

PERCENTAGE CHANGE

Task 1

1) A number increases from 40 to 52. What is the percentage increase?

$$\begin{aligned} & \frac{52 - 40}{40} \times 100 \\ &= \frac{12}{40} \times 100 \\ &= 30\% \end{aligned}$$

2) A number decreases from 90 to 72. What is the percentage decrease?

$$\begin{aligned} & \frac{90 - 72}{90} \times 100 \\ &= \frac{18}{90} \times 100 \\ &= 20\% \end{aligned}$$

3) A number increases from 25 to 45. Work out the percentage increase.

$$\begin{aligned} & \frac{45 - 25}{25} \times 100 \\ &= \frac{20}{25} \times 100 \\ &= 80\% \end{aligned}$$

4) A number decreases from 120 to 84. Work out the percentage decrease.

$$\begin{aligned} & \frac{120 - 84}{120} \times 100 \\ &= \frac{36}{120} \times 100 \\ &= 30\% \end{aligned}$$

5) Work out the percentage change of a number that increased from 16 to 20.

$$\begin{aligned} & \frac{20 - 16}{16} \times 100 \\ &= \frac{4}{16} \times 100 \\ &= 25\% \end{aligned}$$

6) Work out the percentage change of a number that decreased from 74 to 60. Give your answer to 2 decimal places.

$$\begin{aligned} & \frac{74 - 60}{74} \times 100 \\ &= \frac{14}{74} \times 100 \\ &= 18.9189\ldots\% \end{aligned}$$

$$= 18.92\% (2 \text{ dp})$$

7) A number decreases from 180 to 140. Express the percentage decrease to 3 significant figures.

$$\begin{aligned} & \frac{180 - 140}{180} \times 100 \\ &= \frac{40}{180} \times 100 \\ &= 22.222\ldots\% \end{aligned}$$

8) Work out the percentage decrease from £42.50 to £37. Give your answer to 2 decimal places.

$$\begin{aligned} & \frac{42.50 - 37}{42.50} \times 100 \\ &= \frac{5.5}{42.50} \times 100 \\ &= 12.941\ldots\% \end{aligned}$$

$$= 12.94\% (2 \text{ dp})$$

Task 2

9) The price of a Nintendo console increased from £250 to £300. Work out the percentage increase in the price of the console.

$$\begin{aligned} & \frac{300 - 250}{250} \times 100 \\ &= \frac{50}{250} \times 100 \\ &= 20\% \end{aligned}$$

10) A tablet was on sale for £270, down from £300. What percentage discount was applied to the tablet?

$$\frac{300 - 270}{300} \times 100$$

$$= \frac{30}{300} \times 100$$

$$= 10\%$$

11) The price of a football match ticket dropped from £50 to £48. What is the percentage decrease in the price of the ticket?

$$\frac{50 - 48}{50} \times 100$$

$$= \frac{2}{50} \times 100$$

$$= 4\%$$

12) A treadmill that cost £1,500 went on sale for £960. What is the percentage decrease in the price of the treadmill?

$$\frac{1500 - 960}{1500} \times 100$$

$$= \frac{540}{1500} \times 100$$

$$= 36\%$$

13) The price of a cinema ticket decreased from £12 to £10.20. Work out the percentage change in the cost of the ticket.

$$\frac{12 - 10.20}{12} \times 100$$

$$= \frac{1.80}{12} \times 100$$

$$= 15\%$$

14) A laptop's value decreased from £1,200 to £936. Calculate the percentage decrease in the value of the laptop.

$$\frac{1200 - 936}{1200} \times 100$$

$$= \frac{264}{1200} \times 100$$

$$= 22\%$$

15) A train fare increased from £18.60 to £23.25. Work out the percentage increase of the train fare.

$$\frac{23.25 - 18.60}{18.60} \times 100$$

$$= \frac{4.65}{18.60} \times 100$$

$$= 25\%$$

16) A mobile phone value depreciates from £800 to £639.20. What is the percentage decrease in the value of the phone?

$$\frac{800 - 639.20}{800} \times 100$$

$$= \frac{160.80}{800} \times 100$$

$$= 20.1\%$$

17) The price of a jumper increased from £27 to £35.84. Calculate the percentage increase. Give your answer to 2 decimal places.

$$\frac{35.84 - 27}{27} \times 100$$

$$= \frac{8.84}{27} \times 100$$

$$= 32.7407 \dots \%$$

$$= 32.74\% (2 \text{ dp})$$

18) A cyclist's top speed went from 23 km/h to 27.5 km/h after training. What is the percentage increase in their speed? Give your answer to 1 decimal place.

$$\frac{27.5 - 23}{23} \times 100$$

$$= \frac{4.5}{23} \times 100$$

$$= 19.5652 \dots \%$$

$$= 19.6\% (1 \text{ dp})$$

Task 3

19) Sue bought a dress for £80 and re-sold it for £65. What is Sue's percentage loss on the sale of the dress?

$$\frac{80 - 65}{80} \times 100$$

$$= \frac{15}{80} \times 100$$

$$= 18.75\%$$

20) A company buys software for £8,000 and later sells the license for £6,000. What is the percentage loss on the sale of the software?

$$\frac{8000 - 6000}{8000} \times 100$$

$$= \frac{2000}{8000} \times 100$$

$$= 25\%$$

21) A trader buys a painting for £120,000 and resells it for £180,000. What is their percentage profit?

$$\frac{180000 - 120000}{120000} \times 100$$

$$= \frac{60000}{120000} \times 100$$

$$= 50\%$$

22) Ariella purchased a home for £240,000. Five years later, she sells the home for £315,000. Calculate Ariella's percentage profit on the sale of the home.

$$\frac{315000 - 240000}{240000} \times 100$$

$$= \frac{75000}{240000} \times 100$$

$$= 31.25\%$$

23) A baker spends £18 to make 25 cupcakes and sells them for £1 each. Calculate the baker's percentage profit to the nearest percentage.

$$\frac{25 - 18}{18} \times 100$$

$$= \frac{7}{18} \times 100$$

$$= 38.888\ldots\%$$

$$= 39\%$$

24) A store buys 12 mugs for £36 and sells them for £4 each. Calculate the store's percentage profit. Give your answer to 1 decimal place.

$$12 \times £4 = £48$$

$$\frac{48 - 36}{36} \times 100$$

$$= \frac{12}{36} \times 100$$

$$= 33.333\ldots\%$$

$$= 33.3\% (1\ dp)$$

25) An artist spends £120 on materials and £80 on framing. She sells the artwork for £275. Calculate the artist's percentage profit.

$$£120 + £80 = £200$$

$$\frac{275 - 200}{200} \times 100$$

$$= \frac{75}{200} \times 100$$

$$= 37.5\%$$

26) A small café buys 100 bagels for £45. The bagels are resold in packs of 5 for £3.50 each. Calculate the percentage profit on the sale of the bagels. Give your answer to 3 significant figures.

$$100 \div 5 = 20 \text{ packs}$$

$$20 \times £3.50 = £70$$

$$\frac{70 - 45}{45} \times 100$$

$$= \frac{25}{45} \times 100$$

$$= 55.555\ldots\%$$

$$= 55.6\% (3\ sf)$$

Challenge

27) A developer buys land for £150,000 and spends £210,000 building a house. They sell the house for £450,000 but pay 8% of the sale price in fees. What is the percentage profit overall?

$$\text{Total cost} = £150000 + 210000 = £360000$$

$$\text{Total revenue} = 450000 \times 0.92 = £414000$$

$$\begin{aligned}\text{Percentage profit} &= \frac{414000 - 360000}{360000} \times 100 \\ &= \frac{54000}{360000} \times 100 \\ &= 15\%\end{aligned}$$

28) Emma buys a batch of 200 notebooks for £320. She bundles them into packs of 10 and sells each pack for £20. After sales tax of 10% on total revenue, what is her percentage profit?

$$\text{Number of packs} = 200 \div 10 = 20$$

$$\text{Revenue} = £20 \times 20 = £400$$

$$\text{Tax} = 10\% \text{ of } £400 = £40$$

$$\text{Net revenue} = £400 - £40 = £360$$

$$\begin{aligned}\text{Percentage profit} &= \frac{360 - 320}{320} \times 100 \\ &= \frac{40}{320} \times 100 \\ &= 12.5\%\end{aligned}$$

29) A retailer buys 150 pairs of shoes at £18 per pair. 20 pairs are damaged and cannot be sold. The remaining shoes are sold at £30 per pair. Calculate the overall percentage profit. Give your answer to 1 decimal place.

$$\text{Cost} = 150 \times £18 = £2700$$

$$\text{Revenue} = 130 \times £30 = £3900$$

$$\begin{aligned}\text{Percentage Profit} &= \frac{3900 - 2700}{2700} \times 100 \\ &= \frac{1200}{2700} \times 100 \\ &= 44.444\dots\% \\ &= 44.4\% \text{ (1 dp)}\end{aligned}$$

30) A restaurant buys 120 kg of flour at £0.80/kg. 15% of the flour is spoiled. The rest of the flour is used to bake and sell bread loaves at £2.50 each using 0.6 kg per loaf. Calculate the percentage profit on the bread loaves. Give your answer to 1 decimal place.

$$\text{Cost} = 120 \times £0.80 = £96$$

$$\text{Usable flour} = 120 \times 0.85 = 102 \text{ kg}$$

$$\text{Loaves} = 102 \div 0.6 = 170$$

$$\text{Revenue} = 170 \times £2.50 = £425$$

$$\begin{aligned}\text{Percentage Profit} &= \frac{425 - 96}{96} \times 100 \\ &= \frac{329}{96} \times 100 \\ &= 342.708\dots\% \\ &= 342.7\% \text{ (1 dp)}\end{aligned}$$