

## Chapter 18 - Proportionality and Percentages

### Ad Hoc Percentages 5 minutes and 19 seconds

Most calculations of percentages can be done in practice using informal ad hoc approaches where we use what we know to calculate what we need to find. Here's an example, find 30% of £40 a simple one to begin with and I'm going to show you how we can extend the method we use for proportionality problems to the calculation of percentages. So we can think of this as having two variables the percentage and the amount of money in pounds and what we have to begin with is that £40 is 100%. That's the whole amount, everything we have. 100%, £40 and we need to find 30% of that, I'm going to do this in two simple steps first of all, I know I can always find 10% just by dividing by ten so 10% is £4 and now I'm going to multiply 10% by three to get 30% so the four gets multiplied by three and the result is £12.

Now that's the approach we can use for even more complicated calculations like this one, find 45% of £28. So, I set it up again with the two variables, the percentage and the amount of money and the £28 is the 100% start by finding 10% again, divide by ten, £2.80. Right I'm heading for 45% so I'm going to double the ten and then double it again. 20% multiplied by two gives me £5.60, 40% multiplied by two again, gives me £11.20. I now just need a further 5%, to do that, I can halve 10% divide the 10% by two, that's £2.80 divided by two, £1.40. And now to find 45% I just have to add together the 40% and the 5% and there we have the result, 45% is £12.60. So, there's a complicated percentage calculation, carried out without using any difficult calculations at all. All I've done is simple dividing by ten multiplying by two, dividing by two and a simple bit of addition at the end.

Here's another example, find 37% of £40 set that up as before, £40 is a 100%. My approach here is I'm going to find 30% and 7% and add them up. So, let's head for 30%, well 10% is £4 dividing by ten and I'm going to find 1% now. 1% divide that by ten again is forty pence-£0.40. Right now, to get 30% I need to multiply that 10% by three that

gives me three that gives me £12 to get the 7%, I need to multiply the 1% by 7 which is £2.80 and for 37%, I add 30% and 7% and there it is, £14.80. So that's how you do ad hoc calculations of percentages.

Just going to show you one other little trick, err...to make explicit something that a lot of people don't realise, using this example, find 36% of £25 now I wonder if you realise that A percent of B is always equal to B percent of A. Try that with a few examples like 10% of 20 is the same as 20% of 10. 50% of forty is the same as 40% of 50 and so on. Now that can sometimes be very useful, because 36% of £25 can be reinterpreted as 25% of £36 and that's really easy because 25% is a quarter so a quarter of £36 which is £9. So, there's a nice little trick to use sometimes, look out for opportunities to change A percent of B into B percent of A to make the percentage calculation even easier.