
NUTS

❑ THE BASICS

Consider the following problem:
 You bought 12 lbs of peanuts that were priced at \$4 per pound, written “\$4/lb” (and called the *unit price*). What is the total cost (or total value) of the peanuts? It should be clear that we could multiply 12 lbs by \$4/lb and end up with \$48.



Similarly, if we bought N pounds of cashews at \$9/lb, the total value would be $9 \times N$, which of course can be written $9N$.

And for our third example, if we had $(x + 5)$ lbs of walnuts which were worth \$7/lb, the total value of those walnuts would be $7(x + 5)$.

In general,

$\text{Pounds of Nuts} \times \text{Unit Price} = \text{Total Value}$

Here's another idea we need for this chapter. If you had 7 lbs of cashews, and you mixed them with 13 lbs of peanuts, you would have a total of **20** pounds of nuts — that should be obvious. But since this is an algebra class, we also need to deal with the following: If you had 10 lbs of almonds and “ H ” pounds of hazelnuts, what is the total weight of the nuts? It would be $10 + H$, or $H + 10$.

We need to understand one more concept before we solve our nutty examples. Suppose you had a bucket of macadamia nuts whose total value was \$25, and there's a second bucket containing almonds worth a total value of \$35. Now we pour the two buckets of nuts into one huge

Peanuts, etc.

bin. The question is, What is the total value of the mixed nuts in the bin? Well, the correct answer is **\$60**, easily found by adding the total value of the macadamia nuts (\$25) and the total value of the almonds (\$35). Make sense?

Homework

1. If you mix 17 pounds of almonds with 23 pounds of cashews, what is the total weight of the nuts?
2. If you mix A pounds of almonds with 25 pounds of peanuts, what is the total weight of the nuts?
3. If you mix P pounds of pistachios with W pounds of walnuts, what is the total weight of the nuts?
4. One bin contains \$48 worth of peanuts; another bin contains \$52 worth of cashews. If the two bins are combined into one bucket, what is the total value of nuts in the bucket?
5. A bucket of almonds is worth \$210. A bucket of peanuts is worth $\$30P$. Now dump both buckets of nuts into one bin. What is the total value of the nuts in the bin?
6. Find the total value of 10 lbs of pecans if the unit price is \$13/lb.
7. Find the total value of P lbs of pecans if the unit price is \$25/lb?
8. If peanuts sell for \$9/lb, find the total value of $(x + 5)$ pounds.



□ THE EXAMPLES

EXAMPLE 1: The Nutte Shoppe has 14 lbs of walnuts which are priced at \$15/lb. How many pounds of almonds which are priced at \$30/lb should be mixed with the walnuts to get a mixture that will sell for \$24/lb?

Solution: We've got walnuts, 14 lbs at \$15/lb. We've got almonds — we don't know how many pounds — but we know they're worth \$30/lb. And when we mix them together, we get some number of pounds whose unit price is \$24/lb.

Do you see that the problem is asking for the number of pounds of almonds we need to mix with the walnuts? Since this is unknown, how about we let " a " represent the number of pounds of almonds. Let's try to organize this information into a chart to make the solution clearer.

	Pounds of Nuts × Unit Price = Total Value		
walnuts	14	15	210
almonds	a	30	$30a$
mixture	$a + 14$	24	$24(a + 14)$

As mentioned before the example, adding the dollar values of the two kinds of nuts must equal the dollar value of the mixture; that is,

$$\begin{aligned}
 210 + 30a &= 24(a + 14) && \text{(dollar values must add up)} \\
 \Rightarrow 210 + 30a &= 24a + 336 && \text{(distribute)} \\
 \Rightarrow 210 + 6a &= 336 && \text{(subtract } 24a\text{)} \\
 \Rightarrow 6a &= 126 && \text{(subtract 210)} \\
 \Rightarrow a &= 21 && \text{(divide by 6)}
 \end{aligned}$$

Peanuts, etc.

We now know how many pounds of almonds are needed to mix with the walnuts to produce a mixture worth \$24/lb:

21 lbs of almonds

EXAMPLE 2: Safeway has 25 lbs of peanuts which are priced at \$8/lb, and mixes them with 15 lbs of cashews which are priced at \$24/lb. Find the *unit price* of the mixture.

Solution: First note that the chart below uses the general term *quantity* instead of *pounds of nuts*. Letting u represent the unit price of the mixture, we get the following chart:

	Quantity × Unit Price = Total Value		
peanuts	25	8	200
cashews	15	24	360
mixture	40	u	$40u$

The 40 was obtained by adding the pounds of the two kinds of nuts that comprise the mixture, and each box in the Total Value column was obtained by multiplying the two boxes to its left. As before, we note that the total value of the peanuts plus the total value of the cashews must equal the total value of the mixture:

$$200 + 360 = 40u$$

$$\Rightarrow 560 = 40u$$

$$\Rightarrow u = 14$$

And thus the unit price of the mixture is \$14 per pound

EXAMPLE 3: Hadley's sells walnuts which are priced at \$22/lb and cashews which are priced at \$26/lb. How many pounds of each type of nut should Hadley's mix together to get 28 pounds of nuts which would sell for \$25/lb?

Solution: We're letting w represent the Quantity (number of pounds) of walnuts, and similarly for c . All the Unit Prices are given to us in the problem, and each Total Value is the product of the two entries to its left:

	Quantity $\times$ Unit Price = Total Value		
walnuts	w	22	$22w$
cashews	c	26	$26c$
mixture	28	25	700

Since the quantities must total 28 lbs, we get the equation

$$w + c = 28$$

Since the total values must add up, we also get

$$22w + 26c = 700$$

We'll solve this pair of equations by Substitution, by solving the first equation for c :

$$c = 28 - w$$

Plugging this new equation into the second equation gives:

$$22w + 26(28 - w) = 700 \quad (\text{just one variable!})$$

$$\Rightarrow 22w + 728 - 26w = 700$$

$$\Rightarrow -4w = -28$$

$$\Rightarrow w = 7, \text{ so we have 7 lbs of walnuts}$$

$$\text{Then } c = 28 - w = 28 - 7 = 21$$

7 lbs of walnuts
21 lbs of cashews

Peanuts, etc.

Homework

9. The Nut House has 16 lbs of peanuts which are priced at \$13/lb. How many pounds of cashews which are priced at \$18/lb should be mixed with the peanuts to get a mixture that will sell for \$14/lb?
10. Hadley's has 4 lbs of peanuts which are priced at \$12/lb, and mixes them with 11 lbs of almonds which are priced at \$27/lb. Find the *unit price* of the mixture.
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11. Walnut Heaven sells cashews which are priced at \$4/lb and almonds which are priced at \$7/lb. How many pounds of each type of nut should Walnut Heaven mix together to get 18 pounds of nuts which would sell for \$6/lb?
12. Trader Joe's has 4 lbs of walnuts which are priced at \$24/lb. How many pounds of almonds which are priced at \$10/lb should be mixed with the walnuts to get a mixture that will sell for \$18/lb?
13. Peanut Palace has 28 lbs of walnuts which are priced at \$19/lb, and mixes them with 12 lbs of almonds which are priced at \$29/lb. Find the *unit price* of the mixture.
14. Nutty Nuts sells cashews which are priced at \$2/lb and almonds which are priced at \$26/lb. How many pounds of each type of nut should Nutty Nuts mix together to get 32 pounds of nuts which would sell for \$17/lb?

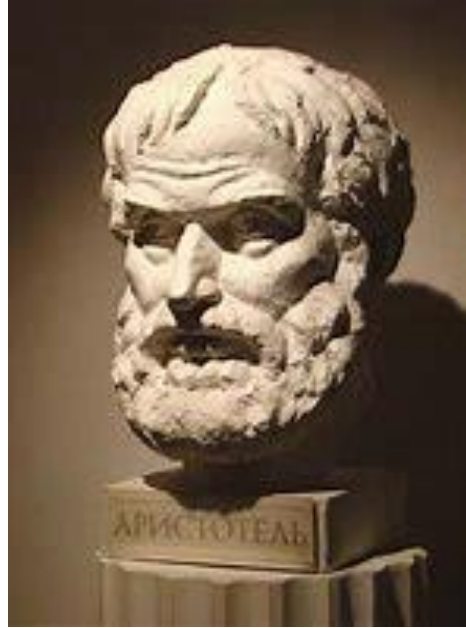
15. Safeway has 6 lbs of cashews which are priced at \$4/lb, and mixes them with 12 lbs of almonds which are priced at \$7/lb. Find the *unit price* of the mixture.
16. The Nutte Shoppe has 4 lbs of cashews which are priced at \$22/lb. How many pounds of almonds which are priced at \$13/lb should be mixed with the cashews to get a mixture that will sell for \$17/lb?
17. Hadley's sells walnuts which are priced at \$22/lb and cashews which are priced at \$26/lb. How many pounds of each type of nut should Hadley's mix together to get 28 pounds of nuts which would sell for \$25/lb?



Solutions

- | | | |
|---|--|---------------------|
| 1. 40 lbs | 2. $A + 25$ lbs | 3. $P + W$ lbs |
| 4. \$100 | 5. $\$210 + \$30P$ | 6. \$130 |
| 7. $\$25P$ | 8. $\$9(x + 5)$ | 9. 4 lbs of cashews |
| 10. \$23/lb | 11. 6 lbs of cashews and 12 lbs of almonds | |
| 12. 3 lbs of almonds | 13. \$22/lb | |
| 14. 12 lbs of cashews and 20 lbs of almonds | 15. \$6/lb | |
| 16. 5 lbs of almonds | 17. 7 lbs walnuts and 21 lbs cashews | |

*“It is the
mark of an
educated
mind to
entertain a thought
without accepting it.”*



— ARISTOTLE —