Ready-Ed Publications

E-book Code: REAU0009

PHOTOCOPY MASTERS

Active Maths

Problem Solving Maths for 10 - 12 year old students.

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ISBN 1 86397 139 4

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Teachers' Notes

The Active Maths booklet represents a response to current trends in mathematics for the development of problem solving skills in primary school students. The activities contained within the booklet are designed to interest and stimulate children in the 10 to 12 years age range. They are presented as blackline masters which are able to be photocopied for use in the classroom. Wherever possible the activities are stand alone worksheets although occasionally other materials such as grid paper, glue or card may be required.

Problem Solving Strategies

The activities in the Active Maths booklet are thematically grouped and are so structured as to provide an increasing level of difficulty with each successive sheet in the theme. Obviously gifted children in lower years, or less able children in higher years, will both find the structured problems equally challenging.

Knowledge of the problem solving abilities of the students is essential, in order that each child can be presented with an activity which he or she feels comfortable solving and not become frustrated with, because of inappropriate matching.

Initially problem solving activities could be tackled in class groups. This establishes a framework from which the children can branch out to work in smaller problem solving groups and then ultimately, independently.

This step by step approach uses a structured framework for tackling problems:

1. Understand the nature of the problem.
2. Develop a strategy for solving the problem.
3. Carry out the chosen strategy.
4. Look back and check.

1. Understand the nature of the problem.

❑ Ask questions about the problem.
❑ Edit out irrelevant details.
❑ Re-word the problem in simpler terms.
❑ Highlight key words or phrases.
❑ Find similar problems to model from.

2. Develop a strategy for solving the problem.

❑ Discuss alternative strategies.
❑ Use concrete aids.
❑ Use pictures or scenarios.
❑ Use tables or patterns.
❑ Use logic.
❑ Guess, check and alter strategy accordingly.
❑ Use trial and error techniques.
❑ Eliminate inappropriate solutions.

3. Carry out the chosen strategy.

❑ Use aids/materials to assist in the calculation.

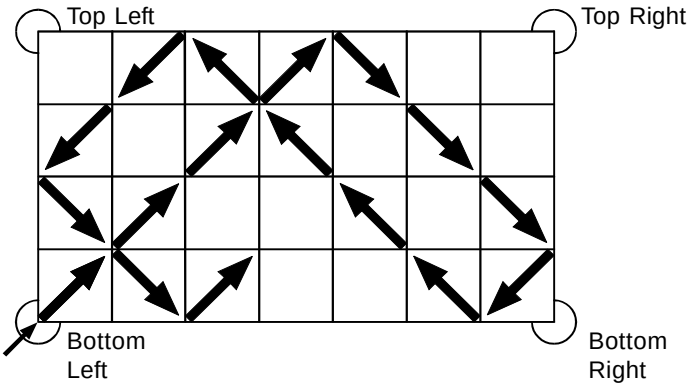
4. Look back and check.

❑ Check that the problem has been fully answered.
❑ Discuss the solution and its feasibility.
❑ Be aware of alternative methods of solving the problem.
❑ Be able to present the steps leading to the solution.

Name .....

Pool Table Maths - 1

❑ This is a special mathematical pool table. It only has pockets at the four corners and the surface is marked out as a 7 by 4 grid.



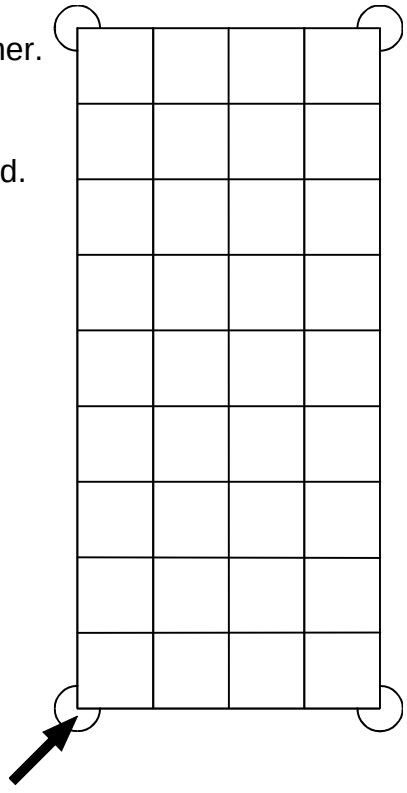
To play on this table you use only **ONE** ball.
This is hit from the bottom left-hand corner to strike and rebound off each cushion at an angle of 45°.
Complete the path of the ball until it meets a pocket.

Which corner pocket did the ball fall into? .....

How many times did the ball hit a side cushion? .....

How many squares has the ball travelled across? (Don't forget to count the starting square.) .....

❑ Here is a second pool table marked as a 4 by 9 grid.
Once again, the ball is hit from the bottom left-hand corner.



Predict which pocket the ball will fall into. .....

Test your prediction by tracing the path of the ball on the grid.

Were you right? .....

Follow-up
Find three pool table sizes where the ball will fall into the top left-hand pocket each time.
(Always start from the bottom left-hand corner!)
Draw your pool tables on grid paper.
Trace the path of each ball across the table.

Name .....

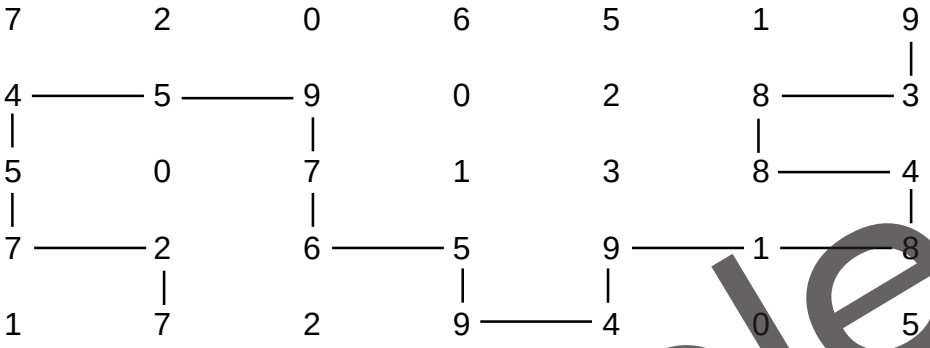
Calculations: Mental calculation strategies.

Number Tracks - 1

❑ The Rules

Draw a line through any 20 numbers then add up the total. Your line may start and finish anywhere but not cross itself. The line must not go through any number more than once. Only lines going **across, up** or **down** are allowed.

Here is an example:



My line is worth .....120.....

❑ Now try this one for yourself. Can you beat a score of 100?

9	1	7	4	8	2	6	0	5	3
4	8	2	6	0	8	3	5	1	7
7	0	9	2	5	4	8	3	6	1
2	6	1	7	4	3	5	9	2	8
1	7	4	8	2	6	0	5	3	9
7	4	8	2	6	0	9	3	5	1
0	9	2	5	4	8	3	6	1	7
2	6	1	7	4	3	5	8	2	8
2	3	5	9	2	8	6	1	7	4
7	4	8	9	1	2	6	0	5	3

I scored a total of .....

Name .....

Understanding and appying mathematics.

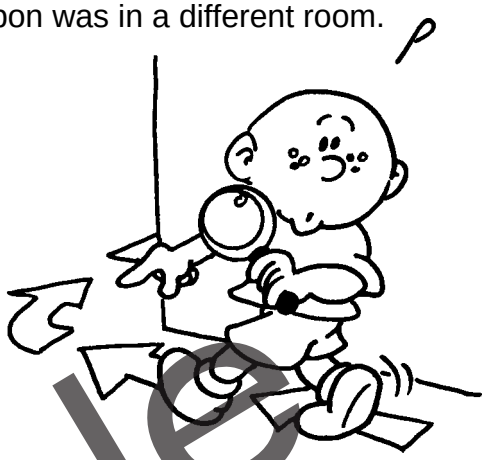
Murder at the Lodge - 1

❑ A murder has been committed at the Lodge.
You've been sent to solve the murder and bring the criminal to justice.

The Lodge contains four rooms, four suspects and four weapons.
At the time of the murder each suspect and each weapon was in a different room.

Here is a plan of the lodge.

Kitchen	**Hall**
Dining Room	**Lounge**



❑ Ten pieces of information are known to be true.

1. Miss Bailey was in the lounge.
2. Mr Allen was in the same room as the walking stick.
3. The knitting needle was in the dining room.
4. Mr Dale was not in the dining room.
5. The murder took place in the room next door to where the duelling pistol was.
6. The victim was not killed by a blow to the head.
7. Mr Allen was in a room next door to Mrs Carrow.
8. The rat poison was not in the hall.
9. The murderer wasn't married.
10. Mr Dale was not in a room next door to Mrs Carrow.

❑ Using these logic tables, find out who committed the murder, where and with which weapon.

	Duelling Pistol	Knitting Needle	Rat Poison	Walking Stick
Mr Allen				
Miss Bailey				
Mrs Carrow				
Mr Dale				

	Hall	Kitchen	Dining Room	Lounge

Hall				
Kitchen				
Dining Room				
Lounge				

The murderer was:

.....

The weapon used was:

.....

The murder room was:

.....

Name .....

Making sense of no. problems; reasoning about numbers through number operations.

Unmagic Squares - 1

❑ Here is a special kind of number square called a **magic square**.

4	9	2
3	5	7
8	1	6

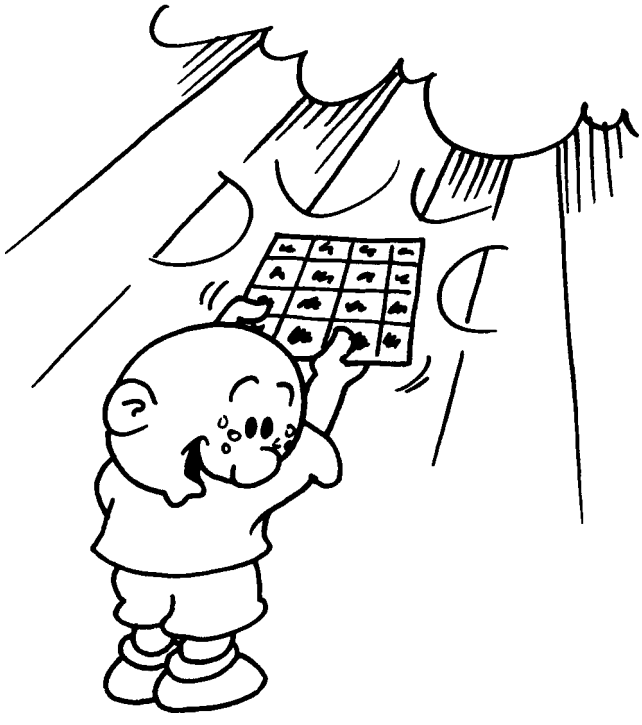
All the rows, columns and both diagonals add up to 15.

❑ Here is another grid. Using the same digits from 1 to 9, design an **unmagic square**.
(All the rows, columns and diagonals must add up to a different number in each case but not 15!)

Here is another unmagic square.

❑ With the help of a pair of scissors, turn it into a proper magic square once again!

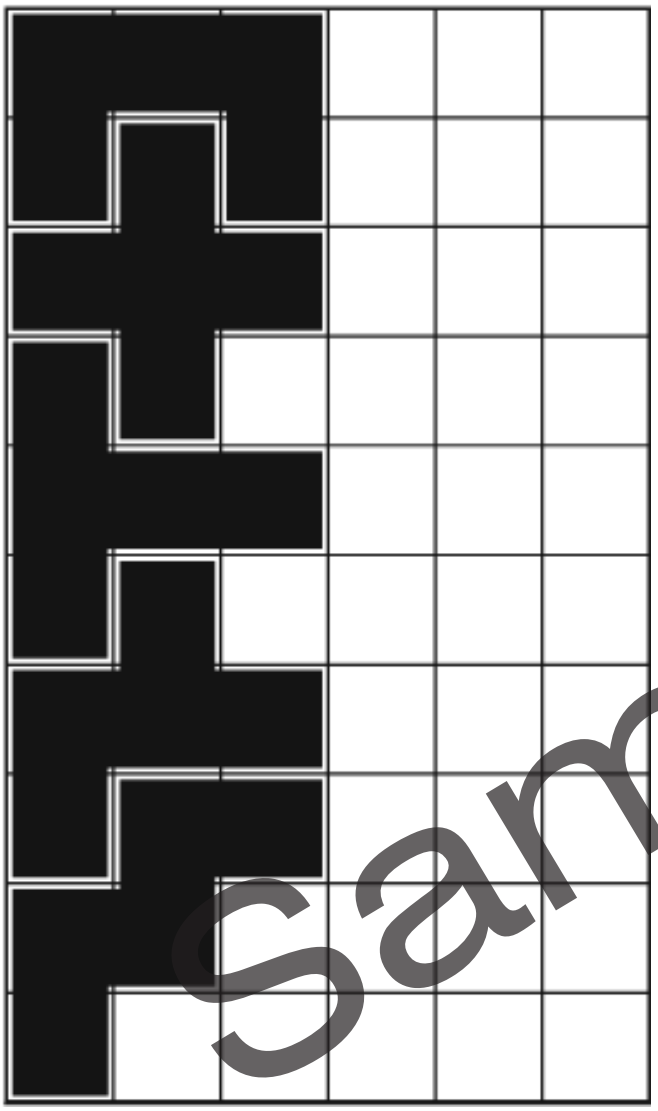
4	15	10	5
14	11	8	1
7	12	13	2
9	6	3	16



Name .....

Shape and space: Properties of 2D shapes.

Pentominoes - 3

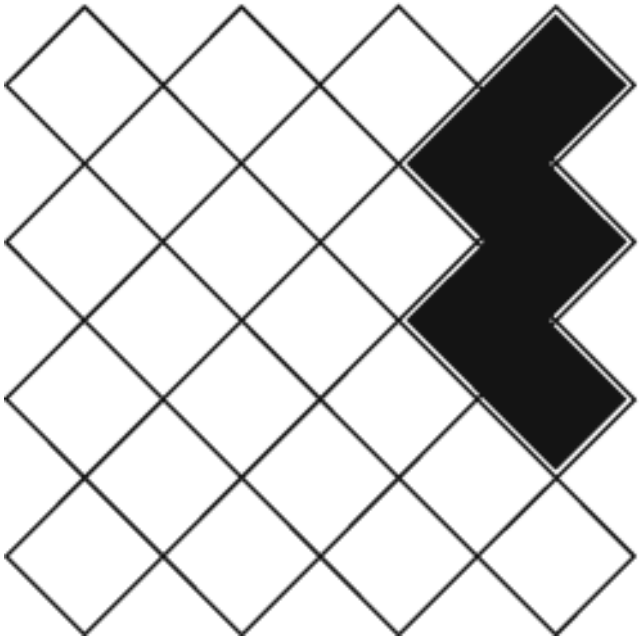


❑ Arrange the 12 pentomino shapes into this 6 by 10 grid.

A few pieces have been placed to give you a start.
Some shapes look different when they are turned over.

❑ Arrange 5 of the 12 pentominoes into the lattice below.

One piece has been placed to give you a start. Some shapes look different when they are turned over.



❑ Try placing all 12 pentominoes in these other grid sizes.

a) 5 by 12
b) 3 by 20 (only 2 solutions)
c) 4 by 15
d) two 5 by 6 rectangles
e) one 5 by 7 rectangles with one 5 by 5 square