Stuck on answering dynamics problems?

Q: QUESTION

G: GIVENS

FBD: - FREE-BODY DIAGRAM
     - LABELS
     - GIVENS

E: - EQUATIONS
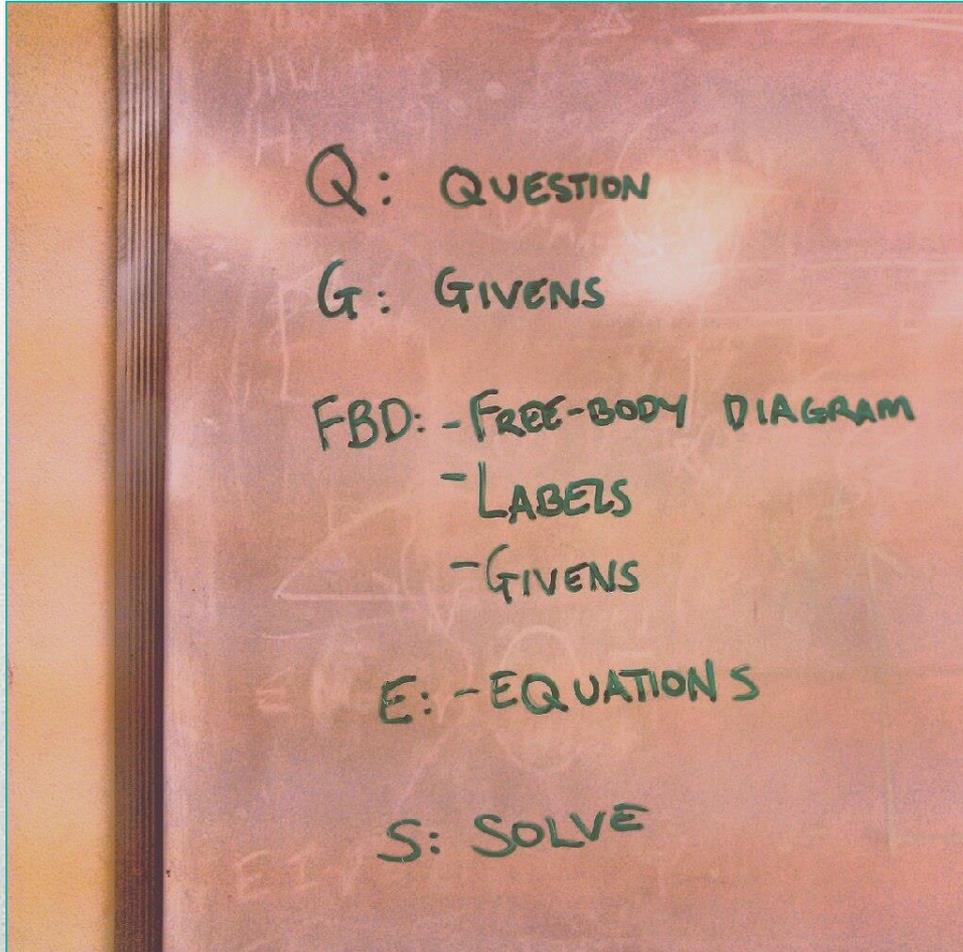
S: SOLVE

o Answer homework sets using this method of solving problems (as pictured)

o Trust the process.
  This method will help you think it through.

o The best way to overcome solving problems is to solve many problems, over and over again.

o The best way to know is to do.
  Work with a study buddy.
  Give yourselves time restraints.

Sample problem with step by step solving:

A marble is released from the bottom of the feet of a bird which was traveling vertically with a constant velocity of 10 ft/s. If the dried fiber hits the ground in 5 s, determine the height of the bird is flying from the ground at the instant the marble is released. Also, find the velocity of the ball when it strikes the bottom of the ground.

Q: question

- What is the question being asked?
- Is it a variable(s) that are trying to be solved?
- What are is the variable(s)?
- What units does the solution(s) requested?

} *Things to ask yourself*

How to apply the method to the sample problem:

A marble is released from the bottom of the feet of a bird which was traveling vertically with a constant velocity of 10 ft/s. If the dried fiber hits the ground in 5 s, determine the height of the bird is flying from the ground at the instant the marble is released. Also, find the velocity of the ball when it strikes the bottom of the ground.

(3) State units in [parenthesis]

(Q): h = ? (ft) and v = ? [ft/s]

(1) Convert word problem into math question form

(2) State the variable(s) to be solved as a letter set equalt and put a question mark as such
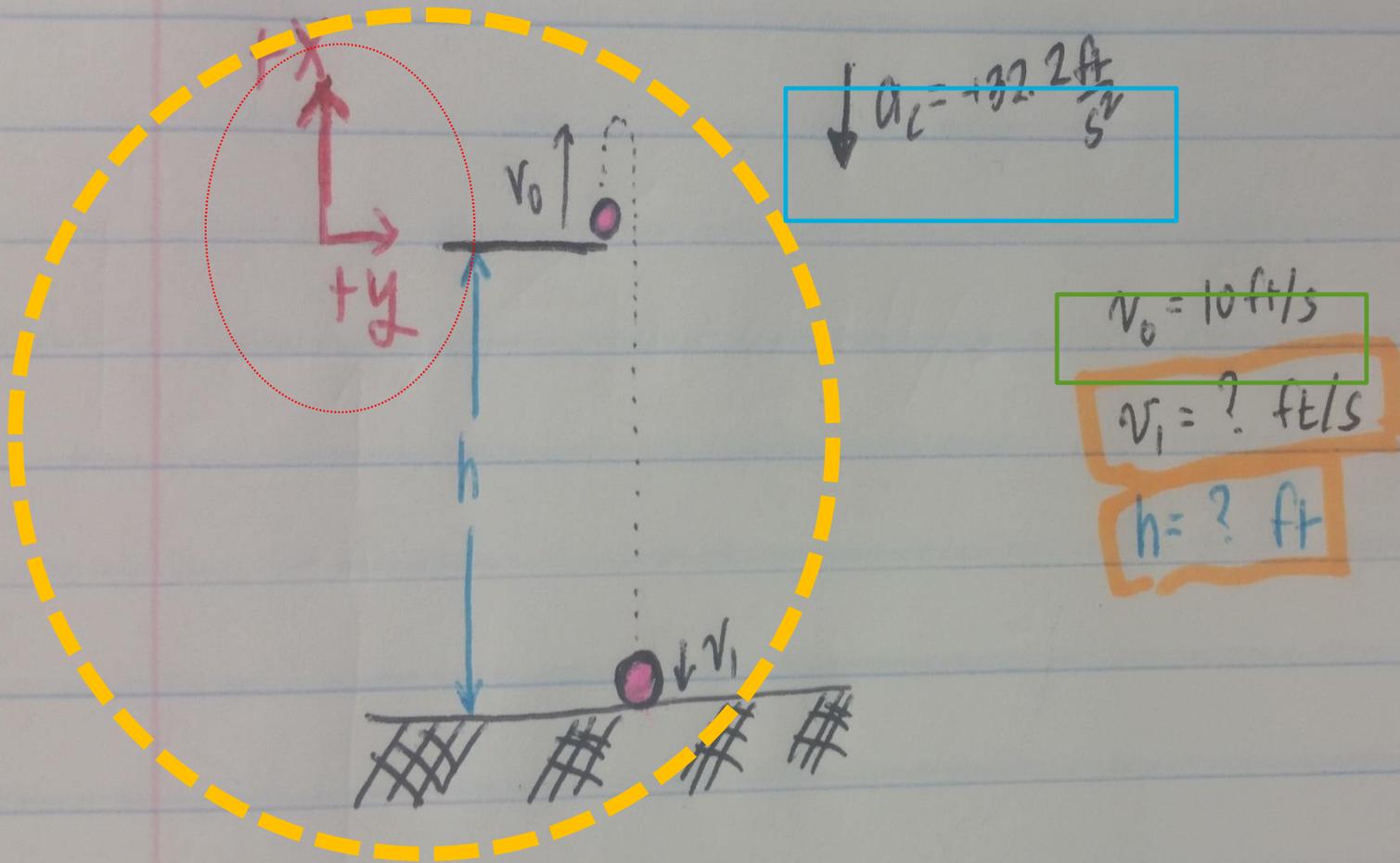
G: given

- What information is given from the word problem?
  - State in mathematical description—include units
- What assumptions will need to make? (i.e., gravity = ? Etc.)
- What coordinate system will you be working in?

FBD: free Body-Diagram

- "Visualize the motion."
- Draw a picture that breaks down the motion.
- Convert the picture into mathematical description
- The mathematical description typically are in the form of trigonometry and geometry
- These tools will give us a basic mathematical description of that body of reference to space, and perhaps even time

G: given / FBD: free body-diagram

$$a_c = -32.2 \frac{ft}{s^2}$$

$$v_0 = 10 \, ft/s$$

$$v_1 = ? \, ft/s$$

$$h = ? \, ft$$

- Start by drawing the FBD diagram: Convert the picture into a mathematical description
- Set coordinate system
- State givens in mathematical description (variable form including units)
- State assumptions (if applicable)

E: equation

- What equation(s) will solve the problem?
- What coordinate system did you learn to apply the equation (if applicable)?
- What other ways have I learned to write the equation? Can I manipulate it to solve the desired outcome?
- Are there any trigonometric/geometric functions that are needed to solve an intermediary step (if applicable)?
- Ask yourself questions to lead to solving the problem.

E: equation

(1)

$$s = s_0 + v_0 t + \frac{1}{2} a_c t^2$$

(2)

$$v = v_0 + a_c t$$

- This is your plan of attack.
- Write out equations that needed to help you solve the question(s) being asked

S: Solution

(1)

$$s = s_0 + v_0 t + \frac{1}{2} a_c t^2$$

$$-h = 0 + 10(3) + \frac{1}{2}(-32.2)(3^2)$$

$$h = 114.9 \, ft$$

(2)

$$v = v_0 + a_c t$$

$$v = 10 + (-32.2)(3)$$

$$v = -86.6 \, ft/s$$

The pieces of the puzzle will come together. And the math descriptions will fit into the appropriate equations need to solve the problem. At this point, the math used to solve should be second nature (i.e., trig identities, calculus 1 thru 4).

Helpful hits:

- Master the process of how to solve dynamics problems.

- Visualize the engineering process into math description

- Don't be afraid of the math.

- More study tips refer to:

Irvine, J. Lelemia (2015) Study Tips Handout for Success in Engineering Mechanics. Hand-out. University of Hawaii at Manoa

"Science is built on previous knowledge!" – 'Anake L. K. Gomes