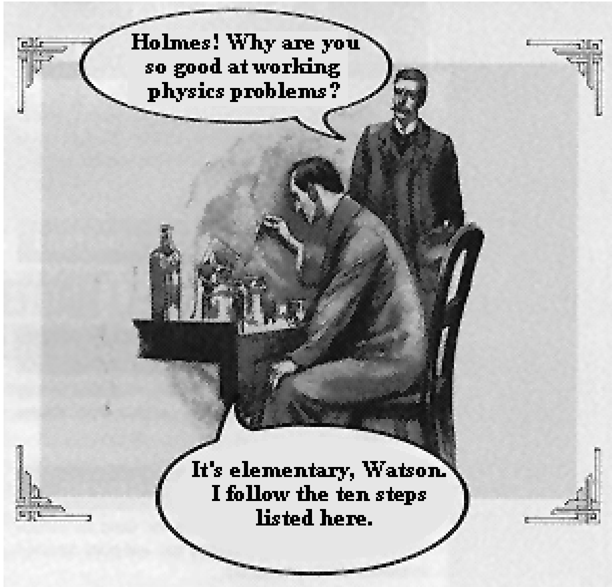

PHYSICS PROBLEM SOLVING STEPS

I.	Read the *entire* problem carefully.
II.	Try to divide the information supplied by the problem statement into: (a) "given data," (b) "unknown quantity or quantities to be found," (c) "conditions" under which the problem is to be solved.
III.	Try to pick out relevant words and phrases that identify the "conditions" under which the problem is to be solved, if this is not clear.
IV.	Try to visualize the physical situation; make whatever drawings or diagrams or graphs seem useful.
V.	Label all the information given in the problem with correct *symbols* and *units*; use *subscripts* where needed.
VI.	Identify the relationships (formulas) which apply to the problem. This is not a "formula hunt." Ask: What physical principles (e.g., Newton's second law, conservation of energy) are relevant?
VII.	Solve for unknown quantities; in general, solve *algebraically* and *do not substitute* numerical values at this point.
VIII.	Substitute numerical values (and *units*) in the algebraic solution; calculate, using scientific notation where needed.
IX.	Simplify the solution; express it in scientific notation where appropriate, with the correct number of significant figures and correct *units*.
X.	Ask yourself: Is the solution physically and dimensionally resonable? (If it is not, retrace steps I through IX.

Here is a simple example.

I. A jetliner moves along the runway with an acceleration of $4\ \text{m/s}^2$ and lifts off the runway after 40 seconds.
Find the liftoff speed and the distance the jet travels before liftoff.

II. (a) Given: $a = 4\ \text{m/s}^2$, $t = 40$ s.

(b) Find: υ and x at $t = 40$ s.

III. Conditions (inferred): $\upsilon_o = 0$, a is uniform, $x_o = 0$.

IV. Sketch a graph of υ vs. t, a straight line with a slope of $4\ \text{m/s}^2$.
The displacement is the area between the line and the $\upsilon = 0$ axis.

V. Quantities are correctly identified in steps II and III (symbols, units, sunscripts).

VI. Since a is uniform and $x_o = 0$, υ can be found from $\upsilon = at$
and x can be found from $x = \upsilon_{av} t = \left(\frac{\upsilon}{2}\right) t$ or from $x = \left(\frac{1}{2}\right) at^2$.

VII. Required expressions are given in VI; in this case algebraic manipulation is not needed.

VIII. $\upsilon = (4\ \text{m/s}^2)(40\ \text{s}) = \boxed{160\ \text{m/s}}$

$x = \left(\frac{160\ \text{m/s}}{2}\right)(40\ \text{s}) = \boxed{3200\ \text{m}}$

IX. OK

X. OK