

Number and Algebra mixed part 4

Whether you are a parent, teacher or home school educator, we've compiled examples of activities, games and puzzles which can be used to support the learning of algebra.

These examples are taken from the 'Number and Algebra mixed' packs found in our SMILE resource collection. The mathematical demand increases as you work through the packs.

There are lots more ideas in the complete packs, which can be downloaded at <https://www.stem.org.uk/rxzed>

Answers to cards can be found at <https://www.stem.org.uk/rxxo5>

Smile 0903

MILLIONS

You will need a calculator
This pack is for a small group
Compare your answers and check
that they make sense

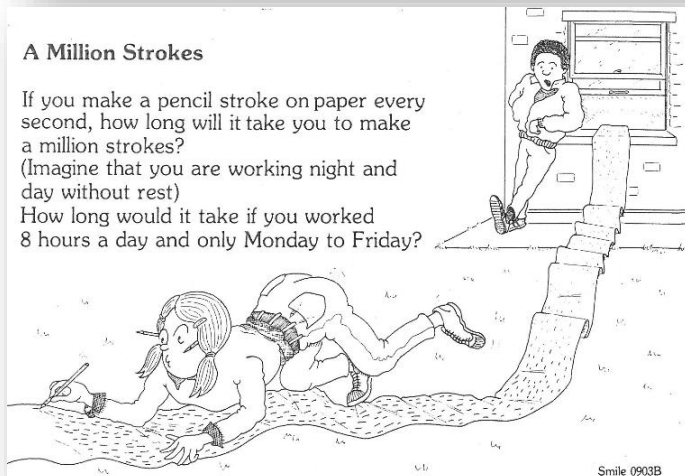
A Long Walk

A man walks a million paces
and each pace is approximately 80cm.
How far does he walk?
If he walks in a straight line,
can he do it in England?
What about in Great Britain?
Which countries in Europe
can he do it in?



A Million Strokes

If you make a pencil stroke on paper every
second, how long will it take you to make
a million strokes?
(Imagine that you are working night and
day without rest)
How long would it take if you worked
8 hours a day and only Monday to Friday?

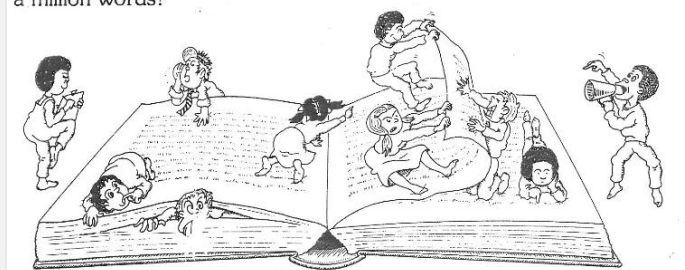


Piles of Paper

If you piled up a
million sheets of
paper, how tall
would the pile be?

The Size of a Book

Take any novel from the library.
Do you think it contains more or less than a million words?
Find, approximately, how many words it does contain.
How many pages would there be in the book if it did contain
a million words?



Hours and Hours

Do you think you have
lived a million hours?
How old is a person
who has lived a million
hours?

smile 0162

The Game of 2, 3, 4, and 5

This game uses 2, 3, 4 and 5.

How many answers can you make by using these numbers in different ways?

e.g. (a) $3 + 5 + 4 - 2 = \underline{10}$

(b) $(3 \times 5) - (4 \times 2) = 15 - 8 = \underline{7}$

(c) $\frac{5(4+2)}{3} = \frac{5 \times \frac{2}{1}}{3} = \underline{10}$

Rules

- (1) You must use 2, 3, 4 and 5 once and only once.
- (2) You can use the square root sign, e.g. $\sqrt{4} = 2$.
- (3) You can use the number as a power e.g. $2^5 = 32$.
- (4) You can use a cube root sign and "use up" the 3 e.g. $\sqrt[3]{4 \times 2} = 2$.

Try to make all the numbers from 1 to 25 this way.

The answer book gives one way for each number.

Try to find some answers which are not in the book - you can check these with a friend.

423
53

Game of Four 4's

This game uses four 4's. You have to try and make as many numbers less than 20 as you can,

e.g. $4 + 4 + \frac{4}{4} = 8 + 1 = 9$

$(4 \times 4) - (4 + 4) = 16 - 8 = 8$

Rules

- (1) You must use four 4's every time.
- (2) You may use decimals $.4 = \frac{4}{10} = \frac{2}{5}$ and $\frac{4}{.4} = 10$
- (3) You may use square root sign $\sqrt{4} = 2$
- (4) You may use recurring decimals $\dot{4} = .4444 \dots$

You can get 9 by $\frac{4}{.4} = 4 \div \frac{4}{10} = 4 \times \frac{10}{4} = 10$

or $\sqrt{.4} = \sqrt{\frac{4}{10}} = \frac{2}{\sqrt{10}}$

Try to make as many numbers as you can between 1 and 20.

The answer book gives one answer for each number - perhaps you can find some answers not in the book!

4444

TARGET 24

A 3 digit problem

Here are some different ways of making the number 24 using the digit 4.

$4! + 4 - 4 = 24$

$4! + \sqrt{4} - \sqrt{4} = 24$

$4! \times 4 \div 4 = 24$

Make 24 using each of the digits 1 to 9.

Rules

- The digit is used three times only, and no other digit is used.
- The following function keys may be used.



FACTORIALS!

We use a special notation for products like these:

$$5 \times 4 \times 3 \times 2 \times 1$$

$$7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$$

$$9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$$

$5 \times 4 \times 3 \times 2 \times 1$ is written $5!$ (read as "five factorial")

$7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$ is $7!$ ("seven factorial")

$7!$ works out to be 5040

Work out the following: 1) $5!$

2) $6!$

3) (a) $3! + 4!$

(b) $3! \times 4!$

(c) $(3+4)!$

(d) $3 \times 4!$

(e) $4 \times 3!$

4) (a) $\frac{4!}{4}$ (b) $\frac{4!}{3}$ (c) $\frac{4!}{3!}$ (d) $\frac{4!}{4!}$

5) $(3!)!$

Answer these questions without multiplying out the factorials.
They are not as straightforward as the first five questions.

6) Write down 4 factors of $6!$

7) Is $19!$ odd or even? Explain.

8) Is 3 a factor of $19!$

9) Is $19!$ prime? Explain.

10) Is $19! + 2$ prime?

11) (a) How many zeros are there at the end of the number $10!$?

(b) How many zeros are there at the end of the number $25!$?

(c) What about $100!$

Try $1000!$