

YOU & MATHS If prices go down by 20%, by what percentage does your purchasing power increase? («Purchasing power» means the amount of goods that you can purchase for a fixed amount of money.)

(USA Lehigh University: High School Math Contest, 2001)

Let's assume that we can buy four apples with € 1 (100 cents). If prices drop by 20%, the same four apples will cost:

$$100 \text{ cents} - 20\% \cdot 100 \text{ cents} = 100 \text{ cents} - \frac{20}{100} \cdot 100 \text{ cents} = 100 \text{ cents} - 20 \text{ cents} = 80 \text{ cents}.$$

Our purchasing power will consequently increase, as we will be able to buy more apples with the same amount of money. The percentage of the new value of our purchasing power is:

$$\frac{100 \text{ cents}}{80 \text{ cents}} = \frac{5}{4} = 1.25 = 125\%.$$

Since our purchasing power was 100% at the beginning, we see that it has increased by the following percentage:

$$125\% - 100\% = 25\%.$$

Another way to see this is by calculating how many more apples we can buy now. Four apples used to cost € 1, but now they cost 80 cents. That means that each apple costs 20 cents, so with € 1 we can buy five apples instead of four: we can have one more apple than before. The percentage of increase in our purchasing power is thus represented by:

$$\frac{\text{no. of extra apples bought}}{\text{initial no. of apples}} = \frac{1}{4} = 0.25 = 25\%.$$