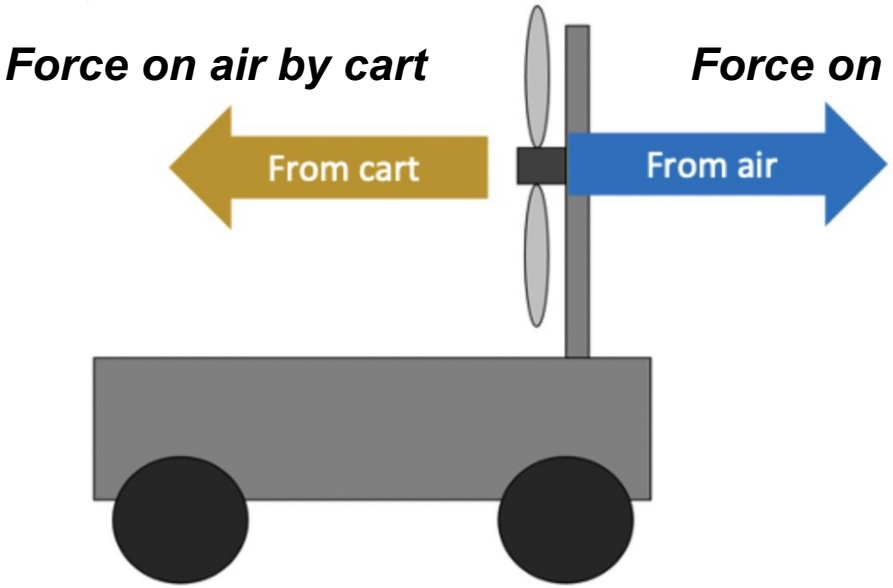
- *Fix the fan onto the cart. Turn on the fan.*



Drag Game 1 suggested answer

Aim: explain your observation in Investigation 1

- *Fix the fan onto the cart. Turn on the fan.*



The fan of the cart blows the air **backward** by acting a **force on** the **air**.

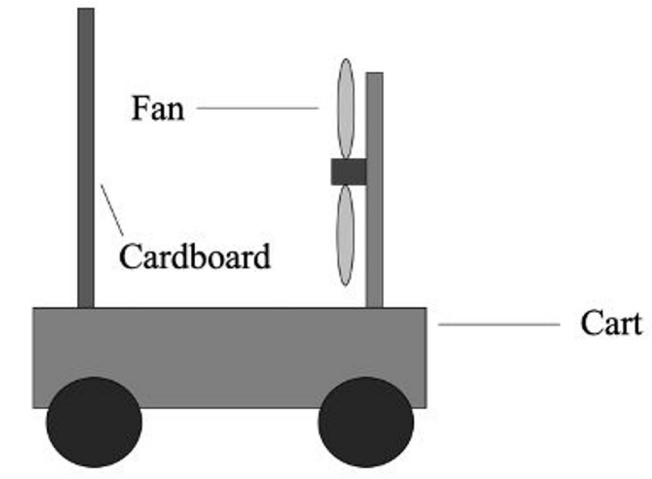
According to action and reaction, the air acts a same-sized **forward force on** the **cart**.

Therefore, the cart moves forward.

Fan Cart - Investigations 3 and 4

(a) **predict** what will happen;
(b) **record the observations;**
(c) **explain** the observations.

You are suggested to use the concept of ***action & reaction*** to explain.



Investigation 3:

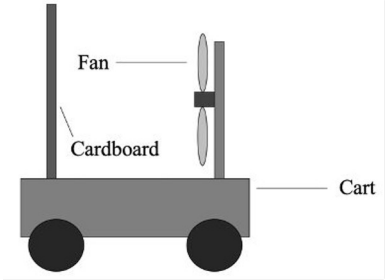
Fix the fan onto the cart again. Turn on the fan so that it blows air toward the cardboard.

DragGame https://tempcopy.draggame.e-learning.hk/339/

1. Go to the DragGame.
2. Work on the DragGame.
3. Upload your work to Nearpod.

Aim: predict your observation in **Investigation 3**

- *Fix the fan onto the cart again.*
  Turn on the fan so that it blows air toward the cardboard.

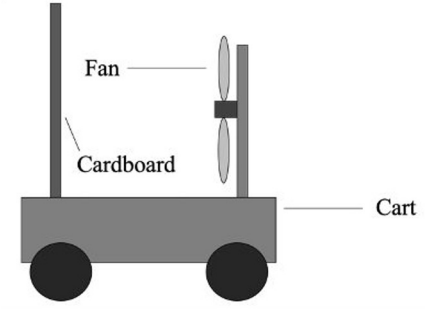


DragGame https://tempcopy.draggame.e-learning.hk/339/

1. Go to the DragGame.
2. Work on the DragGame.
3. Upload your work to Nearpod.

Aim: explain your observation in **Investigation 3**

- *Fix the fan onto the cart again.*
  Turn on the fan so that it blows air toward the cardboard.



DragGame 2 suggested answer

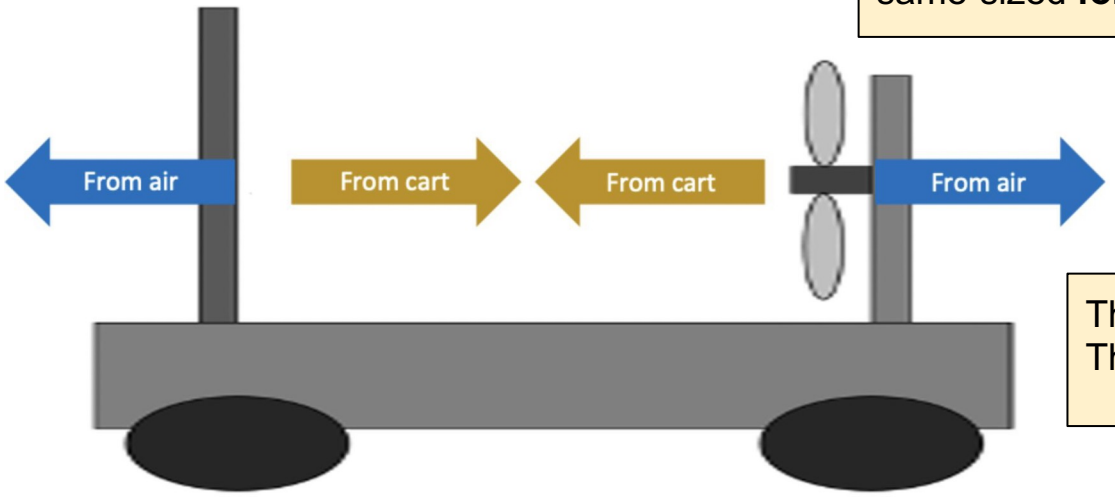
Aim: explain your observation in Investigation 3

- *Fix the fan onto the cart again. Turn on the fan so that it blows air toward the cardboard.*

The air hits the cardboard, acting a **backward force** on **the cart**.

The fan of the cart blows the air **backward** by acting a **force on** the **air**.

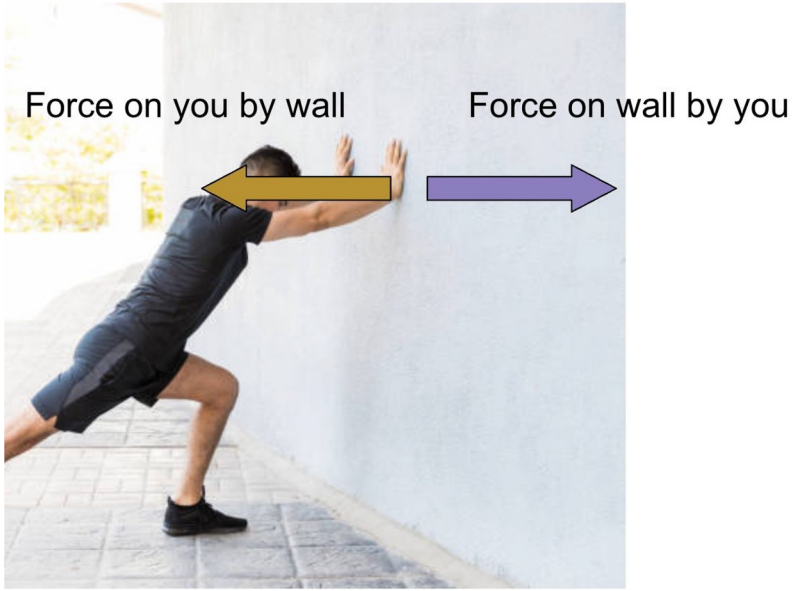
According to action and reaction, the air acts a same-sized **forward force on** the **cart**.



The forces on the cart are **balanced**. Therefore, the cart **does not move**.

Why does the raft move forward when you move the oar ?

Features of action-reaction pairs



- Equal in magnitude (same size)
- Opposite in direction
- Between two objects

(Force on ***A*** by ***B*** and Force on ***B*** by ***A***)

Developed by Faculty of Education, The University of Hong Kong