A Juicy Dilemma
Project # 1 Mat 101

The juice division of Florence-Darlington Foods, Inc. blends cranberry juice with apple juice in 500 gallon vats prior to bottling. The resulting blend is advertised to be 42% cranberry juice. A new supervisor accidentally blended a 500 gallon vat that was 24% cranberry juice. Rather than discard the entire 500 gallons, the supervisor decides to correct the problem by draining off some of the 24% blend and adding pure cranberry juice to strengthen the blend to 42%. Making sure to end up with 500 gallons, how much of the 24% blend should the supervisor drain and replace with pure cranberry juice to correct the mistake? *Round all answers to the nearest tenth of a gallon or nearest tenth of a percent if needed.*

1. **120** gallons of the 24% blend are cranberry juice, and **380** gallons are apple juice.

    210 gallons of the 42% blend are cranberry juice and **290** gallons are apple juice.

2. Suppose we drain 50 gallons of the 24% blend and replace it with pure cranberry juice. Use the table below to determine the resulting percentage of cranberry juice in the blend.

description	total volume	% cranberry juice	volume of cranberry juice
Starting mixture (gallons)	500	24%	120
Drain 50 gallons of blend	-50	24%	-12
Add 50 gallons of cranberry juice	50	100%	50
Resulting blend	500	31.6 %	158

3. Redo the above table showing the results of draining 100 gallons of blend from the original 24% blend and replacing with pure cranberry juice.

description	total volume	% cranberry juice	volume of cranberry juice
Starting mixture (gallons)	500	24%	120
Drain 100 gallons of blend	-100	24%	-24
Add 100 gallons of cranberry juice	+100	100%	100
Resulting blend	500	39.2 %	196

4. Redo the above table to show the draining of x gallons of blend from the original 24% blend and replacing with pure cranberry juice to achieve a 42% blend.

description	total volume	% cranberry juice	volume of cranberry juice
Starting mixture (gallons)	500	24%	120
Drain x gallons of blend	-x	24%	$-.24x$
Add x gallons of cranberry juice	x	100%	$+x$
Resulting blend	500	42%	$120 + .76x$

] ADD

OR
$120 - .24x + x$

5. What does the variable x represent?
    a.) The percent of cranberry juice in the blend.
    b.) The volume of cranberry juice in the original blend
    c.) The volume of cranberry juice in the final blend.
    d.) The volume of juice to be drained and replaced with pure cranberry juice. **(D)**

6. Why are the volumes in the second row negative?
    a.) Because they were not apple juice.
    b.) Because gravity acts downward.
    c.) Because they are being removed from the blend. **(C)**
    d.) Because the percentage of cranberry juice is too low.

7. In the table in # 4, why is the coefficient of x in the 3rd row positive 1?
    a.) You are replacing the drained juice with 1 gallon of cranberry juice at a time. **(A)**
    b.) You are adding pure (100%) cranberry juice.
    c.) You are only adding one type of juice.

8. Use the last column of the table in # 4 to write a **cranberry juice equation** to solve for x. Your equation should show: **Starting amount – amount drained + amount added = desired amount**
    a.) $500 - 24 + x = 42$ c.) $120 - 0.24x + x = 0.42$
    b.) $500 - 24x + 100x = 42$ d.) $0.24(500) - 0.24x + x = 0.42(500)$ **(D)**

9. Solve your equation from # 8 for x. x = **118.42**. This means that the supervisor should drain and replace **118.42** gallons of blend with pure cranberry juice.

PART 1

24% of 500 = 120 cranberry $\left(\frac{24}{100} \times 500\right)$

remaing 380 = apple

42% of 500 = 210 cranberry $\left(\frac{42}{100} \times 500\right)$

remaining 290 = apple

PART 8

$$\frac{120 + .76x}{500} = .42$$

$$120 + .76x = .42(500)$$