Percentage Worksheets

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Writing Percentages

Q1. Write the percentage of the diagram that is shaded.

a)  

b)  

c)  

Q2. Express the following numbers as a percentage. Do not use a calculator.

a) 5 as a percentage of 20.  
b) 8 as a percentage of 25.  
c) 15 as a percentage of 20.  
d) 34 as a percentage of 25.  
e) 49 as a percentage of 50.  
f) 2 as a percentage of 10.  
g) 1 as a percentage of 5.  
h) 48 as a percentage of 400.  
i) 450 as a percentage of 500.

Q3. Use a calculator to express the numbers as a percentage. Round your answers to 1 decimal place.

a) 64 as a percentage of 100  
b) 15 as a percentage of 45  
c) 76 as a percentage of 90  
d) 5 as a percentage of 60  
e) 48 as a percentage of 60  
f) 210 as a percentage of 300  
g) 3.4 as a percentage of 8  
h) 0.62 as a percentage of 4.3  
i) \frac{1}{2} as a percentage of \frac{3}{4}.

Q4. Express these measurements as a percentage of each other.

a) Five minutes as a percentage of one hour.  
b) Two days as a percentage of a week.  
c) £1.30 as a percentage of £5.00  
d) 430 g as a percentage of 2.5 Kg.  
e) 90p as a percentage of £2.50  
f) 6 mm as a percentage of 1.2 m  
g) Fifty minutes as a percentage of one day.  
h) Two months as a percentage of a year.

Q5.

a) In a school of 350 pupils, 150 are girls. What percentage are boys?  
b) In July it was sunny for 21 days. What percentage of days was it sunny for?  
c) A girl gets 46 marks out of 50 on an exam. What percentage did she score?  
d) In a box of 600 eggs 48 were broken. What percentage of eggs was not broken?  
e) In a local election 12500 votes were recorded for a local town. 6540 were Conservative, 4382 were Labour, 955 were for the Green Party and the rest went to Liberal Democrats. What percentage of the vote did the Liberal Democrats receive?
Fractions, Decimals and Percentages

Q1. Write the following fractions as percentages then decimals.

a) \(\frac{17}{100}\)  
b) \(\frac{1}{4}\)  
c) \(\frac{1}{100}\)  
d) \(\frac{8}{10}\)  
e) \(\frac{42}{50}\)

f) \(\frac{16}{25}\)  
g) \(\frac{30}{50}\)  
h) \(\frac{12}{10}\)  
i) \(\frac{1}{50}\)  
j) \(\frac{53}{50}\)

Q2. Write the following percentages as simplified fractions then decimals.

a) 60%  
b) 45%  
c) 75%  
d) 87%  
e) 2%

f) 97%  
g) 72%  
h) 140%  
i) 0.6%  
j) 0.125%

Q3. Write the following decimals as fractions then percentages.

a) 0.8  
b) 0.25  
c) 0.3  
d) 0.85  
e) 0.63

f) 0.16  
g) 0.79  
h) 0.02  
i) 2.1  
j) 0.005

Q4. Match the equivalent fractions, decimals and percentages together.

<table>
<thead>
<tr>
<th>4/5</th>
<th>3/2</th>
<th>68%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.32</td>
<td>32%</td>
<td>0.8</td>
</tr>
<tr>
<td>17/25</td>
<td>80%</td>
<td>150%</td>
</tr>
<tr>
<td>1.5</td>
<td>0.68</td>
<td>8/25</td>
</tr>
</tbody>
</table>

Q5. Use >, < or = symbols to make these statements correct.

a) \(\frac{2}{5}\) \(0.38\)

b) \(0.001\) \(\frac{1}{1000}\)

c) \(1\frac{1}{4}\) \(115\%\)

d) \(17.5\%\) \(\frac{1}{8}\)
Percentage of an Amount Non Calculator

Q1. Calculate the following percentages.
   a) 10% of 120          b) 10% of 450
   d) 10% of 60          e) 10% of 90
   g) 20% of 50          h) 20% of 230
   j) 30% of 40          k) 40% of 70
   m) 30% of 240         n) 70% of 70
   c) 10% of 300         f) 10% of 40
   i) 20% of 610         l) 60% of 200
   o) 80% of 30

Q2. Find 10% to calculate the following percentages.
   a) 5% of 40            b) 5% of 60
   d) 15% of 80          e) 15% of 140
   g) 15% of 160         h) 25% of 320
   j) 25% of 180         k) 25% of 240
   c) 5% of 300          f) 15% of 200
   i) 25% of 400         l) 35% of 460

Q3. The Pie Chart shows the percentage of 80 student’s favourite colours. Complete the table.

<table>
<thead>
<tr>
<th>Favourite Colour</th>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>Purple</td>
<td></td>
</tr>
<tr>
<td>Light Blue</td>
<td></td>
</tr>
</tbody>
</table>

Q4. 
   a) A phone shop is offering a 15% discount on a new phone. The original price is £480. How much do you save with the discount?
   
   b) Simon is offered a job that pays 20% more than his current job. He currently earns £8 per hour. How much extra per hour will Simon earn in his new job?
   
   c) There are 40 people on a coach and 35% of them got on at the last stop. How many people were on the coach before the last stop?
   
   d) Which of these is the better deal?

   Stu’s TVs
   £420 each with 35% off

   Tina’s TV Shop
   £380 each with 15% off
Percentage of an Amount - With Calculators

Q1. Use a calculator to evaluate the following. Round your answers to a suitable degree of accuracy.

   a) 10% of £45       b) 20% of £348       c) 40% of £614       d) 65% of £5.30
   e) 7% of 8 kg       f) 8% of £22.50      g) 14% of 4.5 m       h) 74% of £43.25
   i) 53% of 4.5 kg    j) 130 % of 84 cm    k) 1.5% of £64.23      l) 45.7% of 630 g

Q2. 
   a) There are 30 pupils in class 8E. 60% of them are girls.
      How many girls are there in class 8E?

   b) A sales person earns a bonus of 4.5% of their weekly sales.
      How much bonus does the sales person earn in a week when their sales are £1560?

   c) The 160 boys in Year 9 were asked to choose their favourite sport. 87.5% of the boys chose football.
      How many boys in Year 9 chose football?

   d) There are 55 seats on a coach. 40% of them are vacant.
      How many people are on the coach?

   e) A local school raises £3655 during a charity event. The school gives 42% to charity.
      How much money is left?

   f) The value of a new car is £24500. When it is 3 years old the car would have lost 61% of it's initial value.
      i) How much it's value when new would the car have lost after 3 years?
      ii) Work out the value of the car when it is 3 years old.

   g) Martin invests £520 in a savings account. At the end of the 1-year it has gained 5.4% interest.
      How much will he have in his account after 1 year if he has no deposits?

Q3. Clare compares three different online advertisements for a pair of running trainers.

Runners Wear
Normal Price = £65
Sale:- 32% off

Trainer World
Normal Price = £52
Sale:- 15% off

Marathon Shop
Normal Price = £72
Sale:- 45% off

Work out which online shop Clare should buy the trainers from.
Percentage Increases

Q1. Increase:

a) £40 by 60%  
b) £560 by 30%  
c) £230 by 80%  
d) £87 by 54%  
e) £45 by 32%  
f) 846 kg by 75%  
g) 240 m by 38%  
h) 60p by 70%  
i) £635 by 1.5%  
j) £54.60 by 9%  
k) £32.60 by 3.4%  
l) £12.40 by 120%

Q2.

a) The price for a carton of milk is 95p. How much does it cost after a 20% increase?

b) During 2013 the population of a village increased from 1560 people by 9%. Calculate the population after the increase.

c) Petrol costs 135p. What is the price after a 3.2% increase?

d) An antique watch cost £620. It’s price increased by 23% over three years. How much is it now worth?

e) A season ticket for a football team cost £415. It is to go up by 21% next season. How much will a season ticket cost next season?

f) The number of pupils in a school increases by 14% from 650 students. How many students are there now?

g) Trevor bought his house for £215000. Fifteen years later he sells it for a 41% profit. How much did he sell his house for?

Q3. Jane and Simon took a Maths test in November and June. In November Jane scored 32 and Simon scored 45 marks. The following June Jane improved her score by 25% and Simon improved his by 20%. Who scored highest in June?

Q4.

The diagram shows a patio in the shape of a rectangle.

The patio is 3.6 m long and 2.5 m wide.

Jonathan decides to expand the length by 15% and the width by 24%.

Jonathan is going to cover patio with paving slabs. Each paving slab is a square of length 65cm.

Jonathan buys 38 paving slabs.

a) Does he have enough to pave the new patio? Show all your working.

The paving slabs cost £12.45 each.

b) Work out the cost of 38 paving slabs.
Percentage Decreases

Q1. Decrease:

a) £500 by 20%  
b) £240 by 60%  
c) £180 by 35%  
d) £75 by 15%  
e) £56 by 42%  
f) 970 g by 75%  
g) 5.6 kg by 12%  
h) 78 cm by 24%  
i) 8.54 m by 16%  
j) £12.60 by 35%  
k) £45.20 by 72%  
l) £1843.12 by 68%

Q2. A jar is full of water. 20% of the water is poured out. Half the remaining water is then poured out. What percentage of the jar is now filled with water?

Q3. 

a) All the clothes at a shop are reduced by 20%. A shirt is priced at £45 before the sale. Calculate the cost of the shirt during the sale.

b) The cost for a holiday to the Caribbean is £850 during peek season. For the off-peak season it is reduced by 34%. Calculate the price of the holiday during off-peak season.

c) A HD TV costs £570. In a sale it is reduced by 32%. What is the sale price?

d) A second-hand car costs £5460. The price falls by 45% when it is sold again. How much is it sold for?

e) An insect colony had a population of 4350. After a nearby fire the population fell by 48%. What is the new population?

f) In a forest fire 45% of the trees are destroyed. The forest originally had 12400 trees. How many remain?

g) A computer game was purchased for £45. When the sequel is released the original loses 52% of its initial value. How much is the computer game valued at now?

Q4. Dominic’s Computers promotes a “half price sale” as well as a further additional 12% off sale prices.

 Dominic’s Computers  
Half Price Sale  
+ Additional 12% off the

Overall, what is the equivalent percentage discount?

Q5. The height of a rectangle is decreased by 20% but the area of the rectangle remains the same. By what percentage of the width of the rectangle changed?
Reverse Percentages

Q1. Complete the table, finding the original prices after the percentage change.

<table>
<thead>
<tr>
<th></th>
<th>Original Price</th>
<th>Percentage Change</th>
<th>New Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td></td>
<td>33% Increase</td>
<td>£159.60</td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td>18% Increase</td>
<td>£100.30</td>
</tr>
<tr>
<td>c)</td>
<td></td>
<td>37% Increase</td>
<td>£63.71</td>
</tr>
<tr>
<td>d)</td>
<td></td>
<td>50% Decrease</td>
<td>£6.43</td>
</tr>
<tr>
<td>e)</td>
<td></td>
<td>48% Decrease</td>
<td>£17.99</td>
</tr>
<tr>
<td>f)</td>
<td></td>
<td>8&amp; Decrease</td>
<td>£4.97</td>
</tr>
</tbody>
</table>

Q2. In a summer sale the following items were offered at 45% discount. Here are the sale prices.

a) Shirt = £17.60  
b) Trousers = £24.75  
c) Shorts = £15.40 
d) Sweater = £18.98 
e) Jeans = £28.60  
d) Skirt = £23.43

Q3.

a) The bill for a meal included a 15% service charge. The total cost for the meal was £45.60. What was the cost for only the meal?

b) Tina is offered a pay rise of 25%. She will now earn £550 per week. How much did she get before the pay rise?

c) A town has a population of 4820 people after an 8% increase on the previous year. What was the population the previous year?

d) A man sells his house for £315000. He makes 27% profit. How much did he buy the house for originally?

e) In a sale, normal prices are reduced by 20%. The sale price of a coat is £52. Work out the normal price of the coat.

f) A car depreciated by 24% in a year. If it is now worth £3766, how much was it worth a year ago?

Q4. A company is offering its workers a 10% increase in pay for the next two years.

a) Elliot works out that his pay in two years' time will be £1900. How much is Elliot’s pay now?

b) Elliot proposes to take an immediate pay increase of 20% and have his pay frozen at that rate for two years. Has he made the wise decision?
Compound Percentage Increase

Q1. Find the compound interest when:
   
   a) £1200 is invested for 5 years at 4% per annum.
   
   b) £650 is invested for 3 years at 8% per annum.
   
   c) £7500 is invested for 7 years at 5.5% per annum.
   
   d) £3850 is invested for \(6\frac{1}{2}\) years at 3.2% per annum.
   
   e) £45780 is invested for 5.5 years at 12% per annum.

Q2. A baby whale increases its body weight by 6% each day for the first month of its life. In a safe ocean habitat a baby fish is born weighing 9 kg.

   What is its weight after
   
   i) 2 days  
   ii) 5 days  
   iii) a week?

Q3. The manager of a company awarded his staff an annual pay increase of 4% for every year they stayed.

   a) Paul started work at the company on a salary of £19500. What salary will he be on after 6 years?
   
   b) Suzie started work at the business on a salary of £12400. How many years will it be until she is earning a salary of over £18000?

Q4. Elliot put £520 into a special savings account that offered him 9% compound interest if he promised to keep the money there for at least 4 years.

   How much money will be in the account after
   
   i) 4 years  
   ii) 8 years  
   iii) 10 years?

   How long will it take until he doubles his initial investment?

Q5. Harry deposits £4000 in a bank account. Compound interest is paid at a rate of 3.5% per annum. Harry wants to leave the money in the account until there is at least £5500 in the account.

   Calculate the least number of years Harry needs to leave the money in the account.

Q6. £600 is put in a savings account. It grows at a rate of 5% each year. £500 is put into a different savings account that grows at a rate of 8% each year.

   How many years will it take before the £400 investment is worth more than the £600.

Q7. Show that a 20% increase followed by a 20% increase is equivalent to a 44% increase overall.

Q8. Paul invests £Y at a rate of 4% per annum. After 6 years it will be worth £12000.

   How much, to the nearest penny will it be worth after 12 years?
Compound Percentage Decrease

Q1. Calculate the amount each of these items is worth if they reduce in value by the given percentage for the given number of years.

<table>
<thead>
<tr>
<th>Original value</th>
<th>Number of years</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>£320</td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td>£4600</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>£5820</td>
<td>7</td>
<td>12%</td>
</tr>
<tr>
<td>£64500</td>
<td>2</td>
<td>4.2%</td>
</tr>
</tbody>
</table>

Q2. The value of a new car will depreciate at the rate of 20% each year. I buy a car in 2014 priced at £14500. What would the value of the car be in

i) 2017  
ii) 2020  
iii) 2024

Q3. During a summer heat wave a reservoir near London was losing water at the rate of 7% each day. On 1 July the reservoir held 2.5 million litres of water.

At this rate of loss, how much would have been in the reservoir at midnight on the following days?

i) 3rd July  
ii) 6th July  
iii) 13 July

Q4. The value of machinery in a factory depreciates by 22% each year. The machinery was bought for £82000. What was its value after 5 years?

Q5. A mobile phone loses its value by 8% per month for the first six months. After that it loses its value at a rate of 15% per month. The phone was bought for £450.

What is its value after

i) 5 months  
ii) 7 months  
iii) 1 year?

Q6. A town’s road safety campaign aims to reduce accidents by 18% every year for the next four years. There were 920 accidents last year.

If the campaign is successful, what should the number of accidents be in 4 years time?

Q7. Donna joined a gym that claimed you would reduce your 5 km running time by 2.5% each week. She could run 5 km in 25 minutes to start with.

According to the club how long would it take her to run 5 km after 6 weeks of training?
Give your answer to the nearest second.

Q8. A bird colony is decreasing at 15% per annum.

If the original population was 750 birds, after how many years will there be fewer than 400 birds left?
## Writing Percentages

### Q1.
- a) 60%
- b) 50%
- c) 70%

### Q2.
- a) 25%
- b) 32%
- c) 75%
- d) 136%
- e) 98%
- f) 20%
- g) 20%
- h) 12%
- i) 90%

### Q3.
- a) 64%
- b) 33.3%
- c) 84.4%
- d) 8.3%
- e) 80%
- f) 70%
- g) 42.5%
- h) 14.4%
- i) 66.7%

### Q4.
- a) 8.3%
- b) 28.6%
- c) 26%
- d) 17.2%
- e) 36%
- f) 0.5%
- g) 3.5%
- h) 16.7%

### Q5.
- a) 57.1%
- b) 67.8%
- c) 92%
- d) 92%
- e) 5%
Fractions, Decimals and Percentages

Q1.

a) 17%, 0.17  
   b) 25%, 0.25  
   c) 1%, 0.01  
   d) 80%, 0.8  
   e) 84%, 0.84  
   f) 64%, 0.64  
   g) 60%, 0.6  
   h) 120%, 1.2  
   i) 2%, 0.02  
   j) 106%, 1.06

Q2.

a) \(\frac{3}{5}, 0.6\)  
   b) \(\frac{9}{20}, 0.45\)  
   c) \(\frac{3}{4}, 0.75\)  
   d) \(\frac{87}{100}, 0.87\)  
   e) \(\frac{1}{50}, 0.02\)  
   f) \(\frac{97}{100}, 0.97\)  
   g) \(\frac{18}{25}, 0.72\)  
   h) \(\frac{7}{5}, 1.4\)  
   i) \(\frac{3}{500}, 0.006\)  
   j) \(\frac{1}{800}, 0.00125\)

Q3.

a) \(\frac{4}{5}, 80\%\)  
   b) \(\frac{1}{4}, 25\%\)  
   c) \(\frac{3}{10}, 30\%\)  
   d) \(\frac{17}{20}, 85\%\)  
   e) \(\frac{63}{100}, 63\%\)  
   f) \(\frac{4}{25}, 16\%\)  
   g) \(\frac{79}{100}, 79\%\)  
   h) \(\frac{1}{50}, 2\%\)  
   i) \(\frac{21}{10}, 210\%\)  
   j) \(\frac{1}{200}, 0.5\%\)

Q4.

\(\frac{4}{5} = 0.8 = 80\%\)  
\(\frac{3}{2} = 1.5 = 150\%\)  
\(\frac{8}{25} = 0.32 = 32\%\)  
\(\frac{17}{25} = 0.68 = 68\%\)

Q5. Use >, < or = symbols to make these statements correct.

a) \(\frac{2}{5} > 0.38\)  
   \(\frac{1\frac{1}{4}}{<} 115\%\)

b) \(0.001 = \frac{1}{1000}\)

d) \(17.5\% > \frac{1}{8}\)
Percentage of an Amount Non Calculator

Q1.
   a) 12  
   b) 45  
   c) 30  
   d) 6   
   e) 9   
   f) 4   
   g) 10  
   h) 46  
   i) 122 
   j) 12  
   k) 28  
   l) 120 
   m) 72  
   n) 49  
   o) 24 

Q2.
   a) 2   
   b) 3   
   c) 15  
   d) 12  
   e) 21  
   f) 30  
   g) 9   
   h) 80  
   i) 100 
   j) 45  
   k) 60  
   l) 161 

Q3.

<table>
<thead>
<tr>
<th>Favourite Colour</th>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>20</td>
</tr>
<tr>
<td>Blue</td>
<td>16</td>
</tr>
<tr>
<td>Green</td>
<td>12</td>
</tr>
<tr>
<td>Purple</td>
<td>28</td>
</tr>
<tr>
<td>Light Blue</td>
<td>4</td>
</tr>
</tbody>
</table>

Q4.
   a) £72 
   b) £1.60 
   c) 21 people 
   d) Stu’s TVs = £273, Tina’s TV Shop = £323
Percentage of an Amount - With Calculators

Q1.

a) £4.50  
   b) £69.60  
   c) £245.60  
   d) £3.45  
   e) 5.6 kg  
   f) £1.80  
   g) 0.63 m  
   h) £32.01  
   i) 2.39 kg  
   j) 109.2 cm  
   k) £0.96  
   l) 287.9 g

Q2.

a) 18  
   b) £70.20  
   c) 140  
   d) 33  
   e) £2119.90  
   f) i) £14945  
   g) £9555  
   i) £548.08

Q3. 

Runners Wear = £44.70, Trainer World = £48.40, Marathon Shop = £39.60

Percentage Increases

Q1.

a) £64  
   b) £728  
   c) £414  
   d) £133.98  
   e) £59.40  
   f) 1480.5 kg  
   g) 331.2 m  
   h) £1.02  
   i) £644.53  
   j) £59.51  
   k) £33.71  
   l) £27.28

Q2.

a) £1.14  
   b) 1700  
   c) 139p  
   d) £762.60  
   e) £502  
   f) £741  
   g) £303150

Q3. 

Jane scored 40 marks, Simon scored 54 marks

Q4.

a) Jonathan needs 35 tiles for the patio.

b) Total cost for paving slabs = £473.10
Percentage Decreases

Q1.
   a) £400  b) £96  c) £117
   d) £63.75  e) £32.48  f) 242.5 g
   g) 4.928 kg  h) 59.28 cm  i) 7.17 m
   j) £8.19  k) £12.66  l) £589.80

Q2. 40%

Q3.
   a) £36  b) £561  c) £387.60  d) 3003
   e) 2262 insects  f) 6820 trees  g) £21.60

Q4. 56%

Q5. 25% Increase

Reverse Percentages

Q1.
   a) £120.00  b) £85.00  c) £46.50
   d) £12.85  e) £34.60  f) £5.40

Q2.
   a) £32  b) £45  c) £28
   d) £34.50  e) £52  d) £42.60

Q3.
   a) £39.65  b) £440  c) 4463
   d) £248031  e) £65  d) £4955

Q4.
   a) £1570

   b) Overall increase would have been 21%.
**Compound Percentage Increase**

Q1.
   a) £1458.61  
   b) £818.81  
   c) £10910.10  
   d) £4724.75  
   e) £85383.69

Q2.
   i) 10.11 kg  
   ii) 12.04 kg  
   iii) 13.53 kg

Q3.
   a) £24674  
   b) 7 years

Q4.
   i) £734.02  
   ii) £1036.13  
   iii) £1231.03

Q5. 7 Years

Q6. 8 Years

Q7. $1.2^2 = 1.44$

Q8. £15183.83

**Compound Percentage Decrease**

Q1.
   a) £292.06  
   b) £3591.45  
   c) £2378.49  
   d) £59195.78

Q2.
   i) £7424  
   ii) £3801.09  
   iii) £1556.93

Q3.
   i) 2.01 million litres  
   ii) 1.617 million litres  
   iii) 0.973 million litres

Q4. £23674.83

Q5.
   i) £296.57  
   ii) £231.93  
   iii) £102.91

Q6. 416 accidents

Q7. 21 minutes 28 seconds

Q8. 4 years