

“Solving the Word Problem ...Count the Sweets “

For the lesson on:

31/01/2017

At Presentation Secondary School, Mitchelstown, Co. Cork, Aingil Naofa

Teacher: Ms. O' Malley

Lesson plan developed by: Sheelagh O' Malley and Kate Stack

1. Title of the Lesson:

Forming and Solving Worded Linear Expressions and Equations

2. Brief description of the lesson:

Revision lesson to ensure that students understand how to form and solve linear equations.

3. Aims of the Lesson:

For students:

- To know the difference between expressions and equations.
- To be able to translate worded problems to numbers.
- To communicate mathematics verbally and in written form.
- To use algebra to solve real life problems.
- To highlight to students that a problem can have several equally valid answers.
- To connect to and review prior knowledge of solving algebraic linear equations.

4. Learning Outcomes:

As a result of studying these topic students will be able to:

- Form an expression from a worded problem.
- Solve a worded equation using a variety of different methods.
- Verbalize their findings.

5. Background and Rationale:

(a) *Relationship to the Syllabus: Strand 4 - Algebra*

4.3 Finding formulae

Ways to express a general relationship arising from a pattern or context.

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

4.4 Examining algebraic relationships

Features of a relationship and how these features appear in the different representations.

- distinguish those features that are especially useful to identify and point out how those features appear in different representations: in formulas expressed in words, and algebraically.
- use the representations to reason about the situation from which the relationship is derived and communicate their thinking to others.

(b) *Difficulties students have had in the past with the subject matter:*

- Forming the equations from the worded problems.
- Understanding the language of what they are being asked to do.
- Knowing that they have to solve it.
- Independent thinking.

(c) *The thematic focus of this lesson study:*

Students should:

- Appreciate that mathematics can be used to solve real world problems.
- Become more creative when devising approaches and methods to solving problems.
- Build their enthusiasm for the subject by engaging them with stimulating activities.
- Recognise that there is more than one valid way to solve a problem.

6. Research

- http://www.ncca.ie/en/Curriculum_and_Assessment/Post-Primary_Education/Project_Maths/Syllabuses_and_Assessment/JC_Maths_English_2013.pdf
- Text and Tests Textbook
- Active Maths Textbook
- Exploring Project Maths Book 1 and Book 2
- Connect with Maths 1

7. About the Unit and the Lesson

- By encouraging the students to become confident and competent in interchanging between the written and numerical algebraic problems, students should address their independent thinking skills and discover there is more than one way to solve a problem.
- By presenting their findings, students learn to verbalise their answers, helping to assess understanding and address any misconceptions.
Junior Cycle Syllabus 2016 (page 25)
- Use real life problems as vehicles to motivate the use of algebra and algebraic thinking.
Junior Cycle Syllabus 2016 (page 26)
- Find the underlying formula written in words from which the data are derived (linear relations)
Junior Cycle Syllabus 2016 (page 27)
- Selecting and using suitable strategies (graphic, numeric, algebraic, mental) for finding solutions to equations
Junior Cycle Syllabus 2016 (page 29)

8. Flow of the Unit:

Lesson		# of lesson periods
1	Introduce Algebra Introduce Algebraic terminology Evaluate Expressions Adding and Subtracting terms	3 x 40 min.
2	Multiplying terms without and with brackets Multiplying two Expressions	3 x 40 min.
3	Solving Equations Solving Equations with brackets	3 x 40 min.
4	Forming and Solving Worded Linear Expressions and Equations	1 x 40 min.
5	Revision Sheet on Algebraic Expressions and Equations	1 x 40 min.

9. Flow of the Lesson

Teaching Activity	Points of Consideration	Time
1. Introduction Recap on algebraic terminology. Recap on common mathematical terms.	Understands double, treble, three times Understands all terms associated with different operations. What does solve, product, times, less than, greater than mean?	3 minutes
2. Posing the Task Students will be given three questions to solve in as many ways as possible: <ol style="list-style-type: none"> Write an expression from a word problem Solve the above expression Write and solve a different equation from a word problem 	All students should at least be able to form the expression Students should use a range of different methods to solve the equation including trial and error and balancing	2 minutes
3. Anticipated Student Responses Students may be afraid to start Students may mix up the operations e.g. add 2 instead of double Students may use a table	<u>Get stuck:</u> Encourage students to think about their prior knowledge <u>Incorrect response:</u>	10 minutes

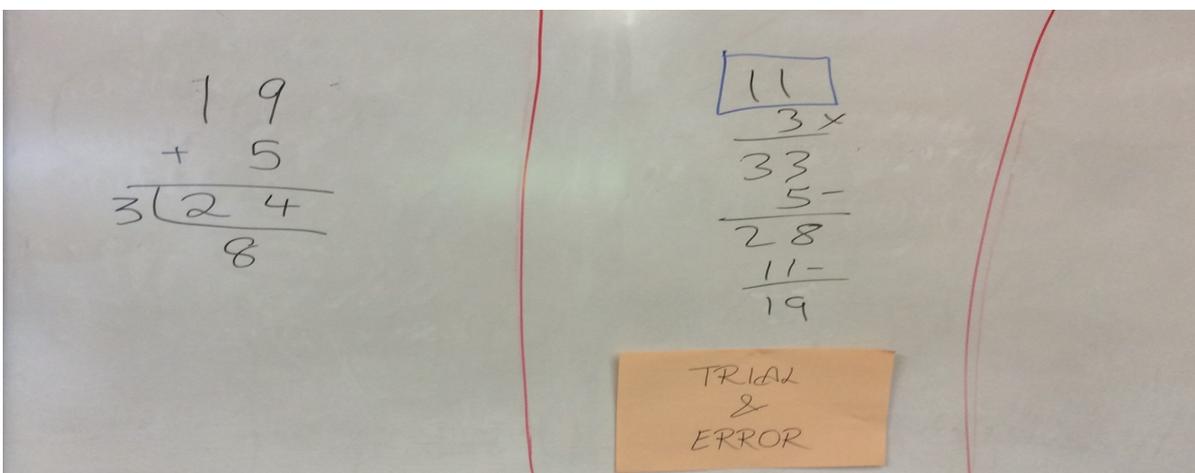
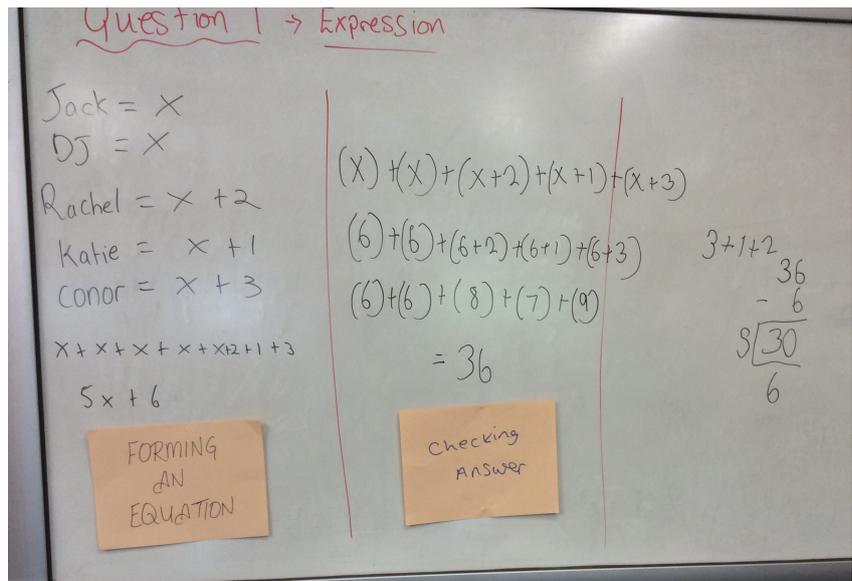
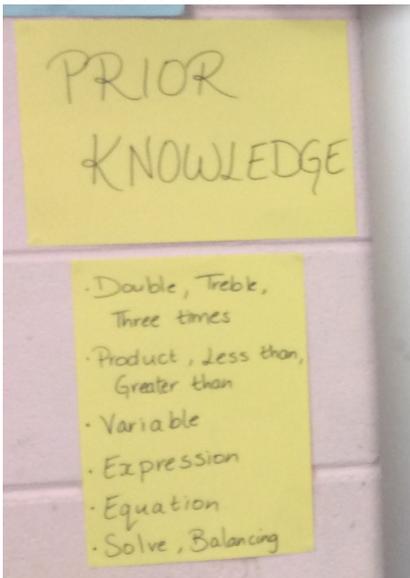
<p>Students may use trial and error Students may just write an answer Students may use balancing equations</p>	<p>Query their incorrect response e.g. Is that what treble means? <u>Finish Early:</u> Encourage students to explore other methods of solving the problems</p>	
<p>4. Comparing and Discussing 1. Just write an answer 2. Trial and Error 3. Table 4. Balancing</p>	<p>"hands up who has the same solution" Query if there are other methods Discuss method and how solution was formed</p>	<p>20 minutes</p>
<p>5. Summing up Homework given, based on activity presented in class Also give out reflection sheet with homework to be collected the next day</p>	<p>On reflection sheet:</p> <ul style="list-style-type: none"> • Did you learn anything new in Maths class today? Explain. • How many solutions to the worded problem did your group come up with? • Do you think you could solve another worded problem like this? 	<p>5 minutes</p>

10. Evaluation

- What is your plan for observing students?
 - Walk around classroom discussing the problems with students and noting the student's solutions.
- Discuss logistical issues such as who will observe, what will be observed, how to record data, etc.
 - Seating plan will be laid out so that all know who the students are and which students will work with each other.
 - While students are working on the task we will note the methods worked out by students so we can decide on what students to call on and what order to get them up.
 - Noting misconceptions to discuss.
 - Take pictures of student's work.

- What observational strategies will you use (e.g., notes related to lesson plan, questions they ask,)
 - Take note of the student's solutions looking for different methods.
 - Take note of the questions students ask and what issues arise.
- What types of student thinking and behaviour will observers focus on?
- Looking for independent thinking.
 - Noting peer to peer learning.
 - Observing their confidence in their approach to solving the questions.
- What additional kinds of evidence will be collected (e.g. student work and performance related to the learning goal)?
- Student work will be collected showing different methods for solving the worded problems.
- Photographs of the student's work.
- Make a record of students turn of phrase throughout the lesson.

11. Board Plan



12. Post-lesson reflection

- The student's prior knowledge language was evident throughout the lesson. The students worked really well in their groups. They started the task without hesitation.
- The students realised that there can be more than one way to solve a question. They came up with some of the outcomes that we had anticipated, but one group took it further and checked their answer.
- During the Ceardaíocht students discussed which solution they preferred and why. All students picked answer one as it was the most detailed. All students were encouraged to give feedback.
- As homework, the students were asked to reflect on the lesson. The students learned that it is not about always being right as long as you learn from your mistakes.
- There were a two groups who mixed up the concepts of adding and multiplying variables e.g. $x + x = x^2$ instead of $2x$.
- The students, with encouragement, tried using different approaches to get their answer. However, the students did not progress, using algebra, as far as we would have hoped when solving the equations.
- The students used number work to solve equations. In hindsight, this lesson might have been more suited to a second year group. As they would have had a deeper understanding of Algebra.
- As a result of this lesson it was seen that students responded positively to group work and discussing their solutions. This could hopefully be incorporated into future lessons.