Increasing and Decreasing by a Percentage

Starter

1. **(Review of last lesson)** Find 27% of £185.

Working: 27% of $185 = 0.27 \times 185 = £49.95$

2. House prices increase 4% over a year. How much is a house worth now that was valued at £175000 last year?

Working: ***Either:*** $100\% + 4\% = 104\%$
104% of $175000 = 1.04 \times 175000 = £182000$
Or: 4% of $175000 = 0.04 \times 175000 = £7000$
$175000 + 7000 = £182000$

3. Working in pairs, do the following calculations in as many ways as possible:
(a) increase £48 by 16% (b) decrease 64 kg by 12%

Working: (a) £55.68
Two-stage: find 16% of 48, then add to the original amount
Fractional multiplier: $100 + 16 = 116\%$ $\frac{116}{100} \times 48$
Decimal multiplier (calculator): $100 + 16 = 116\%$ 1.16×48

(b) 56.32kg
Two-stage: find 12% of 64, then subtract it from original amount
Fractional multiplier: $100 - 16 = 88\%$ $\frac{88}{100} \times 64$
Decimal multiplier (calculator): $100 - 16 = 88\%$ 0.88×64

E.g. 1 Increase 93 by 8%.

Working:

Add the percentage	OR	***Add the amount***
Add percentage to 100%		**Firstly, find** 8% of 93
$100\% + 8\% = 108\% \equiv 1.08$		$8\% \text{ of } 93 = 0.08 \times 93 = 7.44$
Now find $108\% \text{ of } 93$		**Then add this to the original amount**
$1.08 \times 93 = 100.44$		$93 + 7.44 = 100.44$

Since it is easier to add the percentage to 100%, the first method is better.

Decreasing by a percentage
Similarly, it is easier to subtract the percentage than subtract the amount.

E.g. 2 Decrease 156 by 12%.

Working:

Subtract the percentage	OR	***Subtract the amount***
Subtract percentage from 100%		**Firstly, find** 12% of 156
$100\% - 12\% = 88\% \equiv 0.88$		$12\% \text{ of } 156 = 0.12 \times 156 = 18.72$
Now find $0.88\% \text{ of } 156$		**Subtract this from original amount**
$0.88 \times 156 = 137.28$		$156 - 18.72 = 137.28$

E.g. 3 In a sale, a TV was reduced by 24%. If its old price was £330, how much is it now?

Working:
$$100\% - 24\% = 76\% \equiv 0.76$$
$$0.76 \times 330 = £250.80$$

E.g. 4 Sam bought a model airplane for £15 and then sold it for a 38% profit.
(a) How much did he sell it for?
(b) The next owner crashed the plane and then sold it for a 55% loss. How much did she sell it for?

Working: (a)
$$100\% + 38\% = 138\% \equiv 1.38$$
$$1.38 \times 15 = £20.70$$

(b)
$$100\% - 55\% = 45\% \equiv 0.45$$
$$0.45 \times 20.70 = £9.32$$

E.g. 5 A shop sells jumpers in a sale for 25% less. After a week the shop reduces prices by a further 5%. How much is a jumper that was originally priced at £26?

Working:
$$100\% - 25\% = 75\% \equiv 0.75$$
$$0.75 \times 26 = £19.50$$
$$100\% - 5\% = 95\% \equiv 0.95$$
$$0.95 \times 19.50 = £18.53$$

E.g. 6 A salesperson multiplied all the original prices by 0.85 to find the sale price.
(a) What is the percentage discount on the sale items?
(b) On the last day of the sale, she multiplied the sale prices by 0.75. What single number could she multiply the original prices by to get the last day sale price?
(c) By what percentage have the original prices been reduced.

Working: (a)
$$15\%$$

(b)
$$0.85 \times 0.75 = 0.6375$$

(c)
$$1 - 0.6375 = 0.3625 = 36.25\%$$

Video: Increasing/decreasing by a percentage
Video: Percentages - multipliers

Solutions to Starter and E.g.s

Exercise
p158 Ex 9.5 Qu 1-11

Textbook answers (only available during a lockdown)