

Problem Solving Investigations Low Floor High Ceiling Puzzles

Maths Support Team

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Head of Department

Goal

The primary goal of
problem solving is
making sense of
mathematics.

What is a problem?

A problem is a task that requires the learner to reason through a situation that will be challenging but not impossible.



Routine vs Non-routine

7 (a) Elena buys **two books**. She spends **€15.29**.
Which of the two books below does she buy?



The Very Hungry Cat
€5.74



Dear Moon
€9.55



The Golden Bucket
€10



The Secret Four
€15.19

(b) Nathan buys a book called **On the Moon**.

On the Moon costs **€6.80**.

Nathan pays with **a 10 Euro note**.

What **change** does he get?



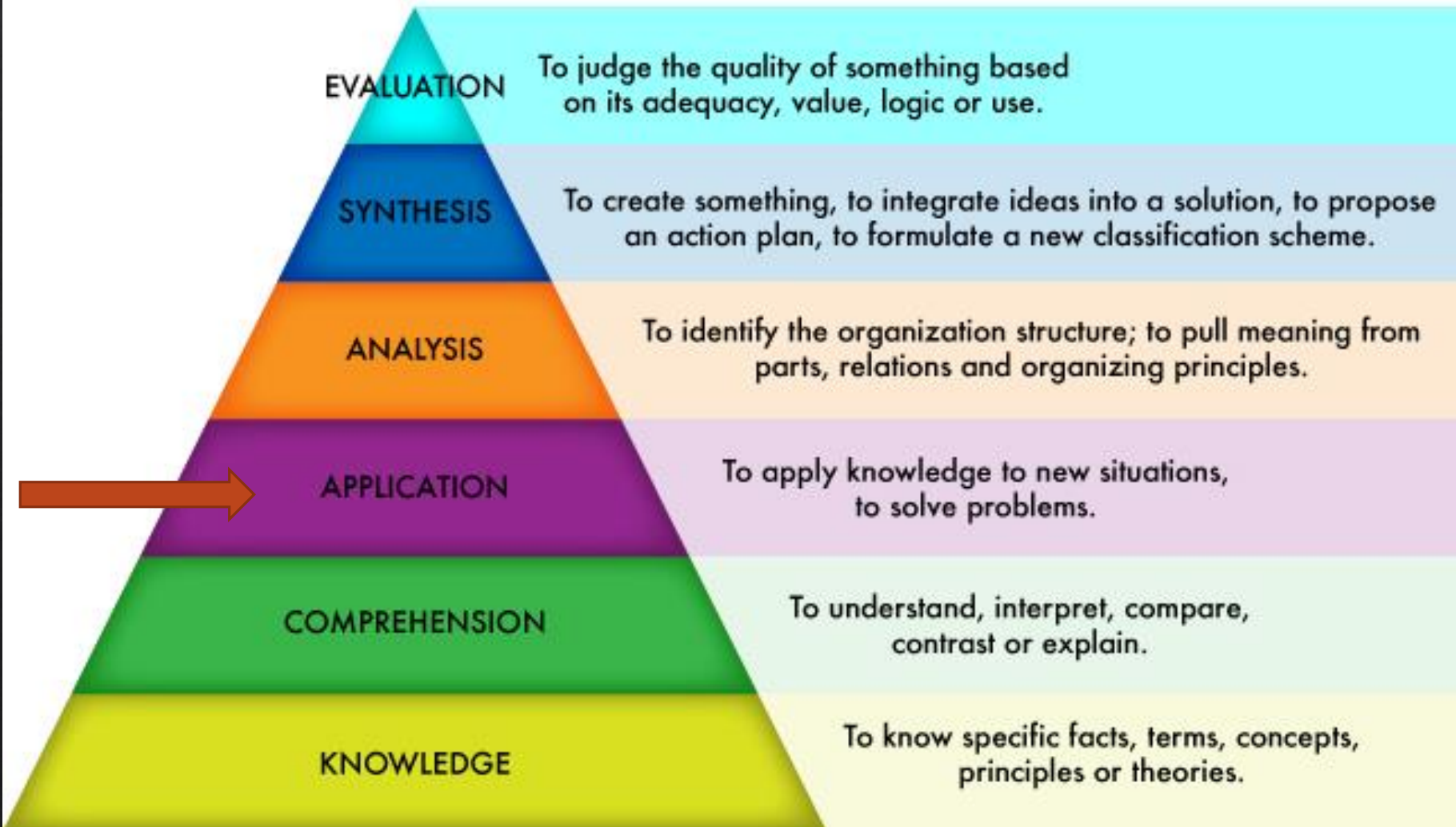
On the Moon
€6.80

Getting Started (preparing for learning)



The teacher presents the problem and any pertinent information needed to solve the problem. Initial instructions for completion of the task are clearly outlined. Before the students are sent off to work, the teacher checks to ensure that they understand the problem.

BLOOM'S TAXONOMY



BLOOM'S TAXONOMY

EVALUATION

To judge the quality of something based on its adequacy, value, logic or use.

SYNTHESIS

To create something, to integrate ideas into a solution, to propose an action plan, to formulate a new classification scheme.

ANALYSIS

To identify the organization structure; to pull meaning from parts, relations and organizing principles.

APPLICATION

To apply knowledge to new situations, to solve problems.

COMPREHENSION

To understand, interpret, compare, contrast or explain.

KNOWLEDGE

To know specific facts, terms, concepts, principles or theories.

Working on It (facilitating learning)

The teacher facilitates learning by:

- ◆ providing situations in which students try their own strategies;



Problem Solving Strategies



Draw a Picture or Diagram



Find a Pattern



Guess, Check & Revise



Use Objects



Make an Organized List

A	B	C
2	4	6

Make a Table

$$20 = 4 \times 5$$
$$3 + 7 = 10$$

Use a Number Sentence



Work Backwards



Use Logical Reasoning



Make It Simpler

Working on It (facilitating learning)

- ◆ offering guidance and redirection through questioning;





Reflecting and Connecting

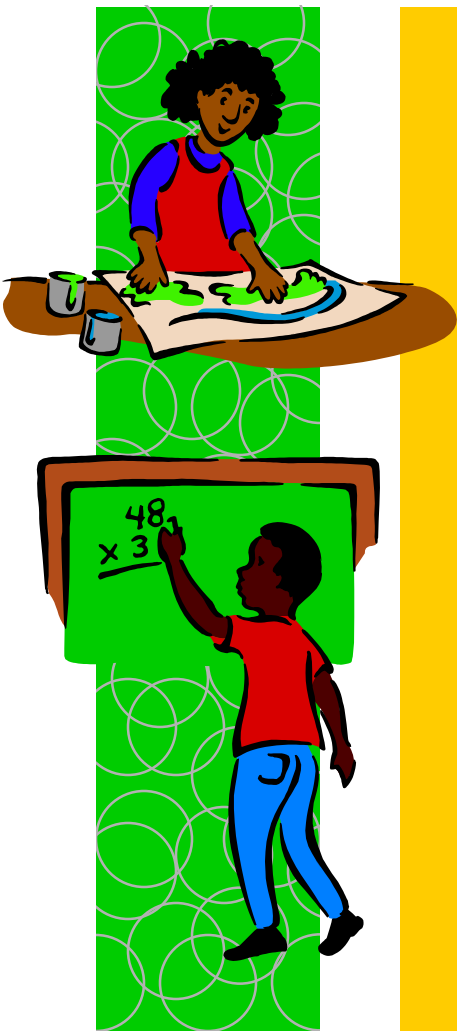
(reflecting on, extending, and consolidating learning)



The discussion, questioning, and sharing that occurs allows students to make connections with their own thinking and to internalize a deeper understanding of mathematical concepts.

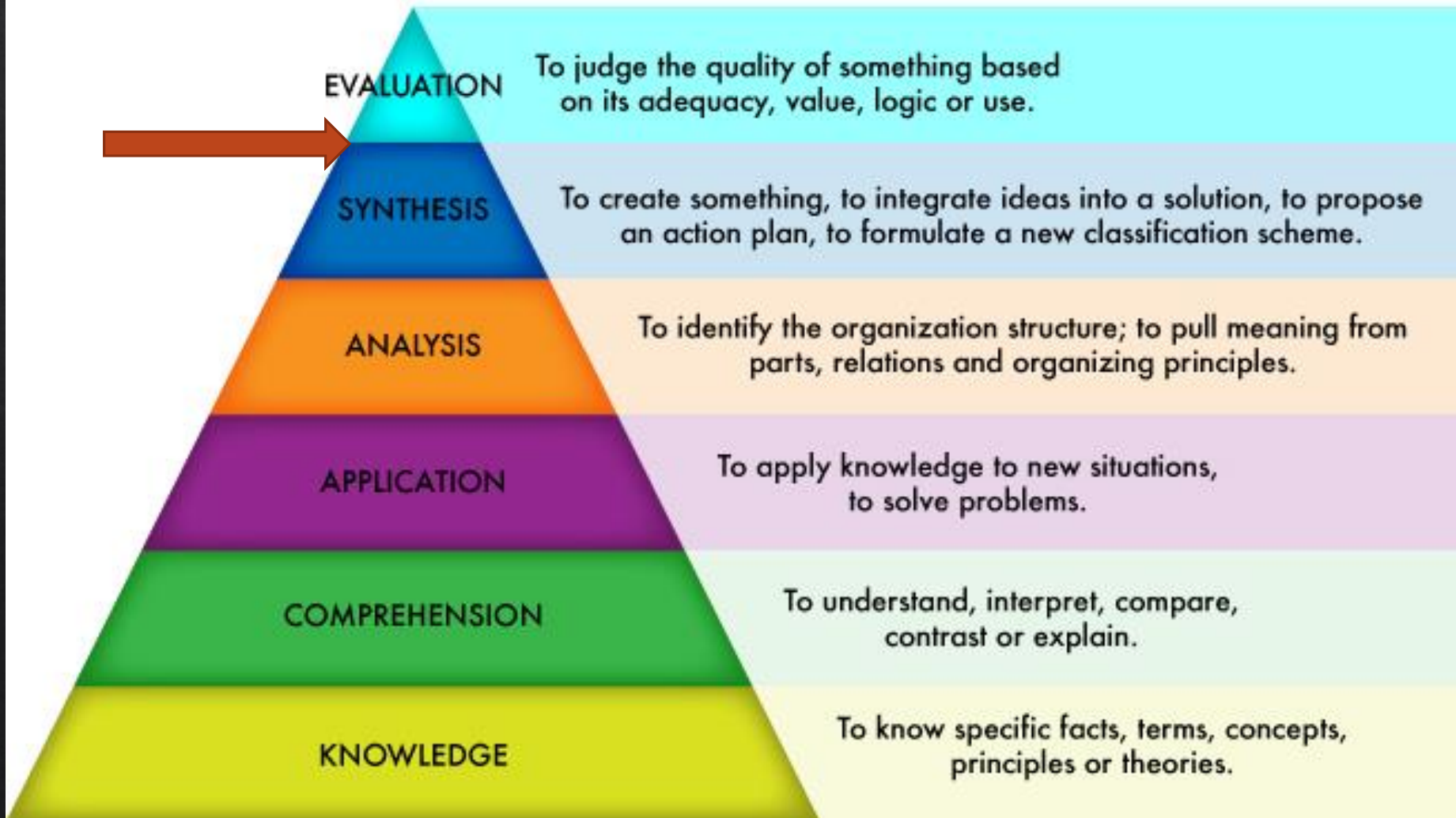
Reflecting and Connecting

(reflecting on, extending, and consolidating learning)

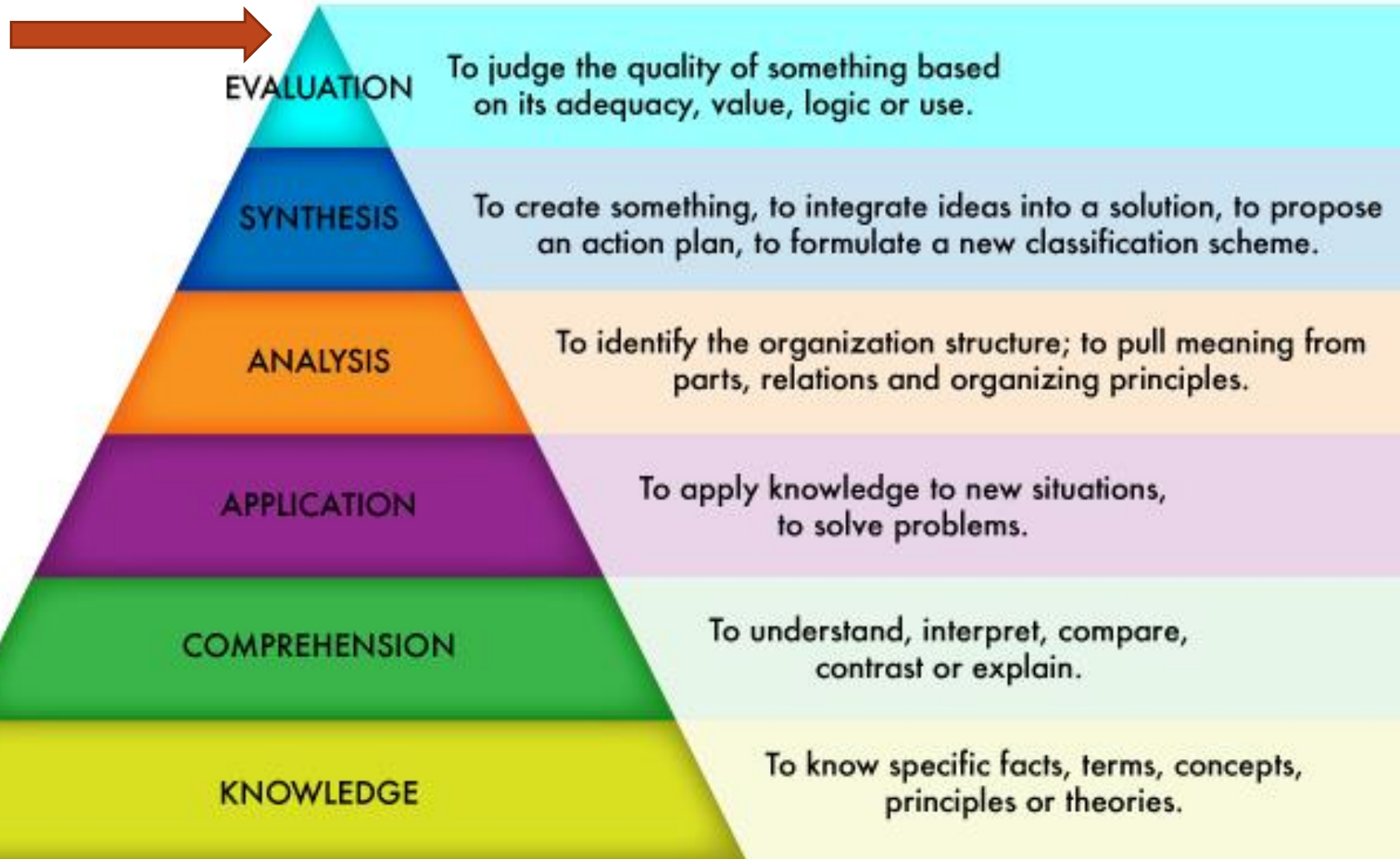


The teacher leads a discussion in which students share their strategies and consider different solutions to the problem. Time is allocated for the sharing of several examples. This discussion validates the various strategies used, and consolidates learning for students.

BLOOM'S TAXONOMY



BLOOM'S TAXONOMY



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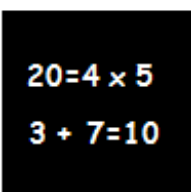
Use Objects



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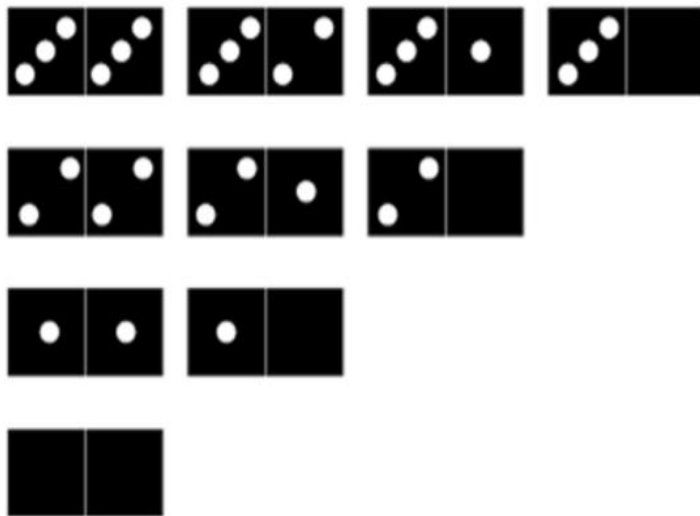


Make It Simpler

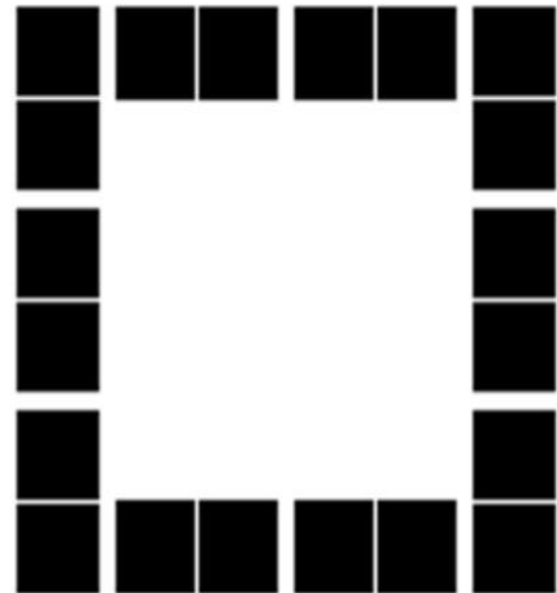
Domino Square



These are the 'double-3 down'
dominoes.



Use these dominoes to make this
square so that each side has eight
dots.



Use objects/Act it out.

Use concrete objects.

Move around and act out the roles to visualize the situation.

Plan and communicate the solution.



Guess and Check.

Think of an answer.

Test your guess.

Write down your guesses.

Repeat until you find an answer.



Problem Solving through Puzzles and Games!

			1		6
6		4			
1		2			
			5		1
			6		3
5		6			

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KEN 2nd grade KEN



KANGAROO Addition Puzzle 1 (4x4)

Put on your thinking cap! Using the numbers 1 through 4, fill in the boxes below. Watch out! Every row and column can only contain each number once. Check each area to find its sum.

7+	6+		3+
	7+		
3+		1	9+
	4		

More worksheets at education.com/worksheets

education.com



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Investigations

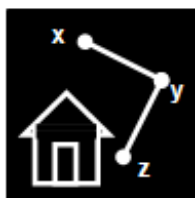


Is your school bag too heavy?

Studies show children should not carry any more than 10% of their body weight and that anything over 15% can be damaging.

- ✓ **Establish how much weight you can carry?**
- ✓ **Can all children carry the same weight? Why?**
- ✓ **Estimate if the weight of your bag is a weight you can carry?**
- ✓ **Weigh school bags.**

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Make It Simpler

Low Floor High Ceiling

Observe the colours.



How would you draw 21?
Explain.

Problem Solving Culture

Educators have a responsibility to promote the experience of problem-solving strategies in their classrooms, and to foster in their students a positive attitude towards problem solving.

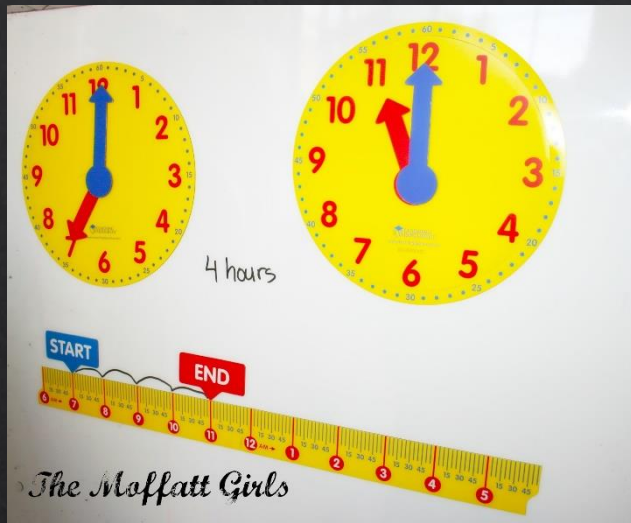
Problem Solving Culture

Educators' role as facilitator is crucial in the provision of an effective problem-solving experience.

Problem Solving Experiences

- Games
- Hands-on tasks – projects
- Real life situations (cooking, shopping, sorting)
- Family outing
- Discussing decisions
- General knowledge

Resources



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	100

Multiplication													
X	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

PalaceCurriculum.com

With exposure, experience, and shared learning, children will develop a repertoire of problem-solving strategies that they can use flexibly when faced with new problem-solving situations.

Maths Support Team Homepage

<https://primarymaths.skola.edu.mt/>

Malta Education and Curriculum homepage

<https://curriculum.gov.mt/en/Pages/Home.aspx>

An interesting article

file:///C:/Users/Schools_home/Downloads/tcm2014-08-18a.pdf

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THANK
YOU

