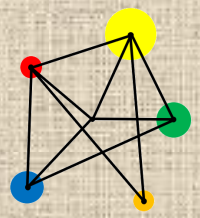
Percentage Increase & Decrease



Calculate Percentage Profit/loss

Calculate Percentage Increase/Decrease

Vocabulary

Percent
A fraction out of 100.

Review of Finding Percentages

Work out:

1. 50% of 40
2. 25% of 16
3. 75% of 320
4. 10% of 4000
5. 30% of 60
6. 15% of 20

Work out:

1. 10% of 55
2. 1% of 1900
3. 2% of 400
4. 99% of 6000
5. 110% of 40

Work out:

1. 200% of 55
2. $15\frac{1}{2}$ % of 55
3. 1.2% of 1.2
4. $33.\dot{3}$ % of £24

Solutions

Work out:

1. 50% of 40 = **20**
2. 25% of 16 = **4**
3. 75% of 320 = **240**
4. 10% of 4000 = **400**
5. 30% of 60 = **18**
6. 15% of 20 = **3**

Work out:

1. 10% of 55 = **5.5**
2. 1% of 1900 = **19**
3. 2% of 400 = **8**
4. 99% of 6000 = **5940**
5. 110% of 40 = **44**

Work out:

1. 200% of 55 = **110**
2. $15\frac{1}{2}$ % of 55 = **8.525**
3. 1.2% of 1.2 = **0.0144**
4. $33.\dot{3}$ % of £20 = **£8**

Examples

a) Increase £40 by 15%

b) Decrease $220 by 41%

Solutions

a) Increase £40 by 15%

10% of £40 = £4

5% of £40 = £2

15% of £40 = £6

£40 + £6 = **£46**

b) Decrease $220 by 41%

10% of $220 = $22

1% of $220 = $2.20

40% of $220 = $88

41% of $220 = $90.20

$220 - $90.20 = **$129.80**

Exercise

1. Increase £16 by 50%
2. Decrease $45 by 20%
3. Decrease 2kg by 10%
4. Increase 61m by 100%

1. Increase 2.5 by 20%
2. Decrease $\frac{4}{5}$ by 50%
3. Increase £200 by 20%

   Decrease the result by 20%

The sides of a square are increased by 50%.

By what percentage does the area of the square increase?

Solutions

1. Increase £16 by 50%
   = £24

2. Decrease $45 by 20%
   = $36

3. Decrease 2kg by 10%
   = 1.8kg

4. Increase 61m by 100%
   = 122m

1. Increase 2.5 by 20%
   = 3

2. Decrease $\frac{4}{5}$ by 50%
   = $\frac{2}{5}$

3. Increase £200 by 20%

   Decrease the result by 20%
   = £192

The sides of a square are increased by 50%.

By what percentage does the area of the square increase? **125%**

Multiplier Method - Example

Increase £84 by 32%

Solution

Increase £84 by 32%

84 x **1.32** = £110.88

You try …

Use the multiplier method to:

a) Increase £120 by 78%

b) Decrease 160kg by 24%

c) Increase 0.9843 by 120%

d) Decrease £400 by 2.5%

Solutions

Use the multiplier method to:

a) Increase £120 by 78%

£120 x 1.78 = £213.60

b) Decrease 160kg by 24%

160 x 0.76 = 121.6 kg

c) Increase 0.9843 by 120%

0.9843 x 2.2 = 2.16546

d) Decrease £400 by 2.5%

$400 x 0.975 = $390

Exercise

1. Increase 220 by 11%
2. Decrease 220 by 11%
3. Increase 200 by 4%
4. Decrease 15 by 3%
5. Increase 200 by 100%
6. Increase 200 by 12.5%

1. Increase 75 by $14\frac{1}{2}$ %
2. Decrease 1870 by 100%
3. Increase 0.1 by 0.1%
4. Decrease $\frac{12}{13}$ by $33\frac{1}{3}$ %

In a sale, the price of a TV is reduced by 15%.

After the sale, the reduced price of the TV is increased by 15%.

How does this price compare with the original price of the TV?

Solutions

1. Increase 220 by 11%
   = 244.2
2. Decrease 220 by 11%
   = 195.8
3. Increase 200 by 4%
   = 208
4. Decrease 15 by 3%
   = 14.55
5. Increase 200 by 100%
   = 400
6. Increase 200 by 12.5%
   = 225

1. Increase 75 by $14\frac{1}{2}$ %
   = 85.875
2. Decrease 1870 by 100%
   = 0
3. Increase 0.1 by 0.1%
   = 0.1001
4. Decrease $\frac{12}{13}$ by $33\frac{1}{3}$ %
   = $\frac{8}{13}$

In a sale, the price of a TV is reduced by 15%.

After the sale, the reduced price of the TV is increased by 15%.

How does this price compare with the original price of the TV?

2.25% less

Key Fact

$$\text{Percentage Change} = \frac{\text{Change}}{\text{Original Amount}} \times 100$$

Examples

The price of a television increased from £400 to £420.

Work out the percentage increase?

The amount of carbon in a compound decreases from 60g to 48g.

What is the percentage decrease of carbon in the compound?

Solutions

The price of a television increased from £400 to £420

Work out the percentage increase?

$$\text{Percentage Increase}$$

$$= \frac{\text{Increase}}{\text{Original Amount}} \times 100$$

$$= \frac{20}{400} \times 100$$

$$= 5\%$$

The amount of carbon in a compound decreases from 60g to 48g.

What is the percentage decrease of carbon in the compound?

$$\text{Percentage Decrease}$$

$$= \frac{\text{Decrease}}{\text{Original Amount}} \times 100$$

$$= \frac{12}{60} \times 100$$

$$= 20\%$$

Exercise

Work out the percentage increase or decrease.

1. From 40 to 60
2. From 100 to 90
3. From 200 to 400
4. From 80 to 100
5. From 100 to 80
6. From 100 to 101

Work out the percentage increase or decrease

1. From 300 to 200
2. From 5 to 5.51
3. From 2 to 10
4. From $2\frac{1}{2}$ to 3
5. From $\frac{1}{2}$ to $\frac{3}{8}$

A car has its price decreased by 20%.

A month later, the new price is decreased by 20%.

What is the total percentage decrease?

The population of a country increases by 10% each year.

What is the percentage increase in population after 10 years?

Solutions

Work out the percentage increase or decrease.

1. From 40 to 60
   Increase 50%
2. From 100 to 90
   Decrease 10%
3. From 200 to 400
   Increase 100%
4. From 80 to 100
   Increase 25%
5. From 100 to 80
   Decrease 20%
6. From 100 to 101
   Increase 1%

Work out the percentage increase or decrease

1. From 300 to 200
   Decrease $33\frac{1}{3}$ %
2. From 5 to 5.51
   Increase 10.2%
3. From 2 to 10
   Increase 400%
4. From $2\frac{1}{2}$ to 3
   Increase 20%
5. From $\frac{1}{2}$ to $\frac{3}{8}$
   Decrease 25%

A car has its price decreased by 20%.

A month later, the new price is decreased by 20%.

What is the total percentage decrease?

Decrease 36%

The population of a country increases by 10% each year.

What is the percentage increase in population after 10 years?

Increase 159%

Further questions

1. Daisy noticed that her phone bill had increased from £24 to £27 per month.
   Work out the percentage increase.

2. The population of a town decreased from 60 000 to 58 500.
   Work out the percentage decrease.

3. Isabella buys a box of 24 books for £50.
   She sells all of the books for £3 each.
   Work out Isabella's' percentage profit.

4. A supermarket offers a £10 discount to customers who spend £50 shopping online.
   Olivia spends £52.63.
   Find the percentage saving made by Olivia.

5. In a year, the value of a house increased from £256 000 to £264 000.
   Find the percentage increase in the value of the house.
   Use this result to estimate the value of the house after another year.

6. A cyclist completes a ride in 5 hours.

   Six months later they complete the same ride in 4 hours 45 minutes.

   Work out the percentage reduction in their time.

Solutions

1. Daisy noticed that her phone bill had increased from £24 to £27 per month.
   Work out the percentage increase. **12.5 %**

2. The population of a town decreased from 60 000 to 58 500.
   Work out the percentage decrease. **2.5 %**

3. Isabella buys a box of 24 books for £50.
   She sells all of the books for £3 each.
   Work out Isabella's' percentage profit. **44 %**

4. A supermarket offers a £10 discount to customers who spend £50 shopping online.
   Olivia spends £52.63.
   Find the percentage saving made by Olivia.
   19 %

5. In a year, the value of a house increased from £256 000 to £264 000.
   Find the percentage increase in the value of the house. **3.125 %**
   Use this result to estimate the value of the house after another year. **£ 272 250**

6. A cyclist completes a ride in 5 hours.

   Six months later they complete the same ride in 4 hours 45 minutes.

   Work out the percentage reduction in their time. **5 %**

Extension

A quantity is decreased by 20%.

What percentage increase will restore the quantity to its original value?

What if the quantity had been decreased by:

a) 60 %

b) 23 %

c) x %

Solutions

A quantity is decreased by 20%. **25 %**

What percentage increase will restore the quantity to its original value?

What if the quantity had been decreased by:

a) 60 %

250 %

b) 23 %

29.87 %
(2 d.p.)

c) x %

$$\frac{100}{100 - x}$$

Exam Style Question

Josh buys 4kg of almonds to sell.
He pays £32 for the almonds.

Josh puts all the sweets into packets.
He puts 200g of almonds into each packet.
He sells each packet of almonds for £2.20.

Josh sells all the bags of almonds.

Work out his percentage profit.

Solution

Josh buys 4kg of almonds to sell.
He pays £32 for the almonds.

Josh puts all the sweets into packets.
He puts 200g of almonds into each packet.
He sells each packet of almonds for £2.20.

Josh sells all the bags of almonds.

Work out his percentage profit.

£32 ÷ 4 = £8 per kilo of almonds

£8 ÷ 5 = £1.60 per packet of almonds

Profit = £0.60 per packet of almonds

$$\text{\% Profit} = \frac{0.60}{1.60} \times 100$$

= 37.5%

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