

Check-Up

35

Finding the original value after a percentage increase or decrease

- a) (No calculator needed.) After a dramatic decrease of 20% from the previous year, a school roll stands at 664 pupils. What was it the previous year?
- b) (Use a calculator.) Including VAT at 17.5%, a climbing frame costs £696.54. What is the price excluding VAT?

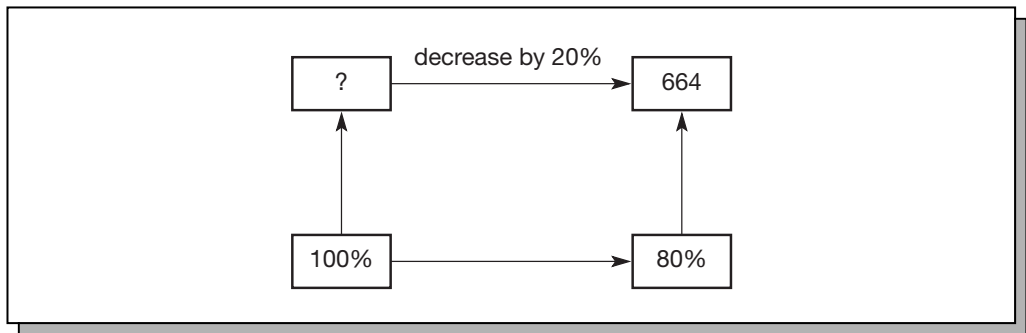
Answers to check-up 35

a) 830. b) £592.80.

Discussion and explanation of check-up 35

These are the trickiest of the three kinds of problems involving percentage increases and decreases: when we have to work backwards from the finishing value and the percentage increase or decrease to find the starting value.

The situation in example (a) can be represented as follows:



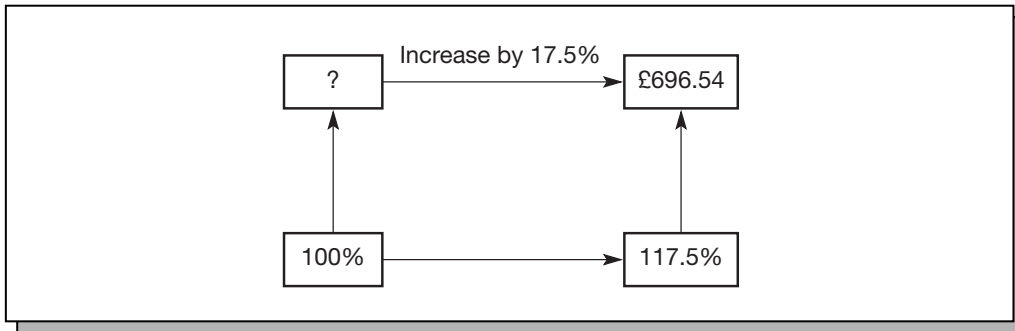
After the decrease by 20%, the finishing number of 664 is actually 80% of the starting number. To find the starting number we have to work back to 100% from 80% = 664. We can handle this informally like this:

$$80\% = 664, \text{ which means } 40\% = 332 \text{ (halving), so } 20\% = 166 \text{ and} \\ 10\% = 83. \text{ Hence } 100\% = 830$$

I would always start by trying to use informal calculations like this. It's a good way to build up your confidence with numbers.

But sometimes there is no obvious simple relationship between the numbers involved and we may have to resort to a calculator. This is the case in example (b). In this case we have to work back from the fact that 117.5% is £696.54 to find 100%. We can start by dividing by 117.5 to find what is 1% and then multiply by 100.

$$117.5\% = £696.54, \text{ so } 1\% = £696.54 \div 117.5, \text{ so } 100\% = \\ £696.54 \div 117.5 \quad 100 = £592.80$$



Summary of key ideas

- ◆ To find the starting value, given the finishing value after a percentage increase or decrease, write down what percentage the finishing value is of the starting value and work back to 100% (e.g. after an increase of 15% the finishing value will be 115%).
- ◆ Sometimes you can do this by informal methods (e.g. if 115% = £23, then 230% = £46, so 10% = £2 and 100% = £20).
- ◆ Other times you may need to use a calculator to find first 1% and then 100% (e.g. if 115% = 597, then 1% = $597 \div 115$ and 100% = $597 \div 115 \times 100$).

Further practice

- 35.1** (No calculator needed.) One year, a primary school achieves a 26% increase in the proportion of pupils getting level 4 or above in the Key Stage 2 handwriting assessment. If the proportion this year is 63% what was it the previous year?
- 35.2** (Use a calculator.) There is concern expressed one year when a decline of about 14.2% from the previous year is reported in the number of pupils entering for GCSE music in England. If the figure entering this year is reported as 37 900, what was the figure the previous year, to the nearest hundred?