

# TEACHING PRIMARY MATHEMATICS

	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

## RICH ACTIVITIES, INVESTIGATIONS & GAMES BOOKLET



**CURRICULUM, MEASUREMENT AND EVALUATION UNIT  
MINISTRY OF EDUCATION & HRD  
COMMONWEALTH OF DOMINICA  
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## **INTRODUCTION**

Children learn mathematics by through active involvement in meaningful and purposeful rich mathematical activities. Such activities may involve discussing, estimating, measuring, calculating, making predictions etc.

This booklet outlines a number of activities suited to encourage mathematical learning. It is divided into three parts. The first part discusses ‘What is a rich mathematical activity?’ and gives many examples of such. The second part is a compendium of number investigations. Investigations are by themselves rich activities. They are also ideally suited for differentiation. Faster students can be challenged by an investigation to go further or answer subsequent “What if?” questions, while slower students may be challenged to search for patterns amidst the data collected. The last part of the booklet gives examples of mental starters and simple games. With the advent of the computer, many excellent games sites are available and the use of such will enhance student motivation and knowledge.

### **Mathematics lesson planning**

A typical mathematics lesson can begin with some kind of mental starter. This may be a small problem or some mental activity as given in the booklet. Doing these on a regular basis alongside interactive games will increase students’ mental mathematics capacities and allow them to calculate more confidently and quickly.

Lesson objectives should be clearly stated in your lesson plans as with activities that allow for differentiation, which is an indication of how you will deal with faster and slower students. Rich activities, such as investigations or other problems are often ideal starters that incorporate differentiation. Ensure that students are actively involved throughout the lesson. Remember, that listening and seeing is passive involvement. The lesson should end with some sort of plenary. A review of the lesson by one or more students (‘What did you learn?’) and a look forward to the next lesson.

See [http://www.croydonmaths.org.uk/lesson\\_plans.htm](http://www.croydonmaths.org.uk/lesson_plans.htm) for some sample plans and also

<http://www.cimt.plymouth.ac.uk/projects/mepres/primary/default.htm>.

<http://www.woodlands-junior.kent.sch.uk/teacher/maths.html>

[http://www.bbc.co.uk/schools/teachers/ks2\\_lessonplans/maths/index.shtml](http://www.bbc.co.uk/schools/teachers/ks2_lessonplans/maths/index.shtml) etc.

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Senior Education Officer

## RICH MATHEMATICAL ACTIVITIES

### Open questions

**Children learn Mathematics effectively by experimenting, questioning, reflecting, discovering, inventing and discussing. The greater part of any Mathematics lesson should then be devoted to getting children engaged in such meaningful thinking experiences. The transmission of factual content should accordingly be of much reduced significance.**

Open ended and investigational activities often meet the above requirements. Open ended questions, as opposed to the traditional closed form of questions, usually elicit multiple correct answers from children. Such questions are easily formed by simply turning a closed question around.

For example:

Closed question	Open question
1. What is $12 + 6$	What sums will give 18 as an answer?
2. What is the area of a rectangle 3cm long and 5cm wide?	What are the dimensions of rectangles with the area $15\text{cm}^2$ ?
3. How many lines of symmetry has a square?	Which shapes have four lines of symmetry?

Open questions can easily be extended by asking follow-up “What if?” or “What about?” type questions.

For example:

Open question	Extension
1. What sums will give 18 as an answer?	What if 19 was the answer? What about the products?
2. What are the dimensions of rectangles with area $15\text{cm}^2$ ?	What about the dimensions of circles, triangles etc. with area $15\text{cm}^2$ ?
3. Which shapes have four lines of symmetry?	What about shapes have 2 lines, 6 lines of symmetry?

Thus, while the initial open questions may be accessible to all children, the easily formed extensions may provide sufficient challenge for even the most able child.

### **What makes a rich mathematical activity?**

Rich mathematical activities are often based on an open ended questions. Activities which encourage this form of active learning are those which:

- **should be accessible to everyone.**
- **allow for further challenges and be extensible.**
- **invite children to make decisions.**
- **involve children in speculating, hypothesis making and testing, proving or explaining, reflecting or interpreting.**
- **promote discussion and communication.**
- **encourage ‘what if’ and what if not’ questions.**
- **are enjoyable.**

### *Some basic ideas*

Start with exploratory ideas like:

**How many different:** ways to work out  $21 \times 13$ ? .... Ways to draw an equilateral triangle? .... Ways to construct a cube?

**Is it true that:**  $5 \times 8$  is the same as  $8 \times 5$ ? ...  $12 \times 42 = 21 \times 24$ ?

**Start with an answer:** explore ..... What was the question? E.g. the answer is 34 – how many different questions/computations can you make that give 34 as an answer?

**Start with a statement:** investigate its truth. E.g. tall people have long fingers or shorter children breathe slower than taller children or the distance around your neck is double the distance around your wrist etc.

**Start with a problem:** does it have sufficient information to solve it? .... What else may be required? ... How many different ways can you solve it? .... Which method is the best? .... Why?

## More rich mathematical activities

Here are some more ideas that can promote thinking. They can be used as lesson starters or developed into investigation type lessons or used as activities within a lesson. It is easy to extend or modify this list to suite the grade level of students you teach.

For each activity consider:

To what extent might students enjoy them?

How many of the students in your class work with these?

How might you extend each of these to challenge more able students?

To what extent would these items promote group discussion in your class?

Which of these activities would involve students in making decisions? In making hypotheses and testing them? In explaining or justifying to others?

### Start with a statement

Investigate the truth of these:

- Everyone has the same hand span.
- Tall people are heavier than short people.
- Students of the same age have the same weight.
- An odd number added to an odd number makes an odd number.
- Numbers divisible by 2 end in 0, 2, 4, 6 and 8.
- The sum of two numbers is always smaller than their product.

### Is it true that:

- All prime numbers are odd?
- 10% of \$100 is the same as 100% of \$10?
- $12 \times 10$  is the same as  $6 \times 20$ ?
- $8 \times 6$  is the same as  $12 \times 4$ ?
- An odd number when multiplied by an even number is always an even number?
- The sum of the digits of a multiple of 3 is always divisible by 3?

- All multiples of 5 are multiples of 10?
- $8^2 = 4^2 + 4^2$ ?  $6^2 = 3^2 + 3^2$ ? Etc

**How many different ways to:**

- Work out 25% of 100?
- Draw a line perpendicular to another?
- Form the net of a cube/cuboid?
- Calculate  $\frac{2}{3}$  of 24?
- Solve simple problems such as –

A bus can hold 18 students. How many buses are needed to transport 93 students to picnic site?

**Start with an answer**

- How many different computations can you make that give 15 as an answer?
- How many different rectangles can you draw with area  $18 \text{ cm}^2$ ?
- Which shapes have four right angles? Two right angles?
- Which shapes have perimeter 10 cm?
- Which three numbers can you add/multiply that give 68 as an answer?
- I have ten marbles altogether in my two pockets. How many marbles could I have in each pocket?
- Which numbers when multiplied together make 24?

**Always, sometimes, never true**

- All numbers in the six times tables are divisible by 3.
- Division always makes a number smaller.
- The sum of the lengths of the two shorter sides of a triangles is always greater than the length of the longest side.

- A three digit number added to a three digit number makes a four digit number.
- A number that has only three factors is a square number.
- The sum of two consecutive numbers is a square number.

**Give an example of ... (and another and another)**

- Two numbers whose sum is 2
- A pair of numbers that differ by three
- A pair of numbers whose product is 60.
- An isosceles triangle.
- An object whose mass is about 1 kg
- A number with five factors

**Hard and easy**

Give an example of an easy or simple example and a hard or complicated example of:

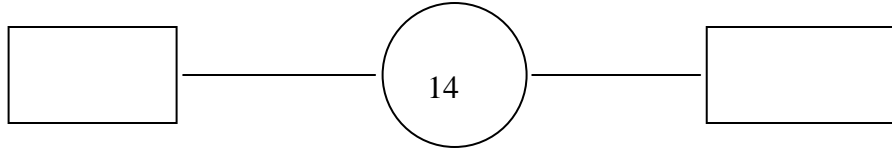
- A calculation whose answer is six
- A two digit addition
- A multiplication of a two digit number by a single digit number
- An addition of fractions
- A non routine word problem
- Two equivalent fractions

# OPEN-ENDED ACTIVITIES IN NUMBER OPERATIONS

## Some Starting Points

### ADDITION

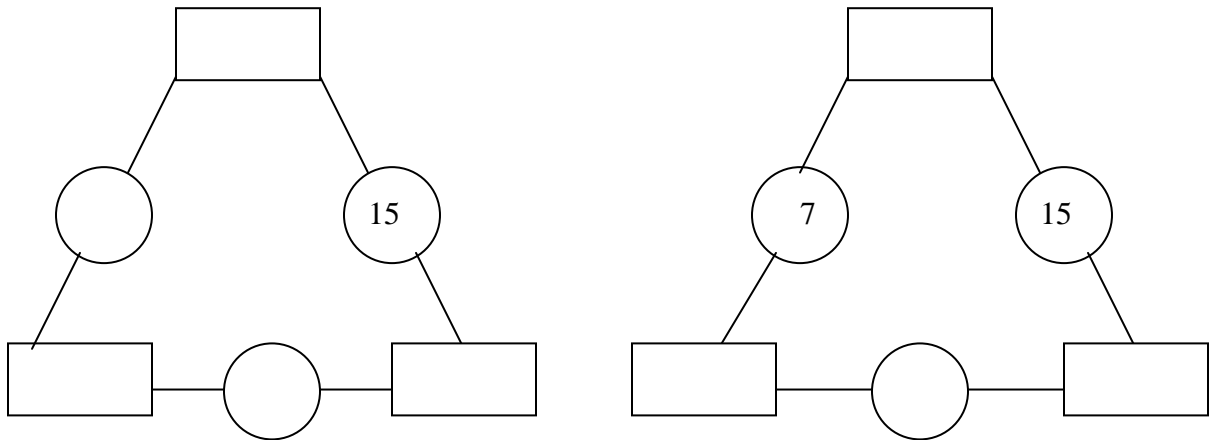
1.



Fill in the two boxes so that their sum is 14. How many ways can this be done? Try with other numbers.

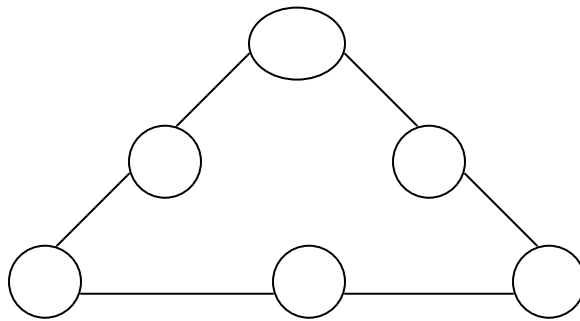
2. The above idea can be extended to the “arithmogon”

e.g.



The sum of the numbers in the boxes on any side must equal the number in the circle on that side of the box.

3. A variation on this theme is to fill the circles below with the numbers 1, 2, 3, 4, 5 or 6 so that the sum of each side is equal to 9. Can the numbers 1 – 6 be fitted to make side sums of 10, 11 etc?





4.

3	4	7	11	18
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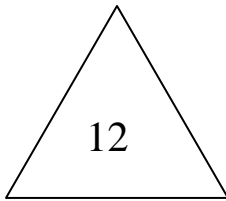
The cells in this 5 cell box are filled in by adding the two previous numbers  
 e.g.  $7 = 3 + 4$ ,  $11 = 4 + 7$ . Complete the following:

4				29
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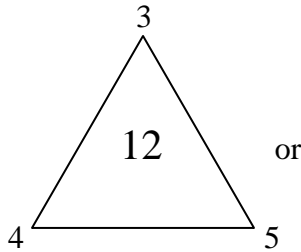
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Make your own

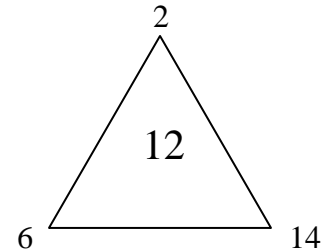
5.



Put numbers at each corner so that their sum is 12.  
 e.g.

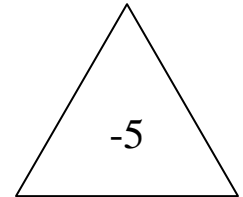
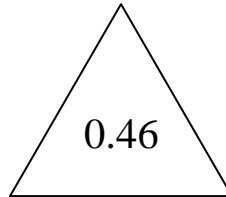
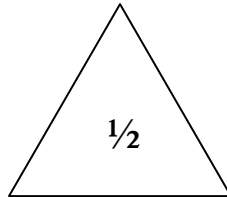
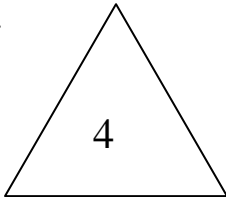


or

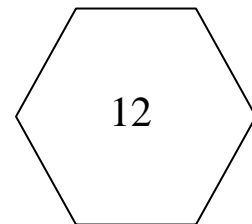
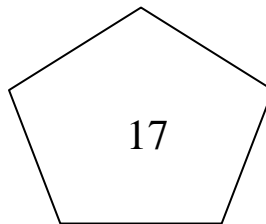
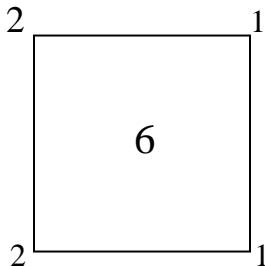


How many solutions can you get? Put a number of your choice in the centre and repeat.  
 This activity is suitable for all ages and abilities.

e.g.

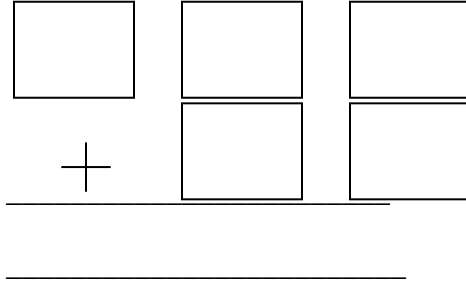


Squares or pentagons etc. can of course be used.



6. Which numbers between 0 and 99 have a digit of 8 (e.g. 62, 44). Any patterns?  
 How about numbers between 0 and 999? With other digit sums?

7. Choose any five numbers. How many different addition sums can you make using these numbers? What numbers cannot be made?
8. Arrange the numbers 1, 2, 3, 4, 5 in the sum



so that the answer is as large as possible; so that the answer is as small as possible. Repeat for other arrangements.

9.  $7 = 3 + 4$
- Which numbers can be made as the sum of two consecutive numbers? Which numbers cannot be made? How about if you use three consecutive numbers?
10. The addition square

+	2	7
3		
8		

is easily completed as

+	2	7
3	5	10
8	10	15

Can you complete

+			
		4	8
		7	11

Try others. Which ones work?

11. Take a two digit number e.g. 41, reverse it, 14 and add the two ( $41 + 14 = 55$ ). Repeat for other two digit numbers. What do you notice? What about three digit numbers?
12. What numbers can you make by adding threes and fives together?

e.g.  $3 + 3 + 3 + 3 = 12$   
 $3 + 5 + 5 = 13$

Can you make all the numbers between 10 and 20? Which numbers can't you make? Repeat for other number pairs e.g. fours and sevens.

14. The number 3 can be split up in four different ways:

$$1 + 1 + 1 \qquad 1 + 2, \quad 2 + 1, \quad 3$$

How many ways can the number 4 be split up? 5 or 6?

15. The digits of 302 are 3, 0, 2 and add up to 5. What about other totals?

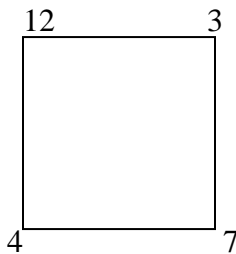
### ***SUBTRACTION***

1. Take a two digit number e.g. 85. Reverse the digits (58).

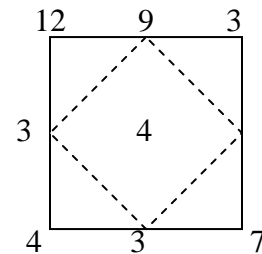
$$\begin{array}{r} \text{Subtract} \quad 85 \\ - 58 \\ \hline 27 \end{array}$$

Repeat for other two digit numbers. What do you notice? Any patterns? Rules? What happens if you use three digit numbers? Four digit numbers?

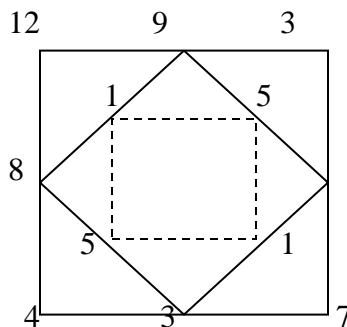
2. Write a number at each of the four corners of a square e.g.



Write the difference between each pair at the mid-point of each side.



Find the difference between each number pair formed by the new square. Write the answer at the mid-point of each side viz.



Keep on repeating this process. What do you notice?

Repeat for other starting numbers. How many squares do you need to reach a square with corner numbers 0, 0, 0, 0

3. The subtraction square

-	4	2
12		
7		

is completed as

-	4	2
12	8	10
7	3	5

Can you complete this reverse square?

-		
	5	9
	7	11

Try others, which ones work?

4. Arrange the numbers 1, 2, 3, 4, 5 in the subtraction

-		

so that the answer is as small as possible, so that the answer is as large as possible. Repeat for other arrangements, other numbers.

5. Write down two digit numbers whose digit difference is 6.

e.g. 93, 17 etc. Any patterns?  
 Repeat investigation 1(reverse digits and subtract for such numbers).  
 Repeat for other digit differences.

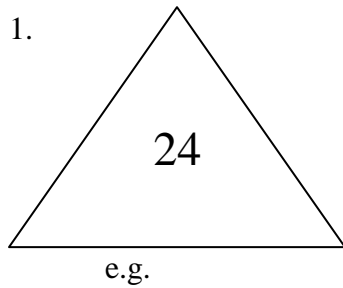
6. Which numbers can be written as the difference between two **square** numbers?

e.g.  $3 = 4 - 1$   
 $5 = 9 - 4$

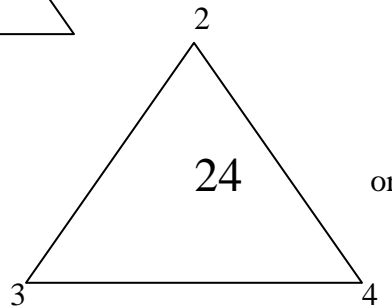
Which numbers cannot be written so? Any rules?

## MULTIPLICATION

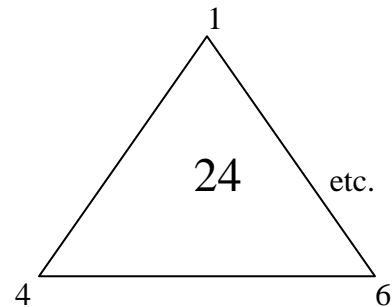
1.



Put numbers at each corner of the triangle so that their product is 24.

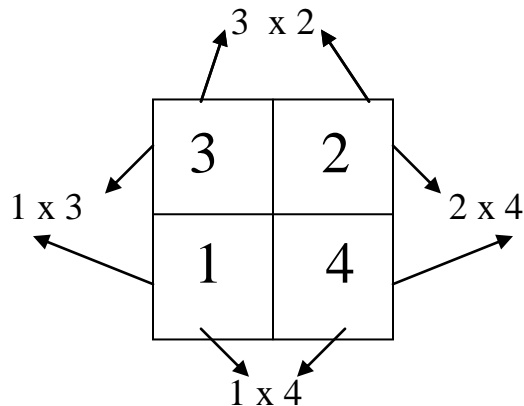


or



How many different ways can this be done? What if the number inside the triangle was changed? Using only the numbers 1, 2, 3, 4, 5, 6 how many different triangles can you make? What if you used squares?

2.



$$3 \times 2 = 6$$

$$2 \times 4 = 8$$

$$1 \times 4 = 4$$

$$1 \times 3 = 3$$

$$6 + 8 + 4 + 3 = \underline{21}$$

Rearrange the numbers 1, 2, 3, 4 and find a new total.

What is the biggest total you can find? Choose your own four numbers and find the biggest total. Repeat. Any rules?

3.

Choose a number from the hundred square, e.g. 67. Multiply its digits ( $6 \times 7 = 42$ ). What is the biggest product? Which numbers appear most often? Which numbers give square numbers?

4. Colour multiples of two on a hundred square. Repeat on other rectangles, triangles e.g.

1	2	3
4	5	6
7	8	9

1	2	3	4
5	6	7	8

1	3	6	10
2	5	9	
4	8		
7			

Repeat for multiples of three, four etc. What patterns do you notice?

5. Choose any 2 x 2 square within a hundred squares

e.g.

23	24
33	34

Multiply numbers on opposing diagonals (23 x 34 and 33 x 24).

Repeat for other 2 x 2 squares, what do you notice about the pairs of products?

Repeat using 2 x 2 squares with a 10 x 10 multiplication chart.

6. Write down the 3 times table. Then add up the digits of each of the numbers (e.g. 18 gives  $1 + 8 = 9$ ). What happens?  
 What if you add the digits for other tables?  
 What if you multiply the digits?
7. Take any three numbers e.g. 6, 7 and 9. How can they be multiplied to give the largest product?  
 (67 x 9?                  6 x 7 x 9?                  79 x 6?)

What if you used three other numbers? How would you get the largest product if you choose four numbers? Five numbers?

8. The number 161 has two features:

- (i). it is a multiple of 7                                  ( $23 \times 7 = 161$ )  
 (ii). it reads the same backwards as it reads forward

Are there any other three digit numbers with both properties

9. Here is a small multiplication table:

x	3	5
2	6	10
4	12	20

The sum of the products is  $6+10+12+20 = 48$

Make up your own small multiplication tables. Work out the sum of the four products in each case. Can you **predict** the totals without working out the middles?

What about larger multiplication tables? e.g.

x	3	4	5
2			
5			

x	3	4	5
2			
4			
7			

10. Work out the answer to:

$$12 \times 42$$

$$21 \times 24$$

What do you notice about the answers?

What do you notice about the digits of both sums?

Try out the same investigations with

$$13 \times 62 \quad \text{and} \quad 31 \times 26$$

and other number pairs. Any patterns? Relationships?

11. Choose any three consecutive numbers e.g. 13, 14, 15

Multiply the least by the greatest (13 x 15)

Multiply the other number by itself (14 x 14)

Compare the results.

Repeat for other groups of three consecutive numbers.

What happens? Why?

What if you used three consecutive even numbers? Odd numbers?

Square numbers? Etc.

12. When you multiply a number ending in 5 by another number ending in 5 the answer also ends in 5. Which other endings have a similar property?

### ***DIVISION***

1. Work out the remainder on division by 5 of each number in the 3 times table. What do you notice about the remainders?

What about other tables and other divisors?

2. A number is divisible by 5 if it ends in a zero or a five. Investigate other divisibility tests.
3. Which two digit number has the most factors?
4. Choose a three digit number, say 426 and repeat it 426426. Divide the number by 11, 13 and by 7. What happens? Investigate other “hiccup” members.
5. What is the smallest number with exactly three factors? Exactly four factors? Any rules?
6.  $37 \times 3 = 111$   
Can you find products which give the answers 1111 or 11111 or .....?  
How about products for 101, 1001 etc.?
7. The number 12 has digit sum  $1 + 2 = 3$ . So 12 is exactly 4 times the sum of its digits. Can you find a whole number which is equal to twice the sum of its digits? Three times?

Investigate which numbers are exactly divisible by the sum of their digits.



## USING GAMES

### *What is a mathematical game?*

*Mathematical games are 'activities' which:*

- involve a challenge, usually against one or more opponents;
- are governed by a set of rules and have a clear underlying structure;
- normally have a distinct finishing point;

Games should also have specific mathematical cognitive objectives.

### **Why play games?**

Games are enjoyable, consequently they are motivating and cause children to like mathematics. Computer games are an added attraction! They can be played against friends or just against the clock. Mathematically you can use games to:

1. Practice and reinforce skills;
2. Develop problem solving strategies;
3. Gain and develop new concepts.
4. Improve motivation - children enjoy playing games
5. Cater for different levels games can allow children to operate at different levels of thinking and to learn from each other.
6. Increase student independence - children can work independently of the teacher.

The main use of games in your classroom will be to take the drudgery out of practice. For example, many of the games you will use in the middle grades of primary school will involve the child's knowledge of number bonds, tables and so on.

The mere exposure of children to games helps them develop strategies to solve problems. The game of dominoes, for example, poses many problems for the child. Often the child can play two or more dominoes – but which one should he play? Why? In attempting to answer these questions the child will necessarily use different methods ranging from trial and error to logical deduction – all essential parts to problem solving.

### **What equipment do you need?**

A few dollars must be set aside for the following:

1. Thick card – coloured sheets or simply cut from old boxes;
2. Scotch tape or masking tape
3. Gum or glue
4. Scissors
5. Coloured markers
6. Ruler, pencil and eraser
7. Counters – you can use buttons, bottle tops and lid covers
8. Dice, you can use wooden blocks (see carpenter for his left overs) or cut them from thick foam or else use a spinner cut from card: six sided spinner put a matchstick through its middle and spin!

## ORAL GAMES AND MENTAL STARTERS

The following mental starters are easy to modify. They are intended to assist the acquisition of number facts and to improve mental calculation. They can be played as games using the whole class with a student being eliminated when they give an incorrect answer. The winner being the last student remaining who has not made a mistake. However, it may be better to divide the class into smaller groups and allow each group to play the game. This will take the pressure off and allow for many more students to become winners.

1. **Say 9 times table**, each group member gives a multiple of 9 (9, 18, 27, ...etc.)

Variations: Use different tables; start with 108 and decrease by 9 each time

2. **Add 3 to a start number** e.g. 16 (19, 22, 25, ...etc.)

3. **Counting back from 100, subtract 9 each time** (100, 91, 82, ...etc.)

Variations: Subtract a different number; begin with a different start number

4. **Add consecutive numbers**: 1+3, 3+5, 5+7 etc. (4, 8, 12, ... etc. )

Variations: add consecutive even numbers, consecutive multiples of three

5. **Count and say 'fizz' when a multiple of three is reached** (1, 2, fizz, 4, 5, fizz, 7 ...)

**Count and say 'buzz' when a multiple of five is reached** (1, 2, 3, 4, buzz, 6, 7, ...)

6. **Fizz-buzz**: combine the ideas in 5 above. That is, count and say 'fizz' when a multiple of three is reached and 'buzz' when a multiple of five is reached. Say 'fizz-buzz' when a number that is both a multiple of three and five is reached:

(1, 2, fizz, 4, buzz, fizz, 7, 8 fizz, buzz, 11, fizz, 13, 14, fizz-buzz, 16, 17, fizz, 19, buzz, ..)

### Team Games

The next few games are team games. They require little preparation and can involve the whole class.

1. **My Turn, Your Turn** K-1 (any number – suitable for a whole class)

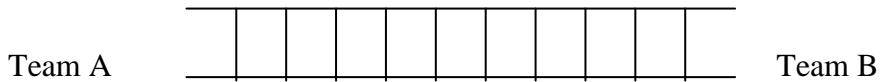
Aim: To practice counting and interpreting symbols.

You will need:

1. A stick of chalk to make the game board.
2. A large die with faces numbered 1, 2, 3, 4, 5, 6.

To play:

Draw a row of squares in the classroom or in the playground with chalk.



Divide the class into two teams with one child standing in the middle square of the game board. Teams stand at opposite ends of the board, take turns throwing the dice. The child in the middle moves the number of steps shown on the dice towards the team which threw the dice. The object of the game is for one team to capture the child in the middle.

Variations: The board could be numbered 1 to 21 and additions or subtractions carried out depending which teams turn it is.

2. **Board Addition** K-4

Aim: To practice skills in addition.

You will need: Two numbered dice.

To play:

Divide the class into two teams. One child or the teacher rolls the two dice. The first two members of the opposing team come out and write the sum of the two numbers rolled on the board. The player who writes the correct answer first earns the team a point. A point is given to the opposing team if the answer is called out.

Variations:

1. Use dice numbered with larger numbers.
2. Teams multiply numbers on the dice.
3. Use three dice.

3. **Arithmetic Bees** K-1

Aim: To practice skills in addition.

You will need: Two numbered dice.

To play:

Divide the class into two teams. One child/teacher rolls the dice. Children take turns in giving the correct answer that is the sum on the two dice. Players are left out whenever they make a mistake. The winner is the last child left or the team with most players left.

Variations:

1. Children find the difference, product on the dice.
2. Use dice with larger numbers.

#### 4. **Dice Rolling**            K

Aim: To practice naming numbers.

You will need:

Two large pairs of numbered (or dotted) dice.

To play:

The teacher rolls both dice and asks class to say what numbers rolled are. The first child to answer correctly then takes the dice and rolls them. The game continues in the like fashion.

Variations:

1. The same as above but children have to say the higher number first.
2. One dice is rolled. Children have to say the number one more than or one less than the number on the dice.

**Bingo or lotto is a game that all the class can participate in. The only preparation is to prepare bingo cards for the children.**

#### 5. **Bingo**

You will need:

1. A set of bingo cards.

e.g.

1	2	6	12
3	5	6	7
8	3	5	11
4	10	9	6

A different card for each child is needed.

2. Counters
3. Dice

To play:

A dice is rolled and the appropriate number shown is covered on the bingo board. Play continues until one player has a row of counters.

Variations: Very numerous – roll two dice and the appropriate sum, difference or product is covered on the board etc.

## Strategy games

### 1. Tens (2 players)

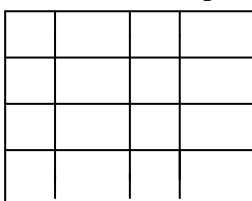
Aim: A simple strategy game to reinforce addition facts.

You will need:

- 16 small cards marked as follows: Two marked with the number 1, two with number 2, ..... Two with number 8.



- A blank board made up of 16 squares.



To play:

The players share the cards. They take turns to place a card on any free square on the board. The players try to complete a line of three cards with a total of 10. A line can be in any direction. The first player to complete a line whose sum is ten takes the three cards. Play continues until all the cards are used up. The winner is the player who has taken most cards.

Variations:

- Play “fifteens” etc.
- The first player to complete a line of four cards which total to thirteen (say) takes the cards.

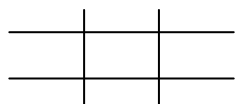
### 2. Number Nought and Crosses (2 players)

Aim: Another strategy game to reinforce addition facts to ten.

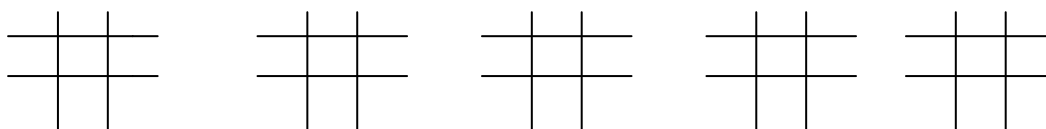
You will need: Pencil and paper

To play:

Draw the noughts and crosses board



Players take turns to write down one of the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 in one of the free squares on the board. No number can be used twice. The first player to complete a line which adds up to 10 wins.



**3. Lines** (2 players)

Aim: A simple game of strategy to practice multiplication and multiples.

You will need:

1. A die marked 1, 2, 3, 4, 5, 6.
2. Some red counters and blue counters.
3. A game board marked

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36

To play:

Players take turns to roll the dice. Whatever number is thrown the player can cover a multiple of this number on the board with his counter. For example, if he throws a three he can cover 3 or 6 or 9 or 12 or 15 etc. on the board. The first player to cover four squares in a row on the board with his counters wins.

**4. Block**

Aim: To practice basic addition subtraction and multiplication facts in a simple strategy game.

You will need:

1. Two dice each marked 1, 2, 3, 4, 5, 6.
2. Some red counters and blue counters.
3. A playing board marked

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20

To play:

Players take turns to roll the dice. The players can choose to add, Multiply or find the difference between the two numbers thrown on the dice. The appropriate square on the playing board can then be covered. The first player to cover three squares in a row with his counters wins.

Variation:

Have one dice marked 10, 20, 30, 40, 50, 60. Alter the numbers on the playing board accordingly

**5. Nim** (2 players)

Aim: To develop problem solving abilities through observation and classification.

You will need: Ten counters

To play:

The ten counters (or objects) are placed in front of the two players. Each player takes turns at moving one or two counters. The player who takes the last counter wins.

Variations:

1. Use 15 counters etc.
2. Players are allowed to remove 1, 2 or 3 counters at a time.
3. The player who takes the last counter wins.

## **Practicing basic skills**

**1. Five Hundred** (2 or more players)

Aim: To practice multiplication tables and addition.

You will need:

Two dice – one marked 0, 1, 2, 3, 7, 9, 11 the other marked 6, 8, 9, 10, 11, 12.

To play:

Players take turns to throw both dice. Their score is the product of the two numbers thrown. The first player to reach 500 wins.

Variations:

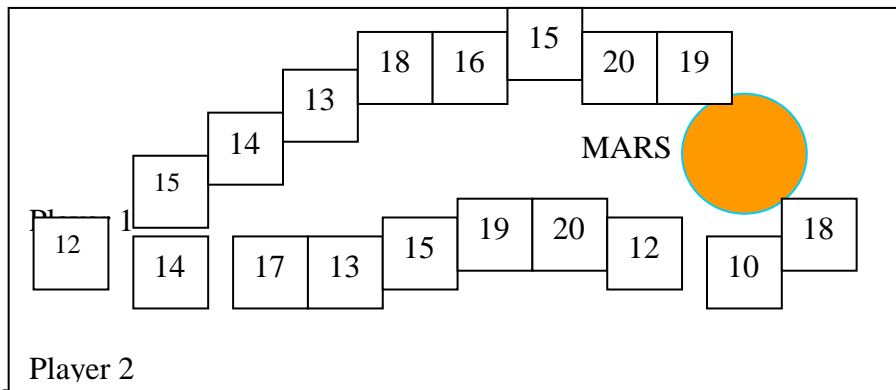
1. Use different numbers on the dice.
2. Players start with 500 and subtract scores on dice. The first player to reach 0 wins.

**2. Race to Mars** (2 players)

Aim: To give practice in quick recall of number facts to 20.

You will need:

1. Two dice – one with faces numbered 5, 6, 7, 8, 9, 10; the other with faces numbered 6, 7, 8, 9, 10, 10.
2. A board as shown.
3. Two counters.



To play:

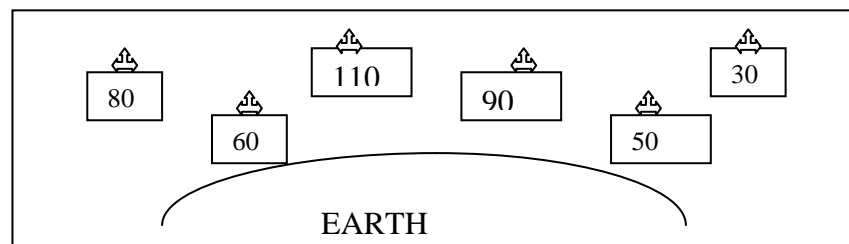
Children take turns to throw both dice together. They add the numbers on the dice and move their counter to the number on the board. The first player to reach Mars wins.

**3. Space Invaders** (as many players as boards)

Aim: To give practice in adding tens.

You will need:

1. Two dice – one numbered 10, 20, 30, 40, 50, 60, the other numbered 0, 10, 20, 30, 40, 50.
2. Two base boards marked with a picture of the earth and numerous flying saucers.



3. 15 coloured counters.

To play:

Children choose boards and take turns to throw both dice. The numbers on the dice are added together – the corresponding space ship on the child's board is covered (shot down) with a counter. The child who shoots down all the space invaders on his board first wins.

Variations:

1. Change numbers on dice and board to practice adding fives, twos, etc.



2. Label one dice 1, 2, 3, 4, 5, 6, the other 10, 10, 10, 20, 20, 20 and multiply numbers on dice, etc.

**4. War** (2 to 4 players)

Aim: To practice number recognition and size.

You will need: A pack of 50 cards marked 1, 2, 3. .... 50.

To play:

Cards are placed face down in a pile. Players take turns to take a card which is put face up on the desk. The player with the largest number takes all the cards on the desk. Repeat until the pile is finished. The winner is the player with most cards at the end.

Variations:

1. Player with smallest number wins.
2. Each player takes two cards and adds the numbers. Player with greatest/least sum wins etc.

**5. Dominoes** (2 to 4 players)

Aim: To give practice in multiplication, division etc.

You will need: A set of cut out cardboard dominoes marked, for example:

6x7	56
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42	8x7
----	-----

To play: Proceed as ordinary dominoes, but each child plays for himself. Winner is child who uses all his dominoes first.

Variations: These are numerous. Dominoes can be marked with addition or subtraction facts. Else dominoes could have divisions e.g.  $\frac{1}{1}$  etc.

## **INTERACTIVE MATHS GAMES & WEBSITES**

These hundreds of good sites for these, you will need at least one computer for every two students and a reasonable internet connection.

A good start is

<http://www.woodlands-junior.kent.sch.uk>

This is an award winning UK primary school site. You will find lots of good stuff here in all subject areas, including items for teachers. Click on games ....

You will find that there is a wealth of simple games to practice number facts etc. as well as more conventional games.

Two other excellent interactive game sites are:

<http://www.gamequarium.org/dir/Gamequarium/Math/> and

<http://www.primarygames.co.uk>

## **FURTHER RESOURCES**

A large set of useful resources for teachers can be found at:

<http://www.primaryresources.co.uk/maths/maths.htm> and

<http://www.teachingideas.co.uk/#>

<http://www.tes.co.uk/primary-teaching-resources/> (you need to register – its free!)

**Take time to search out the sites!**