PERCENTAGE INCREASE AND DECREASE

Finding the percentage

\[
\text{Percentage increase} = \frac{\text{Actual increase}}{\text{Original amount}} \times 100
\]

(or we could replace ‘increase’ by ‘decrease’)

Examples

1. The price of a coat has increased from £60 to £65. What is the percentage increase?

\[
\frac{5}{60} \times 100 = 8.3\%
\]

2. A piece of wood 3 metres long shrinks by 1 cm when it dries out. What is the percentage decrease in length?

\[
\frac{1\,\text{cm}}{300\,\text{cm}} \times 100 = 0.3\%
\]
Finding the Amount

The original amount is always 100%.

Examples

1. A CD player is reduced by 15% in a sale. The sale price is £42.50. What was the original price?

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original</td>
<td>$x$</td>
<td>100%</td>
</tr>
<tr>
<td>New</td>
<td>42.50</td>
<td>85%</td>
</tr>
</tbody>
</table>

\[
\frac{x}{42.50} = \frac{100}{85} \quad \times 42.50 \quad \times 42.50
\]

\[
x = 42.50 \times \frac{100}{85} = \frac{450}{115}
\]

2. A computer is advertised as costing £380 + VAT. What will the full price be if VAT is 15%?

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original</td>
<td>380</td>
<td>100%</td>
</tr>
<tr>
<td>New</td>
<td>$x$</td>
<td>115%</td>
</tr>
</tbody>
</table>
\[
\frac{x}{380} = \frac{115}{100}
\]

\[
x = 380 \times \frac{115}{100}
\]

\[
x = £437
\]

**Compound Percentages**

**Example**  A building society savings account adds 3% interest each year. Anna has £400 in her account. If she doesn’t pay any more money in, how much will she have in:

(a) 1 year  
(b) 2 years  
(c) 3 years  
(d) 10 years

\[
\begin{array}{c|c|c}
\text{Original} & \text{Amount} & \% \text{age} \\
400 & x & 103 \\
\end{array}
\]

\[
\frac{x}{400} = \frac{103}{100}
\]

\[
x = 400 \times \frac{103}{100}
\]

\[
x = £412
\]
(b) \[ 412 \times \frac{103}{100} = \£ 424.36 \]

(c) \[ 424.36 \times \frac{103}{100} = \£ 437.09 \]

(d) \[ 400 \times \frac{103}{100} \times \frac{103}{100} \times \frac{103}{100} \times \ldots \times \frac{103}{100} \]

\[ = 400 \times \left( \frac{103}{100} \right)^{10} \]

\[ = \£ 37.57 \]