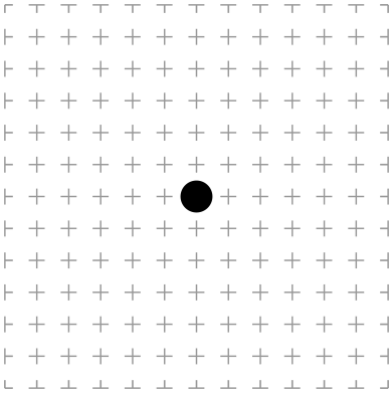
Some suggestions from an AP® Reader about how to draw free-body diagrams:

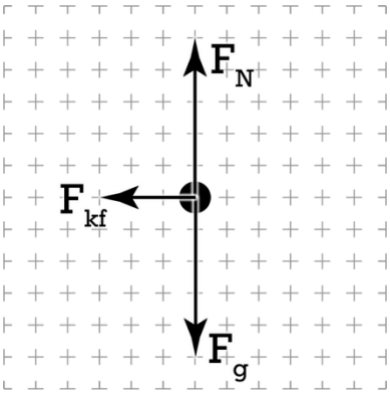
I already have many, many videos about the various kinds of forces, what directions they should be in, and which forces to put in free-body diagrams. A few examples:

- 5 Steps to Help Solve any Free Body Diagram Problem
- An Introductory Tension Force Problem
- Does the Book Move? An Introductory Friction Problem
- Determining the Static Coefficient of Friction between Tires and Snow
- Introductory Static Friction on an Incline Problem
- An incline, 2 masses, and a pulley. What could be more fun?
- Determining the Spring Constant, k, with a Vertically Hanging Mass
- Introductory Centripetal Force Problem - Car over a Hill
- Analyzing Water in a Bucket a Bucket Revolving in a Vertical Circle
- Conical Pendulum Demonstration and Problem

This lecture is simply about how to correctly draw forces in free-body diagrams on AP® Physics exams.

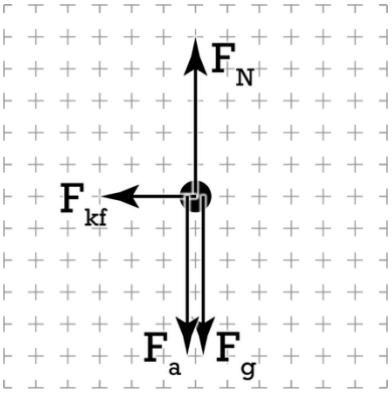


Since the update to all AP Physics exams for 2025, every free-body diagram you will be asked to draw, will be drawn in the free-response booklet, and will be drawn on a figure with a grid and a central dot which represents the center of mass of the object or system.



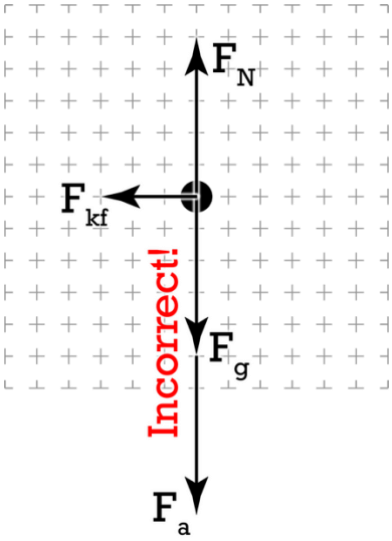
The tail of every force vector needs to start on that dot and point away from that dot.

FYI: This lesson is a free portion of my AP® Physics 1 Ultimate Exam Slayer which is packed with in-depth videos on all four types of free-response questions detailed breakdowns of every category of multiple-choice and battle-tested test-taking strategies, just like the ones you see in this very video! But wait, there's more! You'll get not one … but TWO! full-length practice exams, each powered by our AP® Exam Simulator, carefully crafted to mirror the real digital AP® exam experience. This simulator is not created or endorsed by the College Board or Bluebook—it's just made to help you dominate the exam!



If there are two forces which act in the same direction, draw the two force vectors parallel to one another.

- Do not draw one force vector on the end of another force vector.



Do not draw force vectors outside of the grid.

Do use most of the grid!

- In other words, do not draw very small force vectors.

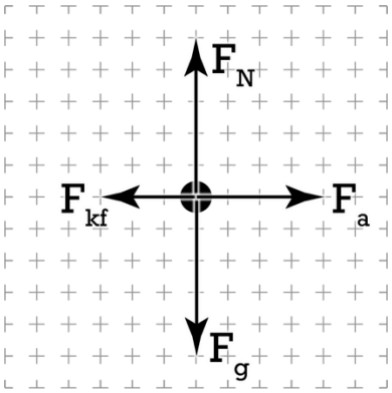
The only vectors which belong in a free-body diagram are force vectors. For example, do not include; velocity, acceleration, momentum, impulse, etc.

You have to label all the forces in your free-body diagrams.

- F_N ; Force Normal
  - N, F_n, Normal Force (also acceptable)
- F_g ; Force of Gravity
  - F_{grav}, W, mg, gravitational force, weight (also acceptable)
- F_{sf} ; Force of Static Friction
- F_T ; Force of Tension
- Are some examples

Note: g or G are not acceptable for the Force of Gravity because “gravity” by itself is not clear enough on an AP® Physics exam. There are many “gravities” in physics:

- Force of Gravity.
- Acceleration due to Gravity.
- Gravitational Field Strength.
- Gravitational Potential Energy.

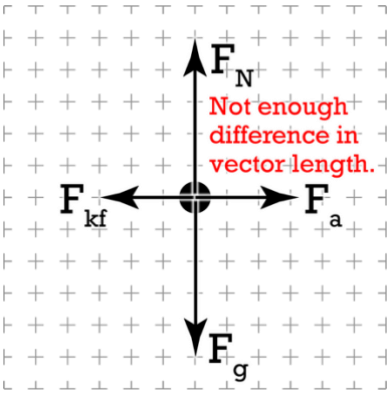


Also Note: We have to be able to read your handwriting. Please write legibly.

Why is the grid there?

- The grid is there to help you show the relative magnitudes of your force vectors.

- I recommend having at least 1 grid length difference in force vectors which are supposed to have different magnitudes. For example:
    - F_g and F_N are equal in magnitude at 5 grid lengths.
    - F_{kf} has a smaller magnitude that F_a ; 3 grid lengths < 4 grid lengths.



Be careful of when and where you are drawing your free-body diagrams for. Hypothetical example: a ball rolling down an incline, rolling along a level table, and then flying off the table into the air. And you are asked to draw a free-body diagram of all the forces acting on the ball after it has left the table.

- Read carefully.
- Draw the free-body diagram for after the ball has left the table.
    - Not while the ball is still on the table!

Draw all the forces acting on the object in free-body diagrams, not just the forces which do not cancel out.

After you have drawn your free-body diagram answer, leave it alone. Later in the problem, if you need to resolve forces into components, draw a new "working" free-body diagram.

Draw the arrowheads of your vectors directly on the end of the line for the force vector.

- Like the arrowhead for the force of gravity.
- Not like the arrowhead for the force normal.