

19 Percentages

Section 1: Review of percentages

HOMEWORK 19A



Tip

'Percent' means 'out of a hundred'.

- Write as percentages.
a 0.75 b 0.6 c 0.08 d 0.632
e $\frac{1}{2}$ f $\frac{4}{5}$ g $\frac{7}{8}$ h $\frac{1}{20}$
- Write each of the following percentages as a common fraction in its simplest terms.
a 45% b 90% c 70% d 37.5%
e 40% f 88% g 65% h 32%
- Write the decimal equivalent of each percentage.
a 78% b 99% c 35%
d 48% e 0.6% f 0.09%
- a If 94.5% of houses in the UK have a TV set, what percentage do not?
b If $\frac{3}{4}$ of mobile phones are sold as pay-as-you-go, what percentage are not?
c 0.245 of computer users back up their work every day. What percentage do not do this?
- Bjorn spends 31.7% of a day asleep, 0.127 of the day doing housework and $\frac{4}{9}$ of the day at work. What percentage of the day is spent doing other things?
- Anya pays 0.12 of her salary into her savings account.
What percentage of her salary is this?
- Barry gets the following marks for three tests:
 $\frac{31}{50}$, $\frac{17}{35}$, $\frac{51}{80}$
In which test did he get the best marks?

Section 2: Percentage calculations

HOMEWORK 19B



Tip

To find a percentage of a quantity, multiply by the percentage and divide the result by 100.



You are allowed to use a calculator for all of Homework 19B.

- Calculate.
a 5% of 150 b 8% of 300 c 30% of 150
d 22% of 50 e 120% of 70 f 150% of 80
- Calculate, giving answers as mixed numbers or decimals as necessary.
a 17% of £40 b 70% of 65 kg
c 3.5% of 80 minutes d 6.3% of £1000
e 4.7% of 210 m
- Arnie got 65% for a test that was out of 60 marks. What was his mark out of 60?
- A machine in a factory has a failure rate of 2.5%. If the machine makes 15 200 items per day, how many are defective?
- Approximately 72% of homes put the correct recycling bin out every week, the rest do not.
In a city of 32 904 homes, how many homes:
a do put out the correct bin
b don't put out the correct bin?
- A laptop is advertised for sale at £549 excluding VAT.
VAT is charged at 20%.
a How much extra is the VAT?
b How much is the total cost of the laptop?

- 7 9.5% of an 864-hectare farm is used to grow wheat and the rest is used to grow barley.

How many hectares of land is used to grow:

- a wheat b barley?

- 8 The cost of energy used in Banjul's house increases by 63% in the three winter months compared with the three summer months.

If the cost in the summer is £205:

- a What is the increase in cost in the winter?
b How much is the fuel bill for the winter?

HOMEWORK 19C

- 1 The number of hits on a variety of websites are given in terms of their percentage change.

Website	Number of hits 2013	Number of hits 2014	% change in hits
MyTube	24 581 548	25 125 495	+2.2%
Cheeper	5 248 559	8 458 125	+61.2%
HiSpace	57 489 326	56 157 489	-2.3%
FileShare	214 548	584 725	+172.5%

- a Which website can claim to be the fastest growing?
b Which website looks to be losing popularity?
c Which website would you rather be the owner of? Explain your answer.

- 2 If A is 75% of B, what percentage of B is A?

HOMEWORK 19D

- 1 Express the first amount as a percentage of the second.
Give your answer correct to no more than two decimal places (if necessary).



Tip

To find one quantity as the percentage of another, divide the first quantity by the second and multiply the result by 100.

- a 200 m of 4 km b 32 m of 4 km
c 125 m of 2 km d 12 cm of 3 m
e 15 mm of 6 cm f 23 cm of 5 m

- g 45p of £6 h 62p of £4.50
i 12 seconds of a minute

- 2 Sanjita got 21 out of 26 for an assignment and Niall got 23 out of 30.

Who got the highest percentage mark? What was this mark?

- 3 In a school election there were 1248 students eligible to vote. Of these, 1008 voted.

What was the percentage voter turnout?

- 4 Mel improved his swimming time for the 200 m backstroke race by 3 seconds. If his previous best time was 2 minutes and 20 seconds, what is his percentage improvement? Give your answer to one decimal place.

Section 3: Percentage change

HOMEWORK 19E



Tip

The quick way to find a percentage increase or decrease is to find the single multiplier.

- 1 Increase each amount by the percentage given.

- a £36 by 20% b £600 by 45%
c £40 by 6.5% d £4500 by 12%
e £625 by 4% f £456 by 4.6%

- 2 Decrease each amount by the percentage given.

- a £54 by 10% b £560 by 24%
c £862 by 14.5% d £632 by 7.4%
e £278 by 5.3% f £34900 by 15.7%

- 3 House prices in a city have increased by 3.1% in a year.

How much would a house be worth at the end of the year if it was priced at £345 000 at the start of the year?

- 4 Sammy has been offered a pay rise of £20 per week or a 5% increase on his hourly rate. If he earns £7.40 per hour for a 37.5-hour week, would he be better taking the £20 or the percentage increase? How much will he now earn?
- 5 The price of being a member of a golf club has decreased by 15% in a year. If last year's price was £485, what is the price this year to the nearest pound?
- 6 Shares in a building company were worth £12.15 each. After six months their value had decreased by 20%.
- Find their value after six months.
 - Six months later their value had risen again by 20%. Are the shares worth the same amount as they were originally? Explain your answer.
- 7 New cars depreciate in value (their value decreases) significantly in their first year. Copy and complete the table to show the value of these cars at the end of their first year.

Car	Original price	Depreciation	New value
Car A	£26 200	32%	
Car B	£16 800	17%	
Car C	£36 500	26%	

- 8 In a small village school, nine pupils are in Year 6. This is 15% of the school population.
- How many pupils are there in the school?
 - How many pupils are not in Year 6?
- 9 The population of a village has increased in a year by 14% to 1083. At the same time, the proportion of children under the age of 16 has decreased from 26% to 23.55%.
- What was the population of the village last year?
 - If there are 255 children in the village this year, how many were there last year?

- Five babies are born at the start of the new year. Assuming the rest of the population stays the same, what is the new proportion of children under 16?

- 10 The value of a company drops by 14% on the stock market.

The following day the original value is restored.

What was the percentage increase from the first day to the second day?

- 11 Sybil invests £250 at 5% compound interest.
- How much money does she have after five years?
 - How many years does she need to invest the money before it is greater than £500?
- 12 A new car is sold for £29 500. It depreciates by 21% in each of its first three years.
- How much is it worth after three years? The car then depreciates at a rate of 12% per year.
 - How old will the car be when it is worth less than £10 000?

HOMEWORK 19F

- 1 Find the original values if:
- 20% is £8
 - 6% is 39.6 kg
 - 140% is 840 g
 - 105% is £472.50
- 2 Mick has had a 7.4% pay rise. If his new salary is £36 730.80, what was his salary before the rise?
- 3 Keith is training for a triathlon. His overall time has improved by 3% since he began his training. His new personal best is now 5 hours and 24 minutes. What was his old personal best (to the nearest minute)?

Chapter 19 review

- 1 Write as fractions in their simplest form.
- 35%
 - 20%
 - 2.5%

- 2 Express each of these fractions or decimals as a percentage.

a $\frac{4}{5}$ b $\frac{1}{3}$ c $\frac{7}{16}$ d 0.6
 e 0.07 f 0.003

- 3 The value of a vintage car increased from £140 000 to £151 200.

What percentage increase is this?

- 4 The value of a car was £45 600 when it was new. After two years it has lost 54.5% of its value.

How much is it worth after two years?

- 5 Vlad has a machine that makes golf tees at 45 per minute.

He wants to increase the speed of the machine by 9%.

How many whole tees will the machine make per minute if he is successful?

- 6 Express:

- a 45p as a percentage of £3
 b 240 g as a percentage of 4 kg.

- 7 The table below shows the ten most popular marathon races in 2013.

City	Country	Number of people who start	Number of people who finish
New York	USA	47 000	46 759
Chicago	USA	45 000	37 455
Berlin	Germany	40 987	34 377
Paris	France	40 000	32 980
London	UK	37 000	36 672
Tokyo	Japan	36 000	34 678
Osaka	Japan	30 000	27 157
Honolulu	USA	30 000	23 786
Marine Corps (Washington D.C.)	USA	30 000	23 515

- a Which of these races can claim to have the best finishing percentage?

b Express the number of runners in London as a percentage of the number of runners in New York.

c Can you use the data to explain which marathon is the toughest?

- 8 The average (mean) house price in the UK at the end of 2013 was £250 000.

a If house prices rose by 8% on average in 2014, what was the average house price at the end of 2014?

b House prices increased by 5.5% in 2013. What was the average price at the end of 2012?

- 9 A market trader normally makes a profit of 25% on sales of batteries on his stall.

Because of increased competition, he reduces the selling price of his batteries by 10%.

What is the cost price of a pack of batteries that now sells for £5.40?