# Percentage

1. The price of each sandwich in a cafe was increased by 4%. Chris bought a sandwich after the price increase for $3.64

104%

Calculate the increase in the price of the sandwich Chris bought.

$$104\% = 3.64$$
$$1\% = 0.035$$
$$100\% = 3.5$$
$$\text{increase} = 3.64 - 3.5$$
$$= \$0.14$$

2. Liam started a new job on a salary of $45 500

At the end of 1 year he is given a pay increase of 5.5%
At the end of each subsequent year he is given a pay increase of 1.25%

Calculate, to the nearest $, Liam's salary at the end of 3 years after he started the job.

1st year

$\frac{5.5}{100}$ × 45 500 = 2502.50

total = 45 500 + 2502.50
= $48002.5

2nd

$\frac{1.25}{100}$ × 48002.5 = 600.03125

total = 48002.5 + 600.03
= $48602.53

3rd  $\frac{1.25}{100}$ × 48602.53 = 607.53

total = 48602.53 + 607.53
= $49210.06
≈ $49210

3. Tahina travels to work by bus.
Her total bus fare last week was £12.50
This week her total bus fare has increased by 8%

*100% = £12.50*
*1% = 0.125*
*108% = £13.5*

(a) Calculate her total bus fare for this week. *= £13.5*

Tahina works in a kiosk selling hot drinks.
She sells coffee, tea and hot chocolate.

$$\frac{378}{9} = 42$$

*C : T : H*
*5 : 3 : 1*
*210 : 126 : 42*

On Monday, Tahina sold a total of 378 hot drinks.
The numbers of cups of coffee, tea and hot chocolate she sold were in the ratios $5:3:1$

(b) Calculate the difference between the number of cups of coffee and the number of cups of hot chocolate that Tahina sold on Monday.

*210 - 42 = 168*

On Monday, $\frac{3}{14}$ of the number of cups of coffee Tahina sold were sold without milk.

(c) Calculate the number of cups of coffee that Tahina sold without milk.

$$\frac{3}{14} \times 210 = 45 \text{ cups}$$

The cost of each cup of coffee that Tahina sells from the kiosk is £2.80

Tahina went on holiday to the USA and to Canada.
She bought a cup of coffee in the USA for $3.20

*Kiosk = 2.80 × 1.24*
*= $3.472*

Using an exchange rate of £1 = $1.24

(d) compare the cost of each cup of coffee sold from Tahina's kiosk with the cost of the cup of coffee that Tahina bought in the USA.

*diff = 3.472 - 3.2*
*= $0.272*

In Canada, Tahina bought a sandwich for 5.28 Canadian dollars.
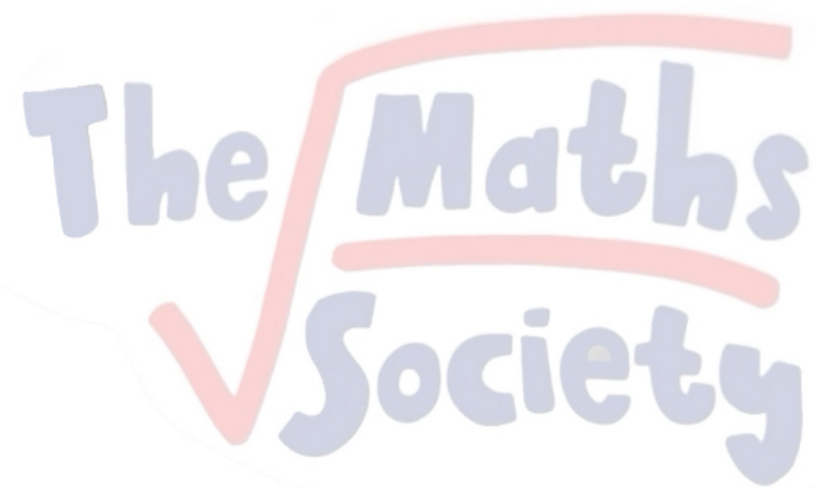
Using exchange rates of

£1 = $1.24     and     1 Canadian dollar = $0.75

(e) convert 5.28 Canadian dollars to pounds (£)
Give your answer to 2 decimal places.

*5.28 Cad = $3.96*

$$\frac{3.96}{1.24} = £3.19$$

4.  The manufacturer's price for a *Jinko* car is $x

Ben was given a 7% discount on the manufacturer's price when he bought a *Jinko*.
Ben paid $23 622 when he bought his *Jinko*.

(a) Calculate the value of $x$.

$93\% = \$23\ 622$
$1\% = 254.4301$
$100\% = \$25443$

$x = 25\ 443$

After a year Ben sold his *Jinko* for $19 880

(b) Calculate the percentage loss, to 3 significant figures, on the price Ben paid for his *Jinko*.

$$\frac{23\ 622 - 19\ 880}{23\ 622} \times 100 = 15.9\%$$

During the year that Ben owned the *Jinko*, he travelled $d$ km in the car.
The average fuel consumption of the car was 10 km per litre.
The average cost of the fuel he used was $1.40 per litre.
Other costs for the car in the year came to $938

The cost per km, including the loss in value, of his *Jinko* to Ben during the year that he owned the car was $0.40

(c) Calculate the value of $d$.

distance $= d$

$$\text{cost} = \frac{d}{10} \times 1.40$$

$$\text{total cost} = \frac{1.4d}{10} + 938 + (23\ 622 - 19880)$$

$$= \frac{1.4d}{10} + 4720$$

$$0.4d = 0.14d + 4720$$
$$0.4d - 0.14d = 4720$$
$$0.26d = 4720$$
$$d = 18\ 153.8\ \text{km}$$

5. Some students at a school are asked the following question

"Did you walk to school today?"

52% of the students asked are in Year 7 and the rest of the students asked are in Year 8.
20% of the students asked are Year 8 students who walked to school.
42% of the students asked did not walk to school.

Find as a percentage of all students asked, those who are in Year 7 and did not walk to school.

$\boxed{7}$

52% stu

$\boxed{8}$

48% stu
/
20% walked  —  28% (did not)

total didn't walk = 42%

Year (7) = 42% - 28%
(did not)   = 14%

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6. Indre buys 1000 Hungarian dolls in Budapest to sell in Austria.
   She pays in Hungarian forints.

   Indre pays 1900 forints for each small doll she buys.
   She pays 10 300 forints for each large doll she buys.

   The number of small dolls that Indre buys is 4 times the number of large dolls that she buys.

   (a) Calculate the total cost, in forints, of the 1000 dolls that Indre buys.

   small = 800 × 1900    large = 200 × 10300    total = 1520 000 + 2060 000
         = 1520 000              = 2060 000              = 3 580 000 forints

   Indre has to pay 100 euros to transport the dolls from Hungary so that she can sell them in Austria.

   Initially the price of each small doll that Indre sells is 8 euros and the price of each large doll that Indre sells is 40 euros.

   $(S) = \frac{80}{100} \times 800 = 640 \times 8 = 5120$

   She sells 80% of the small dolls and $\frac{7}{8}$ of the large dolls at these prices. $(l) = \frac{7}{8} \times 200 = 175 \times 40 = 7000$

   Indre then reduces the price of each of her remaining dolls by 40%
   She sells all of the remaining dolls.

   $(s) \frac{40}{100} \times 8 = 3.2 \quad 8 - 3.2 = 4.8$ —

   $(l) \frac{40}{100} \times 40 = 16 \quad 40 - 16 = 24$

   When Indre bought the dolls, the exchange rate was 1 euro = 327.6 forints.

   160 × 4.8 = 768 euros  ⎫
   25 × 24 = 600 euros     ⎬
   total = 1368 euros     ⎭

   (b) Calculate the total profit, in euros to 2 decimal places, that Indre made by selling all 1000 dolls.

   original: $\frac{3\,580\,000}{327.6}$ = 10 927.96 euros

   all total = 5120 + 7000 + 1368

   (c) (i) Calculate the percentage profit, to 3 significant figures, that Indre made.

   = 13 488 euros.

   (ii) State how the percentage profit in part (c) (i) would be affected if the total profit calculated in part (b) had been in forints.

(b) profit = 13 488 − (10 927.96 + 100)

          = 2460. 04 euros

(c)  $\frac{2460.04}{11027.96} \times 100 = 22.5\%$.

ii) the percentage profit would remain the same.

7.  Each year the students at a college organise a music concert.

In 2017, the total cost of organising the concert was $675
In 2018, the total cost of organising the concert was 20% more than the total cost in 2017

(a) Calculate the total cost of organising the concert in 2018

$$\frac{20}{100} \times 675 = 135 \qquad \text{total} = 675 + 135 = \$810$$

The tickets sold each year were either adult tickets or student tickets.

In 2019, the total number of tickets sold was 385
In 2019, the number of adult tickets sold and the number of student tickets sold were in the ratio

$$\frac{385}{35} = 11$$

number of adult tickets : number of student tickets = 19 : 16

(b) Calculate the number of adult tickets sold in 2019 — 209 : 176

adult = 209

In 2019, the price of each adult ticket sold was $8.50 and the price of each student ticket sold was $4.50

(c) Calculate the total amount of money, in $, received for all the tickets sold in 2019

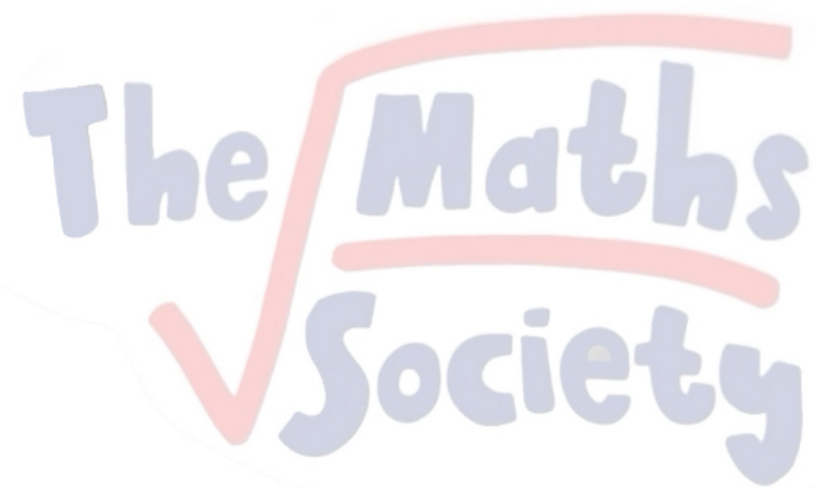$$\text{total} = (209 \times 8.5) + (176 \times 4.5)$$
$$= \$2568 \cdot 50$$

In 2019, the total cost of organising the concert was double the total cost in 2017

(d) Calculate the percentage profit made in 2019
    Give your answer to 1 decimal place.

675 × 2 = 1350

$$\frac{2568 \cdot 5 - 1350}{1350} \times 100 = 90.3\%$$

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8. A shopkeeper sells a radio for $27
For this selling price, the shopkeeper makes a profit of 8%

Calculate the selling price of the radio so that the shopkeeper would make a profit of 35%

$$108\% = 27$$
$$1\% = 0.25$$
$$135\% = 0.25 \times 135$$
$$= \$33.25$$

9. Garcia makes bags from fabric.

Garcia buys a length of fabric that is 40 metres long.
The cost of the fabric is $5 per metre and he uses all the fabric to make bags.
Each bag that he makes uses a length of 80 cm of the fabric.

Garcia sells $\frac{3}{5}$ of the bags he made for $14 each bag.

He then reduces the selling price of each bag by 15% and sells the rest of the bags he made.

Calculate the percentage profit that Garcia makes by selling all the bags he made.

$\text{cost} = 40 \times 5$
$= \$200$

each bag $= 0.8\,m$
$\frac{40}{0.8} = 50$ bags
$1m = 5$
$0.8 = \$4$

$\frac{3}{5} \times 50 = 30$
$30 \times 14 = \$420$

$\frac{15}{100} \times 14 = \$2.1$
$14 - 2.1 = \$11.9$

$20$ bags $= 20 \times 11.9$
$= \$238$

original $= \$200$

earned $= 420 + 238$
$= \$658$

% profit $= \dfrac{658 - 200}{200} \times 100$
$= 229\%$

10. At the end of a college course, Pierre has to take five examinations.
Each examination is marked out of 100
Pierre has to get an overall mean mark of 80% or more for the five examinations in order to pass the course.

After taking the first four examinations, Pierre's mean mark for these four examinations is 78%

Calculate the lowest mark Pierre can get in his fifth examination so that he passes the course.

mean = 78%

total = 78 × 4 = 312

$$\frac{312 + x}{5} = 80$$

$$312 + x = 400$$

$$x = 88$$

lowest mark = at least 88%

11. The production costs of building a *Kimo* boat are

$L for labour
$M for materials
$H for overheads

In 2020, the total of the production costs for a *Kimo* boat was $120 000 where

$$\frac{120\ 000}{10} = 12\ 000$$

$$L:M:H = 5:3:2$$
$$60\ 000 : 36\ 000 : 24\ 000$$

(a) Calculate the value of *H* in 2020

$H = \$24\ 000$

The production costs were different in 2021 from what they were in 2020

The labour costs had increased by 10%    $\frac{110}{100} \times 60\ 000 = 66\ 000$
The cost of materials had increased by 5%    $\frac{105}{100} \times 36\ 000 = 37\ 800$
The overheads had decreased by 4%    $\frac{96}{100} \times 24\ 000 = 24\ 960$

(b) Calculate the percentage increase, from 2020 to 2021, in the total of the production costs of building a *Kimo* boat.    total = $128 760

$$\% \text{ inc} = \frac{128\ 760 - 120\ 000}{120\ 000} \times 100 = 7.3\%$$

Gordon bought a *Kimo* boat and sold it a year later for $360 000, making a loss of 25% on the price for which he bought the boat.

$75\% = 360\ 000$
$1\% = 4800$
$100\% = 480\ 000$

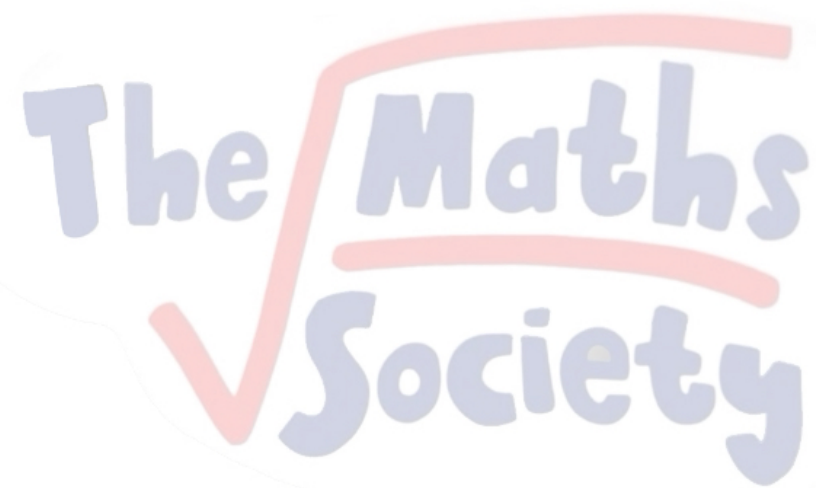(c) Calculate the price for which Gordon bought the boat.
$460\ 000

Gordon sold the boat to a friend living in Hungary. Gordon's friend paid Gordon the $360 000 in Hungarian forints.

Using exchange rates of

£1 = $1.35    £1 = 388.50 Hungarian forints

(d) change $360 000 to Hungarian forints.

$$\frac{360\ 000}{1.35} = £\frac{800,000}{3}$$

$$\text{forints} = \frac{800\ 000}{3} \times 388.5$$

$$= 103,600,000 \text{ forints}$$

12. There are 480 people in an airport departure lounge.

30% of these people are catching a plane to Dubai. $\frac{30}{100} \times 480 = 144$

(a) Show that 336 of these people are **not** catching a plane to Dubai.

480 − 144 = 366 (not catching to Dubai)

The people in the airport lounge who are not catching a plane to Dubai are catching a plane to Sweden or a plane to Greece or a plane to Brazil.

Of these 336 people

$\frac{336}{21} = 16$

the number catching a plane to Sweden is $s$
the number catching a plane to Greece is $g$
the number catching a plane to Brazil is $b$ where

$$s : g : b = 6 : 7 : 8$$

(b) Calculate the value of $s$

$s = 96$

Pablo went by plane from Canada to Brazil in February 2020 and in February 2021

In February 2020, the cost of his ticket was $680
In February 2021, the cost of his ticket was $730

(c) Calculate the percentage increase, to one decimal place, in the cost of the ticket from February 2020 to February 2021

% inc = $\frac{730 - 680}{680} \times 100 = 7.4\%$

Pablo bought a ticket to go by plane to Sweden in June 2021
The cost of his ticket was $468

The cost of this ticket was 4% greater than the cost of his ticket the last time he went by plane to Sweden, which was in December 2020

(d) Calculate the cost of Pablo's ticket to Sweden in December 2020

104% = 468      100% = $450
1% = 4.5

At the end of his trip, Pablo had 320 Swedish krona left.
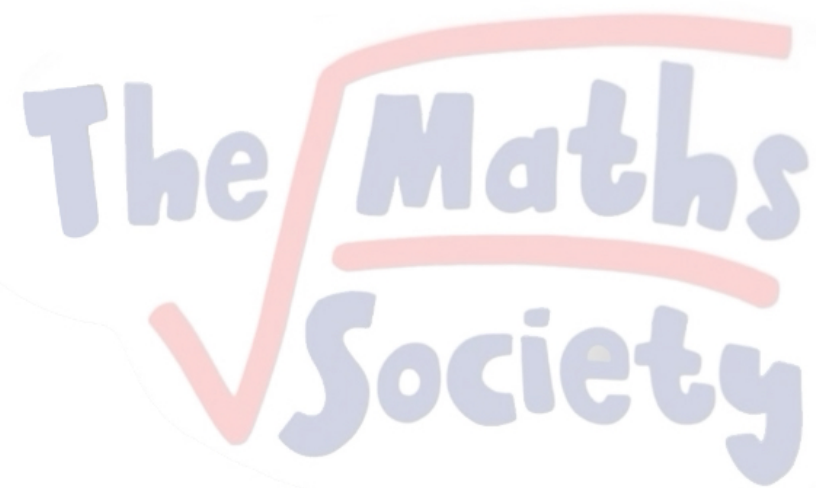He changed the 320 Swedish krona into Canadian dollars.

Using the following exchange rates,

1 Canadian dollar = 0.57 euros          1 Swedish krona = 0.094 euros

(e) calculate the number, to 2 decimal places, of Canadian dollars that Pablo should have received.

320 × 0.094 = 30.08 euros
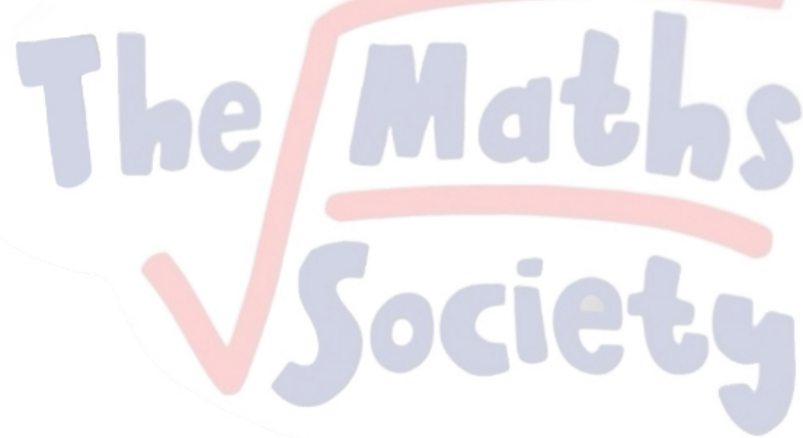
$\frac{30.08}{0.57} = 52.77$ cad

13. Patrick sells a painting for 557.75 euros.
He makes a profit of 15% on the price he paid for the painting.

Calculate the price Patrick paid for the painting.

$$115\% = 557.75$$
$$1\% = 4.85$$
$$100\% = 485 \text{ euros.}$$

14. The price of a holiday is reduced by 4% in a sale.
Haniya pays $600 of the sale price when she books the holiday.
She pays the remainder of the sale price in 4 equal monthly payments of $180

Calculate the price of the holiday before the sale.

$$4 \text{ mnths} = 4 \times 180$$
$$= \$720$$

$$\text{total} = \$720 + \$600$$
$$= \$1320$$

$$96\% = 1320$$
$$1\% = 13.75$$
$$100\% = 1375$$

$$\text{original price} = \$1375$$

15. Rory buys and sells jewellery.

Rory buys a necklace for $180
He sells the necklace for $230

$$\frac{230 - 180}{180} \times 100 = 27.7\%$$

(a) Calculate, to 3 significant figures, Rory's percentage profit.

27.7%.

Rory sells a bracelet for $203
This price represents a 16% profit on his cost price.

(b) Calculate the cost price of the bracelet.

116% = 203          100% = $175
1% = 1.75

Rory travelled by plane from New York to Dubai to buy some jewellery.

The total flight time for the journey was 12 hours 48 minutes.
The average speed for the journey was 860 km/h

(c) Calculate the total distance, in kilometres, travelled by the plane.

d = s × t
= 860 × 12.8 = 11 008 KM

Rory bought some earrings for a total cost of 91 750 dirhams.

Using the exchange rate,

| 1 dollar = 3.67 dirhams |

(d) calculate the total cost of the earrings in dollars.

$$\frac{91\ 750}{3.67} = \$25\ 000.$$