SCIENCE BEHIND THE CONCEPTS

TORPEDO BAY
NAVY MUSEUM

The Science of Jackstay Lines

When a jackstay line is on an **incline**, angling downwards, the force due to **gravity** will pull the load down. As the paper clips are sliding along the line the two surfaces rubbing together create **frictional force**.

The force of friction acts against the **weight force** and will slow down the moving object. The particles of air that the object moves through will also hit the object causing **air resistance**, which is a form of **frictional force**, also known as **drag**. This will also slow down the object by acting against the **weight force**.

Remember, if you take away **air resistance**, all objects will fall at the same speed no matter what their mass is. The force due to **gravity** acts the same on all objects.

Heavier objects will fall faster on a jackstay line. This is because when the heavier object is placed on the line it causes the line to sag more and increases the incline of the line, which causes the heavier object to accelerate faster and fall quicker. This is despite the **frictional force** increasing.

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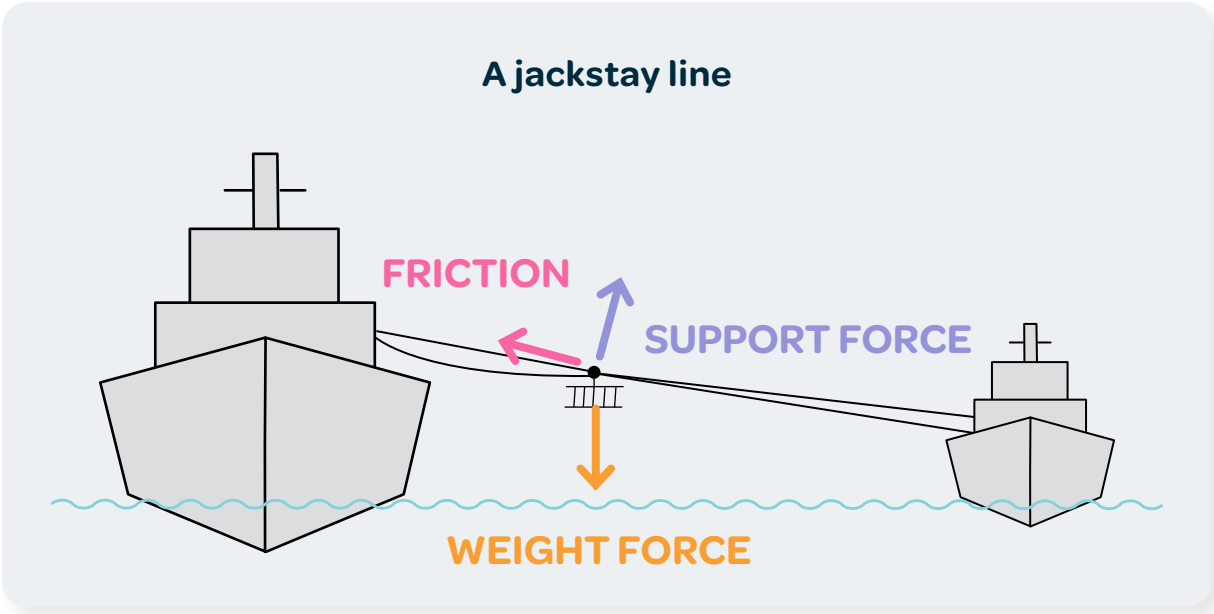
FORCE DIAGRAM



You can explore these concepts by doing the following activities:

ACTIVITY: FRICTION

Rub your hands together very fast. *Do they feel heat?*

This is due to the **frictional force**. The rough surface of your hands resist each other. When you rub them together, some of the energy you use is converted to heat.

ACTIVITY: AIR RESISTANCE

Take two pieces of the same sized sheet of paper. Crumple one up then drop them both from the same height. They are the same mass but *which one hits the floor first?*

This is due to the larger surface area of the sheet of paper hitting more of the air particles and creating more **air resistance/ drag** than the crumpled up ball of paper.