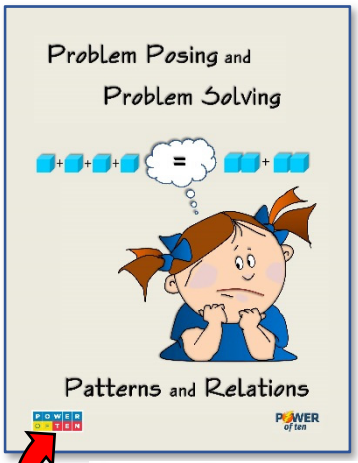
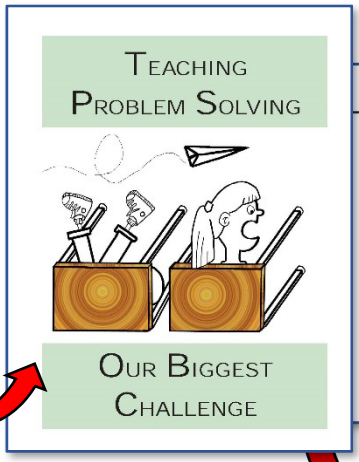
Quick Guide Teaching

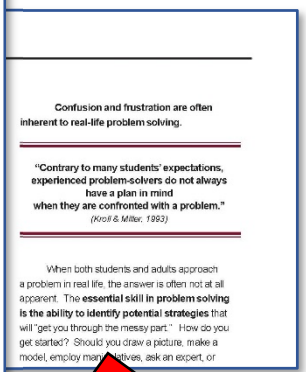
Problem Posing and Problem Solving



For an in-depth look at Problem Posing and Problem Solving, see the chapter in the Teachable Moment K-3 Manual and chapters on Teaching Problem Solving in the Teachable Moment 4-6, 6-8 and 4-8 Manuals.

Confusion and frustration are often inherent to real-life problem solving and should be celebrated as this provides the strategies necessary to develop perseverance and self-correcting.





Almost every lesson should include problem solving as a process – it should be embedded in everything.

The "Qualities of a Good Problem Solver" posters are available free at www.poweroften.ca. They should be posted in the classroom so that students and teachers can easily reference them.

Qualities of a Good Problem Solver

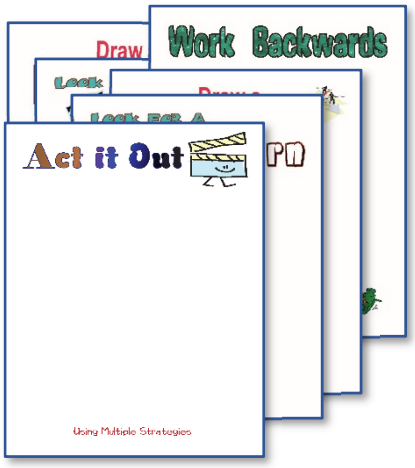
- Gets Started
- Gets Unstuck (if you don't get stuck, it wasn't a problem)
  (see Teachable Moment K-3 Problem Posing and Problem Solving, page 11 for Power Point presentation)
- Uses Multiple Strategies
- Perseveres
- Self-corrects

Multiple Strategies

Posters available FREE at www.poweroften.ca and in the
Teachable Moment K-3 Manual, Problem Posing and Problem Solving Chapter, page 7 and
Teachable Moment 4-6 Manual, Teaching Problem Solving – Chapter 9, pages 116-138

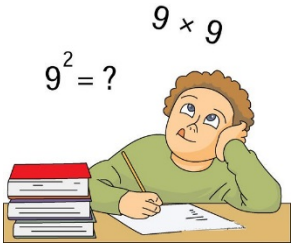
Multiple Strategies

- Act it Out
- Try a Simpler Problem
- Break the Problem into Smaller Parts
- Use a Model
- Draw a Diagram
- Use Logic
- Predict (guess) and Check
- Use a Number Sentence
- Look for a Pattern
- Make a List
- Create a Chart
- Use a Graph
- Work Backwards



13 Strategy Posters are available in English and French

Create a class environment where students become metacognitive; they "think about their thinking."

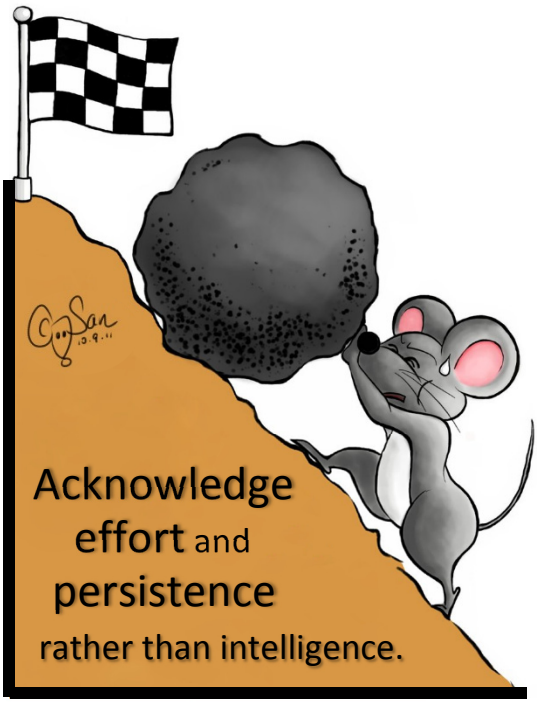


- There is power in naming your strategies.
- Classifying and sorting is a powerful metacognitive tool. When do you use certain strategies?
- *Ask,* "What is similar and what is different?"
- *Ask,* "How did you get your answer?"

Contrary to many students' expectations, experienced problem-solvers do not always have a plan in mind when they are confronted with a problem.

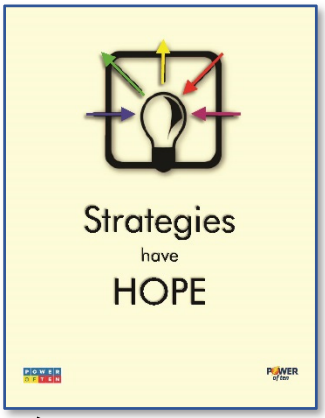
(Kroll & Miller) 1993. Teachable Moment 4-6 Manual, Teaching Problem Solving Chapter 9, page (9)3

Carol Dweck talks about the difference between a 'fixed mindset and growth mindset'. Students with a growth mindset try harder to find a different strategy when confronted with a setback – they believe that the more you work at something, the better you get at it. Students with a fixed mindset are concerned about looking smart, believe hard work is a sign of low ability, often give up when faced with a setback, and even consider cheating if needed.



Students need to learn and feel the power of hard work.

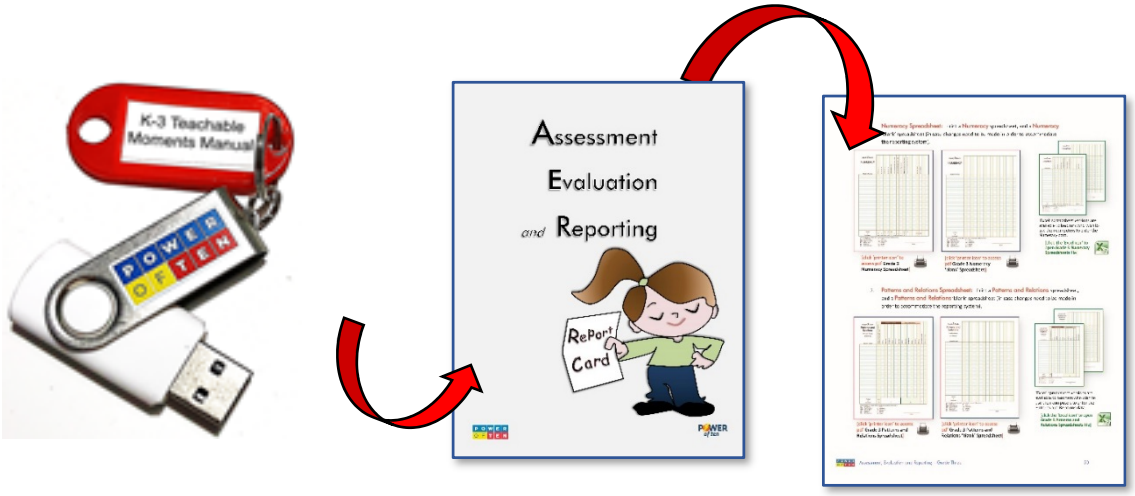
Remember that "Strategies have HOPE!"



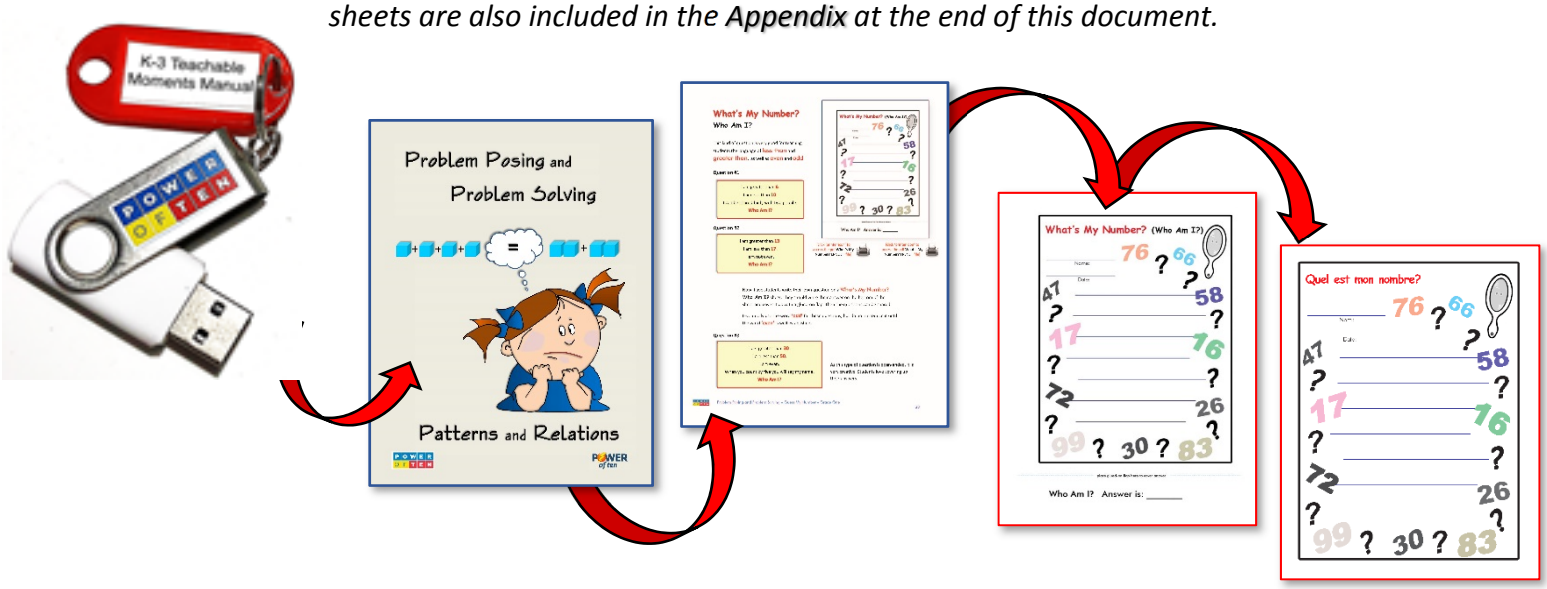
Check out this chapter for more detailed information.

SUPPORTING A GROWTH MINDSET

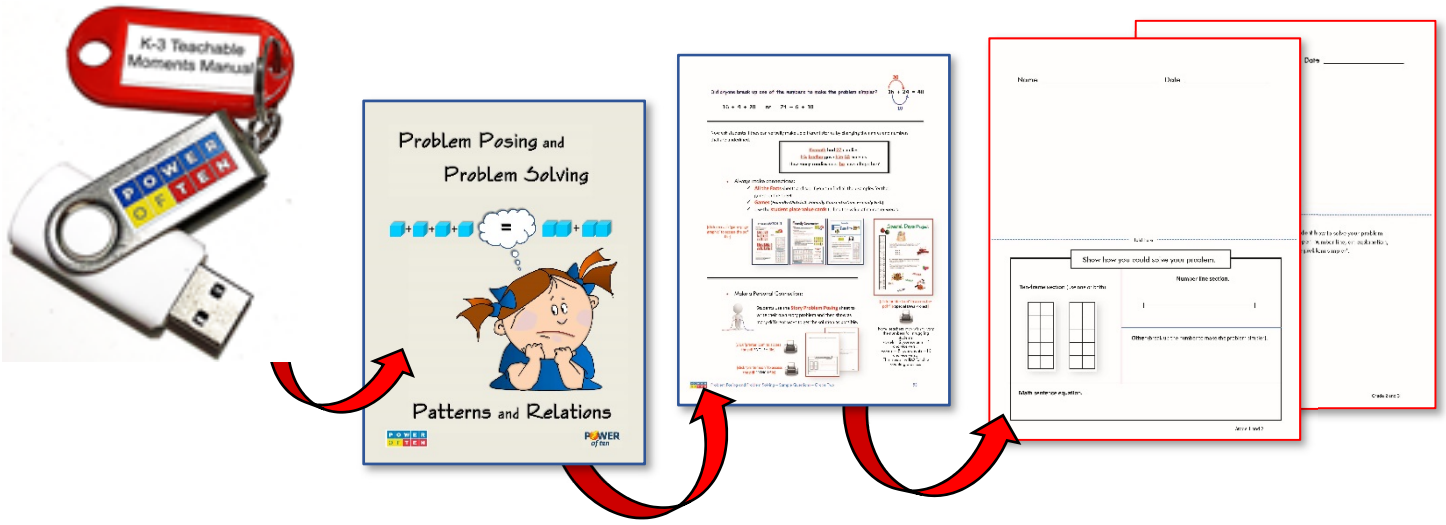
- Develop a library of good problems and use them over and over.
- Assess Problem Solving and Problem Posing on a regular basis and report on it every term – see Teachable Moment K-3 *Assessment and Evaluation, page 50*.



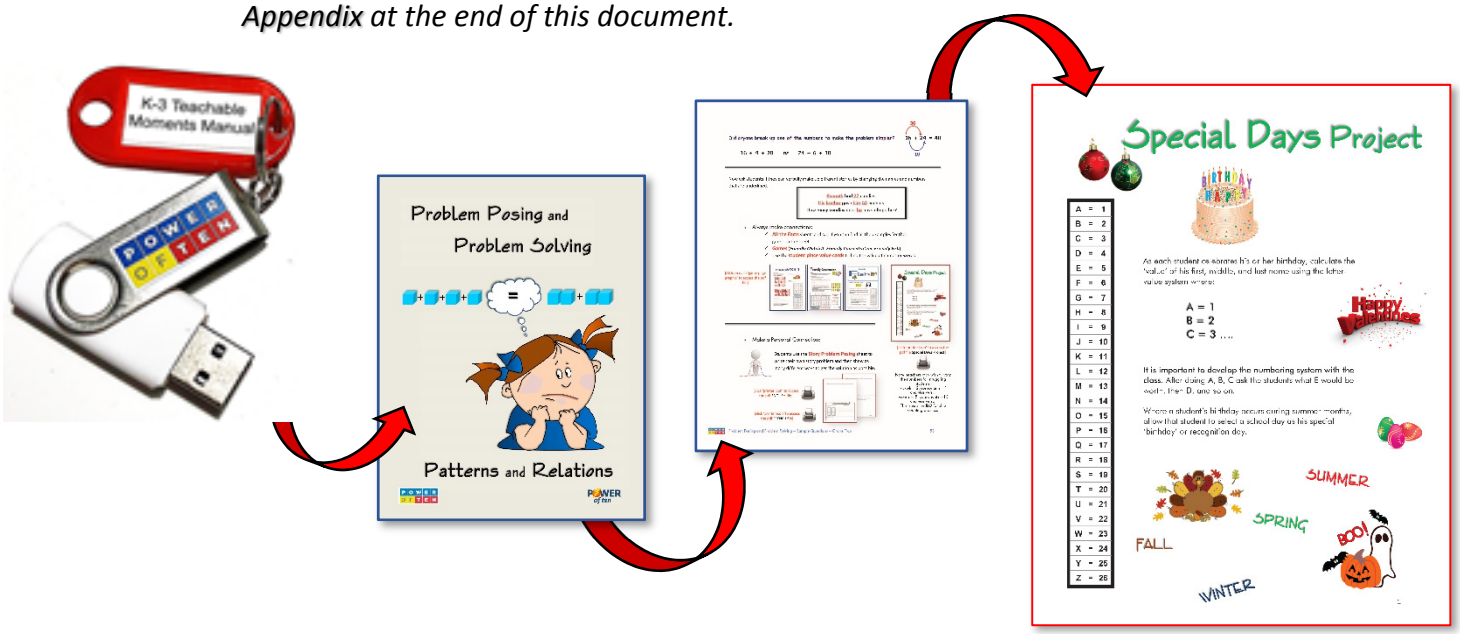
- Start to develop a repertoire of strategies that encourage 'open-ended' thinking.
- Consider using Problem Posing where students create a problem and then develop strategies for solving the problem that could be used for teaching their peers.
  - What's My Number? (Teachable Moment K-3, Problem Posing and Problem Solving, page 38) – *English and French formatted What's My Number? sheets are also included in the Appendix at the end of this document.*



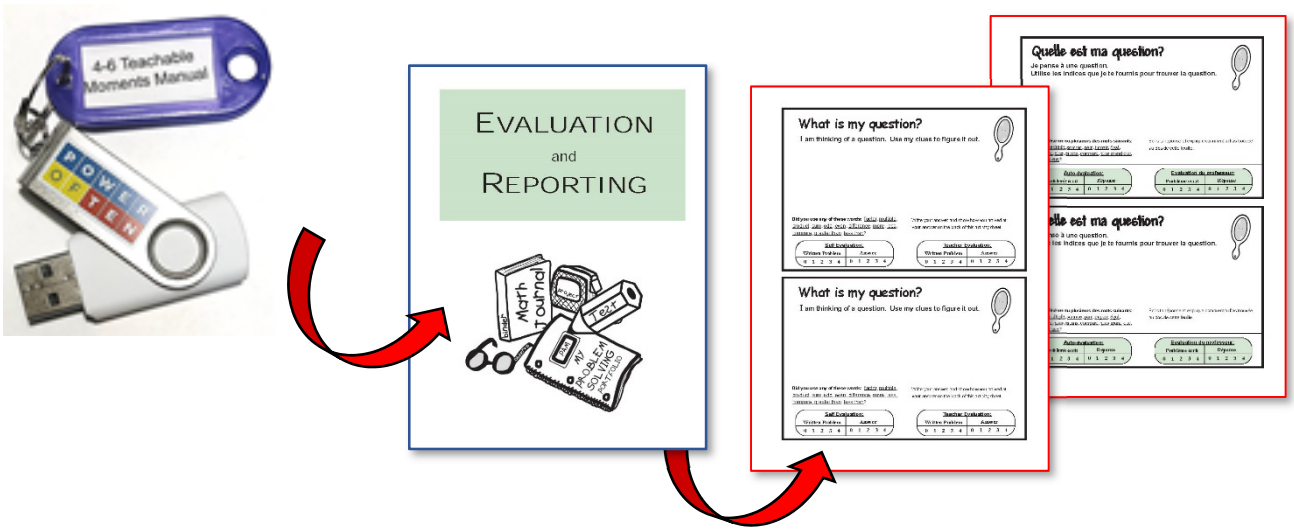
- Solve My Story (Teachable Moment K-3, Problem Posing and Problem Solving, page 53) – *English and French formatted **Story Problem Posing** sheets are also included in the **Appendix** at the end of this document.*



- Special Days Project (Teachable Moment K-3, Problem Posing and Problem Solving, page 53) – *Special Days Project sheet is also included in the **Appendix** at the end of this document.*



- What is my question? Teachable Moment 4-6 Manual, Evaluation Chapter 10, page (10)78.



– *English and French formatted **What is my question?** sheets are also included in the **Appendix** at the end of this document.*

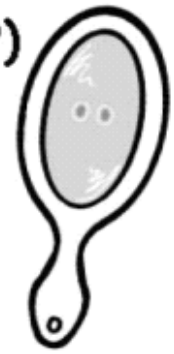
- Guess My Number Activity (See pages 69-70 Teachable Moment K-3, Problem Posing and Problem Solving.)

Appendix

The following, previously referenced throughout this document, are attached:

- What's My Number? *(English format)*
- What's My Number? *(French format)*
- Primary Story Problem Posing – Grades 1 and 2 *(English format)*
- Primary Story Problem Posing – Grades 1 and 2 *(French format)*
- Primary Story Problem Posing – Grades 2 and 3 *(English format)*
- Primay Story Problem Posing – Grades 2 and 3 *(French format)*
- Special Days Project
- What is my question? *(English format)*
- What is my question? *(French format)*
- Grade **3** Patterns and Relations [Writes Story Problems/Solves Story Problems]
- Grade **3** Patterns and Relations [Blank Sheet]
- Grade **5** Patterns and Relations [Writes Story Problems/Solves Story Problems]
- Grade **5** Patterns and Relations [Blank Sheet]

What's My Number? (Who Am I?)



Name: _____

Date: _____

76 ? 66 ?

47 _____ 58

? _____ ?

17 _____ 16

? _____

_____ ?

72 _____ 26

? _____ ?

99 ? 30 ? 83

place glued-on flap here to cover answer

Who Am I? Answer is: _____

Quel est mon nombre?

Nom: _____

Date: _____

76 ? 66 ?

47 _____ 58

? _____ ?

17 _____ 16

? _____ ?

7 2 _____ 26

? _____ ?

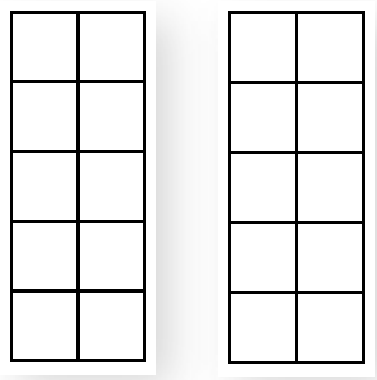
99 ? 30 ? 83

Name _____ Date _____

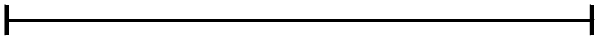
fold here

Show how you could solve your problem.

Ten-frame section (use one or both).



Number line section.



Other (break up the number to make the problem simpler).

Math sentence equation.

Name _____ Date _____

fold here

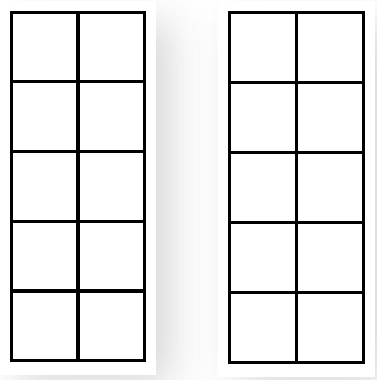
Show how you would teach a younger student how to solve your problem.
You may use an equation, a diagram, an open-number line, an explanation,
or 'break it up' to 'make the problem simpler'.

Nom _____ Date _____

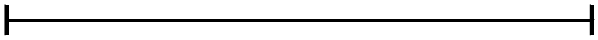
pliez ici

Montre comment tu peux résoudre ton problème.

Grille de dix cases (utilise une ou les deux).



Droite numérique



Autre (décompose le nombre afin de rendre la question plus simple).

Équation de phrase mathématique.

Nom _____ Date _____

pliez ici

Montre comment tu enseignerais un élève plus jeune comment résoudre ton problème.
Sers-toi d'une équation, d'un diagramme, d'une ligne des nombres ouverte, d'une explication ou 'décompose-le' afin de 'rendre le problème plus simple'.

Special Days Project

A	=	1
B	=	2
C	=	3
D	=	4
E	=	5
F	=	6
G	=	7
H	=	8
I	=	9
J	=	10
K	=	11
L	=	12
M	=	13
N	=	14
O	=	15
P	=	16
Q	=	17
R	=	18
S	=	19
T	=	20
U	=	21
V	=	22
W	=	23
X	=	24
Y	=	25
Z	=	26

As each student celebrates his or her birthday, calculate the 'value' of his first, middle, and last name using the letter-value system where:

A = 1
B = 2
C = 3 ....

It is important to develop the numbering system with the class. After doing **A**, **B**, **C** ask the students what **E** would be worth, then **D**, and so on.

Where a student's birthday occurs during summer months, allow that student to select a school day as his special 'birthday' or recognition day.

SUMMER

SPRING

FALL

WINTER

What is my question?

I am thinking of a question. Use my clues to figure it out.

Did you use any of these words: factor, multiple, product, sum, odd, even, difference, more, less, compare, greater than, less than?

Write your answer and show how you arrived at your answer on the back of this activity sheet.

Self Evaluation:	
Written Problem	Answer
0 1 2 3 4	0 1 2 3 4

Teacher Evaluation:	
Written Problem	Answer
0 1 2 3 4	0 1 2 3 4

What is my question?

I am thinking of a question. Use my clues to figure it out.

Did you use any of these words: factor, multiple, product, sum, odd, even, difference, more, less, compare, greater than, less than?

Write your answer and show how you arrived at your answer on the back of this activity sheet.

Self Evaluation:	
Written Problem	Answer
0 1 2 3 4	0 1 2 3 4

Teacher Evaluation:	
Written Problem	Answer
0 1 2 3 4	0 1 2 3 4

Quelle est ma question?

Je pense à une question.
Utilise les indices que je te fournis pour trouver la question.

As-tu utilisé un ou plusieurs des mots suivants:
facteur, multiple, somme, pair, impair, égal, différence, plus, moins, compare, plus grand que, plus petit que?

Ecris ta réponse et explique comment tu l'as trouvée au dos de cette feuille.

Auto-évaluation:	
Problème écrit	Réponse
0 1 2 3 4	0 1 2 3 4

Evaluation du professeur:	
Problème écrit	Réponse
0 1 2 3 4	0 1 2 3 4

Quelle est ma question?

Je pense à une question.
Utilise les indices que je te fournis pour trouver la question.

As-tu utilisé un ou plusieurs des mots suivants:
facteur, multiple, somme, pair, impair, égal, différence, plus, moins, compare, plus grand que, plus petit que?

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Auto-évaluation:	
Problème écrit	Réponse
0 1 2 3 4	0 1 2 3 4

Evaluation du professeur:	
Problème écrit	Réponse
0 1 2 3 4	0 1 2 3 4

Grade 3 Math

Patterns and Relations

(Problem Posing and Solving)

Student Names	Creates, compares, describes, extends patterns (numbers to 1000, sounds, actions)	Writes Story Problems						Solves Story Problems						Writes minutes in hour	Writes days in month
		Addition	Subtraction	Multiplication	Division	Who Am I?	Multi-step	Addition	Subtraction	Multiplication	Division	Who Am I?	Multi-step		
Method of Assessment	HMW I DQ	J I						T DQ						I	I

Insert main **ILOs** in each column. Write in the method of assessment (if known) such as:

AF = (All the Facts)
HMW = (How Many Ways)
WDIK = (What Do I Know)
WQ = (Written Quiz)
DQ = (Daily Quiz)
MB = (Mastering Basics)
T = (Test)
I = (Interview)
OB = (Observation
J = (Journal)
P = (Project)
OT = (Other)

Term: _____

Grade 3 Math

Patterns and Relations

(Problem Posing and Solving)

Student Names															
Method of Assessment															

Insert main **ILOs** in each column. Write in the method of assessment (if known) such as:

AF = (All the Facts)
HMW = (How Many Ways)
WDIK = (What Do I Know)
WQ = (Written Quiz)
DQ = (Daily Quiz)
MB = (Mastering Basics)
T = (Test)
I = (Interview)
OB = (Observation
J = (Journal)
P = (Project)
OT = (Other)

Term: _____

Grade 5 Math

Patterns and Relations

(Problem Solving)

Student Names	**Construct** *patterns*	**Interpret** *patterns*	**Construct** *T-tables*	**Interpret** *T-tables*	**Interpret** *T-tables & other patterns algebraically*	**Write** *story problems (+, -, x, ÷)*	**Solve** *story problems (+, -, x, ÷)*	**Write** Story Problems: *Involving fractions*	**Write** Story Problems: *Involving decimal fractions*	**Write** Story Problems: *Involving area*	**Solve** Story Problems: *Involving fractions*	**Solve** Story Problems: *Involving decimal fractions*	**Solve** Story Problems: *Involving area*	*Use multiples strategies*		
Method of Assessment	DQ MB T		DQ MB T		DQ MB T J	J T	J T	J T			J T			Strategies Sheet		

Insert main **ILOs** in each column. Write in the method of assessment (if known) such as:

AF = (All the Facts)
HMW = (How Many Ways)
WDIK = (What Do I Know)
WQ = (Written Quiz)
DQ = (Daily Quiz)
MB = (Mastering Basics)
T = (Test)
I = (Interview)
OB = (Observation
J = (Journal)
P = (Project)
OT = (Other)

Term:

Grade 5 Math

Patterns and Relations

(Problem Solving)

	Student Names	1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)	12)	13)	14)	15)
1.																
2.																
3.																
4.																
5.																
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26.																
27.																
28.																

Insert main **ILOs** in each column. Write in the method of assessment (if known) such as:

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HMW = (How Many Ways)
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WQ = (Written Quiz)
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Term: _____