

MATHEMAGIC ACTIVITY BOOK

CLASS - VII

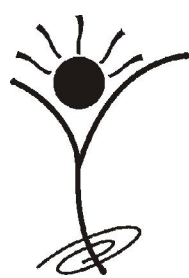
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SYLLABUS GUIDELINES

CLASS - VII

Based on CBSE, ICSE & GCSE Syllabus

Number System

(i) Knowing our Numbers: Integers

- Multiplication and division of integers (through patterns). Division by zero is meaningless
- Properties of integers (including identities for addition & multiplication, *commutative, associative, distributive*) through patterns. These would include examples from whole numbers as well. Involve expressing commutative and associative properties in a general form. Construction of counter-examples, including some by children. Counter examples like subtraction is not commutative.
- Word problems including integers (all operations).

(ii) Fractions and rational numbers:

- Multiplication of fractions
- Fraction as an operator
- Reciprocal of a fraction
- Division of fractions
- Word problems involving mixed fractions
- Introduction to rational numbers (with representation on number line)
- Operations on rational numbers (all operations)
- Representation of rational number as a decimal.
- Word problems on rational numbers (all operations)
- Multiplication and division of decimal fractions
- Conversion of units (lengths & mass)
- Word problems (including all operations)

(iii) Powers:

- Exponents (only natural numbers.)

- Laws of exponents (through observing patterns to arrive at generalization.)

i. $a^m \cdot a^n = a^{m+n}$

ii. $(a^m)^n = a^{mn}$

iii. $\frac{a^m}{a^n} = a^{m-n}$, where $m - n \in \mathbb{N}$

iv. $a^m \cdot b^m = (ab)^m$

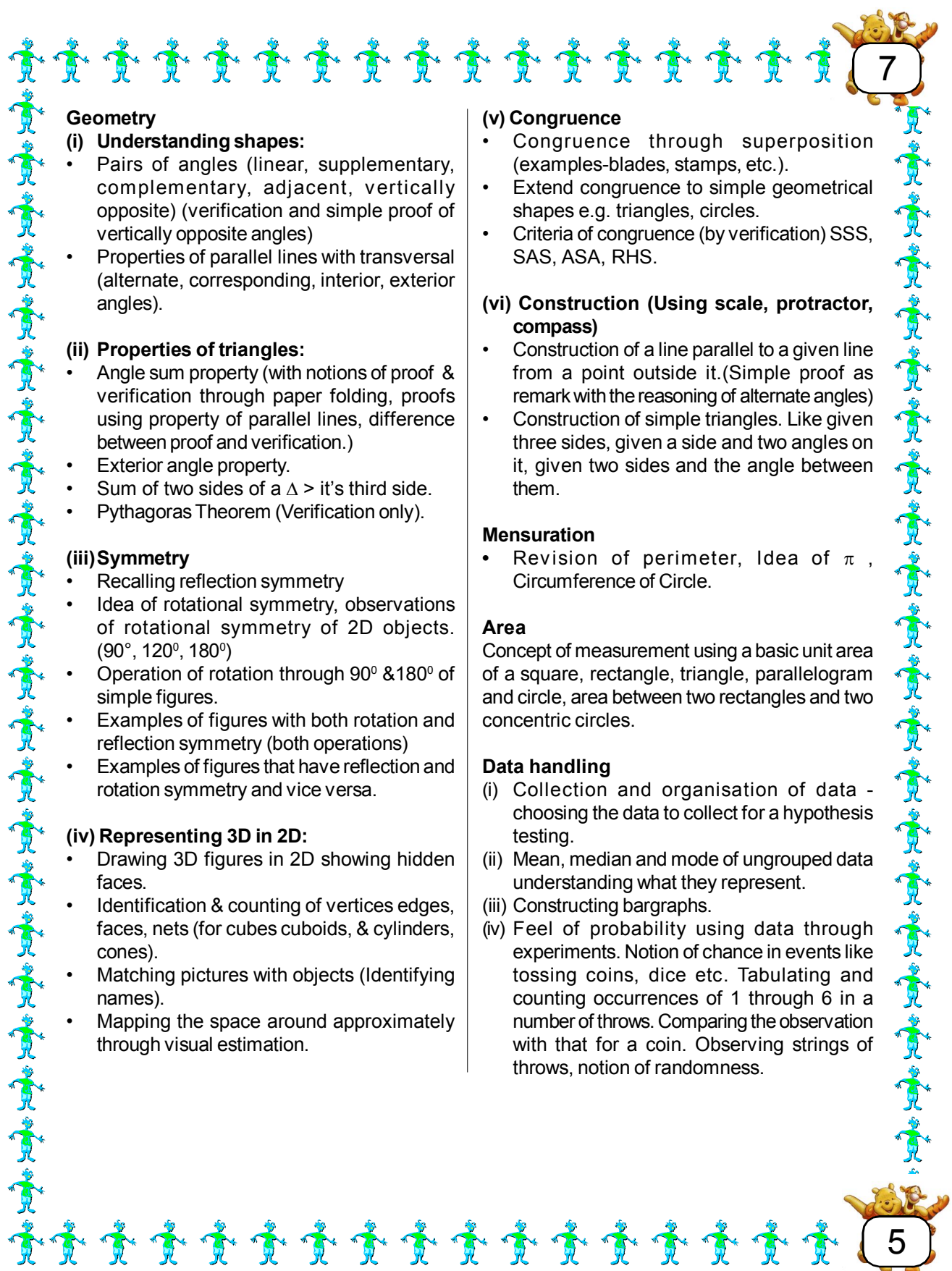
Algebra

Algebraic Expressions

- Generate algebraic expressions (simple) involving one or two variables
- Identifying constants, coefficient, powers
- Like and unlike terms, degree of expressions e.g. $x y^2$ etc. (exponent ≤ 3 number of variables ≤ 2)
- Addition, subtraction of algebraic expressions (coefficients should be integers).
- Simple linear equations in one variable (in contextual problems) with two operations (avoid complicated coefficients).

Ratio and Proportion

- Ratio and proportion (revision)
- Unitary method continued consolidation, general expression.
- Percentage- an introduction.
- Understanding percentage as a fraction with denominator 100
- Converting fractions and decimals into percentage and vice-versa.
- Application to profit & loss (single transaction only)
- Application to simple interest (time period in complete years)



Geometry

(i) Understanding shapes:

- Pairs of angles (linear, supplementary, complementary, adjacent, vertically opposite) (verification and simple proof of vertically opposite angles)
- Properties of parallel lines with transversal (alternate, corresponding, interior, exterior angles).

(ii) Properties of triangles:

- Angle sum property (with notions of proof & verification through paper folding, proofs using property of parallel lines, difference between proof and verification.)
- Exterior angle property.
- Sum of two sides of a $\Delta >$ it's third side.
- Pythagoras Theorem (Verification only).

(iii) Symmetry

- Recalling reflection symmetry
- Idea of rotational symmetry, observations of rotational symmetry of 2D objects. (90° , 120° , 180°)
- Operation of rotation through 90° & 180° of simple figures.
- Examples of figures with both rotation and reflection symmetry (both operations)
- Examples of figures that have reflection and rotation symmetry and vice versa.

(iv) Representing 3D in 2D:

- Drawing 3D figures in 2D showing hidden faces.
- Identification & counting of vertices edges, faces, nets (for cubes cuboids, & cylinders, cones).
- Matching pictures with objects (Identifying names).
- Mapping the space around approximately through visual estimation.

(v) Congruence

- Congruence through superposition (examples-blades, stamps, etc.).
- Extend congruence to simple geometrical shapes e.g. triangles, circles.
- Criteria of congruence (by verification) SSS, SAS, ASA, RHS.

(vi) Construction (Using scale, protractor, compass)

- Construction of a line parallel to a given line from a point outside it.(Simple proof as remark with the reasoning of alternate angles)
- Construction of simple triangles. Like given three sides, given a side and two angles on it, given two sides and the angle between them.

Mensuration

- Revision of perimeter, Idea of π , Circumference of Circle.

Area

Concept of measurement using a basic unit area of a square, rectangle, triangle, parallelogram and circle, area between two rectangles and two concentric circles.

Data handling

- (i) Collection and organisation of data - choosing the data to collect for a hypothesis testing.
- (ii) Mean, median and mode of ungrouped data understanding what they represent.
- (iii) Constructing bargraphs.
- (iv) Feel of probability using data through experiments. Notion of chance in events like tossing coins, dice etc. Tabulating and counting occurrences of 1 through 6 in a number of throws. Comparing the observation with that for a coin. Observing strings of throws, notion of randomness.



Activity work sheet



Why Study Mathematics?



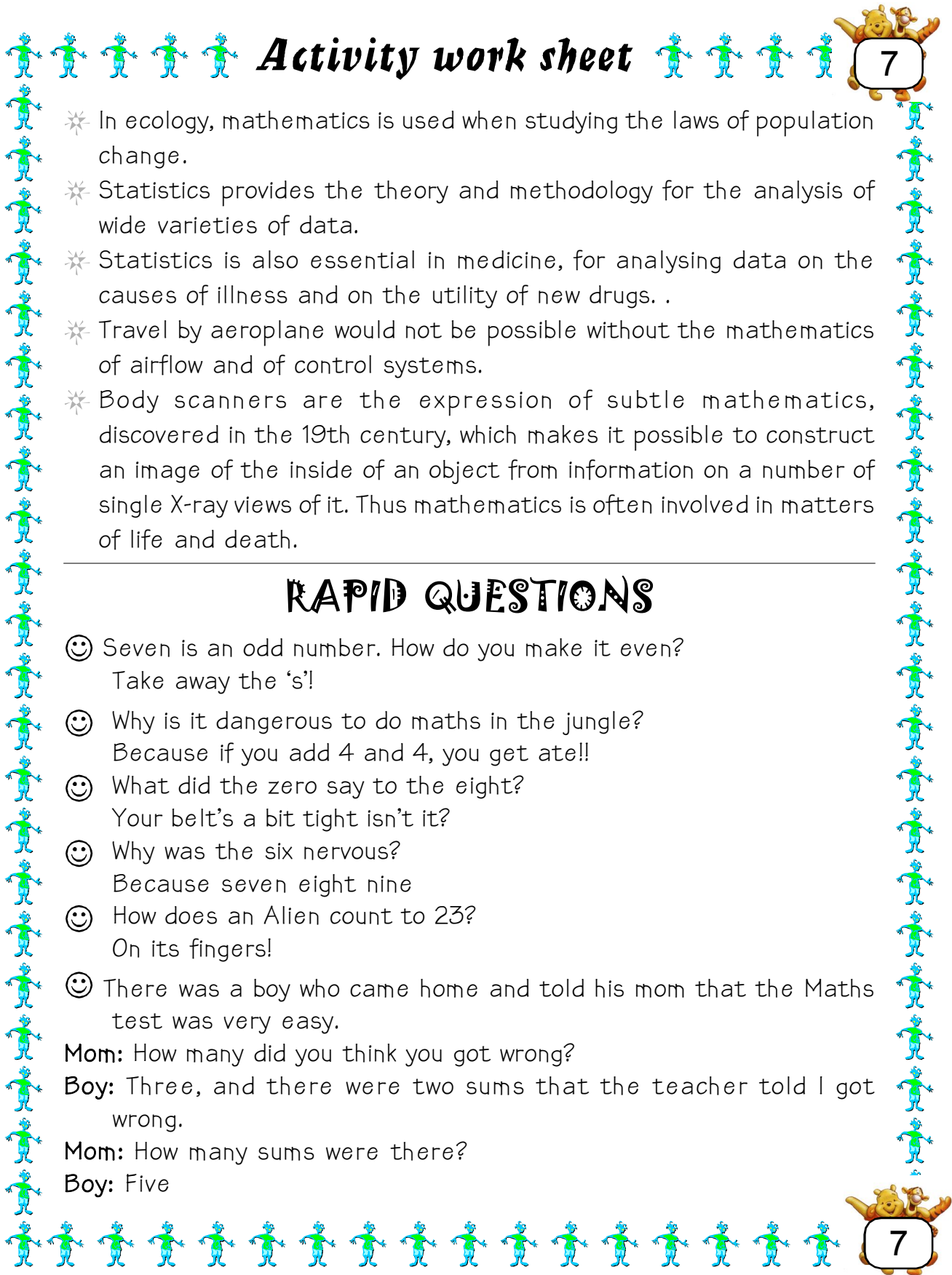
The main reason for studying mathematics to an advanced level is that it is interesting and enjoyable. People like its challenge, its clarity, and the fact that you know when you are right. The solution of a problem has an excitement and a satisfaction.

The importance of mathematics

We see the use of arithmetic and the display of information by means of graphs everyday. These are the elementary aspects of mathematics. Advanced mathematics is widely used, but often in an unseen and unadvertised way.

- ✧ The mathematics of error-correcting codes is applied to CD players and to computers.
- ✧ The stunning pictures of far away planets sent by Voyager II could not have had their crispness and quality without such mathematics.
- ✧ Voyager's journey to the planets could not have been calculated without the mathematics of differential equations.
- ✧ Whenever it is said that advances are made with supercomputers, there has to be a mathematical theory which instructs the computer what is to be done, so allowing it to apply its capacity for speed and accuracy.
- ✧ The development of computers was initiated in this country by mathematicians who continue to make important contributions to the theory of computer science.
- ✧ The next generation of software requires the latest methods from what is called *category theory*, a theory of mathematical structures which has given new perspectives on the foundations of mathematics and on logic.
- ✧ The physical sciences (chemistry, physics, oceanography, astronomy) require mathematics for the development of their theories.







Activity work sheet

- ✧ In ecology, mathematics is used when studying the laws of population change.
- ✧ Statistics provides the theory and methodology for the analysis of wide varieties of data.
- ✧ Statistics is also essential in medicine, for analysing data on the causes of illness and on the utility of new drugs. .
- ✧ Travel by aeroplane would not be possible without the mathematics of airflow and of control systems.
- ✧ Body scanners are the expression of subtle mathematics, discovered in the 19th century, which makes it possible to construct an image of the inside of an object from information on a number of single X-ray views of it. Thus mathematics is often involved in matters of life and death.

RAPID QUESTIONS

☺ Seven is an odd number. How do you make it even?
Take away the 's'!

☺ Why is it dangerous to do maths in the jungle?
Because if you add 4 and 4, you get ate!!

☺ What did the zero say to the eight?
Your belt's a bit tight isn't it?

☺ Why was the six nervous?
Because seven eight nine

☺ How does an Alien count to 23?
On its fingers!

☺ There was a boy who came home and told his mom that the Maths test was very easy.
Mom: How many did you think you got wrong?
Boy: Three, and there were two sums that the teacher told I got wrong.
Mom: How many sums were there?
Boy: Five





Percentage Crossword Puzzle

ROSS

- A unit of money that is based on hundredths.
- This place value is commonly used when converting between decimals and percents.
- The ratio whose second term is 100.
- 100% is represented by one _____.
- The process of changing a fraction to a decimal or to a percent.
- A number that names a part of whole.
- The point having one or more lights to its right.

WN

- The number above the fraction bar that indicates how many equal part of the whole are being considered.
- The number below the fraction bar that indicates how many equal parts are in the whole.
- A percent is based on this number.
- Used to compare two or more quantities.



DOWN

2. The number above the fraction bar that indicates how many equal part of the whole are being considered.
3. The number below the fraction bar that indicates how many equal parts are in the whole.
4. A percent is based on this number.
9. Used to compare two or more quantities.

Tricks For Quicker Mathematics

★ Instant Subtraction

(I) Rule : All from 9 and last from 10

Example : $1000 - 459$

4	5	9
Subtract	↓ from 9	↓ from 9 ↓ from 10
5	4	1

So the answer is $1000 - 359 = 541$

This rule always work for subtractions from numbers consisting of a 1 followed by zeros. Other example is $10,000 - 1736$

1	7	3	6
↓ From 9	↓ From 9	↓ from 9	↓ from 10
8	2	6	4

Hence Answer is $10000 - 1736 = 8264$

Now its your chance - Do the following calculation **mentally** in **3 minutes**.

1. $1000 - 354 =$		6. $1000 - 59 =$	
2. $100 - 28 =$		7. $10000 - 335 =$	
3. $10000 - 2354 =$		8. $10000 - 765 =$	
4. $10000 - 7635 =$		9. $1000 - 507 =$	
5. $1000 - 961 =$		10. $100 - 37 =$	

★ Multiplication of number close to 100.

- Multiply 89×95
- 89 is 11 less than 100.
- 95 is 5 less than 100.
- Write the sentence in the following format

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89	×	11
95		5
84		55

- Subtract 5 from 89 or 11 from 95 you will get 84 (i.e. subtract diagonally)
- Multiply vertically; multiply the numbers in right box i.e.,
 $11 \times 5 = 55$,

Hence $89 \times 95 = 8455$

Now its your chance. Perform following multiplication **mentally** in **5 minutes**.

1. 89×97	4. 97×97	7. 78×93	9. 81×96
2. 89×77	5. 93×95	8. 68×93	10. 88×74
3. 64×99	6. 74×85		

★ Multiplication of numbers just above 100

Multiply $108 \times 107 =$

- Add in this way
 $108 + 7 = 115$ (A)
- Multiply the extreme numbers
 $8 \times 7 = 56$ (B)
- So the answer is 11556

Similarly
 $105 \times 109 = 11445$ By $105 + 9 = 114$; $9 \times 5 = 45$
Answer is 11445

Now its your chance. Do the following Multiplication **mentally** in **5 minutes**

1. $103 \times 104 =$	6. $104 \times 109 =$
2. $105 \times 102 =$	7. $105 \times 104 =$
3. $109 \times 106 =$	8. $106 \times 108 =$
4. $108 \times 104 =$	9. $101 \times 109 =$
5. $107 \times 103 =$	10. $106 \times 103 =$

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Brain Twisters

1. A **pandigital** sum (for addition, subtraction, multiplication or division) is one which uses all of the digits 1 to 9 once and once only.
For example : $128 + 439 = 567$ is a pandigital addition sum.
Find another one.

2. Here is a magic square using the numbers 1 to 16 (with no repeats) arranged so the magic total of the numbers along every row, column and diagonal is 34. It is possible, by replacing **ONLY ONE** of the numbers and then re-arranging all of them, to make the magic total 36.
To do that - which number must be replaced by what?

1	14	15	4
8	11	10	5
12	7	6	9
13	2	3	16

3. Take the 2-digit number 45. Square it (45×45) to make 2025 .
Split this 4-digit number in half to make 20 and 25. Add them ($20 + 25$) to make 45 Which is what you started with.

Find another 2-digit number which does the same.

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