

## Percentage Increases and Decreases

Increasing and decreasing by a percentage builds on the basic understanding of what a percentage actually is and how to find simple percentages. If you're unsure on the basics then check out our guide on *Percentages - The Basics* before continuing.

### Basic Percentage Increase

To increase by a percentage you simply find the percentage you need and add this on to the original value. If you don't have a calculator you will need to use the method set out in the *Percentages - The Basics* guide to find the amount you need to increase by. Check out the example below for how this will work...

#### Worked example:

*Tom has just been given a 5% pay rise. He used to earn £220 per week. How much will he earn each week now?*

**Step 1** - Find 5% of £220  $\longrightarrow$   $220/10 = 22$  and  $22/2 = £11$

**Step 2** - Add the 5% onto his original wage  $\longrightarrow$   $£220 + £11 = £231$

When you have a calculator they can give you some trickier numbers to work with. You can just do the same method, but using a calculator. There is, however, a much quicker way to use the calculator to "jump" you to the answer. You need to take your original value and multiply by one and the decimal of the percentage you are increasing by. So if you wanted to increase something by 30% then you would multiply by 1.3. Multiplying by the '1' gives you 100% and then the '.3' gives an extra 30% - that's the 30% increase sorted. The example below shows how this works.

#### Worked example:

*A restaurant bill comes to £37.50 with V.A.T added on top at 20%. How much do you actually need to pay including V.A.T?*

**Step 1** - Multiply the original price by 1.2  $\longrightarrow$   $£37.50 \times 1.2 = £45$

## Basic Percentage Decrease

To decrease by a percentage you simply find the percentage you need and subtract this from the original value. Again, if you don't have a calculator you will need to use the method set out in the *Percentages - The Basics* guide to find the amount you need to decrease by. Check out the example below for how this will work...

### Worked example:

*A shop is having a 20% sale. The original price of a shirt was £25. What is the price of the shirt now in the sale?*

**Step 1** - Find 20% of £25      $\longrightarrow$       $25/10 = 2.5$  and  $2.5 \times 2 = £5$

**Step 2** - Subtract the 20% from the original price      $\longrightarrow$       $£25 - £5 = £20$

As with the increases, when you have a calculator they can give you some trickier numbers to work with. You can just do the same method, but using a calculator. There is, however, a much quicker way to use the calculator to “jump” you to the answer. You need to take your original value and multiply by one **minus** the decimal of the percentage you are decreasing by. So if you wanted to decrease something by 30% then you would multiply by 0.7. The example below shows how this works.

### Worked example:

*Catherine buys a car for £11,500. She expects the car to depreciate (lose value) by 25% over the next two years. What will the car be worth in two years?*

**Step 1** - Multiply the original price by 0.75      $\longrightarrow$       $£11,500 \times 0.75 = £8,625$

## Practice Questions

- Without using a calculator, increase the following amounts by the percentages given:
  - £270 by 15%
  - 350kg by 30%
  - £45 by 5%
- Without using a calculator, decrease the following amounts by the percentages given:
  - 50cm by 20%
  - £165 by 25%
  - 752g by 60%
- I put £620 into a bank account, which pays 4% simple interest. If I don't add or withdraw any money, then how much will be in the account after one year?
- The Smith family paid £2895 for their holiday. After a bad experience with some of the local food, the holiday company agreed to refund them 15% of the cost of their holiday. How much were they refunded and how much did they end up paying for their holiday?
- Last year a theme park had 22,652 visitors. This year they are expecting to see a 12% increase in the number of visitors. How many are they expecting this year?
- A sports shop has a 20% sale on everything in the shop. I buy a tennis racket for £76 in the sale. What was the original price of the racket before the sale?
- My phone bill this month was £22, which was a 16% increase on last month. How much did I pay last month?