

Student Worksheet 1

TI-30XB MultiView™: Algebra Rules!

W1

Name: _____

In this worksheet we will look at how algebra can help us to analyse some everyday situations. You will use a range of calculator and non-calculator methods to solve the stated problems. To start with, consider the following problem.

Australia seems to be getting drier, which puts a strain on our water supplies. The houses of some people living in the country away from towns are not connected to the town water supply. These people have tanks to collect rainwater for them to use, and they sometimes worry about whether there is enough water in their tanks for daily needs. An average family uses 600 L each day inside the house. Assume a family has a 30 000 L tank and that it is full of water.

After reading the above paragraph carefully, answer the following questions.

a) How much water would be left in the tank after:

i) a day _____

ii) 2 days _____

iii) a week? _____

Let y be the amount of water (in litres) left in the tank after x days

b) Explain why a rule for the amount of water remaining in the tank is given by $y = 30000 - 600x$:

We will use the table feature of your calculator to investigate the situation further.
See next page.

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On your TI-30XB MultiView™, do the following:

Press **table** to access the Table feature and enter the rule (as shown), and press **enter**

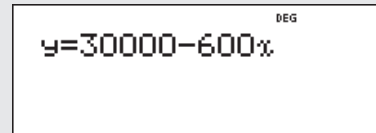
The next screen asks for the starting x value (**Start**), and the amount by which to step the x value (**Step**)

Type **Start** = 0

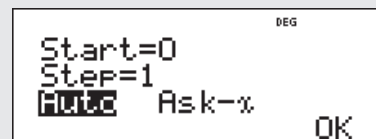
Type **Step** = 1

Leave **Auto** selected, and press **enter**

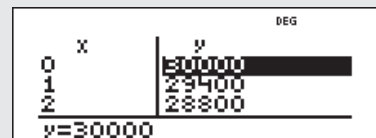
The table of values for the rule and the chosen Start/Step values is displayed. Press \downarrow to scroll down through the table. The values in the y -column display the amount of water in the tank after each day.



DEG
 $y=30000-600x$



DEG
Start=0
Step=1
Auto Ask-x OK



DEG

x	y
0	30000
1	29400
2	28800

$y=30000$

- c) Scroll down through the table to find out after how many days the tank will be empty (assuming no rain falls during this period)?
-

- d) If you scroll down far enough you will see negative values displayed for y - explain why this is happening:
-

- e) For what values of x is the rule useful in describing the water left in the tank?
-

Modify your rule and/or the table settings (via **table**) to answer the following questions. [Hint: You can change the **table** **Start** and/or **Step** values]

- f) How many days will this water last if it does not rain and the family uses 500 L per day?
-

- g) How many days will this water last if it does not rain and the family uses 100 L per day?
-

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Supposing the family uses W litres of water per day.

- h) Write an equation that could be solved to calculate the number of days that the water would last in this situation:

- i) Use algebra to solve this equation for x in terms of W :

- j) Use your answer to **part i** to calculate how many days the water would last if the family could reduce their daily water usage to the following amounts.

Daily water usage (in L)	400	425	450	475	500	525	550	575
No of days water will last								

- k) Suppose it doesn't rain for an entire year. What daily amount of water usage would be required so that the family had enough for this period? Is this realistic (Explain why/why not)?

Student Worksheet 2

TI-30XB MultiView™: Algebra Rules!

W2

Name: _____

In **Worksheet 1**, the usefulness of the calculator **table** feature was seen. In this worksheet you will practice using this feature to help solve some further problems.



Remember!

To generate a table of values for a given rule

- Press **table** and type in the rule and press **enter**
- Set the Start and Step value for x and press **enter**
- Set **Auto** or **Ask- x** for the table style and press **enter**

[Note: When entering a rule, you will need to modify the variables so that only the letters y and x are used]

Problem 1

A town planner constructs a rule for the total length (L metres) of a taxi parking strip required to park n taxis. The rule is $L = 5.5n + 1.5$

a) Use this rule to complete the following table:

n	1	2	3	4	5	6	7	8	9	10
L										

b) Why do you think n is multiplied by 5.5?

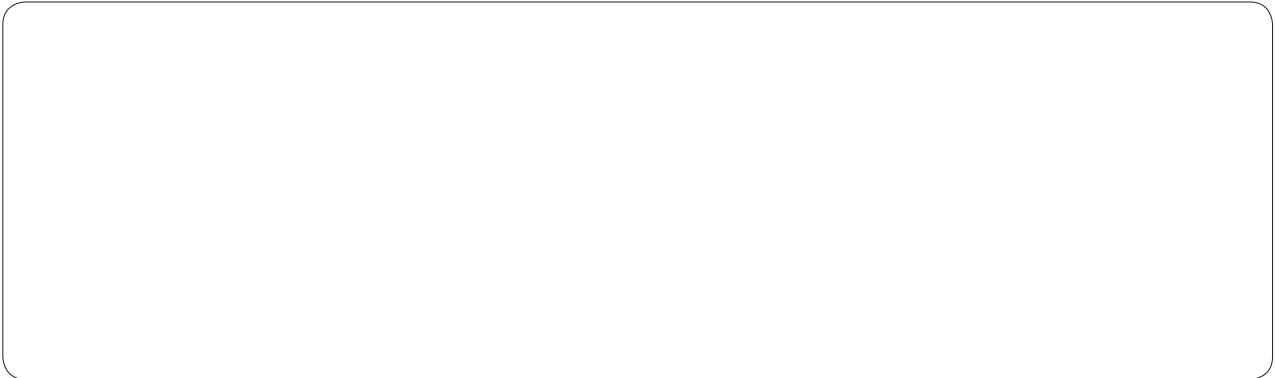
c) Why do you think 1.5 is added to $5.5n$?

Student Worksheet 2

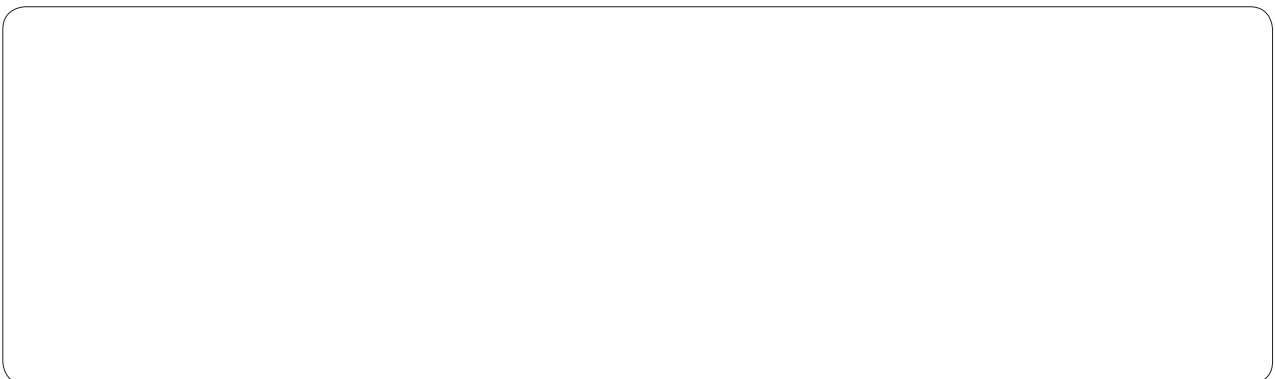
TI-30XB MultiView™: Algebra Rules!

W2

- d) Draw a diagram to show how the rule would work in the case of taxi parking strip for 3 cars. Label the lengths of each taxi, and where the extra 1.5 metres might be located.



- e) Suppose that a taxi parking strip has a length of 40 metres. Use algebra (or the `table` feature) to find how many taxis could properly be parked in this strip (according to the rule).



Problem 2

Ranjid wanted to calculate the monthly cost of using his new SMS only device. He is charged an access fee of \$12 each month, and \$0.25 per message. Let T be the total cost of a monthly bill for sending n messages.

- a) Write a rule linking T and n :

- b) What would be the cost to Ranjid in a month where he sends 173 text messages?

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W2

c) The headline "Teen sends 14,528 text messages in one month" was published in a newspaper in early 2009. Luckily the teen was on an unlimited text plan! If Ranjid had done what the teen had done, what would his monthly bill been?

d) How many messages would Ranjid need to send to receive a monthly bill over \$100?

e) Use algebra (or the `table` feature) to verify the answer obtained in **part d**:

Problem 3

Claudia has bought a bag of sweets plus two extra sweets. She will share the bag of sweets between herself and her brother, and keep the two extra sweets herself. Use h to represent the number of sweets in the bag. Use k to represent the number of sweets in Claudia's share.

a) Write a rule for calculating k when you know h :

b) This table shows how many sweets there might have been in the bag. Use your rule and the calculator `table` feature to show how many of these sweets are in Tim's share.

h	12	16	20	40
k				

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c) If Claudia has 27 sweets in her share, how many sweets were in the bag?

d) Use algebra (or the `table` feature) to verify the answer obtained in part c:

Student Worksheet 3

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W3

Name: _____

Sometimes the values given by two rules need to be compared. In this worksheet you will investigate some tools for doing this. Consider the following problem.

Jeff is a computer sales person. His weekly pay depends on how many computers he sells. He receives a basic amount of \$300, and a bonus of \$50 for each computer sold.

Jeff's friend Tamara is also a computer sales person. However, her pay consists of a basic amount of \$210, and she receives a bonus of \$65 for each computer sold.

Let P_j be Jeff's total weekly pay for selling x computers

Let P_t be Tamara's total weekly pay for selling x computers

a) Find a rule for Jeff and Tamara's pay:

$$P_j = \underline{\hspace{2cm}}$$

$$P_t = \underline{\hspace{2cm}}$$

b) Complete the following table (use the calculator `table` feature if you wish):

x	0	1	2	3
P_j				
P_t				

It would be nice to compare Jeff and Tamara's pays in a side by side table. To do this we will enter the two rules via the TI-30XB MultiView™ `data` feature.

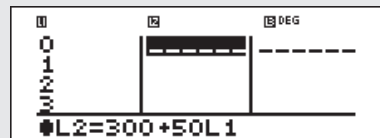
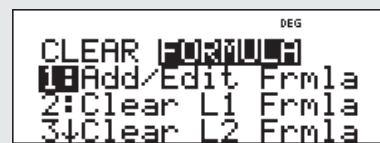
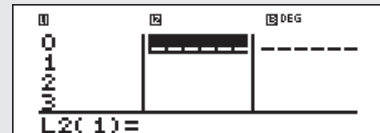
Student Worksheet 3

TI-30XB MultiView™: Algebra Rules!

W3

On the calculator do the following:

1. Press **[data]** and type the numbers 0 to 20 in the first column (called L1)
2. Press **[▶]** to move to top of the next column (as shown)
3. Press **[data]** **[▶]** to show the **FORMULA** menu
4. Press **1** to select **Add/Edit Frmla**
5. Type **L2=300+50L1** (L1 can be found by pressing **[data]**)
6. Press **[enter]** to calculate Jeff's total pay for the given values of x



- c) Repeat the above steps 2-6 to place a rule in **L3** which will calculate Tamara's total pay for the given values of x . If you have done this, the following screen should result:

L1	L2	L3
0	300	300
1	350	375
2	400	450
3	450	525
4	500	600
5	550	675
6	600	750
7	650	825
8	700	900
9	750	975
10	800	1050
11	850	1125
12	900	1200
13	950	1275
14	1000	1350
15	1050	1425
16	1100	1500
17	1150	1575
18	1200	1650
19	1250	1725
20	1300	1800

Use your calculator table to answer the following questions.

- d) In a particular week, both Jeff and Tamara sell 10 computers each.
Who earned more money in that week, and by how much?

- e) For a particular number of computers sold, they will both receive the same total pay.
What is this number?

- f) Write an equation which could be solved to find the answer from part e.
(Hint: For what value of x do the two rules give the same pay?)

Student Worksheet 3

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W3

g) Solve this equation for x :

h) Why do you think a company would have chosen to pay staff in this way?

i) Which method of payment would you prefer, Jeff's or Tamara's (explain why):

Student Worksheet 4

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W4

Name: _____

Use the methods you used in Worksheet 3 to answer the following questions.

Problem 1

Kath has \$80 and saves \$12 per week. Kim has \$200, but spends \$18 per week.

- a) Write a rule for how much money Kath will have after x weeks: $Y_{Kath} =$ _____
- b) Write a rule for how much money Kim will have after x weeks: $Y_{Kim} =$ _____
- c) Use your calculator to complete the following table:

x	0	2	4	6	8
Kath's savings					
Kim's savings					

- d) After how many weeks will Kim have run out of money?

- e) Write an equation which will help find out when Kath and Kim will have the same amount of money:

- f) Use algebra (or the `table` feature) to find out when they will both have the same amount of money:

Student Worksheet 4

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W4

Problem 2

Joachim purchases a tomato seedling (7.3 cm tall) and a capsicum seedling (12.5 cm tall). During the summer season, the tomato seedling grows in height by an average of 1.5 cm per week, and the capsicum seedling grows at an average of 0.4 cm per week.

a) Write a rule for the height (H_t) of the tomato seedling x weeks after it has been planted:

b) Write a rule for the height (H_c) of the capsicum seedling x weeks after it has been planted:

c) After how many weeks will the two seedlings be the same height (use algebra or the

d) The answer to part c is not a whole number. Give reasons why this might have happened:

Assessment Task

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Name: _____

Place all your working in the space provided.
Use your calculator table feature to help you answer the questions as necessary.

Question 1

The rule $V = 8000 - 150t$ describes the volume of water (V litres) in a tank t hours after a pump started pumping water from the tank.

- How much water did the tank hold at the start?
- What is the steady rate at which the water is being pumped out?
- How much water will be in the tank after 10 hours?
- After how many days will the tank be empty?
- Use algebra to show how you found your answer from **part d**:

Assessment Task

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AT

Question 2

Rani is a travelling salesperson who uses her own vehicle. She is paid travel expenses at the rate of \$155 per week plus 21 cents per kilometre that she travels for work.

a) If T is the amount paid (in dollars) in a week for travel expenses and k kilometres is the distance travelled for work, write a rule for T in terms of k :

b) How much would Rani receive for travel expenses in a week where she travelled 580 km for work?

c) In a particular week, Rani received pay of \$509.69, how many kilometres did she travel in that week?

d) Use algebra to show how you found your answer from **part c**: