



Fractions, Decimals and Percentages

Age 14+ Level ★★ Worksheet 1

1. 2011 Digits

What is the sum of the first 2011 digits when $20 \div 11$ is written as a decimal?

2. Recurring Mean

What is the mean of $1.\dot{2}$ and $2.\dot{1}$?

3. Pineapple Juice

The Juice Drink company decides to mix leftover juice drinks to make a new drink.

They have 450 litres of pineapple drink, which is 42% juice.
They mix it with 630 litres of orange drink.
The new drink is 35% juice.

What percentage of the orange drink was juice?

4. Bargain

A shop advertised "Everything half price in our sale", and then advertised that there is "An additional 15% off sale prices".

Overall, this is equivalent to what reduction on the original prices?

5. Washing-up

A survey for washing-up liquid revealed that $\frac{2}{3}$ of all customers bought Jinx and $\frac{1}{3}$ of customers bought Kleenz. Nobody bought both. After an advertising campaign for Kleenz, the only change in sales was that $\frac{1}{4}$ of the people who had bought Jinx were now buying Kleenz instead.

What fraction of customers now buy Kleenz?

6. Fractions of 1000

What is the value of $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{5}$ of $\frac{5}{6}$ of $\frac{6}{7}$ of $\frac{7}{8}$ of $\frac{8}{9}$ of $\frac{9}{10}$ of 1000?

These problems are adapted from UKMT (ukmt.org.uk) and WMC (competition.ac) problems.



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Age 14+ Level ★★ Worksheet 2

1. Solitaire

After playing 500 games, my success rate at Solitaire is 49%.

Assuming I win every game from now on, how many extra games do I need to play in order to increase my success rate to 50%?

2. Breakfast Time

The hobbits Frodo, Sam, Pippin and Merry have breakfast at different times. Each one takes a quarter of the porridge they find in the pan, thinking that the others have not yet eaten.

What fraction of the porridge is left after all four hobbits have had their breakfast?

3. Percentage of a Quarter

What percentage of $\frac{1}{4}$ is $\frac{1}{5}$?

4. Percentage Swap

What is 50% of 2007 plus 2007% of 50?

5. Itchy's Fleas

Itchy the dog has a million fleas. His anti-flea shampoo claims to leave at most 1% of the original number of fleas.

What is the minimum number of fleas that the shampoo will remove?

6. Coal Truck

The mass of an empty coal truck before it is loaded is 2000 kg. At the start of a day it is loaded with coal, and the coal makes up 80% of the total mass.

At the first delivery, the driver unloads a quarter of the coal. Can you express the mass of coal left on the truck, as a percentage of the total mass, after the driver made the first delivery?

7. Percentage Unchanged

If the base of a rectangle is increased by 10% and the area is unchanged, by what percentage (exactly) is the width decreased?

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