Worksheet - Fractions, decimals and percentages

Year: Year 8 · 20

Show your working.

Question 1

Question 1 – Converting between fractions, decimals and percentages *(Section A · Skills practice)*

Copy and complete the table. Write each fraction in its simplest form.

Fraction	Decimal	Percentage
$\frac{3}{8}$	?	?
?	0.65	?
?	?	12%
$\frac{7}{20}$	?	?

a. Complete the row for $\frac{3}{8}$.
b. Complete the row for 0.65.
c. Complete the row for 12%.
d. Complete the row for $\frac{7}{20}$.

Question 2

Question 2 – Terminating and recurring decimals *(Section A · Skills practice)*

Some fractions give decimals that stop, and some give decimals that repeat for ever. Write each fraction as a decimal. Use a dot above digits that repeat.

a. $\frac{1}{8}$
b. $\frac{2}{9}$
c. $\frac{5}{11}$
d. $\frac{7}{15}$

Which of these decimals terminate? Explain how you can tell from the denominator.

Question 3

Question 3 – Ordering fractions, decimals and percentages *(Section A · Skills practice)*

Put each set of numbers in order, smallest first. Convert them all to the same form first.

a. $\frac{3}{5}$, 0.58, 62%
b. $\frac{7}{8}$, 0.9, 85%
c. $\frac{1}{3}$, 0.3, 33.5%
d. $\frac{9}{20}$, 0.4, 46%, $\frac{3}{8}$

Question 4

Question 4 – Percentages of amounts *(Section A · Skills practice)*

Work these out. Show how you used 10% or 1% as a stepping stone for parts (a) to (c). You may use a calculator for part (d).

a. 15% of £80
b. 35% of 240 kg
c. 5% of 380 m
d. 17.5% of £64

Question 5

Question 5 – One quantity as a percentage of another *(Section A · Skills practice)*

Write the first amount as a percentage of the second. Give each answer to 1 decimal place where needed.

a. 18 out of 24
b. £7 out of £50
c. 45 cm out of 2 m (convert units first)
d. 250 g out of 1.2 kg

Question 6

Question 6 – Percentage increase and decrease with multipliers *(Section A · Skills practice)*

Use a single multiplier to work out each new value.

a. Increase £60 by 15%.
b. Decrease 250 kg by 12%.

c. Increase 80 cm by 7.5%.
d. Decrease £1500 by 4%.

Question 7

Question 7 – The January sales *(Section B · Real-life practice)*

A sports shop is having a sale. Each price is reduced by the percentage shown.

Item	Original price	Reduction
Football boots	£65	20%
Tracksuit	£48	15%
Water bottle	£8	5%
Rucksack	£36	35%

a. Work out the sale price of each item.
b. Which item has the biggest reduction in pounds?
c. Zainab buys boots and a tracksuit. How much does she spend altogether?
d. Zainab pays with a £100 note. How much change does she get?
e. What overall percentage did she save compared with the original total? Give 1 decimal place.

Question 8

Question 8 – Adding VAT *(Section B · Real-life practice)*

In the UK, VAT (value added tax) at 20% is added to the price of most goods. A shop displays prices without VAT in its trade catalogue.

Item	Price without VAT
Laptop bag	£45
Keyboard	£32.50
Computer mouse	£18

a. Work out the price including VAT for each item.
b. What single multiplier adds 20% VAT?
c. Ahmed buys one of each item. What is his total bill including VAT?
d. Work out the total VAT he pays.

Question 9

Question 9 – School test scores *(Section B · Real-life practice)*

Three Year 8 pupils took tests in different subjects. Their results are shown.

Pupil	Subject	Score
Kai	Maths	34/40
Lola	Science	27/36
Max	French	41/50

a. Write each score as a percentage.
b. Who did best? Who did worst?
c. The pass mark for each test was 70%. Who passed?
d. Lola's score improved by 12% of her original mark in the next test. What is her new score out of 36, to 1 decimal place?

Question 10

Question 10 – The football crowd *(Section B · Real-life practice)*

The attendance at a football club's home matches this season is shown.

Match	Attendance
Match 1	24 500
Match 2	26 950
Match 3	25 130

a. Find the percentage increase in attendance from Match 1 to Match 2.
b. Find the percentage change from Match 2 to Match 3. Is it an increase or a decrease?
c. The stadium holds 30 000. What percentage of the seats were filled at Match 3? Give 1 decimal place.
d. The club hopes for 12% more fans at Match 4 than at Match 3. How many fans is that, to the nearest hundred?

Question 11

Question 11 – Cooking for the class *(Section B · Real-life practice)*

Hamza is cooking a fruit crumble for the class. The recipe uses 250 g of flour, of which 60% is plain flour and the rest wholemeal. It uses 180 g of butter, of which one third is salted.

a. How much plain flour is used? How much wholemeal flour?
b. What percentage of the butter is salted? Give your answer to 1 decimal place.
c. Hamza wants to make 40% more crumble. How much of each ingredient does he need now? (Flour in total and butter.)
d. The butter costs £1.70 per 250 g. How much does the butter cost for the larger crumble, to the nearest penny?

Question 12

Question 12 – House prices *(Section B · Real-life practice)*

A house in Leeds was bought for £180 000. After a year its value increased by 5%. After the second year it fell by 3% of its value at the end of year 1.

a. Find the value after one year.
b. Find the value after two years.
c. What is the overall percentage change after two years? Give 1 decimal place.
d. Is the overall change the same as 5% - 3% = 2%? Explain.

Question 13

Question 13 – Savings account *(Section B · Real-life practice)*

Jasmine puts £400 into a savings account that pays 3% interest per year. The interest is added to the account each year (compound interest).

a. How much is in the account after 1 year?
b. How much is in the account after 2 years?
c. How much interest has she earned after 3 years, to the nearest penny?
d. Jasmine's brother has simple interest of 3% on £400. How much would he have after 3 years? Why is it less?

Question 14

Question 14 – Two discounts *(Section C · Problem solving)*

A shop advertises: "Take 20% off, then another 10% off the new price!" A jacket costs £90 originally.

a. Find the price after the first discount.
b. Find the price after the second discount.
c. What single percentage discount is this equivalent to?
d. Mia says, "It is the same as 30% off." Show that she is wrong.
e. What would the price be with a single 30% discount, and how much more would Mia pay?

Question 15

Question 15 – Reverse percentages *(Section C · Problem solving)*

Several pupils see prices after a change but need to find the original price.

Item	Final price	Change
Trainers	£48	20% reduction
Phone case	£18	20% VAT included

Item	Final price	Change
Bus pass	£63	5% increase

a. Find the original price of the trainers.
b. Find the price of the phone case before VAT was added.
c. Find the price of the bus pass before the increase.
d. A pupil divides £48 by 0.8, and another multiplies £48 by 1.2. Explain which is correct and why the other is wrong.

Question 16

Question 16 – Population change *(Section C · Problem solving)*

The population of four towns is shown for 2015 and 2025.

Town	2015	2025
Ashby	12 000	13 800
Barford	8 500	7 650
Calton	20 000	21 000
Denby	5 000	6 250

a. Find the percentage change for each town, saying increase or decrease.
b. Which town changed most in percentage terms?
c. Which town had the largest increase in actual numbers?
d. If Barford continues to fall by the same percentage over the next 10 years, what will its population be in 2035? Round to the nearest 10.

Question 17

Question 17 – Comparing best offers *(Section C · Problem solving)*

Three shops sell the same games console with the following offers. The original price is £240 in each shop.

Shop	Offer
TechWorld	25% off
GameZone	£50 off
ByteStore	10% off, then a further 15% off

a. Work out the price in each shop.
b. Which shop is cheapest?
c. What single percentage reduction would match ByteStore's offer?
d. Dev says that TechWorld has the best offer because 25% is the biggest number. Is he right in general? Explain with an example.

Question 18

Question 18 – How pupils travel to school *(Section C · Problem solving)*

In a survey of 240 pupils in Years 7 to 9, 45% said they walk to school, $\frac{1}{4}$ said they take the bus and 0.2 said they go by car. The rest cycle.

a. Write each of the three given amounts as a percentage.
b. What percentage of pupils cycle?
c. How many pupils cycle?
d. Draw (describe) a pie chart for these four groups and give the angle for each.

Question 19

Question 19 – The restaurant bill *(Section C · Problem solving)*

A group of 6 friends eat at an Italian restaurant. The food and drink come to £84. The restaurant adds a 12.5% service charge. The group also has a voucher that takes 10% off the food and drink total (before the service charge is added).

Step	Detail
Food and drink	£84
Voucher	10% off the £84
Service charge	12.5% of the amount after the voucher

a. Find the amount after the voucher.
b. Work out the service charge.
c. Find the final total and the share per person.
d. What single multiplier takes the original £84 to the final total?
e. Without the voucher, what would each person have paid with the service charge?

Question 20

Question 20 – Challenge: up 20% then down 20% *(Section D · Challenge)*

The price of a games console goes up by 20% in December and then goes down by 20% in January.

a. Start with a price of £250. Find the price after each change.
b. Is the January price the same as the original? Explain.
c. Show that, whatever the starting price P, the final price is $0.96P$.
d. What single percentage change does this correspond to?
e. What percentage decrease is needed to return to the original price after a 20% rise? Give 1 decimal place.