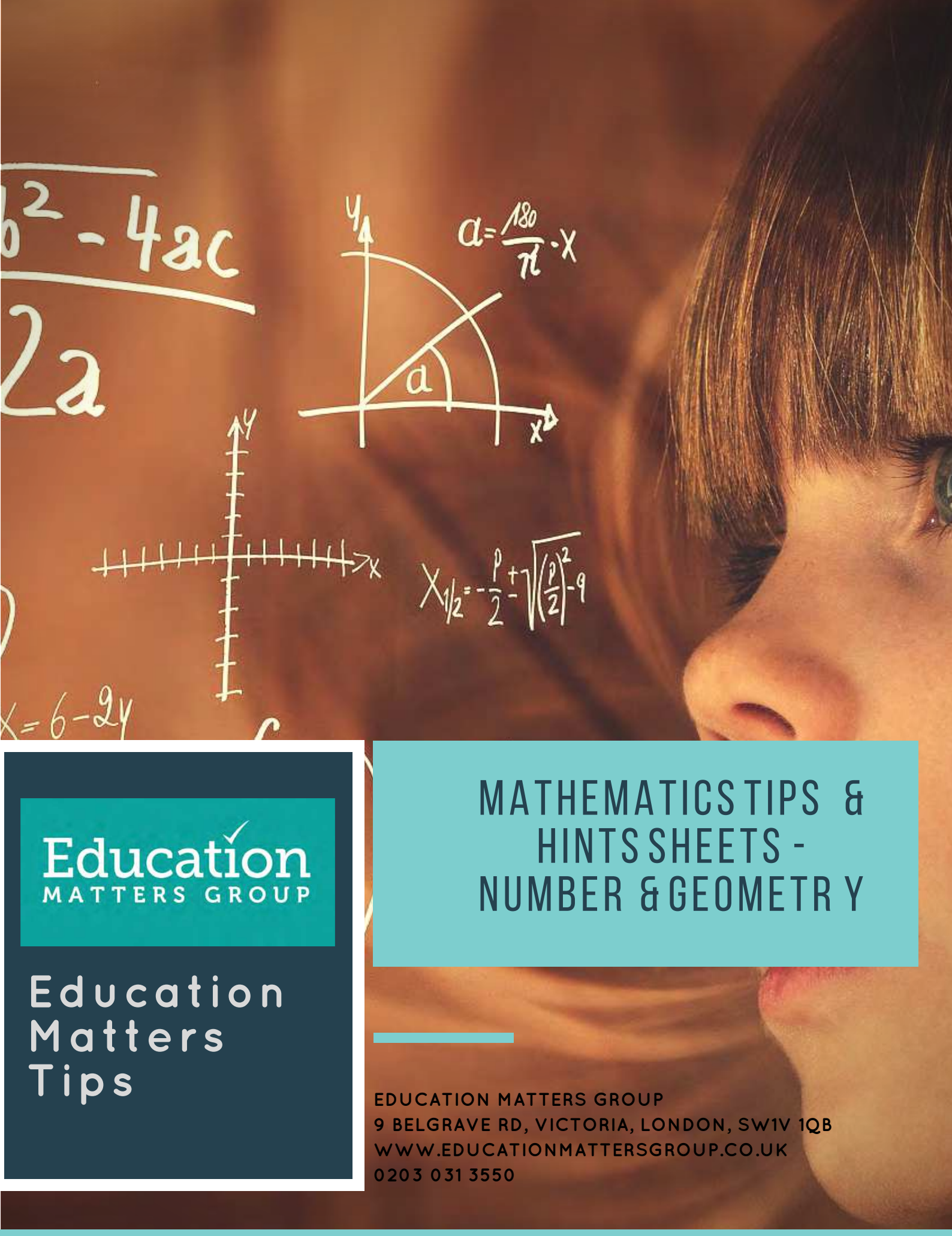

Education
MATTERS GROUP

Education Matters Tips

MATHEMATICS TIPS & HINTS SHEETS - NUMBER & GEOMETRY

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MATHEMATICS TIPS& HINTS SHEETS

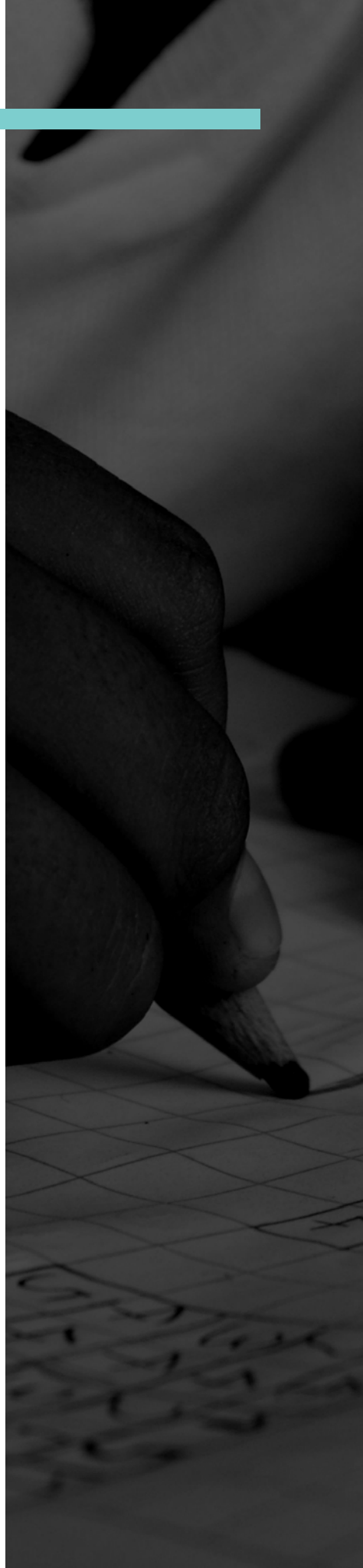
We hope this will give you some valuable hints and tips to help in teaching Mathematics concepts in a positive way.

Whilst these are some guidelines, it is important that you follow what has been set out by the school.

The tips have these topics covered-

- Place Value- Tools that could be used
- Order of operations- Associative, Communtative and Distributive Laws
- Number- Operations and Calculate
- Fractions, Decimals and Percentages
- Ratios
- Geometry- 2D and 3D shapes and their properties
-Calculating areas
-Types of lines
- Statistics& probability

We would suggest that especially with number, students move from using concrete items to using pictorial representations to written abstract methods to consolidate their learning and understanding of concepts taught.



EMG TIPS

Mathematics NUMBER PlaceValue

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Concrete Pictorial Abstract process

Using this process builds upon learning. Students do and see, then draw and see and then be able to write it using a written method.

Followingthe C -P-A-can the studentshow the relationship with the numbersystem using manipulatives first,through pictures or drawings nextand then through a written system ?

Concrete → **Pictorial** → **Abstract**

Students manipulate objects and concrete materials

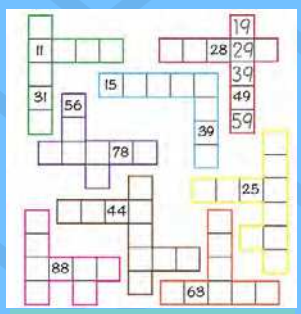
Students draw pictures and diagrams to show learning

Students use numbers and mathematical symbols

Place Value

Tools that could be used- Hundreds grid, Place Value Board, Beads, Number fans, Playing cards, number jigsaw, dice, number beads, place value arrows, counters, dienes

Hundreds grid

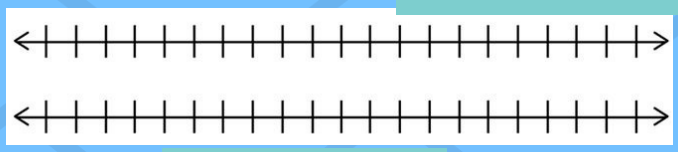


Number jigsaw

Number fans

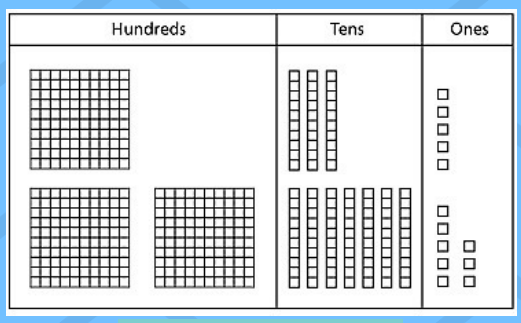
Number beads

Number dice

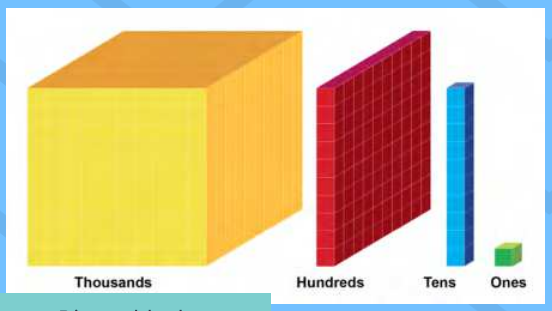


Number line

playing cards

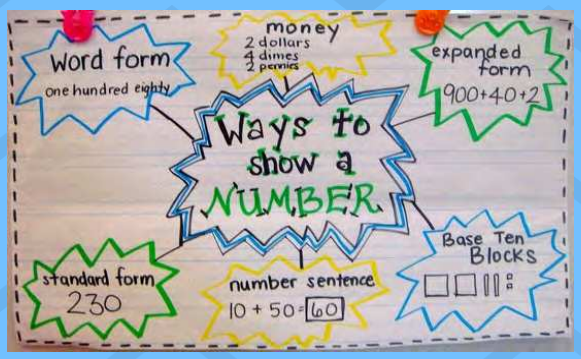


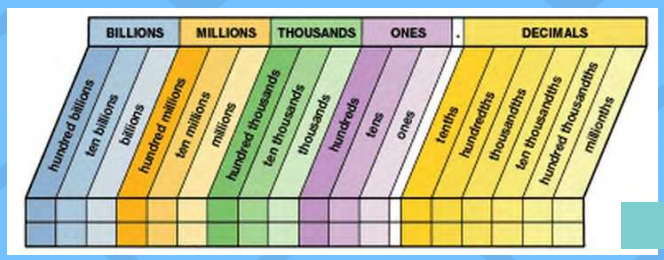
place value grid



Dienes blocks

place value arrows





place value grid

place value counters

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INVESTING IN YOUR FUTURE

EMG TIPS

Mathematics NUMBER Operations& Calculate

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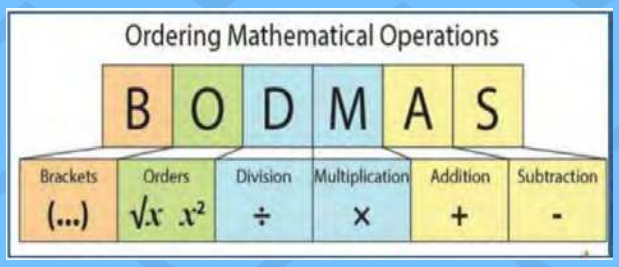
Order of operations

How Do I Remember It All...? BODMAS!
B- Brackets first
O- Orders(i.e. Powers and Square Roots, etc.)
DM- Division and Multiplication(left-to-right)
AS- Addition and Subtraction(left-to-right)



Order of Operations

Do things in Brackets First

✓ $6 \times (5 + 3) = 6 \times 8 = 48$

✗ $6 \times (5 + 3) = 30 + 3 = 33$ (wrong)

Exponents (Powers, Roots) before Multiply, Divide, Add or Subtract

✓ $5 \times 2^2 = 5 \times 4 = 20$

✗ $5 \times 2^2 = 10^2 = 100$ (wrong)

Multiply or Divide before you Add or Subtract

✓ $2 + 5 \times 3 = 2 + 15 = 17$

✗ $2 + 5 \times 3 = 7 \times 3 = 21$ (wrong)

Otherwise just go left to right

✓ $30 \div 5 \times 3 = 6 \times 3 = 18$

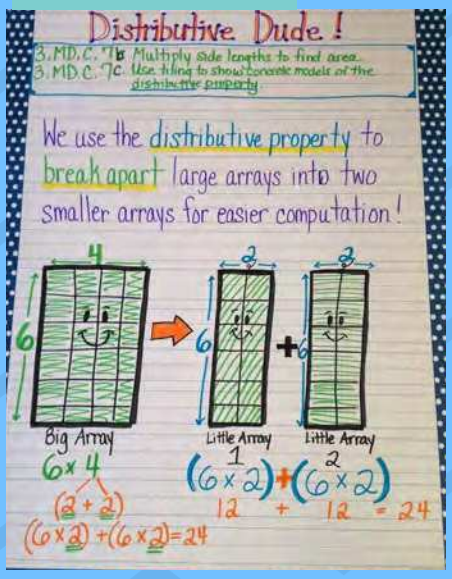
✗ $30 \div 5 \times 3 = 30 \div 15 = 2$ (wrong)

Concrete → Pictorial → Abstract

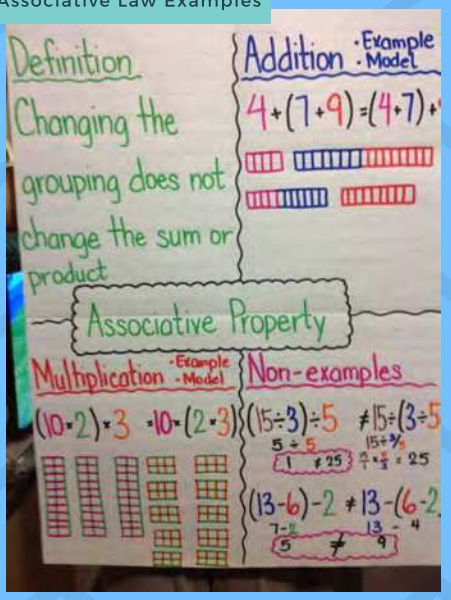
Followingthe C -P-A-can the studentshow the relationship with the numbersystem using manipulatives first,through pictures or drawings nextand then through a written system ?
Alsousing the tools from the firstpage ,think of ways you can combine the concreteexamples firstto then getto some of the pictorial versions above

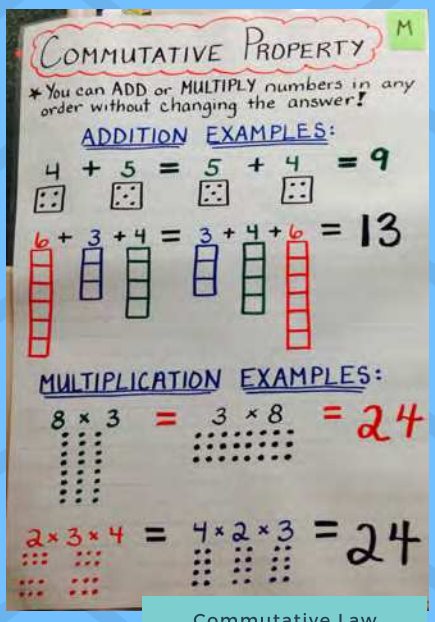
Youcould use -place value grid ,dienes ,place value counters ,number lines andthen progress to using pictures to explain their understanding

Distributive Law Examples



Associative Law Examples





Commutative Law Examples

EMG TIPS

Mathematics Calculate

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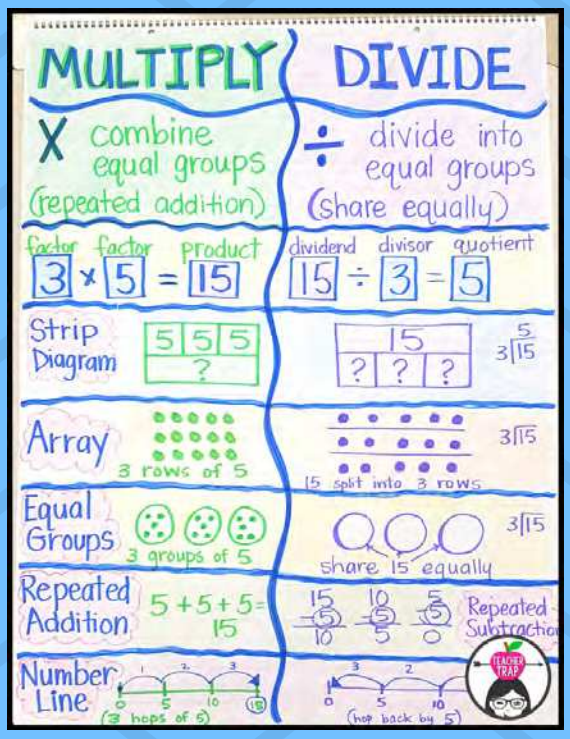
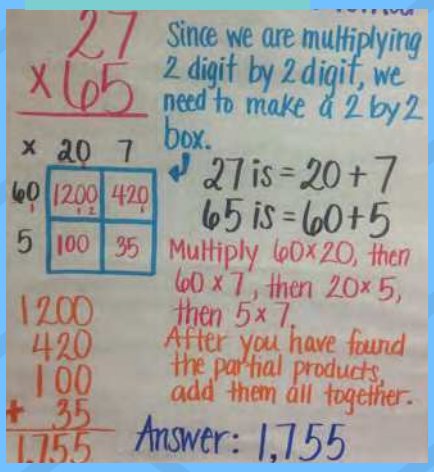
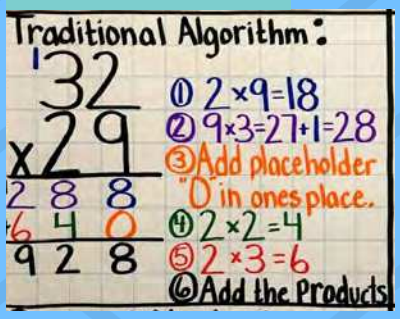
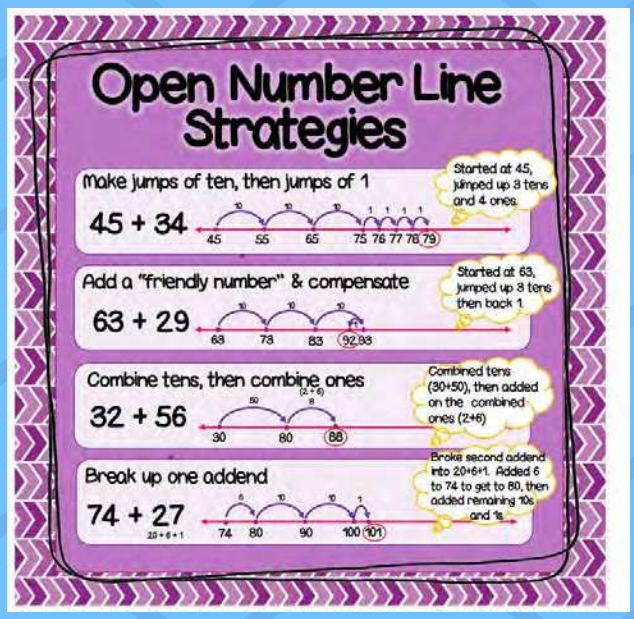


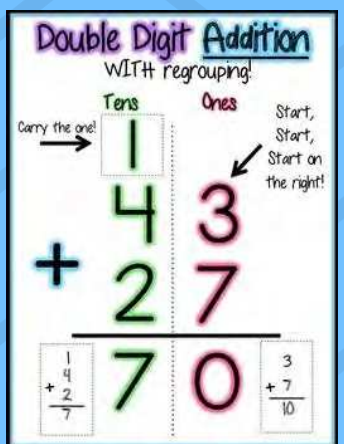
Grid Method

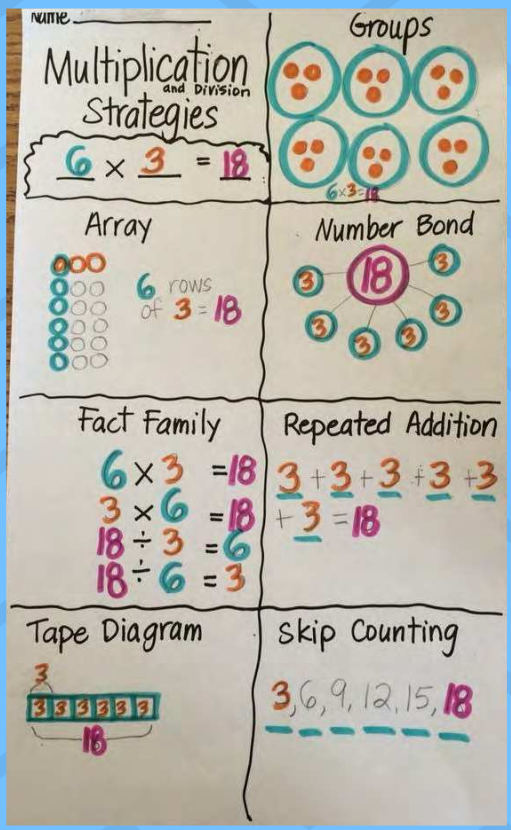


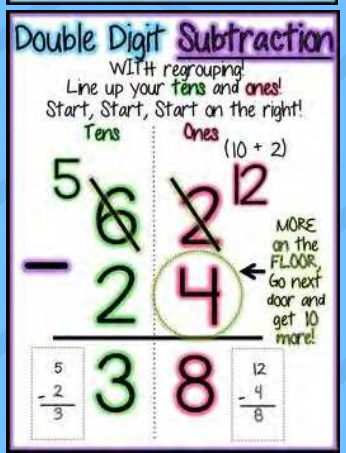
Column Method

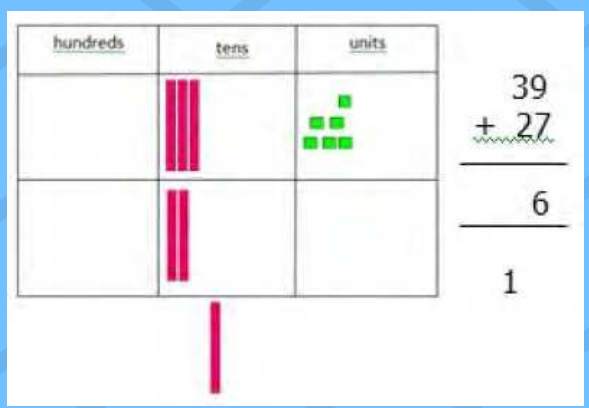












EMG TIPS

Mathematics Fractions,Decimals andPercentages

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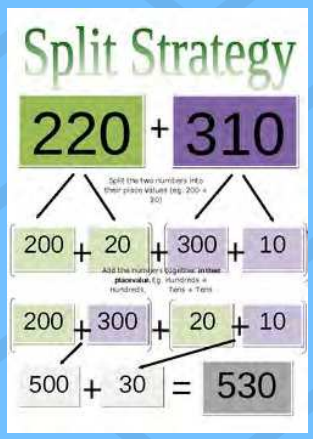
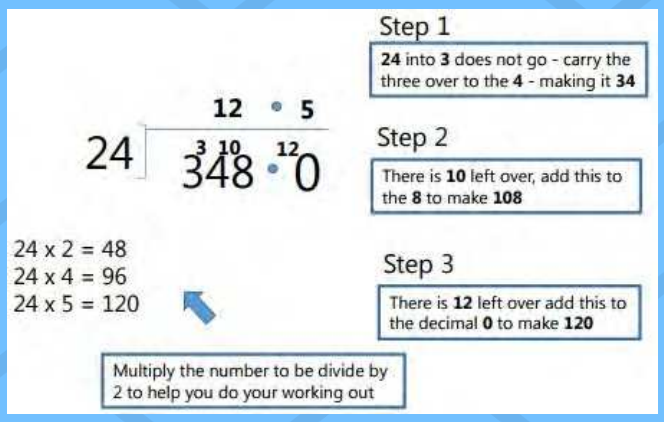
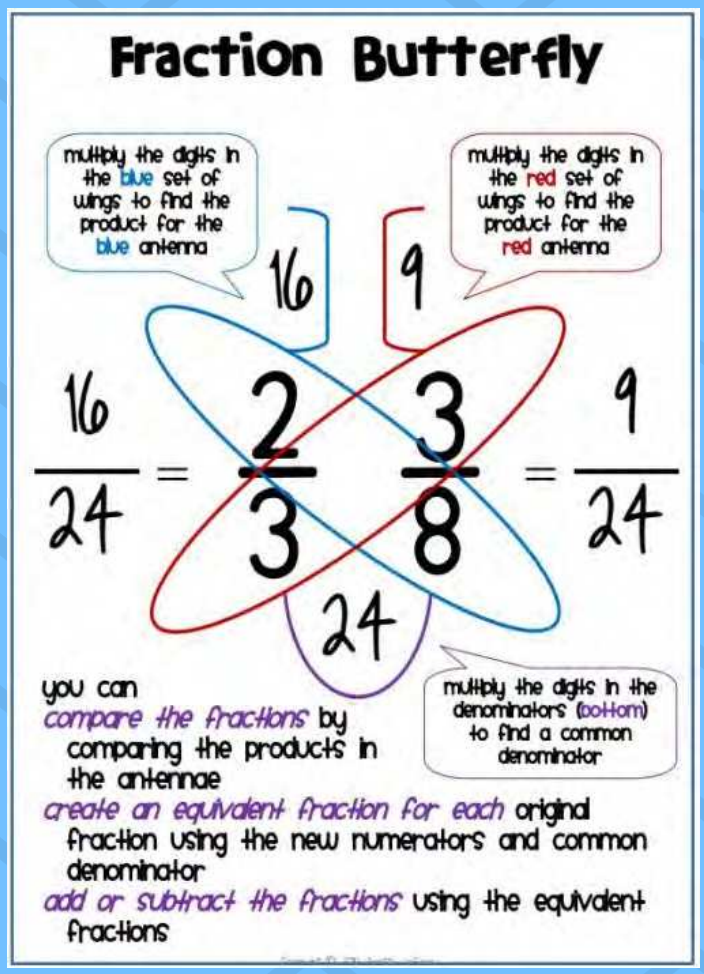
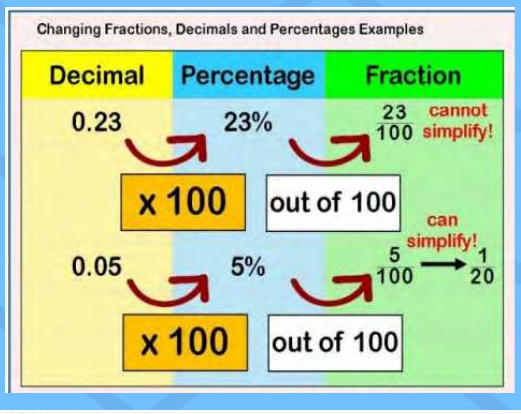
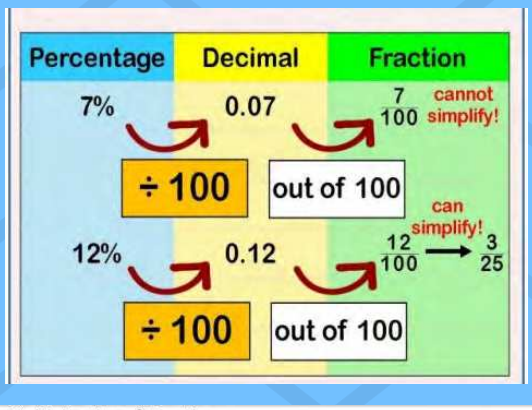


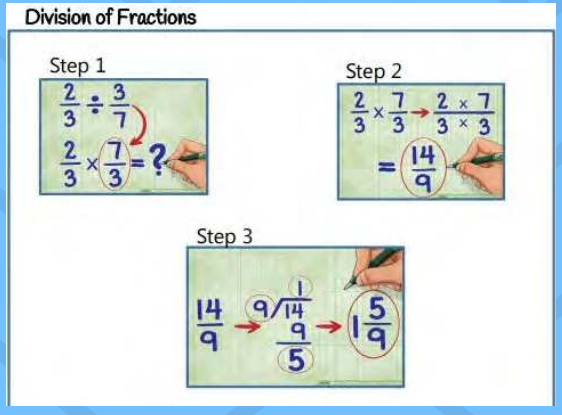


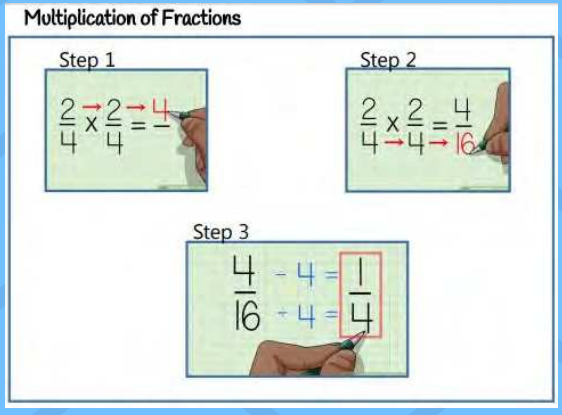


Fraction	Percent	Decimal
1	100%	1.0
1/2	50%	0.5
1/3	33.3%	0.33
1/4	25%	0.25
1/5	20%	0.2
1/6	16.6%	0.166
1/8	12.5%	0.125
1/10	10%	0.1
1/12	8.3%	0.083









EMG TIPS

Mathematics
Calculate-Ratios

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ratio

A ratio shows the relative sizes of two or more like values.

A ratio may compare a selected number of parts to other parts in the whole, or compare the selected number of parts to the total number of all parts in the whole.

part-part  4:6 part-part

or

part-whole  $\frac{4}{10}$ part-whole

These relative values in a ratio are often called part-part or part-whole.

A ratio can be written as:

four to six, 4 to 6, 4:6 or $\frac{4}{6}$

The numbers in a ratio are called terms.
A ratio may have more than two terms, e.g. 4:5:3:1

simplifying a ratio

Simplifying a ratio means reducing its terms to the lowest possible numbers by dividing the terms by the same number.

÷10 ÷5 ÷2 ÷2

800:1000 80:100 16:20 8:10 4:5

÷10 ÷5 ÷2 ÷2

We can use a series of small numbers, or, use the largest number possible by finding the highest common factor (HCF or GCF) to divide each term.

Determining Ratios

A Ratio is a comparison or a relationship between two items.

The Ratio of Blue Circles to Pink Circles is five blue circles compared to three pink circles.

We can write this in any three of the following ways:

Blue to Pink = 5 to 3 or 5 : 3 or 5/3

Equivalent Ratios

If we double our circles we now have 10 Blue circles to 6 Pink circles. There are still 5 Blue Circles for every three Pink circles. We simply now have two of these groupings.

This means the simplest Ratio we can write for our situation is Blue to Pink = 5 : 3.

The Ratios 10 : 6 and 5 : 3 are said to be "Equivalent".

Ordering of Ratios

We can express our Ratio comparison in two ways :

Blue Circles to Pink Circles or
Pink Circles to Blue Circles

Blue to Pink = 5 to 3 or 5 : 3 or 5/3

Pink to Blue = 3 to 5 or 3 : 5 or 3/5

EMG TIPS

Mathematics
Geometry

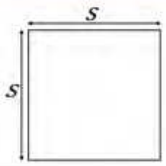
Education MATTERS GROUP

2D shapes
Perimeter and Area

SQUARE

$P = 4s$

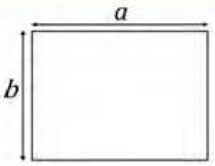
$A = s^2$



RECTANGLE

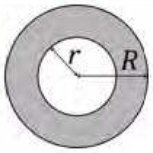
$P = 2a + 2b$

$A = ab$



CIRCULAR RING

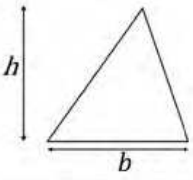
$A = \pi(R^2 - r^2)$



TRIANGLE

$P = a + b + c$

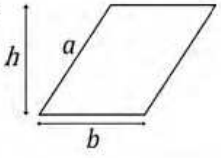
$A = \frac{1}{2}bh$



PARALLELOGRAM

$P = 2a + 2b$

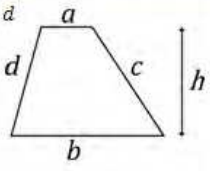
$A = bh$



TRAPEZOID

$P = a + b + c + d$

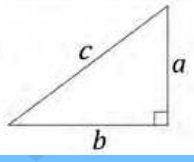
$A = h\frac{a+b}{2}$



PYTHAGOREAN THEOREM

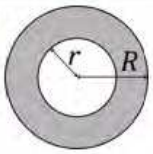
$a^2 + b^2 = c^2$

$c = \sqrt{a^2 + b^2}$



CIRCULAR RING

$A = \pi(R^2 - r^2)$



SPHERE

$S = 4\pi r^2$

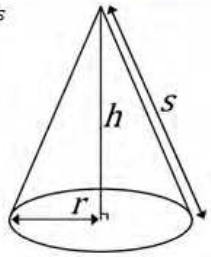
$V = \frac{4\pi r^3}{3}$

RIGHT CIRCULAR CONE

$A = \pi r^2 + \pi rs$

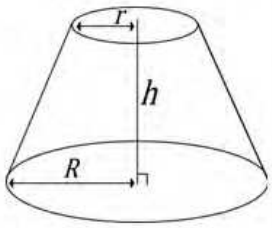
$s = \sqrt{r^2 + h^2}$

$V = \frac{1}{3}\pi r^2 h$



FRUSTUM OF A CONE

$V = \frac{1}{3}\pi h(r^2 + rR + R^2)$



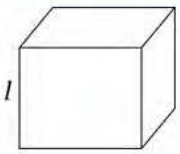
A square is a four sided regular polygon.; The rectangle is a 4 sided polygon, quadrilateral, with right angle corners.; The circle is a shape where all points along the shape are equal distance from a specific point. This point is the center of the circle and the distance to the center of the circle is the radius.; The triangle is a 3 sided polygon. Triangles can be classified by their sides:Equilateral triangles: All sides are equal in length., Isosceles triangles: Two sides are equal in length., Scalene triangles: All sides have different lengths., Triangles can also be classified by their angles: Right triangle: One angle is 90 degrees., Oblique triangle: Has no angle equal to 90 degrees., Obtuse triangle: One angle is greater than 90 degrees., Acute triangle: All angles are less than 90 degrees.; A parallelogram is a 4 sided polygon or quadrilateral with two sets of parallel sides. The opposite sides are equal in length;.A trapezoid is a 4 sided polygon or quadrilateral with one set of parallel sides.

3D shapes
Area and volume

CUBE

$A = 6l^2$

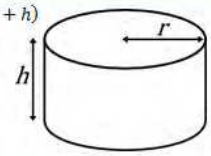
$V = l^3$



CYLINDER

$A = 2\pi r(r + h)$

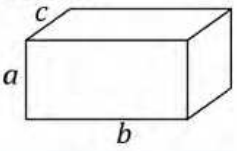
$V = \pi r^2 h$

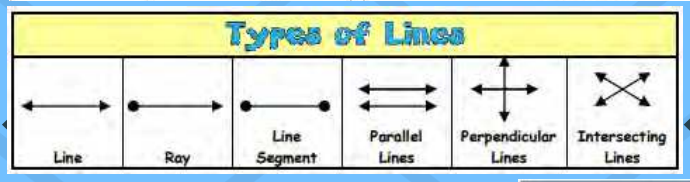


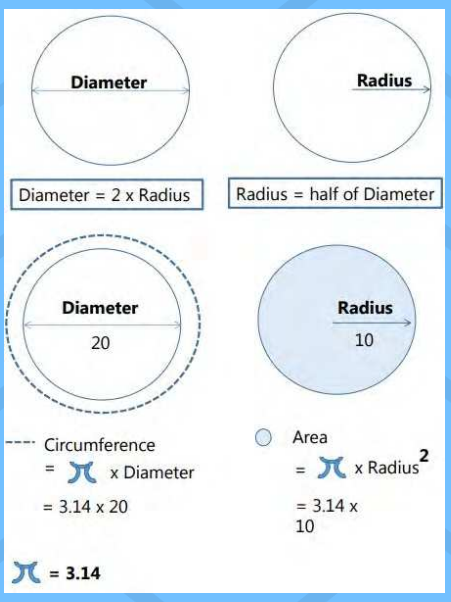
RECTANGULAR BOX

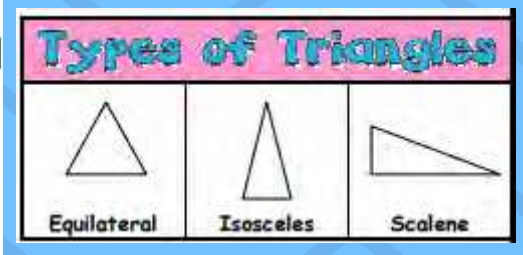
$A = 2ab + 2ac + 2bc$

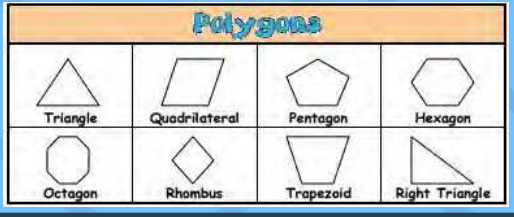
$V = abc$

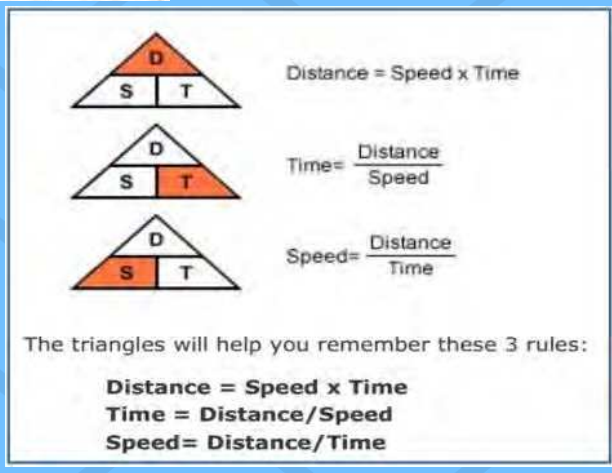












EMG TIPS

Mathematics Statistics& Additionaltips

Education MATTERS GROUP

Mean

Add all the numbers then divide by the amount of numbers

9, 3, 1, 8, 3, 6

9 + 3 + 1 + 8 + 3 + 6 = 30

30 ÷ 6 = 5

The mean is 5

Median

Order the set of numbers, the median is the middle number

9, 3, 1, 8, 3, 6

1, 3, 3, 6, 8, 9

*NB

The median is 4.5

Mode

The most common number

9, 3, 1, 8, 3, 6

The mode is 3

Range

The difference between the highest number and lowest number

9, 3, 1, 8, 3, 6

9 - 1 = 8

The range is 8

JOINING PROBLEMS

Join (Result Unknown) 6 + 3 = __	Join (Change Unknown) 4 + __ = 7	Join (Start Unknown) __ + 4 = 6
Mr. Smith had 6 cookies. Suzy gave him 3 more cookies. How many cookies does Mr. Smith have now?	Mr. Smith had 4 cookies. Suzy gave him some more. Then, Mr. Smith had 7 cookies. How many cookies did Suzy give Mr. Smith?	Mr. Smith had some cookies. Suzy gave him 4 more cookies. Then, he had 6 cookies. How many cookies did Mr. Smith start with?

SEPARATING PROBLEMS

Separate (Result Unknown) 7 - 4 = __	Separate (Change Unknown) 5 - __ = 1	Separate (Start Unknown) __ - 4 = 4
Mr. Smith had 7 cookies. He gave 4 of them to Suzy. How many cookies did Mr. Smith have left?	Mr. Smith had 5 cookies. He gave some to Suzy. Then, he had 1 cookie left. How many cookies did Mr. Smith give to Suzy?	Mr. Smith had some cookies. He gave 4 to Suzy. Then, he had 4 cookies left. How many cookies did Mr. Smith have to start with?

PART – PART – WHOLE PROBLEMS

Part - Part - Whole (Whole Unknown) 6 + 3 = __	Part - Part - Whole (Part Unknown) 7 - 4 = __ or 4 + __ = 7
Mr. Smith had 6 white cookies and 3 pink cookies. How many cookies did Mr. Smith have altogether?	Mr. Smith had 7 cookies. 4 were pink and the rest were white. How many white cookies did Mr. Smith have?

COMPARING PROBLEMS

Compare (Difference Unknown) 5 - 3 = __ or 3 + __ = 5	Compare (Quantity Unknown) 3 + 2 = __	Compare (Referent Unknown) 8 - 5 = __
Mr. Smith had 5 cookies. Suzy had 3 cookies. How many more cookies did Mr. Smith have than Suzy?	Mr. Smith had 3 cookies. Suzy had 2 more cookies than Mr. Smith. How many cookies did Suzy have?	Mr. Smith had 8 cookies. He had 5 more than Suzy. How many cookies did Suzy have?

The 9 Problem Solving Strategies

1. **Look for the important words in the question**
   - Write them down.
   - Underline them.
   - Make sure I know what to do.
2. **Look for a pattern**
   - Can I see something happening over and over again?
   - Will this help me solve the problem?
3. **Have a go**
   - Try an answer.
   - Does the answer make sense?
4. **Use a table or a chart**
   - Will something like this help?
5. **Use a drawing**
   - Can I draw something about the problem?
   - Will this help me to find the answer?
6. **Work backwards**
   - Can I start at the end of the question to help work it out?
   - Will my answer work?
7. **Try an easier problem**
   - Can I change the numbers in the question to make it simpler?
   - Will this make finding the answer easier?
8. **Make a model**
   - Can I use paper or blocks to help me find the answer?
   - Can I use people to help me find the answer?
9. **Think logically**
   - Can I tell something about the answer straight away?
   - Can I get rid of answers that are not correct?

Problem Solving Model

Read It! — UNDERSTAND THE PROBLEM

- Read the problem 2, maybe 3 times. Highlight or underline important information.
- Talk it! – talk about the problem to understand it better.

Think It! — MAKE A PLAN

- What strategy will you use and why?
- Talk it! – discuss strategies with a partner.
- What manipulatives will you use?

Solve It! — CARRY OUT THE PLAN

- Apply your strategy.
- You may need to revise and try a different strategy.....
- Show your work (thinking).
- Ask yourself...
  - Is your answer reasonable?
  - Does it make sense?

Explain It! — COMMUNICATE THE SOLUTION

- Answer the question!
- Tell, show, write, ... how the answer was reached. Consider extensions.
- First I... I noticed that... Then I... I thought... Finally...