

Range of problems strategy: Common types of difficult problems

Taken from: J. Fleet, F. Goodchild, R. Zajchowski, *Learning for Success*, 2006

Expand your thinking in preparation for exams, where problems are not exactly the same as you have previously solved. Work from an existing problem, and make it more challenging by adding or changing:

Hidden knowns: needed information is hidden in a phrase or diagram Eg. “at rest” means initial $v = 0$ in physics.

Multipart-same concept: a problem may comprise 2 or more sub-problems, each involving the same concept. This type of problem can be solved only by identifying the given information in light of these sub-problems

Multipart-different concepts: same idea as above, but the sub-problems involve the use of different concepts

Multipart-simultaneous equations: same idea as above, but no single sub-problem can be solved by itself. You may have 2 unknowns and 2 equations or 3 unknowns and 3 equations, and you will need to solve them simultaneously, e.g. using substitution, comparison, addition and subtraction, matrices, etc.

Work backwards: some problems look different because to solve them you have to work in reverse order from problems you have previously solved

Letters only: when known quantities are expressed in letters, problems can look different. If you follow the decision steps, they are not usually as difficult.

“Dummy variables”: sometimes a quantity that you think should be a known is not specified because it is not really needed – that is, it cancels out. E.g. mass in work-energy problems, temperature in gas-law problems.

Red herrings, unnecessary information: a problem may give you more information than is needed, which is confusing if you think you should use everything provided.