Table 1. Solve problems using a SiQuENC of steps

Sketch **Situation**(s)	Draw detailed cartoon using POSTE https://davidliao.com/handouts/Critical%20reading%20and%20reasoning/CRR%20for%20middle%20school/POSTE.pdf
Graph and tabulate **Quantities**	If suitable diagrams and tables are not obvious, use Table 2's selection criteria S1, S2, and S3 to select suitable diagrams and tables.
Copy flashcard **Equation**(s) and inequalities	Put all rules from Table 2, category R (if used) near center of flowchart. Put all formulas from Table 2, category A (if used) near corresponding symbols in central relationship(s) from category R, if available.
Neurotically analyze	Carry out REASoNing, as described in Table 3.
Cut and **communicate**	Use task verb ("explain", "justify", and "briefly explain") and Table 3 to pick portions of REASoNing to write out.

Table 2. Choose and apply concepts using a chapter map

		Kinematics	**Forces**	**Work & Energy**	**Impulse & Momentum**
Snapshots	S1.	2 snapshots	1 snapshot	2 snapshots	2 snapshots
Scope	S2.	Just describe motion	Explain interactions	Explain interactions	Explain interactions
Vectorial?	S3.	Vector	Vector	Scalar	Vector
Diagrams	D1.	v_x-t plot	Force diagram	Energy bar chart	Momentum bar chart
	D2.	Motion diagram			Momentum vector-addition
Tables	T1.	Kinematics components	Force components		Momentum components
Rules	R1.	$\Delta x = v_{x,i}t + \frac{1}{2}a_x t^2$	$a_x = \frac{\sum F_x}{m}$	$E_1 + W = E_2$	$\sum p_{x,i} + J_x = \sum p_{x,f}$
	R2.	$v_{x,f}^2 = v_{x,i}^2 + 2a_x\Delta x$		$K_1 + U_{G,1} + U_{S,1} + W = K_2 + U_{G,2} + U_{S,2} + \Delta U_{INT}$	$\sum \vec{p}_i + \vec{J} = \sum \vec{p}_f$
	R3.	$v_{x,f} = v_{x,i} + a_x t$			
	R4.	$\Delta x = \left(\frac{v_{x,i} + v_{x,f}}{2}\right)t$			
	R5.	Δx = Signed area between v_x-t plot and t-axis			
	R6.	Δv_x = Signed area between a_x-t plot and t-axis			
Abstracted quantities	A1.	$\Delta x = x_f - x_i$	$a_x = \frac{\Delta v_x}{\Delta t}$	$K = \frac{1}{2}mv^2$	$p_x = mv_x$
	A2.	$v_{x,AVG} = \frac{\Delta x}{\Delta t}$	$a_{IN} = \frac{v^2}{r}$	$U_G = mgh$	$J_x = \sum F_x \Delta t$
	A3.	v_x = IROC on x-t plot	$F_G = mg$ (Earthward)	$U_S = \frac{1}{2}k(\Delta x)^2$	J_x = Signed area between $\sum F_x$-t plot and t-axis
	A4.	$a_{x,AVG} = \frac{\Delta v_x}{\Delta t}$	F_T (strings pull)	$W = Fd\cos\theta$	
	A5.	a_x = IROC on v_x-t plot	F_N (perpendicular press)	W = Signed area between F_x-x plot and x-axis	
	A6.		$f_K = \mu_K F_N$ (opposes slippage)	ΔU_{INT}	
	A7.		$f_S \leq \mu_S F_N$ (opposes slippage)		
Measurable (or nearly measurable) **quantities**	M1.	t	a_x, Δt, Δv_x	m, v, h	m, v_x
	M2.	x, Δx	v, r	Δx	Sometimes F_x
	M3.	v_x, a_x	m	Sometimes F	Δt
	M4.		F_{PROBE} (pull or F_N)	d, θ	

Table 3. Plan and write explanations using REASoNing

Toulmin	REASoN	Think **pre-write**, write algebra	Cut and **communicate**: **Write** concisely		
			Explain fully/**PLR** (deprecated)	**Justify**	**Briefly explain**
Warrants	**R**ules	• Place rule(s) from category R (if used) near center of flowchart. • Place formula(s) from category A near corresponding symbols of relationship(s) from category R (if any).	• State all relationships used from categories R and A. • State conservation laws, if any, in abbreviated form ("the sum of ___ and ___ becomes shared between ___ and ___"). • If relationships from both categories R and A are used, use parentheses to sneak formulas from category A into sentences citing relationships from category R, if any.	• State main relationships used from category R. • If reasoning doesn't rely on any relationship from category R, state relevant equations from category A. • State conservation laws, if any, in abbreviated form ("the sum of ___ and ___ becomes shared between ___ and ___").	N/A
Evidence	**E**qual	• For each quantity in categories A and M given to be unchanged between situations/trials, mark a circled equal sign. • For each quantity in categories A and M with a given expression or value, mark the given expression or value.	• List quantities in categories A and M given to be unchanged between situations/trials. • List given values/expressions, if available of quantities in categories A and M.	N/A	N/A
	Altered	For each quantity in categories A and M given to be changed between situations/trials, draw change symbols (arrows or inequalities) and/or adjust the handwriting size of the quantity's expression.	List given changes in quantities in categories A and M.		
Claim	**So what?**	Using algebraic reasoning available to a student with ordinary mastery of Algebra 2, deduce whether the quantity or quantities of interest from categories A and M changed, and, if so, how.	Walk reader through chain of quantities from categories A and M and their corresponding changes until the quantities the question asks about (or close proxies) have been shown to have a particular value/expression, to stay unchanged, or to change (indicate how). Style example: "so the ___ doubles, so the ___ quadruples, so the ___ is quartered".		
	Next?	Did you answer the question?	Checkmark the appropriate option. You don't need to write "I'm done." ☺		