1

Using the scale method (called alligation by some), you can very neatly and quickly solve this question of weighted averages.

Weightage of mid terms (or whatever) - 60%
Weightage of final exams - 40%
Marks obtained in mid term - 45%
Average required - 60%
So marks obtained in finals - x%

Since the weights are in the ratio 3:2, the distance on the scale will be in the ratio 2:3.
So x = 82.5%

OR

What is weighted average?
It is average when each value has a different weight. e.g. a group of friends has 10 boys and 20 girls. Average age of boys is 20 years and average age of girls is 17 years. What is the average age of the group?

Here, the average is weighted since we have different number of boys and girls.
We calculate it as follows:

$$WAvg = \frac{20*10+17*20}{10+20}$$

What we are doing instinctively here is using weighted average formula which as given below:

$$C_{avg} = \frac{C_1*W_1+C_2*W_2}{W_1+W_2}$$

You need to find the average of C and W is the weight. In the example above, C is age and W is number of boys and girls.

The alligation method, or the scale method as we call it, is based on the weighted averages formula itself:

$$C_{avg} = \frac{C_1*W_1+C_2*W_2}{W_1+W_2}$$

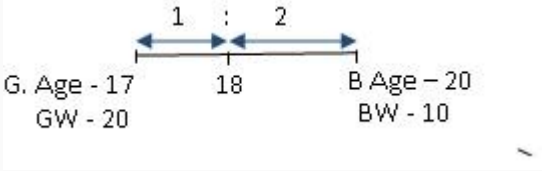
If I re-arrange the formula, I get

$$\frac{W_1}{W_2} = \frac{C_2-C_{avg}}{C_{avg}-C_1}$$

So I get that weights will be in the same ratio as difference between higher value of C and average value of C and difference between average value of C and lower value of C.

How does this help? Knowing this, we can directly make a diagram and get the answer.
e.g. A group of friends has 10 boys and some girls. Average age of boys is 20 years and average age of girls is 17 years. The average age of the group is 18 years. How many girls are there?
Draw:

Attachment:



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On a scale (number line), mark 17 years as age of girls, 18 years as average and 20 years as age of boys. Now, distance between 17 and 18 is 1 and distance between 18 and 20 is 2, The ratio of W1/W2 will be 2:1 (Note, the numbers 1 and 2, give a ratio of 2:1 for girls:boys as seen by the formula)
Since there are 10 boys, there will be 20 girls.

This method is especially useful when you have the average and need to find the ratio of weights.

$$C_{avg} = \frac{C_1*W_1+C_2*W_2}{W_1+W_2}$$

$$C_{avg}*(W_1+W_2) = C_1*W_1+C_2*W_2$$ (Cross multiplying)

$$C_{avg}*W_1+C_{avg}*W_2 = C_1*W_1+C_2*W_2$$

$$C_{avg}*W_1-C_1*W_1=C_2*W_2-C_{avg}*W_2$$

$$W_1(C_{avg}-C_1)=W_2(C_2-C_{avg})$$

$$\frac{W_1}{W_2}=\frac{C_2-C_{avg}}{C_{avg}-C_1}$$

2

2 gallon of gray paint needs $2*\frac{3}{3+5}=2*\frac{3}{8}=\frac{3}{4}$ gallons of white paint and $2*\frac{5}{8}=\frac{5}{4}$ gallons of black paint.

To get $\frac{3}{4}=0.75$ gallons of white paint we should purchase at least 1 gallon of white paint;
To get $\frac{5}{4}=1.25$ gallons of black paint we should purchase at least 1.5 gallons of black paint.

Total: 1+1.5=2.5.

Answer: B.

3

You can treat this question as wighted average problem: $weighted\ average=\frac{weight_1*value_1+weight_2*value_2}{value_1+value_2}$ --> $0.3=\frac{0.15*A+0.5(4-A)}{4}$ --> $A\approx 2.3$.

Answer: C.

Also you can notice that as wighted average (alcohol share) of final mixture (30%) is closer to that of mixture A (15%) than to that of mixture B (50%) then there should be more of mixture A in final solution of 4 gallons than of mixture B, so answer choices A and B are out right away. Plus, if in final mixture there were equal amounts of mixtures A and B then the final solution would have (15%+50%)/2=32.5% of alcohol, and as 32.5% is a little more than 30% (actual concentration) then there should be a little more of mixture A than mixture B in 4 gallons, answer choice C fits best.

4

Out of 100 pounds 99% or 99 pounds is water and 1 pound is non-water. After some **water** evaporates the cucumbers become 98% water and 2% of non-water, so now 1 pound of non-water composes 2% of cucucmbers, which means that the new weight of cucumbers is 1/0.02=50 pounds.

Answer: B.