

Worksheets for GCSE Mathematics



Percentages

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Maths Resources for Teachers



Number

Percentage Worksheets

Contents

Differentiated Independent Learning Worksheets

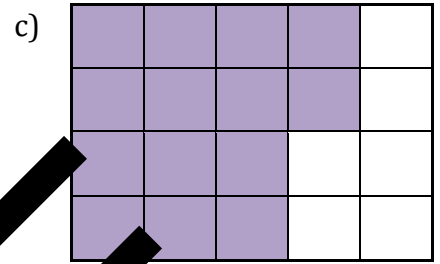
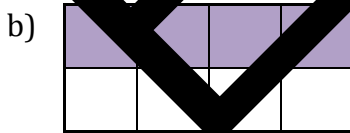
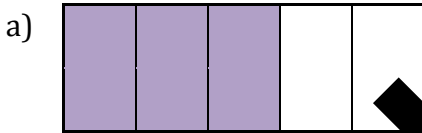
- Writing Percentages Page 2
- Fractions, Decimals and Percentages Page 3
- Calculating Percentages of an amount Page 4
- Calculating Percentages of an amount - Calculator Page 5
- Percentage Increases Page 6
- Percentage Decreases Page 7
- Reverse Percentages Page 8
- Compound Percentage Increase Page 9
- Compound Percentage Decrease Page 10

Solutions

- Writing Percentages Page 11
- Fractions, Decimals and Percentages Page 12
- Calculating Percentages of an amount Page 13
- Calculating Percentages of an amount - Calculator Page 14
- Percentage Increases Page 14
- Percentage Decreases Page 15
- Reverse Percentages Page 15
- Compound Percentage Increase Page 16
- Compound Percentage Decrease Page 16

Writing Percentages

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



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 70. f) 2 as a percentage of 10.
 g) 7 as a percentage of 5. h) 48 as a percentage of 40. i) 450 as a percentage of 300.

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) 4 as a percentage of 60 f) 210 as a percentage of 300
 g) 3.4 as a percentage of 10 h) 0.6 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) £1.00 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 10000 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 total 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) 10%

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) 0.9

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.

$\frac{4}{10}$

$\frac{3}{2}$

68%

0.32

32%

0.8

$\frac{17}{25}$

80%

150%

1.5

0.68

$\frac{8}{25}$

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

a) $\frac{2}{5}$ 0.2

b) 0.001 $\frac{1}{100}$

c) $1\frac{1}{4}$ $1\frac{1}{2}$

d) 17.5% $1\frac{1}{4}$

Percentage of an Amount Non Calculator

Q1. Calculate the following percentages.

- | | | |
|---------------|---------------|---------------|
| a) 10% of 120 | b) 10% of 450 | c) 10% of 300 |
| d) 10% of 60 | e) 10% of 90 | f) 10% of 40 |
| g) 20% of 50 | h) 20% of 230 | i) 20% of 610 |
| j) 30% of 40 | k) 40% of 70 | l) 50% of 200 |
| m) 30% of 240 | n) 70% of 100 | o) 80% of 50 |

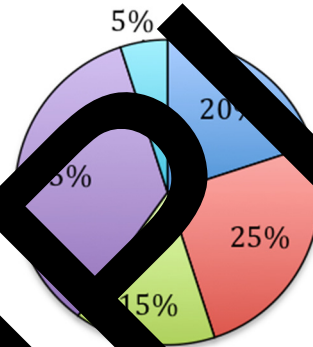
Q2. Find 10% to calculate the following percentages.

- | | | |
|---------------|---------------|---------------|
| a) 5% of 40 | b) 5% of 60 | c) 5% of 300 |
| d) 15% of 80 | e) 15% of 140 | f) 15% of 200 |
| g) 15% of 160 | h) 25% of 320 | i) 25% of 400 |
| j) 5% of 80 | k) 25% of 40 | l) 35% of 460 |

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

Favourite Colour	People
Red	
Blue	
Green	
Purple	
Light Blue	

■ Red
 ■ Blue
 ■ Green
 ■ Purple
 ■ Light Blue



- a) A phone shop is offering a 15% discount on every 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 shoes
£420 each with 35% off

Tina's shoes
£300 each with 15% off

Percentage of an amount - With Calculators

Q1. Use a calculator to evaluate the following and 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) 2% of 4.5 m h) 74% of £43.25
 i) 53% of 4.5 kg j) 13% of 84 cm k) 1.5% of £64.23 l) 45.7% of 630 g

Q2.

- a) There are 70 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. 90% of the seats are vacant.
 How many people are on the coach?
- e) A local school raised £3655 during a charity event. The school gives 42% to charity.
 How much money was left?
- f) The value of a new car is £4500. When it is 3 years old the car would have lost 61% of its initial value.
 i) How much is its value when new would the car have 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, he has gained 5.4% interest.
 How much will he have in his account after 1 year if he does no deposits?

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

<p>Runners Wear</p> <p>Normal Price = £65</p> <p>Sale:- 32% off</p>	<p>Marathon Shop</p> <p>Normal Price = £72</p> <p>Sale:- 10% off</p>
<p>Train World</p> <p>Normal Price = £52</p> <p>Sale:- 15% off</p>	

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

Percentage Increases

Q1. Increase:

- | | | |
|-----------------|-----------------|-------------------|
| a) £40 by 60% | b) £560 by 10% | 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% | l) £12.40 by 120% |

Q2.

- The price for a carton of milk is 95p. How much does it cost after a 20% increase?
- During 2013 the population of a village increased from 1560 people to 1620. Calculate the population after the increase.
- Petrol costs 85p. What is the price after a 3.2% increase?
- An antique watch cost £620. Its price increased by 23% over three years. How much is it now worth?
- A season ticket for a football team cost £105. It is taken up by 10% next season. How much does a season ticket cost next season?
- The number of pupils in a school increased by 14% from 650 students. How many students are there now?
- A man bought his house for £210,000. Fifteen years later he sells it for a 41% profit. How much did he sell his house for?

Q3.

Jane and Simon took maths test in November and June. In November Jane scored 52 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%.

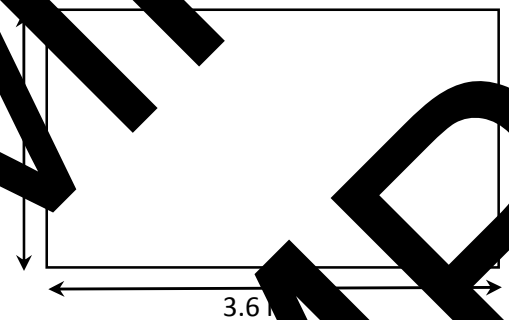
Jonathan is going to cover patio with paving slabs. Each paving slab is a square of length 65cm.

Jonathan buys 38 paving slabs.

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

The paving slabs cost £12.45 each.

- Work out the cost of 38 paving slabs.



Percentage Decreases

Q1. Decrease:

- a) £500 by 20%
- b) £240 by 10%
- 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 7%
- l) £843.12 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 in 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 of a holiday to the Caribbean is £850 during peak season. For the off-peak season it is reduced by 34%. Calculate the price of the holiday during the peak season.

c) A HD TV costs £570. In a sale it is reduced by 23%. What is the sale price?

d) A second-hand car costs £5460. The price falls by 45% when it is sold. 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 30% of the trees are destroyed. The forest originally had 12400 trees. How many remain?

g) A computer game was purchased for £45. When the store was released the original price is 52% of its initial value.

How much is the computer game value now?

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



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.

	Original Price	Percentage Change	New Price
a)		33% Increase	£159.60
b)		18% Increase	£100.30
c)		7% Increase	£63.50
d)		50% Increase	£1.43
e)		48% Decrease	£1.99
f)		8% Decrease	£4.90

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

- a) Jacket = £17.60 b) Trousers = £17.50 c) Sports = £15.40
 d) Sweater = £18.98 e) Jeans = £28.60 f) Skirt = £23.43

Q3. a) The bill for a meal included a 12% service charge. The total cost for the meal was £45.60.
 What was the cost for only the meal?

- b) Tina is offered a raise of 25%. She will now earn £550 per week.
 How much did she get before the pay rise?
- c) A town's population was 1820 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 5% 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:
- £1200 is invested for 5 years at 4% per annum.
 - £650 is invested for 3 years at 8% per annum.
 - £7500 is invested for 7 years at 5.5% per annum.
 - £3850 is invested for 1 year at 3.2% per annum.
 - £45780 is invested for 5 years at 6% 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
- 2 days
 - 5 days
 - 1 week?
- Q3. The manager of a company awards his staff an annual percentage increase of 4% for every year they stay.
- a) Paul started work at the company on a salary of £19500. What salary will he be on after 5 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 over £18000?
- Q4. Elliot put £520 into a special savings account that offered him a 9% compound interest and 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?
- b) How long will it take until he doubles his initial investment?
- Q5. Harry deposited £4000 in a bank account. Simple 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 £500.
- Q7. Show that a 20% decrease followed by a 20% increase is equivalent to a 4% increase overall.
- Q8. Paul invests £ Y at a rate of 7% per annum. After 6 years it will be worth £12000.
- How much, to the nearest penny will it be worth after 12 years?

Writing Percentages

Q1.

- a) 60%
- b) 50%
- c) 70%

Q2.

- a) 25%
- b) 32%
- c) 50%
- d) 136%
- e) 90%
- f) 20%
- g) 20%
- h) 12%
- i) 90%

Q3.

- a) 64%
- b) 33.3%
- c) 84.4%
- d) 3%
- e) 80%
- f) 70%
- g) 42.5%
- h) 14%
- i) 66.7%

Q4.

- a) 8.3%
- b) 28.6%
- c) 26%
- d) 17.2%
- e) 36%
- f) 0.5%
- g) 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) $\frac{1}{4}$, 0.75 d) $\frac{1}{5}$, 0.87 e) $\frac{1}{50}$, 0.02
 f) $\frac{97}{100}$, 0.97 g) $\frac{1}{4}$, 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) $\frac{17}{25}$, 68% e) $\frac{63}{100}$, 63%
 f) $\frac{4}{25}$, 16% g) $\frac{79}{100}$, 79% h) $\frac{1}{5}$, 20% 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
$1\frac{1}{4}$	<	115%

b)

0.001	=	$\frac{1}{1000}$
15%	>	$\frac{1}{8}$

Percentage of an Amount Non Calculator

Q1.

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

Q2.

- a) 2
- b) 3
- c) 15
- d) 11
- e) 21
- f) 12
- g) 9
- h) 80
- i) 100
- j) 45
- k) 60
- l) 161

Q3.

Favourite Colour	People
Red	16
Blue	18
Green	12
Purple	28
Light Blue	

- a) £72
- b) £1.60
- c) 10 people
- d) Stella's = £173, 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 ii) £9555 |
| g) £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