

Teachers Explanatory Notes

TI-30XB MultiView™: Algebra Rules!

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This unit is designed to fit in with the study of algebra at Year 7, in particular the construction, use and interpretation of linear function tables. It could be attempted after students have spent some time mastering linear substitution and/or linear equation solving.

1. Some students may have a water tank at home. Discuss the difference between tanks which are just for the vegetable garden and tanks which serve as the sole source of water for a family. Ask students about the capacities of various tanks – how large is their tank?
2. Handout **Worksheet 1**, and ask a student to read the problem context, and then ask students to think about how the amount of water in the tank would vary over time in the absence of rain. What factors will affect how much water is used each day? Write up a table on the board with columns for the number of days, and the amount of water remaining. Ask students to help calculate the amount of water remaining in the tank after 0, 1, 2, 3, 7 days. Then ask students to record their answers to question **a**. W1
3. Introduce using x and y as the variables, and remind them of the idea of a function as a 'number processor' with a given rule to calculate the output value from a given input number (**see Powerpoint slides**). Ask students if they can suggest a rule for calculating the amount of water remaining in the tank in terms of these variables. In the worksheet, the first rule has been given – students are required to explain in words why such a rule will work. Emphasise notational variations such as describing this as an algebraic rule (some will call it a formula). PPT
4. Ask students to get their calculator ready, and work through the steps together for constructing a table. Discussion of the meaning of *Start* and *Step* will be useful here, as it is helpful in later in the unit. Ensure students can produce the table, and ask questions to check their understanding. If time permits, as how the *Start* and *Step* values could be modified to more quickly find the water remaining after 30 days. There is a **PowerPoint slide** showing these steps, and some **online videos**. PPT
5. Allow students to use their table to answer questions **c-g**. Helps students as needed. For part **h** and **i**, discuss with the class if there might be a way of more quickly calculating the number of days of water left in the tank based on different daily water usages – this is a generalisation of the methods used in questions **f** and **g**. Ask students to use this new rule to answer question **i** and **j**.
6. Hand out **Worksheet 2**, in which students practice the skills learnt in **Worksheet 1**. The rule in problem 1 is given, but students are required to interpret the meanings of the parameters 5.5 and 1.5 in the problem context. In problems 2 and 3, students must first construct the appropriate rule. PPT
W2

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7. Hand out **Worksheet 3**, which focuses on situations where a comparison of two models is introduced. Students may not be familiar with the use of subscripts, so check this with them as you work through the problem context together. Ask students what types of values x can take – for example, can they be other than positive integers?
8. Note that the TI-30XB MultiView™ table feature only works for a single rule at a time. For this reason, students will need to be shown how calculator list formulas (explain connection between formula and rule) can be used for side by side comparison of table values. Students can be asked to complete question **c** after a whole class approach to constructing the first list formula (for Jeff's pay).
9. Hand out **Worksheet 4**, in which students practice the skills learnt in **Worksheet 3**. In both problems, students must first construct the appropriate rule. Some allowance should be made for students to use either algebra or the table to find needed values.
10. To complete the unit, ask students to compare the efficiency of table methods against algebra routines – what was harder, easier, more/less tedious? This should promote discussion about the relative advantages of algebraic solving routines in such problems!
11. Students can be given the **Assessment Task** and the end of this document to check their basic skills and concept understanding of the materials covered in this Unit.

W3

W4

AT

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This Unit includes:

• Teacher Notes & Lesson Overview

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• Teacher PowerPoint

PPT

• Worksheet 1, 2, 3 & 4

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• Student Assessment Task

AT

• Solutions to Student Worksheets

WS

• Solutions to Assessment Task

ATS

To obtain the complete set of units available please
email teacher-support@list.ti.com

 **TEXAS
INSTRUMENTS**

Your Passion. Our Technology. Student Success.

Year 7 Algebra, Function and Pattern

Statement of Learning Opportunities

- Students construct tables of values for functions defined by simple rules, using whole number values as inputs and plot the corresponding set of ordered pairs, including the use of technology. They interpret simple functions, the set of input values used and the set of output values obtained, in context.

Key Ideas

- Linear functions with rules of the form $y = ax + b$ can be used to model some everyday problems
- Function tables can be generated with/without technology
- Values of x and y can be found by reading from the function table
- Algebraic substitution can be used to find values for y
- Algebraic solving can be used to find values for x
- Linear function models are often useful for only a restricted set of x values
- Interpretation is required to explain the meaning of various x and y values
- The parameters a and b have meaning in the context of the original problem
- Two linear functions can be used to compare different but related contexts

Key Vocabulary

Algebraic rule, formula, linear functions, equations, models, input & output values, table of values, substitution, equation solving, equivalence

Lesson Overview

- i) Introduction of a problem that can be modelled by a linear function (Worksheet 1)
- ii) Simple substitution of particular values into the function rule
- iii) Construction of a function table with the aid of the calculator
- iv) Reading and interpretation of table values in the problem context
- v) Modification of the model for changed conditions, and reuse and interpretation of the table values
- vi) Generalisation of the model for a variable daily water usage
- vii) Consideration of limitations of the model
- viii) Further student practice with formulating using and interpreting linear models (Worksheet 2)
- ix) Introduction of a problem that can be modelled by two linear functions (Worksheet 3)
- x) Use of List formulas to construct a table of values for each linear function
- xi) Use of table feature and algebraic solving routines to calculate and interpret values in the problem context
- xii) Further student practice with formulating, comparing and interpreting linear models (Worksheet 4)

Curriculum Links

TI-30XB MultiView™: Algebra Rules!

C

Equipment

- Worksheets 1 to 4 (can be done in parts)
- TI-30XB MultiView™ or other calculator capable of following features:
 - Function tables
 - List formulas

Indicators of Success

- Students are able to formulate a rule for the linear relationship between two variables in a given context
- Students are able to construct a table of values for a linear rule
- Students are able to interpret values from a table for the problem context
- Students are able to use algebra to solve simple linear equations arising from a consideration of the problem