Percentages, Fractions & Decimals

When a quantity is divided into 100 “bits” each bit is called “1 percent”.

\[ 21\% = \frac{21}{100} = 0.21 \]

Exercise 1(B)

1. Write each percentage as a fraction and as a decimal:
   a) 50%  
   b) 25%  
   c) 75%  
   d) 20%  
   e) 10%

2. Write the following percentages as fractions:
   a) \(\frac{3}{3}\) %  
   b) \(\frac{6}{6}\) %  
   c) 40%  
   d) 60%  
   e) 80%

3. Write each percentage as a fraction and as a decimal:
   a) 67%  
   b) 29%  
   c) 57%  
   d) 61%  
   e) 37%
   f) 91%  
   g) 41%  
   h) 11%  
   i) 1%  
   j) 7%

4. Write each fraction as a percentage and as a decimal:
   a) \(\frac{33}{100}\)  
   b) \(\frac{83}{100}\)  
   c) \(\frac{3}{100}\)  
   d) \(\frac{17}{100}\)
   e) \(\frac{31}{100}\)  
   f) \(\frac{71}{100}\)  
   g) \(\frac{9}{100}\)  
   h) \(\frac{53}{100}\)

5. Write each decimal as a fraction and as a percentage:
   a) 0.63  
   b) 0.79  
   c) 0.27  
   d) 0.19
   e) 0.43  
   f) 0.89  
   g) 0.51  
   h) 0.01
6 A survey found that 45 out of 100 cars have alarms fitted. What percentage a) have alarms fitted b) don’t have alarms fitted?

7 67 people out of 100 said that they were holidaying in Scotland this year. What percentage are a) holidaying in Scotland b) holidaying abroad?

8 A survey found that only 34 out of 100 people eat breakfast in the morning. What percentage a) eat breakfast b) don’t eat breakfast?

Exercise 1(C)

1 Write the following fractions as percentages and decimals:

a) \( \frac{7}{50} \)  
b) \( \frac{3}{50} \)  
c) \( \frac{12}{25} \)  
d) \( \frac{7}{20} \)  
e) \( \frac{13}{20} \)  
f) \( \frac{7}{10} \)  
g) \( \frac{3}{10} \)  
h) \( \frac{9}{10} \)  
i) \( \frac{16}{40} \)  
j) \( \frac{34}{40} \)  
k) \( \frac{12}{80} \)  
l) \( \frac{36}{90} \)  
m) \( \frac{7}{70} \)  
n) \( \frac{12}{75} \)  
o) \( \frac{9}{75} \)  

Percentages as Fractions in Simplest Form

Exercise 2(B)

1 Write each percentage as a fraction in its simplest form:

a) 40%  
b) 20%  
c) 90%  
d) 4%  
e) 12%  
f) 16%  
g) 80%  
h) 30%  
i) 35%  
j) 55%  
k) 22%  
l) 95%  
m) 28%  
n) 36%  
o) 48%  

2 The label below shows the nutritional content from a tub of coleslaw. Change the percentage of each nutritional element to a fraction in its simplest form.

**COLESLAW**

- Total Fat: 24%
- Saturated Fat: 15%
- Cholesterol: 2%
- Sodium: 8%
Exercise 2(C)

1 Write each percentage as a fraction in its simplest form:
   a) 18%  b) 42%  c) 34%  d) 46%  e) 58%
   f) 68%  g) 72%  h) 76%  i) 6%  j) 56%
   k) 96%  l) 14%  m) 32%  n) 92%  o) 52%

2 Jane scored 68% in her maths test whilst Alice scored 15 out of 25. Who had the better result?

3 Ed scored 19 out of 25 in his English test and 14 out of 20 in his Maths test. Which subject did he do better in and by what percentage?

4 Shameela and Ben had both been told by their doctor that they should lose weight. Shameela weighed 112 kg and Ben weighed 82 kg.
   After two months of healthy eating, Shameela had lost 6 kg and Ben had lost 6% of his body weight.
   Shameela claimed to have lost more weight but Ben said that he had lost the higher percentage of her body weight. Was he right?

NON CALCULATOR PERCENTAGES

Exercise 3(A)

1 Work out:
   a) 50% of £84  b) 25% of £1000  c) 20% of £80
   d) 10% of £40  e) 20% of £6400  f) 33 \( \frac{1}{3} \) % of £81
   g) 50% of £9  h) 10% of £52  i) 10% of £63
   j) 75% of £48  k) 75% of £92  l) 66 \( \frac{2}{3} \) % of £45
   m) 33 \( \frac{1}{3} \) % of £7.20  n) 66 \( \frac{2}{3} \) % of £153.60  o) 75% of £61
   p) 10% of £15.50  q) 20% of £13.20  r) 10% of 20p

2 A turtle laid 132 eggs. 50% of them were eaten by birds. How many were eaten by birds?
3 20% of the pupils in a school are left handed. If there are 1100 pupils, how many of them are left handed?

4 25% of the items sold at a car boot sale were CDs. How many CDs were sold if there were 5400 items?

5 In Glasgow in 2009, it was sunny for 20% of the time. If there are 365 days in a year, how many days was it sunny for?

Exercise 3(B)

1 Work out:
   a) 50% of £3·20  
   b) 25% of £852  
   c) 20% of £8
   d) 10% of £60   
   e) 10% of 43g    
   f) $\frac{33}{3}$% of £39
   g) 25% of £1260  
   h) 10% of 52cm    
   i) 20% of £7·50
   j) 75% of £4·80  
   k) 60% of £12 000 
   l) 80% of £550
   m) $\frac{33}{3}$% of £7·20 
   n) $\frac{66}{3}$% of £153·60
   o) 75% of £61
   p) 10% of £15·50 
   q) 20% of £13·20
   r) 10% of 20p
   s) 50% of £1·2 million
   t) 40% of £390
   u) 70% of 60p
   v) 30% of 1750kg  
   w) 90% of 50p
   x) 60% of £75
   y) 80% of £21   
   z) 70% of £8

2 From 1(d) you will see that 10% of £60 = £6. Use this result to write down:
   (i) 30%  
   (ii) 5%  
   (iv) 15%

3 For £80 calculate:
   (i) 10%  
   (ii) 30%  
   (iii) 5%  
   (iv) 15%

4 For £40 calculate:
   (i) 10%  
   (ii) 30%  
   (iii) 5%  
   (iv) 15%
5  State 2 different ways of calculating 15% without a calculator.

6  33 \(\frac{1}{3}\)% of the passengers in a train containing 267 passengers continue on the train until its destination. How many passengers:
   a) continue to the final stop   b) get out before the final stop?

7  75% of the people in a room are over the age of 30. If there are 754 people in a room, how many of them are:
   a) over the age of 30   b) under the age of 30?

8  On a cruise ship, 40% of the passengers are ladies, 35% are men, 15% are girls and the rest are boys. There are 2400 passengers. How many are
   a) ladies   b) men   c) girls   d) boys?

9  A car costs £12 500 when new. At the of the first year its value is 66 \(\frac{2}{3}\)% of the new price. At the end of the second year its value is 75% of the value after 1 year. At the end of the third year, its value is 80% of the value after 2 years. What is the value of the car at the end of
   a) 1 year   b) 2 years   c) 3 years?

Exercise 3(C)

1  Work out:
   a) 30% of £450   b) 70% of 240kg   c) 90% of £8
   d) 40% of 640m   e) 80% of £75   f) 90% of £62
   g) 35% of 600kg   h) 55% of £800   i) 85% of £90
   j) 65% of £540   k) 60% of £862   l) 80% of £48
   m) 15% of £16   n) 15% of £64   o) 15% of £8.20
   p) 8% of £340   q) 6% of £850kg   r) 9% of £250
   s) 4% of 750ml   t) 3% of 500m   u) 7% of £8
   v) 2% of 480kg   w) 1% of £5   x) 32% of £70
   y) 36% of £20   z) 53% of £86
2 Heidi is offered 11% of £350 or 45% of £80. Which offer should Heidi take?

3 Goats’ cheese contains 15% fat. How much fat is there in a pack which contains:
   a) 240g       b) 460g       c) 0.86kg       d) 0.38kg

4 Of the 3 cakes below, which one, per helping, is better for you in terms of fat content? (assume the cupcake is 1 helping)

   500g Chocolate Cake  250g Carrot Cake  50g Cupcake
   18% Fat             8% Fat             12% Fat

Challenge Question

A computer catalogue quotes prices to which a tax of $17\frac{1}{2}$ % (VAT) must be added. What would be the price of the computer above?
CALCULATOR PERCENTAGES

Exercise 4(A)

Calculate:

a) 12% of £600  
   b) 23% of £280  
   c) 36% of £25  
   d) 28% of £522  
   e) 24% of £16.50  
   f) 19% of £343  
   g) 57% of £62  
   h) 42% of £812  
   i) 83% of £4100  
   j) 18% of £94  
   k) 74% of £26  
   l) 14% of £598  
   m) 82% of £84  
   n) 18% of 22.50  
   o) 12% of £85.50  
   p) 76% of £55.50  
   q) 92% of £630  
   r) 42% of £720  
   s) 55% of £682  
   t) 3% of £150  
   u) 6% of £35  
   v) 8% of £45  
   w) 2% of £60  
   x) 7% of £20

Exercise 4(B)

Calculate:

a) 7% of £16  
   b) 9% of £65  
   c) 41% of £25  
   d) 89% of £530  
   e) 17% of £380  
   f) 22% of £60  
   g) 46% of £5  
   h) 22% of £680  
   i) 7% of £50  
   j) 19% of £60  
   k) 11% of £90  
   l) 44% of £12.50  
   m) 5% of £17  
   n) 6% of £90  
   o) 84% of £68.50  
   p) 8.5% of £64  
   q) 7.2% of £620  
   r) 3.1% of £540  
   s) 10.7% of £8890  
   t) 4 1/2% of £18  
   u) 12 1/2% of £84  
   v) 3 1/2% of £650  
   w) 2 1/2% of £12

Reminder!

\[
\begin{align*}
35\% \text{ of } £640 &= \frac{35}{100} \times 640 \\
&= 35 \div 100 \times 640 \\
&= £224
\end{align*}
\]
Exercise 4(C)

Calculate:

a) $4\cdot7\%$ of £16  
b) $2\cdot9\%$ of £63\cdot50  
c) $41\cdot6\%$ of £25\cdot40  
d) $6\cdot4\%$ of £32

e) $1\cdot7\%$ of £95  
f) $54\cdot8\%$ of £432\cdot20  
g) $4\cdot35\%$ of £5  
h) $1\cdot65\%$ of £24

i) $7\frac{1}{4}\%$ of £86  
j) $5\frac{1}{4}\%$ of £20  
k) $9\frac{1}{4}\%$ of £34  
l) $11\frac{1}{4}\%$ of £600

m) $10\frac{1}{4}\%$ of £20  
m) $10\frac{1}{4}\%$ of £77  
n) $40\frac{1}{4}\%$ of £61

o) $80\frac{1}{4}\%$ of £68\cdot50

q) $2\frac{3}{4}\%$ of £18  
qu) $7\frac{3}{4}\%$ of £62\cdot10  
r) $3\frac{3}{4}\%$ of £637  
s) $10\frac{3}{4}\%$ of £8890

u) $4\frac{1}{5}\%$ of £48  
u) $6\frac{1}{5}\%$ of £52  
v) $3\frac{2}{3}\%$ of £420  
w) $2\frac{2}{5}\%$ of £14

y) $6\frac{3}{5}\%$ of £88  
y) $19\frac{3}{5}\%$ of £12\cdot40  
z) $10\frac{3}{5}\%$ of £658\cdot70

PERCENTAGE INCREASE & DECREASE

Exercise 5(B) Non Calculator Questions

1. A lawnmower costing £130 is **reduced** by 50% in a sale. Calculate the sale price of the lawnmower.

2. A gamestation costing £120 is in the sale marked “**25% discount**.” Calculate the sale price of the game station.

3. A pair of shoes are **reduced** by 10%. If the shoes cost £50 full price, how much are they after the discount?

4. Simon has a new bike which should have cost him £350 from the factory. He received a 20% **discount** for taking the shop display bike. How much did Simon pay for the bike?

5. A tourist helicopter ride to the Grand Canyon costs £162. Children under 5 years of age receive a 75% **discount**. How much does it cost for a child under 5 years of age to visit the Grand Canyon?
6 A shampoo bottle usually holds 240ml. In a special offer 25% is added to the contents. Calculate the amount of shampoo in the special offer bottle.

7 A cake shop decides to increase the weight of each cake by 20%. Each cake used to weigh 1600g. How much does each cake weigh now?

8 A painting costing £320 has its price raised by 50%. How much does the painting cost now?

9 A man buys a car at an auction for £2460. He fixes it up and sells it with a price increase of 20%. How much does he sell it for?

10 A recipe uses 72g of sugar. Mrs Helder decides to increase this amount by 25%. How much sugar does Mrs Helder need?

Exercise 5(C)

1 Milk costs 80p per litre, but the price is expected to rise shortly by 5%. What will the new cost of a litre of milk be?

2 Johnny takes the local bus to school. His return fare is £1.50 per day. The bus company decides to increase all their fares by 20%. What will Johnny’s new return fare be?

3 In a sale a pair of shoes, normally priced at £47.52, are reduced by 25%. What is the sale price of the shoes?

4 The average attendance at a football stadium last season was 48000. This season it has dropped by 15%. What is the average attendance at the stadium this season?

5 Farmer Yates had 60 cattle, but due to an outbreak of sickness he lost 85% of his herd. How many cattle does he still have left?
Exercise 6(A)

Calculator Questions

1. Calculate the sale price of the following items with the reductions stated:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NORMAL PRICE</th>
<th>DISCOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) T.V</td>
<td>£350</td>
<td>15%</td>
</tr>
<tr>
<td>(b) D.V.D Player</td>
<td>£260</td>
<td>65%</td>
</tr>
<tr>
<td>(c) Hi-Fi System</td>
<td>£850</td>
<td>30%</td>
</tr>
<tr>
<td>(d) Shirt</td>
<td>£35</td>
<td>45%</td>
</tr>
<tr>
<td>(e) Ornament</td>
<td>£15·80</td>
<td>25%</td>
</tr>
<tr>
<td>(f) Table</td>
<td>£840</td>
<td>15%</td>
</tr>
<tr>
<td>(g) Carpet</td>
<td>£688</td>
<td>14%</td>
</tr>
<tr>
<td>(h) Fitted Kitchen</td>
<td>£5,800</td>
<td>24%</td>
</tr>
<tr>
<td>(i) Magazine</td>
<td>£1·40</td>
<td>20%</td>
</tr>
<tr>
<td>(j) Bag of sweets</td>
<td>£1·15</td>
<td>60%</td>
</tr>
<tr>
<td>(k) Shoes</td>
<td>£52</td>
<td>5%</td>
</tr>
</tbody>
</table>

2. Calculate the new price of the following items after the following increases:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>COST</th>
<th>INCREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Laptop</td>
<td>£400</td>
<td>12%</td>
</tr>
<tr>
<td>(b) Camera</td>
<td>£560</td>
<td>35%</td>
</tr>
<tr>
<td>(c) Calculator</td>
<td>£12</td>
<td>14%</td>
</tr>
<tr>
<td>(d) Playstation</td>
<td>£200</td>
<td>32%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM</th>
<th>COST</th>
<th>INCREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e) Ornament</td>
<td>£34</td>
<td>26%</td>
</tr>
<tr>
<td>(f) Book</td>
<td>£15.50</td>
<td>16%</td>
</tr>
<tr>
<td>(g) CD</td>
<td>£12</td>
<td>11%</td>
</tr>
<tr>
<td>(h) Jacket</td>
<td>£55</td>
<td>23%</td>
</tr>
</tbody>
</table>
Exercise 6(B)

1. **Calculate** the sale price of the following items with the reductions stated:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NORMAL PRICE</th>
<th>DISCOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) T.V.</td>
<td>£350</td>
<td>15%</td>
</tr>
<tr>
<td>(b) V.C.R.</td>
<td>£440</td>
<td>22%</td>
</tr>
<tr>
<td>(c) HI-FI System</td>
<td>£849</td>
<td>18%</td>
</tr>
<tr>
<td>(d) Skirt</td>
<td>£84.20</td>
<td>37%</td>
</tr>
<tr>
<td>(e) Shirt</td>
<td>£35.60</td>
<td>28%</td>
</tr>
<tr>
<td>(f) Ornament</td>
<td>£64.85</td>
<td>45%</td>
</tr>
<tr>
<td>(g) Table</td>
<td>£220</td>
<td>7½ %</td>
</tr>
<tr>
<td>(h) Carpet</td>
<td>£640</td>
<td>18½ %</td>
</tr>
<tr>
<td>(i) Fitted Kitchen</td>
<td>£5,800</td>
<td>26%</td>
</tr>
<tr>
<td>(j) Magazine</td>
<td>£95</td>
<td>11%</td>
</tr>
<tr>
<td>(k) Bag of sweets</td>
<td>£1.19</td>
<td>24%</td>
</tr>
<tr>
<td>(l) Shoes</td>
<td>£44.44</td>
<td>4¼ %</td>
</tr>
</tbody>
</table>

2. **Calculate** the new price of the following items after the following increases:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>COST</th>
<th>INCREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Laptop</td>
<td>£487</td>
<td>13%</td>
</tr>
<tr>
<td>(b) Camera</td>
<td>£250·50</td>
<td>35%</td>
</tr>
<tr>
<td>(c) Calculator</td>
<td>£8·49</td>
<td>12%</td>
</tr>
<tr>
<td>(d) Playstation</td>
<td>£199·50</td>
<td>21%</td>
</tr>
<tr>
<td>(e) Ornament</td>
<td>£34·20</td>
<td>24%</td>
</tr>
<tr>
<td>(f) Book</td>
<td>£15·50</td>
<td>17%</td>
</tr>
<tr>
<td>(g) CD</td>
<td>£9·99</td>
<td>11%</td>
</tr>
</tbody>
</table>
FURTHER PROBLEMS

Exercise 7(B)

1. A salesman has a salary of £16500. He receives a bonus of 4% of his salary. How much does he get altogether?

2. £820 is divided between 2 ladies. One gets 65%. How much does each receive?

3. In a class of 40 pupils, 55% are girls. How many boys are there?

4. In 1981, the population of a town was 8030. By 1991, the population was just 90% of this figure. What was the population in 1991?

5. A car cost £12460 when new. A year later, its value was only 75% of this. What was its value a year later?

6. The composition of brass by weight is 64% copper, 32% zinc and the remainder is lead. Find the weight of (a) copper (b) zinc (c) lead in 650 kg of brass.

7. During a sale, all items are sold with 15% off their usual cost. What is the sale price of a CD which usually costs £12.20?

8. There are 40 people in a doctor's waiting room. 65% are male. How many are female?

9. The rental on a flat is £360 per month. Ted and Lucy get a special deal and only have to pay 85% of this. How much did they pay per month?

10. A university noticed that 16% of the new students dropped out by the end of the first year. If there were 1350 new students, how many dropped out?

11. The Dragons basketball team play 40 matches in the season. They win 55%, draw 22.5% and lose the rest. Calculate the number of (a) wins (b) draws (c) losses.

12. Mrs Wilson pays 12.5% tax on her fuel bills. Calculate the tax on her (a) gas bill of £144 (b) electric bill of £99
1. Everyone should eat 5 portions of fruit or vegetables every day. The first food Harry eats one morning is an apple for breakfast:
   a) What percentage of his recommended daily amount has he had?
   b) If he eats a portion of sweet corn with his lunch and a banana after lunch what percentage of Harry’s recommended daily allowance has he still to eat?

2. What is the largest number; 6% of 100, 2% of 300 or 1% of 700?

3. What is the biggest amount of money; 25% of £200, 30% of £150 or 60% of £90?

4. A 500g Mars Bar contains 20% sugar, a 400g Snickers contains 22% sugar and a 350g Topic contains 26% sugar.
   a) Calculate the amount of grams of sugar there are in each bar.
   b) What bar has the most sugar in it?

5. 3 breakfast cereals each claim to have a low percentage salt content. In a 500g packet of Cornyflakes there are 7.5 grams of salt, a 1kg packet of Crispie Rice has 16 grams of salt and a 200g packet of Sugar Pops has 2.8 grams of salt.
   a) Calculate the percentage of salt in all 3 cereals
   b) Which cereal has the lowest salt content?

6. The recommended daily amount of salt is 6 grams. Sarah’s breakfast had 1.5 grams of salt in it. What percentage of her recommended daily amount has she had?

7. 3 different packets of Cheese and Onion crisps are tested for saturated fat.
   Walkers 30g packet has 3g of saturated fat
   Golden Wonder 25g packet has 2.6g of saturated fat
   McCoys 35g packet has 3.4g of saturated fat
   What crisps would be the healthiest option?
   You must give a reason for your answer.
8. Mesco’s the supermarket sells healthy choice ready made meals. They have 1.5 grams of fat per 100 grams. What is the percentage of fat in these meals?

Angela in the school canteen makes her own versions of these meals. These weigh 300 grams and have a fat content of 4 grams. What meal contains the least percentage of fat?

9. Before adding milk a 60g portion of All Bran cereal contains 15g of sugar, a 70g portion of Corn Flakes contains 17g of sugar and a 50g portion of Frosties contains 14g of sugar. What would the healthiest breakfast cereal be? You must give a reason for your answer.

10. A 250ml can of Red Bull contains 1ml of caffeine, a 330ml of Coca Cola contains 1.1ml of caffeine and a 500 can of Diet Irn Bru contains 1.2ml of caffeine. Which of these cans would be the worst to drink if you want to go to sleep soon? You must give a reason for your answer.

11. John, Peter and James all want to increase their weightlifting. They all train hard and after 2 months John has improved from being able to lift 45kg and can now lift 50kg. Peter could lift 48kg and can now lift 54kg while James could lift 55g and can now lift 61kg. Which of the 3 boys has improved the most compared to their original weightlifting abilities?

12. Sam deposited £1200 in the bank. The interest rate is 4% per annum. How much will Sam earn in interest if he leaves the money in for the full year?

13. We should all drink 8 glasses of water a day. What percentage of your recommended daily amount of water have you drank if you have:
   a) 2 glasses
   b) 4 glasses
   c) 7 glasses
14. John and Peter want to do a swim for charity. Before they start training Peter can swim 40 lengths and John 30 lengths. Peter’s training increases his stamina and allows him to swim 25% more. John’s training allows him to swim 50% more.
   a) How many lengths can they now both swim?
   b) If Peter was sponsored for £1 per length and John for £1.20 per length who raised the most money?

15. Torrison’s the supermarket sells healthy choice ready made meals. They have 0.5 grams of fat per 100 grams. What is the percentage of fat in these meals?
    Jessie in the school canteen makes her own versions of these meals. These weigh 400 grams and have a fat content of 1.4 grams. What meal contains the least percentage of fat?

16. Heather had £650; she decided to keep £350 at home and deposited the rest in the bank. The interest rate is 6% per annum. How much will Heather earn in interest if she leaves the money in for the full year? How much more would she have received if she had deposited the full amount in the bank?

17. If George deposited £500 and received £25 in interest after leaving it in the bank for a year what was the percentage interest rate the bank paid?

18. William can run 10 km without stopping for a rest. He wants to be able to run 12 km without stopping for a rest. What percentage must he improve his running by to be able to achieve this?