# MATHEMATICS

N.S. Yr. 5   P.33

Percentages as fractions of 100. Equivalence of percentages, fractions and decimals.

Equipment

Paper, pencil, ruler

MathSphere

<u>Concepts</u>

Children should be able to read, write and understand the language associated with percentages: ***percentage, percent, %.***

Where does the % sign occur? Watch out for it in everyday life.

One whole = 100%,
One half   = 50%,
One quarter = 25%,
One tenth   = 10%

Understand **equivalence** between $10\% = 0.1 = \frac{1}{10}$
$$20\% = 0.2 = \frac{2}{10} \text{ etc}$$

Children should be able to find simple percentages of quantities by thinking of them as fractions, for example 25% of a quantity is the same as $\frac{1}{4}$ of that quantity.

They should then think of 25% of a quantity as being 25 lots of 1% of that quantity.
Eg. What is 25% of a metre?
    One metre is 100cm, so 1% of one metre is 1cm.
    25% of one metre is therefore 25cm.

In teaching percentages at this level, relate them constantly to fractions and revise fractions as decimals. Later, greater emphasis will be placed on the fact that the digits in a percentage are the same as the digits in a decimal (e.g. 75% = 0.75), but this can cause confusion in the early stages since zeroes are often not written in decimals (e.g. 50% = 0.5).

Be careful with 10%. Because $10\% = \frac{1}{10}$, many children immediately deduce that $20\% = \frac{1}{20}$ etc, which is totally incorrect!

Percentage Project

Collect as many cuttings from newspapers and magazines as you can that have a % sign in them and make a Percentage Scrap Book.

Here are some pages from my Percentage Scrap Book.

Sale of Shoes
20% off all shoes!!!!!!
Great sale.
Don't miss it.

33% off plastic Dinosaurs.

Save 25% off clocks, watches, digital clocks, grandfather clocks!!!!!

1. Divvy has **100** socks. (Maths Rats need to keep their feet warm!).
60 are **red**. **16** are **green**. **18** are **yellow**. **6** are **orange**.

Fortunately, we Maths Rats have very clean feet!

a) What percentage of Divvy's socks are **red**?
b) What percentage of Divvy's socks are **green**?
c) What percentage of Divvy's socks are **yellow**?
d) What percentage of Divvy's socks are **orange**?

e) What percentage of Divvy's socks are **not orange**?
f) What percentage of Divvy's socks are **not yellow**?

2. Find a **hundred** objects of different colours. You will need about four or five colours altogether. You could use coloured cubes or small objects such as bottle tops, marbles or counters.

Sort them into groups of the same colour. Put the number of each in the table below and say what percentage this is:

Object	Number	Percentage

3. Can you swap the objects for similar objects so that **50%** are the same colour, **30%** are the same colour and **20%** are the same colour?

In this section remember that   **all of something is 100%,
half of something is 50%
one quarter of something is 25% and
one tenth of something is 10%.**

1. Subby eats a whole cake. What percentage of the cake has he eaten?

There are times when even
Maths Rats can be **too** greedy.
Ooooh, my tummy hurts.
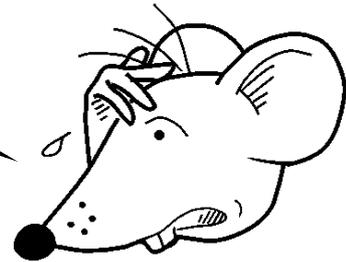
2. Addy only eats a half of his cake. What percentage has he eaten?

Delicious!
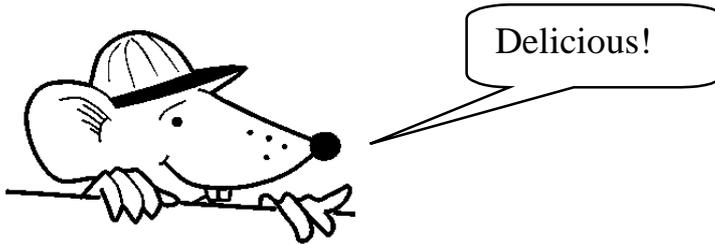
3. Divvy has **100** marbles. He sells **25** of them.
What percentage did he sell?

4. Multy sees **100** cars pass his house. Ten of them are black.
What percentage are black?
What percentage are **not black**?

**5.** What percentage of these shapes is shaded? :
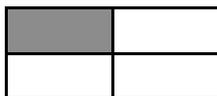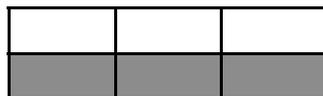
a)   **b)**   **c)**
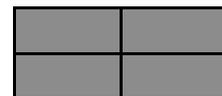
d)

1. Can you say in words what fractions these represent?

a) 100%   **b)** 50%   **c)** 25%   **d)** 10%

2. What percentage of these shapes is shaded?

a)

b)

c)

d)
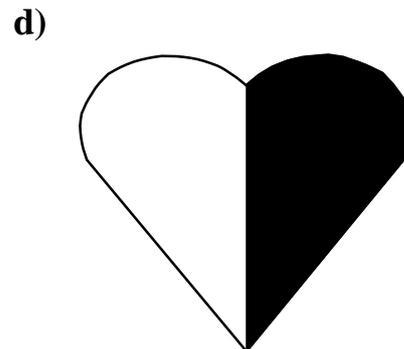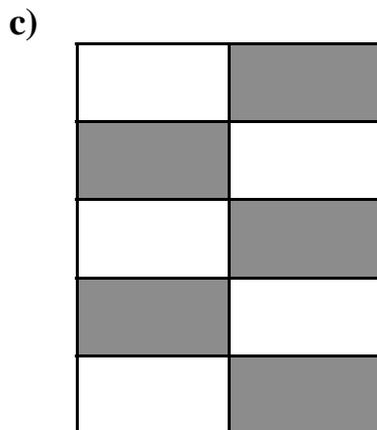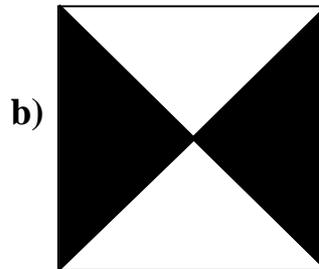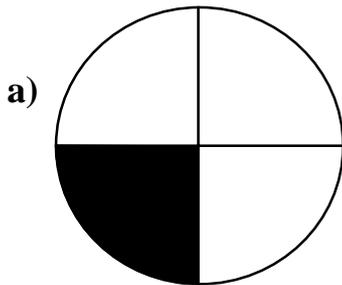
3. Write down all the whole numbers from **one** to **twelve**.
Cross out all the **even** numbers.
What percentage of the numbers have you crossed out?

4. Write down all the letters of the alphabet from **A** to **J**.
Underline the letters **B, D** and **G**.
What percentage have you underlined?

5. Write down all the numbers from **1** to **100**.
Cross out all the numbers in the **seven** times table up to **98**.
What percentage of numbers are **not** crossed out?

There are some other very important facts to know about percentages.
Try to learn these.

10% is the same as **0.1** and this is the same as $\dfrac{1}{10}$

20% is the same as **0.2** and this is the same as $\dfrac{2}{10}$ or $\dfrac{1}{5}$

1% is the same as **0.01** and this is the same as $\dfrac{1}{100}$

25% is the same as **0.25** and this is the same as $\dfrac{1}{4}$

50% is the same as **0.5**   and this is the same as $\dfrac{1}{2}$

75% is the same as **0.75** and this is the same as $\dfrac{3}{4}$

1. Three quarters of Maths Rats love to wear trainers.
    What percentage is this?
    How can we write this as a decimal?

2. One quarter of Maths Rats like to wear shades.
    What percentage is this?
    How can we write this as a decimal?

3. One fifth of children at Ravenbrook School cycle to school each day.
    What percentage is this?
    How can we write this as a decimal?

1. Fill in the gaps in this table. Try to do this without help and then see if you were right.

Percentage	Decimal	Fraction
25%		
	0.5	
75%		
	0.1	
20%		
	0.01	

2. **One fifth** of rats like to eat bananas.
    What percentage is this?

3. **One quarter** of people at the Maths Rats High School went abroad for
    their holidays this year.
    What percentage was this?
    How can we write this as a decimal?

4. **Two hundred** people saw a film.
    0.75 of them said they enjoyed it.
    What fraction of them enjoyed it?
    What percentage of them enjoyed it?
    How many of them enjoyed it?

5. **One hundred** people ran a long distance race.
    One of the people was injured and did not finish.
    What percentage did not finish?
    How can we write this as a decimal?
    How can we write this as a fraction?

6. Write these as percentages:

    a) 0.1   **b)** 0.2   **c)** 0. 5   **d)** 0.75   **e)** 0.01   **f)** 0.25

On the next page are some harder problems.
To help you with these, remember that there are
100 cm in a metre,
100 pennies in a pound,
1 000 grammes in a kilogram.
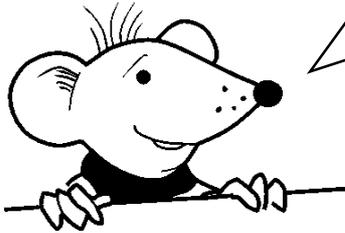
Sometimes it is easier to think in <u>percentages</u>.
E.g. What is **25%** of **£100**?

Think: **1%** of **£100** is **£1**, so **25%** is <u>**£25**</u>.

Sometimes it is easier to think in <u>fractions</u>,
E.g. What is **25%** of **36**?

Think: **25%** is the same as $\frac{1}{4}$.

$\frac{1}{4}$ of **36** is <u>**9**</u>.
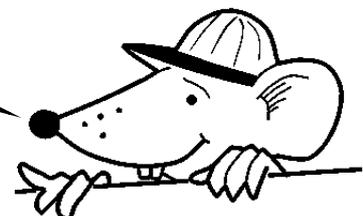
Without using a calculator, find the answers to these questions:

1. What is **50%** of **200** ?

2. What is **10%** of **2 metres** ?

3. What is **25%** of **400 people** ?

4. What is **30%** of **£1** ?

5. What is **30%** of **£4** ?

6. What is **75%** of **1 metre** ?

7. What is **75%** of **2 Kg** ?

8. What is **40%** of **1 Kg** ?

9. What is **20%** of **£30** ?

10. What is **75%** of **800** ships ?

Do not forget that **100%** means everything or everyone you are talking about.
So, if **35%** of people go to school in their cars, the other **65%** do not go to school in their cars.

11. On a school visit, **80%** of children **did not** need a travel sickness pill. What percentage **did** need a travel sickness pill?

12. In a survey, **40%** of elephants said they never forgot. What percentage of elephants **did not** say they never forgot?

Sometimes it is easy to use **halving** when calculating percentages such as 50%, 25% or 75%.

E.g. What is 75% of 500m ?

50% is one **half** of **500m**   = **250m.**
25% is one **half** of **one half** of **500m** = **125m**.
So **75%** is **250** + **125**   = **375m.**

Use this idea to work out these questions:

1. What is **one quarter** of **240 metres**?

2. What is **25%** of **£24** ?

3. What is **75%** of **440 Kg** ?

4. Find **75%** of **60**.

5. Two thousand spectators watched a football match of
Rington United versus Great Bobos.
Seventy five percent supported Great Bobos.
How many spectators was this?

6. Twenty five percent of the pupils in a class of 32 are girls.
How many girls is this?
What percentage are boys?

7. Twenty percent of a number is 46.
What is ten percent of the number?

Crumbs! Tricky stuff!

Answers

Page 4
1. **a)** 60%   **b)** 16%   **c)** 18%   **d)** 6%   **e)** 94%   **f)** 82%
2. Depends on objects chosen.
3. One half should be the same colour etc.

Page 5
1. 100**%**
2. 50%
3. 25%
4. 10%   90%
5. **a)** 25%   **b)** 50%   **c)** 100%   **d)** 50%

Page 6
1. **a)** 100% means all of something (1).
   b) 50% means a half of something.
   c) 25%   means a quarter of something. **d)** 10% means one tenth of
      something.

2. **a)** 25%   **b)** 50%   **c)** 50%   **d)** 50%

3. 1, ~~2~~, 3, ~~4~~, 5, ~~6~~, 7, ~~8~~, 9, ~~10~~, 11, ~~12~~
   50% crossed out.

4. A <u>B</u> C <u>D</u> E F <u>G</u> H I J
   30% are underlined.

5. Cross out 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98
   86% not crossed out.

Page 7
1. 75%   0.75
2. 25%   0.25
3. 20%   0.2 or 0.20

Answers

Page 8
1. 25%   **0.25** $^1/_4$
    50%   0.5 $^1/_2$
    75%   **0.75** $^3/_4$
    10%   0.1 $^1/_{10}$
    20%   **0.2** $^1/_5$ or $^2/_{10}$
    1%   0.01 $^1/_{100}$

2. 20%
3. 25%   0.25
4. $^3/_4$ 75%   150
5. 1%   0.01 $^1/_{100}$
6. **a)** 10%   **b)** 20%   **c)** 50%   **d)** 75%   **e)** 1%   **f)** 25%

Page 10
1. 100   **2.** 20 cm   **3.** 100 people   **4.** 30p   **5.** 120p or £1.20
6. 75 cm   **7.** 1 500 g   **8.** 400g   **9.** £6   **10.** 600 ships
11. 20%   **12.** 60%

Page 11
1. 60 metres
2. £6
3. 330 Kg
4. 45
5. 1 500 spectators
6. 8 girls   75%
7. 23