

Introduction to Word Problems in Algebra

Title of the Lesson: $4M \alpha \beta 2 x + y$ – translating words into symbols.

For the lesson on 20/01/17

At Ms. Whelans 1st yrs class Teacher: Majella. Guest *Lesson plan developed by: Majella Guest*

Pupils will use their existing knowledge to think about the various ways we express the same numbers, how we write them in English and in 'maths'.

The Problem:

Billie is designing, making and selling number plates. Each can have a maximum of six characters, numbers or letters. Billie cannot use plus and minus signs, or any other mathematical symbols. He can make 10 by using '10' or by 'TEN'. In how many ways can he make 2? Using the letters of the alphabet and digits 0-9 how many different ways can you write the number two

Aims of the Lesson:

Students will write a particular number in as many ways as possible using letters and numbers to solve a problem

- For students to understand that the same number can be expressed in a variety of ways
- For students to appreciate that using maths symbols is more useful than words as a way of describing problems involving numbers
- For students to see that an equation allows us to find a missing piece of information

Learning Outcomes:

- Students should be able to express a number in a variety of ways
- Students should be able to replace words with appropriate mathematical symbols
- Students will be able to examine a statement (equation) in words or mathematical symbols and find any unknown numbers



Background and Rationale

The Common Introductory Course provides the initial engagement with patterns, relationships and expressions, laying the groundwork for progression to symbolic representation, equations and formulae. This lesson would act as an introduction to word problems in algebra encouraging students to use symbols instead of words. This will assist in achieving other learning outcomes on the syllabus such as

- find the underlying formula written in words from which the data are derived (linear relations)

- find the underlying formula algebraically from which the data are derived (linear,

Students habitually find the translation of written words into an algebraic expression or equation difficult. Recognising the words we use in English and how we use maths symbols to express these should help students translate word problems into algebraic equations.

Research

The Common Introductory Course provides the initial engagement with patterns, relationships and expressions, laying the groundwork for progression to symbolic representation, equations and formulae.

- make use of letter symbols for numeric quantities
- emphasise relationship-based algebra

• use real life problems as vehicles to motivate the use of algebra and algebraic thinking http://flm-journal.org/Articles/7C0CBF1CFF62ABA1AA0B29961E4632.pdf

About the Unit and the Lesson

The Common Introductory Course provides the initial engagement with patterns, relationships and expressions, laying the groundwork for progression to symbolic representation, equations and formulae.

- make use of letter symbols for numeric quantities
- emphasise relationship-based algebra
- use real life problems as vehicles to motivate the use of algebra and algebraic thinking



Flow of the Unit:

Lesso n		# of lesson periods
1	• Students will have been introduced to algebra. They will be aware of how we use x or y to signify an unknown.	3 x 30 min.
2	• Students will have had some experience of solving algebraic equation.	1 x 30 min.
3	• Introduction to word problems in algebra as outlined above	2 x 30 min. (research lesson)
4	• Extend this lesson to form 'sentences' using the = sign to complete statements.	3 x 30 min.
5	• Practice 'translating' word problems into numbers and mathematical symbols. Being able to solve these equations.	1 x 30 min.

Flow of the Lesson

Teaching Activity	Points of Consideration
 1. Introduction Introduce problem Billie is designing, making and selling number plates. Each can have a maximum of six characters, numbers or letters. Billie cannot use plus and minus signs, or any other mathematical symbols. He can make 10 by using '10' or by 'TEN'. In how many ways can he make 2?	Students will work for 7 min on their own. Encourage them to think for themselves.
2. Posing the Task Using the letters of the alphabet and digits 0-9 how many different ways can you write the number two.	Get students to think of different ways of describing 2. 'Its 3 before 5' 'Its 6 divided by 3' etc.



3. Anticipated Student ResponsesI can't think of any except 2 and TWOMay use mathematical symbolsMay use too many digits/letters	Allow time for students to think - even if they feel they're not getting anywhere. Some students may need help to get started Circulate and give hints where necessary.
	Encourage students to think about how they text.
4.Comparing and Discussing	Students should look at their partners work.
Students will show their solutions to a partner and will get some time to add any more they can think of after discussion with partner.	They are trying to figure out their partners answers which may give them another idea for their own solution
Each student will give one example for the class	Students will be checking solutions as they go on the board and can continue adding to their own list.
Development	
Teacher will put examples on the board for different numbers – can students work out the number? (soft mention of x or an unknown)	40B460 6OVER2 7TAKE3 HALF22
Students will try some with their partner – swap boards.	Looking for the use of maths symbols.
Extension problem	
Is there an easier/handier/quicker way to write the numbers if I don't use the alphabet?	
Can you write your numbers using these symbols and digits 0-9?	

Evaluation

- There will be 3 teachers in the room one leading the lesson and 2 observing.
- Teachers observing will note pupils initial attempts and the statements/suggestions they



make. We will take pictures of students work on whiteboards.

• The focus will be on observing students ability to think about numbers in a variety of ways. Most importantly is the observation of student thought process when going from using the alphabet to mathematical symbols. Do they understand the 'instruction' that the symbol gives?



Post-lesson reflection

The lesson was a successful introduction to word problems in algebra. Students were able to complete the tasks set and discuss their solutions. They also learned from each other to enhance their own solutions.

The observing teachers found that students understood the task well and needed only clarification on what they could and couldn't use.

The responses were mostly as expected. Some students couldn't get past TWO or TOO and needed the examples from their peers to realise what was possible. Some students came up with interesting solutions and really relished the challenge.

The main misconception noticed was that some students had the operation the wrong way around -'3 TAKE 5' instead of 5 TAKE 3. This is a common problem when we start word problems and this would open the discussion around what the mathematical operations mean in English and if it matters the position they take in an English sentence or a mathematical sentence.

The lesson was really only an introduction to word problems and the real value of it could not be determined until the remaining lessons are complete. The fact that students found the tasks challenging but achievable at least meant that they would be prepared to face the next set of tasks



with optimism.







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