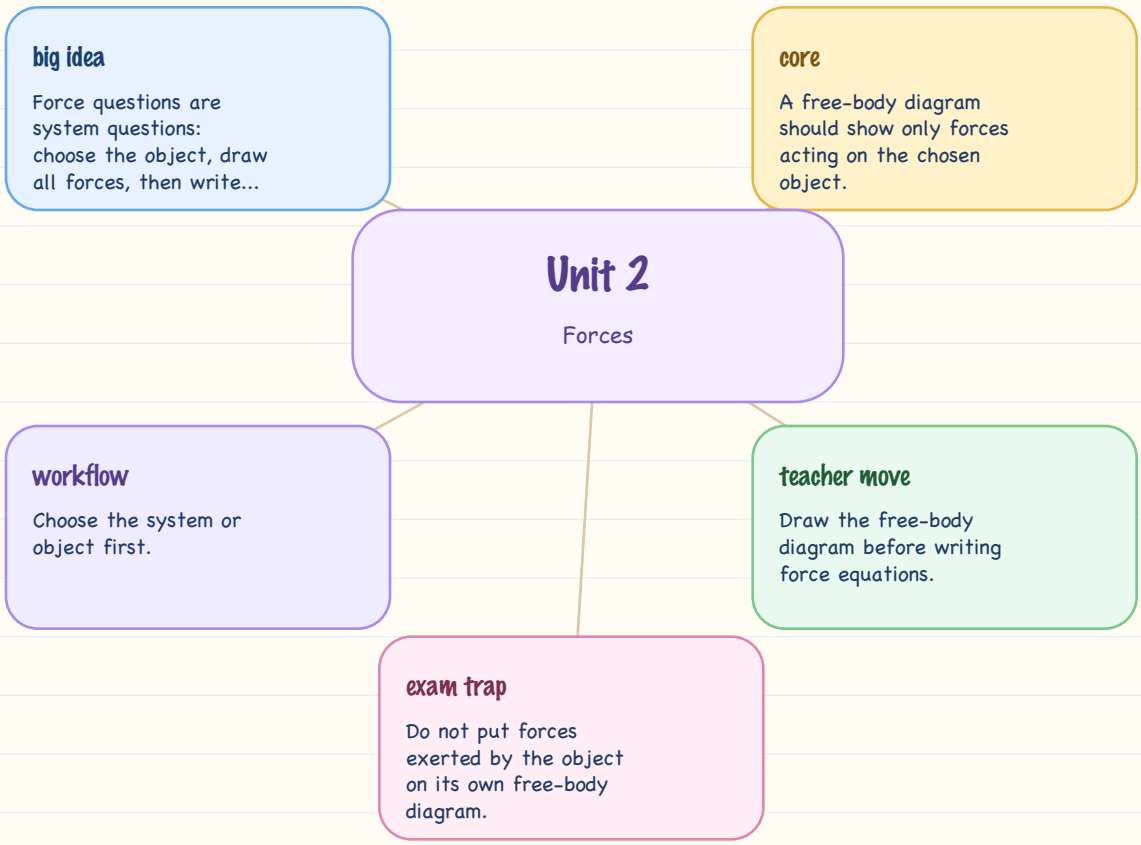
Unit 2 Visual Notebook

Forces, Equilibrium, Springs, and Newton's Second Law

DISTILLED FROM VIDEO

Diagram-first study pages using the same source-locked SPH3U workflows and teacher moves.



Visual Strategy

Step 1 pick system → **Step 2** draw FBD → **Step 3** resolve axes → **Step 4** sum forces

Use this when stuck

- Choose the system or object first.
- Draw all real forces on that object.
- Choose axes that make components simple.
- Write Fnet = ma along each useful direction.
- Use constraints, friction direction, spring stretch, or equilibrium geometry only after the force diagram is clear.

Video teacher tips

- Draw the free-body diagram before writing force equations.
- For equilibrium, set net force to zero and use geometry or components.
- Decide friction direction from relative motion or tendency of relative motion.
- Set directions before assigning signs or writing equations.
- Connect spring force to deformation and restoring direction.
- Read the graph feature first: slope, area, intercept, or trend.

Example and Recall

Worked example pattern

Newton's second law with direction (Unit 2 distilled pattern: write the equation after choosing the positive direction)

Choose right as positive.

A 3.0 kg object has a 12 N net force to the right.

Use Fnet = ma.

a = Fnet/m = 12/3.0.

Answer pattern: a = 4.0 m/s² to the right.

Spring force reading (Unit 2 distilled pattern: spring force depends on deformation)

Identify how far the spring is stretched or compressed.

Use the simple Hooke-law pattern F = kx when the problem states a linear spring.

If k = 200 N/m and x = 0.050 m, F = (200)(0.050).

Quick recall prompts

- Draw a free-body diagram for a block on a horizontal surface.
- Use Fnet = ma to find acceleration from net force and mass.
- Explain the friction direction in a conveyor-belt context.