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## Discount Savings

ID: 13573

Time required  
*45 minutes*

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### Activity Overview

*In this activity, students will find discounts and sale prices for items selling at 20% off and 40% off by using tables. They will then find the general rules, using a variable, for finding those discounts and prices.*

Topic: Numbers, Algebra

- *Percents, discounts*
  - *Patterns, tables*
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### Teacher Preparation and Notes

- *Students should have some experience with finding percents before this activity but prior knowledge of making tables on the TI-73 is not necessary.*
- *TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it.*
- ***To download the student worksheet and TI-Navigator files, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter “13573” in the quick search box.***

### Associated Materials

- *MGAct15\_Savings\_worksheet\_TI73.doc*
- *L1.73I, L2.73I, L3.73I, L4.73I, L5.73I (lists)*
- *MGAct15\_Savings\_Nav\_TI73.act*

### Suggested Related Activities

*To download the activity listed, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter the number in the quick search box.*

- *Two Friends Method (TI-73 Explorer) — 8458*
- *Picturing Percents (TI-73 Explorer) — 5709*
- *Percents Small and Large (TI-73 Explorer & TI-Navigator) — 11268*

**Problem 1 – A 20% Discount**

In this problem, students will explore percent discounts and sale prices. The scenario is a sporting goods store having a sale. Students are to calculate the discount and the associated sale price.

Your students should have some experience with finding percents before attempting this activity. They should also have some experience representing an unknown amount by using a variable. They do not need any experience building and interpreting tables with the TI-73.

Many middle school students persist in finding the sale price for an item by finding the amount of the discount and then subtracting that discount from the original price. For example, to find the sale price for an item that was originally \$80 and is marked down 20%, such students find 20% of \$80 (\$16) and subtract the discount from the original price ( $\$80 - \$16 = \$64$ ).

Building tables can help students discover patterns for such problems. After doing several such tables, students are often led by their classmates to understand that finding 20% of a number and subtracting it from the original amount is equivalent to finding 80% of the original number. They may also come to relate the equations  $y = x - 0.20x$  and  $y = 0.80x$  to the problem.

Question 1

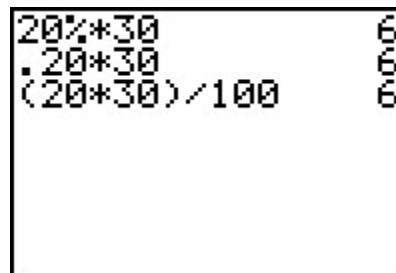
Discuss with students the terms original (or regular) price, percent of discount, discount, and sale price. Have students use the TI-73 to complete the table for 20% off.

The answers can be found by a few different methods of the Home screen. Students can find 20% of the number (method 1), solve an equation (method 2) or solve a proportion (method 3).

Method 1:  $Z \_ X M [ \_ \beta$

Method 2:  $\bar{Z} \_ M [ \_ \beta$

Method 3:  $\Delta Z \_ M [ \_ E \Phi \Psi \_ \_ \beta$

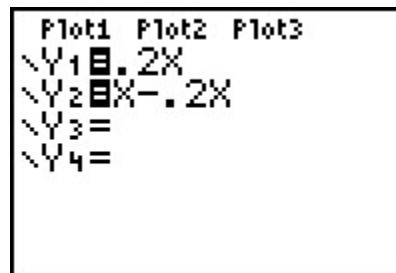


Questions 2–4

Ask students to give rules, using words, for finding the amount of discount and the sale price for any item during the 20% off sale. This will help lead them to write the equations using variables.

After students have written the equations, have them enter the equation in the Y= editor in order to create a table.

Press & and clear any equations that may be entered. Then, press  $\bar{Z} M \beta M T \bar{Z} M \beta$  to enter the equations.



Then, press  $\rightarrow$  to access the table setup menu. Lead students in a discussion as to the values of the **TblStart** (the first value in their table) and  $\Delta$ **Tbl** (the amount the rows in their table increase by).

To display the actual table, press  $\ast$ . Before students move on in the worksheet, you may want to ask them to interpret some of the values in the table. For example, scroll down to the 14 in the Y1 column and ask them what this number means. Then scroll to the 40 in the Y2 column and ask them to explain what this number means.

TABLE SETUP		
TblStart=20		
$\Delta$ Tbl=10		
Indent:	Auto	Ask
Depend:	Auto	Ask

X	Y1	Y2
20	4	16
30	6	24
40	8	32
50	10	40
60	12	48
70	14	56
80	16	64

X=20

Questions 5–9

After students show that they are comfortable answering questions about the values in the table, have them answer Questions 5-9 on the student worksheet.

Students will find that they cannot answer all the questions with the given table set up. They will need to adjust the table step at some points to find the values needed. Simply press  $\rightarrow$  again to change the values and return to the table.

**Problem 2 – The Sale Gets Greater**

In the second problem, the percent discount increases to 40%. Students will simply adjust the equations entered in Y1 and Y2 and display the table again.

Questions 10–15

The first set of questions is very similar to the questions answered from the 20% sale. Students should feel comfortable moving about the table and adjusting the table set up to find the answers needed.

Questions 16–17

Students may find the last two questions more challenging. With the patterns explored in the activity, students will hopefully move toward understanding that the discount does not have to first be found before finding the sale price. This may come through natural class discussion or you may have to lead discussion in this direction ultimately.

**Extension**

Possible extensions include having students explore 30% or 35% off or have students find sale prices with sales tax included.

**Extension – TI-Navigator™**

1. Use **Screen Capture** to monitor students' progress completing the table from the home screen.
2. For Question 2, use **Quick Poll** to gather students' attempts at writing the equations needed to enter in Y1 and Y2.
3. You can allow students to see a table with the correct equations by opening ***MGAct15\_Savings\_Nav\_TI73.act***. This will show the two equations for the 20% off sale and the associated table.
4. As an extension, use TI-Navigator to send **L1**, **L2**, and **L3** to students. Lists **L2** and **L3** represent a 35% off sale. Students are to work in pairs or small groups to determine the discount amount with the given set of three lists. Then, send **L4** and **L5** and have the groups determine the discount (10%).

Students need to enter the associated equations and produce the table to justify their conclusion. Use **Screen Capture** to assess students' work.

5. Use **Screen Capture** throughout to monitor student progress.

**Solutions – student worksheet**

Problem 1

1.

Original Price	20% off Discount	Sale Price
\$20	\$4	\$16
\$30	\$6	\$24
\$40	\$8	\$32
\$50	\$10	\$40
\$60	\$12	\$48
\$70	\$14	\$56
\$80	\$16	\$64
\$90	\$18	\$72
\$100	\$20	\$80
$x$ (any original price)	$0.2x$	$x - 0.2x$

2.  $y = 0.2x$

3.  $y = x - 0.2x$ ; Some students may have already discovered that  $y = 0.8x$  is the same amount.

4.

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Plot1 Plot2 Plot3
\Y1=.2X
\Y2=X-.2X
\Y3=
\Y4=
    
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5. \$32

6. \$48

7. \$90

8. change  $\Delta Tbl$  to 5

9. change  $\Delta Tbl$  to 2 and start at \$40

Problem 2

10.

Original Price	40% off Discount	Sale Price
\$20	\$8	\$12
\$30	\$12	\$18
\$40	\$16	\$24
\$50	\$20	\$30
\$60	\$24	\$36
\$70	\$28	\$42
\$80	\$32	\$48
\$90	\$36	\$54
\$100	\$40	\$60
$x$ (any original price)	$0.4x$	$x - 0.4x$

11. change the 2 to a 4 in both equations

12. \$16

13. \$36

14. \$120

 15. change the  $\Delta$ Tbl to 5 and scroll to 25

16. \$40.50

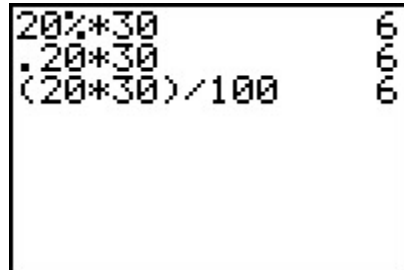
 17.  $y = 0.6x$  will find the sale price



**Problem 1 – A 20% Discount**

Your favorite sporting goods store is having a sale. Use your TI-73 calculator to create a table that displays the discount and sale price for items originally costing \$20, \$30, \$40, etc., up to \$100 for a sale when all items are reduced by 20%.

- Using the TI-73 home screen, make a table for the 20 percent off sale. You can enter percent calculations in various ways. These are shown for \$30 at the right.



Original Price	20% off Discount	Sale Price
\$20		
\$30		
\$40		
\$50		
\$60		
\$70		
\$80		
\$90		
\$100		
x (any original price)		

- Write an equation for the amount of the discount. \_\_\_\_\_
- Write an equation for the sale price after the discount. \_\_\_\_\_
- Use the TI-73 table feature to make a table for the 20 percent off sale. Enter the “amount of discount” equation in Y1 and the “sale price” in Y2. Press & to enter the equations.

Then press  $\rightarrow$  and enter the settings at the right to set up the table.





5. What would the discount be for an item that was originally \$40? \_\_\_\_\_
6. What would the sale price be for an item that was originally \$60? \_\_\_\_\_
7. What was the original price for an item that is \$72 during the sale? \_\_\_\_\_
8. How can you find the sale price for an item that originally cost \$25?  
\_\_\_\_\_
9. How can you find the sale price for an item that originally cost \$42?  
\_\_\_\_\_

**Problem 2 – The Sale Gets Greater**

10. Now make a table for a 40% off sale.

Original Price	40% off Discount	Sale Price
\$20		
\$30		
\$40		
\$50		
\$60		
\$70		
\$80		
\$90		
\$100		
$x$ (any original price)		

11. How did you change the original equations ( $Y_1$  and  $Y_2$ ) to create the second table?  
\_\_\_\_\_

12. What would the discount be for an item that was originally \$40? \_\_\_\_\_
13. What would the sale price be for an item that was originally \$60? \_\_\_\_\_
14. What was the original price for an item that is \$72 during the sale? \_\_\_\_\_
15. How can you find the sale price for an item that originally cost \$25?  
\_\_\_\_\_

16. Suppose you have \$24.50 to spend. Find the original price for the most expensive item you can afford during the 40% off sale. \_\_\_\_\_

17. Write a one step rule to find the sale price for any item during a 40% off sale, using  $x$  as the original price.  
\_\_\_\_\_