WALT increasing and decreasing by given percentage
Success Criteria I know that increase means 100% gets increased by more percentage eg 20% more will be 120%

A shopkeeper may often need to increase or decrease the price of an item by a given percentage. This is easily done using a **multiplier**.

For example:
- if a price is increased by 20%, the final price is $100\% + 20\%$ or 120% of the original price
- if a price is decreased by 20%, the final price is $100\% - 20\%$ or 80% of the original price.

> The multiplier provides us with a **one-step** method for increasing or decreasing quantities.

Example 15

What multiplier corresponds to:
a a 40% increase   b a 15% decrease?

a multiplier $= (100 + 40)\% = 140\% = 1.4$

b multiplier $= (100 - 15)\% = 85\% = 0.85$

[**Note:** $\text{multiplier} = \dfrac{\textbf{new value}}{\textbf{old value}}$ In **Example 15**,   multiplier $= \dfrac{140\%}{100\%} = 1.4$]

EXERCISE 2C.1

1 Find the multiplier that corresponds to:

a a 20% increase   b a 20% decrease   c a 45% increase
d a 45% decrease   e an 8% decrease   f a 3% increase
g a 100% increase   h a 600% increase   i a 100% decrease

Example 16

For the following multipliers, state the percentage increase or decrease occurring:
a 1.15   b 0.88

a   1.15   b   0.88
  $= 1.15 \times 100\%$ $= 0.88 \times 100\%$
  $= 115\%$ $= 88\%$
  which is an increase over 100%   which is an decrease below 100%
  by 15%   of 12%

2 For the following multipliers, state the percentage increase or decrease occurring:

a 1.12   b 1.23   c 0.96   d 0.85
e 1.45   f 0.67   g 2.4   h 0.3

INCREASING AND DECREASING QUANTITIES

Example 17

a Increase $10 500 by 8%.   **b** Decrease $120 by 12%.

a new amount
$$= 108\% \text{ of } \$10\,500 \qquad \{\text{to increase by 8\%, multiply by 108\%}\}$$
$$= 1.08 \times \$10\,500$$
$$= \$11\,340$$

b new amount
$$= 88\% \text{ of } \$120 \qquad \{\text{to decrease by 12\%, multiply by 88\%}\}$$
$$= 0.88 \times \$120$$
$$= \$105.60$$

3 Calculate the following:
- **a** increase $50 by 5%
- **b** increase $68 by 15%
- **c** increase 60 kg by 12%
- **d** decrease $27 by 30%
- **e** decrease $780 by 20%
- **f** decrease 45 m by 10%

4
- **a** Jack was being paid a wage of $25 per hour. His employer agreed to increase his wage by 6%. What is Jack's new wage per hour?
- **b** At the school athletics day Henrietta increased her previous best discus throw of 10.5 m by 12%. How far did she throw the discus?
- **c** Manuel thought that his 3.5 m high hedge around his garden needed to be trimmed. If he reduced the height by 20%, how high would it be?
- **d** Tim's new diet enabled him to lose 15% of his weight in the first year. If he originally weighed 90 kg, how much did he weigh after one year?

Example 18

A house is bought for $156 000 and six months later is sold for $175 500. What is the percentage increase on the investment?

percentage change
$$= \frac{\text{change}}{\text{original}} \times 100\%$$

Method 1:

multiplier
$$= \frac{\text{new value}}{\text{old value}}$$
$$= \frac{175\,500}{156\,000}$$
$$= 1.125$$
$$= 112.5\%$$
$$\therefore \text{ a } 12.5\% \text{ increase occurred}$$

Method 2:

percentage increase
$$= \frac{\text{increase}}{\text{original}} \times 100\%$$
$$= \frac{19\,500}{156\,000} \times 100\%$$
$$= 12.5\%$$
$$\therefore \text{ a } 12.5\% \text{ increase occurred}$$