

Strategies for Solving Mixture Problems

- #1. Go straight to the algebra.
- #2. Build a table of just what you're given.
- #3. Build a table of what you're given AND what you've figured out.

Each has advantages and drawbacks.

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Strategy #1 – Go Straight to Algebra

"How many pounds of chocolate-covered raisins costing \$3.40 per pound and how many pounds of malted milk balls costing \$3.00 per pound must be combined to create 10 pounds of a mixture costing \$3.25 per pound?"

$$3.40 \cdot x + 3.00 \cdot (10 - x) = \$32.50$$

Obvious question:

"Where did that formula come from?"

Good for rapid calculation on small problems.
Breaks with larger problems; may require further explanation with a skeptical consumer.

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Strategy #2 – Build A Table Of Just What You're Given

Item	Pounds	\$ per pound
Chocolate Raisins	x	3.40
Malted Milk Balls	$10-x$	3.00
Mixture	10	3.25

$$3.40 \cdot x + 3.00 \cdot (10 - x) = 3.25 \cdot 10$$

Good intermediate form.

Still leaves some questions: *"Why 3.40 times x ?"*
Also breaks on larger & more complex problems.

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Strategy #3 – Build A Table Of What You're Given AND What You've Figured Out

Item	Pounds	\$ per pound	\$ for this item
Chocolate Raisins	x	3.40	$3.40 \cdot x$
Malted Milk Balls	$10-x$	3.00	$3.00 \cdot (10-x)$
			$3.40 \cdot x +$
			$3.00 \cdot (10-x)$
Mixture	10	3.25	$= 3.25 \cdot 10$

$$3.40 \cdot x + 3.00 \cdot (10 - x) = 3.25 \cdot 10$$

Wordy, but doesn't leave many questions.
Scales well to larger and more complex problems.

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Notice the Pattern

Multiply Across Rows

Item	Pounds	\$ per pound	\$ for this item
Chocolate Raisins	x	3.40	$3.40 \cdot x$
Malted Milk Balls	$10-x$	3.00	$3.00 \cdot (10-x)$
Mixture	10	3.25	$3.25 \cdot 10$

$$3.40 \cdot x + 3.00 \cdot (10 - x) = 3.25 \cdot 10$$

Cost of Raisins + Cost of Malted Milk Balls = Cost of Mixture

Add / Subtract Within Columns

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Other Problems Have The Same Pattern

Multiply Across

Item	\$ invested	Interest rate	\$ interest
Savings #1	2500	4.25% = 0.0425	$2500 \cdot 0.0425$
Savings #2	1500	x	$1500 \cdot x$
Combined Savings	4000	(0.05)	$106.25 + 1500 \cdot x$

$$106.25 + 1500 \cdot x = 200$$

Interest #1 + Interest #2 = Combined Interest

Add / Subtract Within Columns

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Many Problems Have The Same Structure, But Sometimes It's Harder To See

"How many quarts of 90% solution have to be added to 12 quarts of 50% solution to create 75% solution"

Item	Quarts of solution	Concentration of pure "stuff"	Quarts of pure "stuff"
Solution #1	x	90% = 0.90	$0.90 \cdot x$
Solution #2	12	50% = 0.5	$12 \cdot 0.5$
Mixture	$12 + x$	75% = 0.75	$0.90 \cdot x + 12 \cdot 0.5$

$$0.90 \cdot x + 12 \cdot 0.5 = 0.75 \cdot (12 + x)$$

Qts of pure stuff in #1 + Qts of pure stuff in #2 = Qts of pure stuff in the mixture

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Spreadsheet We're Building Today

Multiply Across Each Row

	A	B	C	D	E
Item		Number of pounds	Dollars	Dollars	
1	Type A nuts	50	2	100	
2	Type B nuts	3	6	18	
3	mixture			118	
4	mixture	53	5	265	
5					
6					

Add / subtract

In 1st and 3rd columns

adding down (to get total \$\$ for mixture by adding \$\$ for ingredients)
by multiplying total weight of the mixture, times the mixture's cost per pound)
"Error" --- the difference between "adding down" and "multiplying across"

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