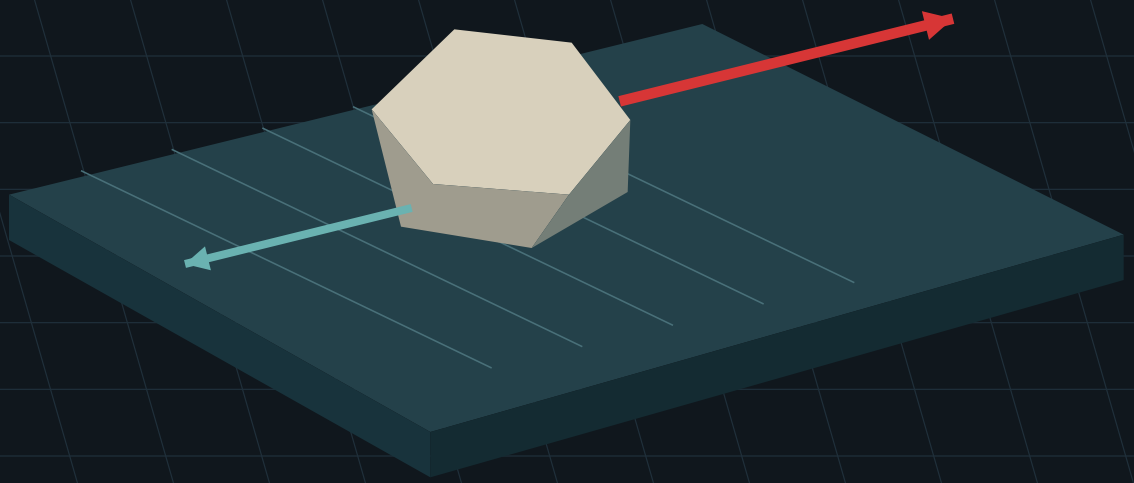
ATLAS UNDER PRESSURE

AN ILLUSTRATED LEARNING GUIDE

THE SCIENCE BEHIND THE MYSTERIES

Understand phenomena.
Interpret evidence.
Evaluate explanations.



ENGLISH EDITION / 2026

16 CHAPTERS WITH GUIDED PRACTICE

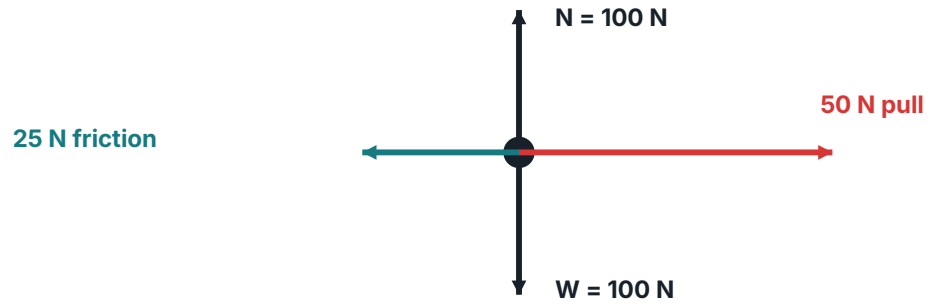
3.1 / UNDERSTAND

Choose the object; add the forces

Treat the block as the system. Its weight is the gravitational force from Earth. The surface exerts a support force, often called the normal force because it is perpendicular to the contact. A pull and a friction force may act horizontally. Include only forces acting on the chosen block in its free-body diagram.

For constant mass in an inertial frame, the net external force equals mass times acceleration: Fnet = ma. Here an inertial frame is a reference that is not accelerating or rotating in the model. "Net" means the vector sum, with directions included. A 50 N pull right and 25 N of friction left give 25 N right, not 75 N.

If vertical acceleration is zero and no other vertical forces act, support balances weight on a level surface. This balance is not a third-law pair: both forces act on the block. A third-law interaction pair acts on two different objects. Tilting the pull or the surface changes the force diagram and can change the support force.



Rightward sliding with balanced vertical forces. Schematic: stated values, not arrow lengths, define the forces.

3.4 / COMPARE

Change a condition; redraw the model

The same object may require a different calculation when its conditions change.

Condition	What changes	What to check
30 N pull; initially at rest	Static friction adjusts.	Compare pull with the limit.
50 N pull; sliding right	Use sliding friction.	Check direction and coefficient.
Pull tilted upward	Vertical balance changes.	Do not assume N = mg.
Inclined surface	Weight has a slope component.	Choose axes and redraw forces.
Constant straight-line velocity	Acceleration is zero.	Forces may still act and balance.

COMMON TRAP

A plausible diagram shows a possible mechanism, not proof of what happened in a real landscape. You would also need records of the driving interaction, the contact state, and the timing. A track preserves an outcome; several mechanisms may be compatible with its shape.

3.7 / CHECK THE REASONING

Answers with the reasoning included.

1. Static friction is 18 N opposite the pull, within the given 40 N limit. Horizontal net force and acceleration are zero under the stated assumptions. The limiting value is not automatically the actual friction.

2. Net force is 60 - 25 = 35 N right. Acceleration is 35 / 10 = 3.5 m/s² right. Use the given sliding friction, not the static threshold from a different regime.

3. No. Constant straight-line velocity means zero acceleration, so the net force is zero in an inertial frame. Forces may be present but balanced. Moving and accelerating are different statements.

4. Useful observations include the contact state during motion and time-aligned records of position and a candidate driving interaction. Compare alternatives; tracks alone need not identify a unique cause.

SOURCES AND FURTHER READING

NASA Glenn Research Center: Newton's Laws of Motion

OpenStax: College Physics 2e, section 5.1: Friction (further reading)