$$\frac{3y}{3} = \frac{2x}{3} + \frac{7}{3}$$

$$\frac{3y}{3} = \frac{2x}{3} + \frac{7}{3}$$

$$\frac{1}{3} = \frac{2x}{3} + \frac{7}{3}$$

M70 MG5/e 1.8

(3) Solve A = = = (B+b)h for b. Multiply both sides by 2 to clear fraction. < {2.1=1 on RHS $2 \cdot A = a \cdot f(B+b)h$ 2A = (B+b)hDivide both sides by h: $\frac{\partial A}{h} = \frac{(B+b)h}{-b}$ $\frac{2A}{g} = B + b$ Subtract B from both sides: $\left|\frac{2A}{b} - B = b\right|$ 403 G Solve T= 3vs - 4ws + 5vw for V. (* Essential Observation *) V appears twice on the RHS! CAUTION: Don't pick one v and ignore the other. You should never Add Hws to both sides to remove have v on both the term that does not contain v. sides of the eqn. T + 4ws = 3vs + 5vw* Essential Method * Factor out V $T + 4\omega s = v (3s + 5w)$ Divide by quantity in parentheses (35+5w) $\frac{T+HWS}{3S+SW} = V$

M70 5/e 1.8

Notice H appears twice on RHS.
*Notice H appears twice on RHS.
Subtract
$$2LW$$
 which does not contain H.
 $S-2LW = 2LH + 2WH$
Factor out H.
 $S-2LW = H(2L+2W)$
Divide by quantity in parentheses.
 $\frac{S-2LW}{2L+2W} = H$
Slight Ly better answer is fully factored:
 $\frac{S-2LW}{2(L+W)} = H$

Math 70 4 B 2.3 Compound Interest Formula*

Interest: Amount of money paid for the privilege of using someone else's money.

- Case 1: A person who borrows money from a lender will pay interest to the lender as the cost of using the lender's money
- Case 2: A person who invests money (savings account, stock market, bonds) is lending money to a bank, business, or government. The investor will be paid interest for allowing that bank, business, or government to use their money.

Simple Interest Formula I = PRTA = P + I = P + PRT = P(1 + RT)

I = Interest (\$) - money paid to lender or investor

P = Principal (\$) - money borrowed or invested

R = Rate, interest rate (%) -- per year

T = Time, in years

A = Total amount in owed or in account after T years

 $I = \frac{PR}{N}$

Simple interest for part of a year

$$A = P + I = P + \frac{PR}{N} = P\left(1 + \frac{R}{N}\right)$$

N = number of equal parts in a year, so $T = \frac{1}{N}$. Example: Divide year in four parts, T = ¼ year.

Compound interest

Example: Simple interest for part of a year, added to account four times per year for 1.5 years

After the first ¼ year: $A = P + I = P + P \cdot \frac{R}{4} = P\left(1 + \frac{R}{4}\right) \leftarrow$ This result becomes the new P! After the second ¼ year (1/2 year total):

$$A = P\left(1 + \frac{R}{4}\right) + P\left(1 + \frac{R}{4}\right)\frac{R}{4} = P\left(1 + \frac{R}{4}\right)\left(1 + \frac{R}{4}\right) = P\left(1 + \frac{R}{4}\right)$$

After the third ¼ year (3/4 year total): $A = P\left(1 + \frac{R}{4}\right)^2$

After the fourth ¼ year (1 year total): $A = P\left(1 + \frac{R}{4}\right)^4$

After the fifth ¼ year (1.25 year total): $A = P\left(1 + \frac{R}{4}\right)^{5}$

After the sixth ¼ year (1.5 years total): $A = P\left(1 + \frac{R}{4}\right)^{6} \leftarrow \text{Notice } 6 = 4 \times 1.5 = \text{NT}$

 $A = P \left(1 + \frac{R}{N} \right)^{(NT)}$

Compound Interest Formula*

N = number of times interest is compounded each year Caution: When using GC to calculate, make sure to use parentheses around (NT) in exponent!

*MEMORIZE!

Math 70 5/e 1.8

1es

8

Karen invests \$10,000 in a savings account paying 5% interest compounded quarterly for 3 years. How much money will be in the account after 3 years?

$$A = P\left(1 + \frac{1}{2}\right)^{(nt)}$$
 compound interest formula

$$A = unknown$$

$$P = \#10,000$$

$$\pi = .05$$

$$n = 4 \text{ times per year (quarterly)}$$

$$t = 3 \text{ years}$$

$$A = 10000 (1 + .05/4)^{(4 \times 3)}$$

$$(4 \times 3)$$

$$(1 + .05/4)^{(4 \times 3)}$$

$$(1 + .05/4)^{(4 \times 3)}$$

Math 70 1.7

Basic GC steps for tables <u>step 1</u>: Input expression into [y=] <u>step 2</u>: Set up table using [TBLSET] (Keystrokes: [2nd] [WINDOW]) Choose Indeput: Auto Ask ~ X-van Always Depend: [Auto] ~ Y-van <u>step 3</u>: Create table using [TABLE] (Keystrokes: [2nd] [GRAPH])

Rev 12-2-11	Name
[I-84+ GC 1	0+ Using the Y= menu, Automatic and Ask Tables
Objectives:	Input functions into the Y= menu Use TBLSET and TABLE to set up and view tables
In addition to calculator ha or graphs is f	the calculating screen and the menus for mathematical operations, the graphing s other screens to store equations, create tables or graph. The starting point for tables he Y= menu.
CAUTION: V	when using the Y = menu, the equation must be solved for y.
To input equation key	ations, press . Use the variable key for x and the regular number and /s (including the MATH menu and its options) for everything else.
CAUTION: errors withou	Do not use the memory storage location (ALPHA) (STO) for x. This can cause strange t any error screens.

Example 1: Put y = 3x + 4 in the Y= menu.

Y= CLE	ar <u>3</u> X,T,Ø,n	+ 4 ENTER
Answer:	Plot1 Plot2 Plot3 \Y183X+4 \Y2= \Y3= \Y4= \Y5= \Y6= \Y7=	

Answer:

Notice that the Y= menu allows more than one equation.	For now, make sure that all the equations
after y_1 are cleared by using the \checkmark or $\overbrace{\text{ENTER}}$ key	rs and CLEAR

Once an equation has been put into the Y= menu, we can use the GC to make a table of values.
Y=
Step 1: Input the equation into the Y= menu. Begin by pressing
2nd WINDOW
Step 2: Set up the table using TBLSET. Begin by pressing
In the TBLSET menu there are four settings:
 TblStart ("Table Start") refers to the first x-value to be used in the table.
2. △Tbl ("Delta Table") is the amount that will be added to each x-value to get the next x-value.
3. Indpt: ("Independent variable") is whether you will input each x-value or let the GC calculate it.
4. Depend ("Dependent variable") is whether you should input each y-value or the let the GC do it.
Step 3: View the table using TABLE Press 2nd GRAPH Use and to move
down or up the table. If you go "off the edge", the table will move and re-fill (if automatic).
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Example 2: Find the x-values calculated by these choices in TBLSET.



TblStart is -73, so the first x-value will be -73.

 \triangle Tbl is .5, so the GC will add .5=½ to -73 to get the next x-value, and continue adding ½ to get each subsequent value in the table.

Both Indpnt and Depend are automatic, so the GC will fill the table automatically with y-values from the Y= menu. (Without seeing the Y= menu, we can't know what values of y it will calculate.)

Answer:

X	у	
-73		
-72.5		
-72		
-71.5		

Example 3: Create an automatic table for y = 3x + 4 and use it to fill in the given table.

X	-2	-1	0	1	2
У					

<u>Step 1:</u> Input y = 3x + 4 into the Y= menu. (See Example 1.)

<u>Step 2:</u> Notice that the table begins with x=-2 and advances by 1 each row. Set up the table using TBLSET so that TblStart is -2, \triangle Tbl is 1, and Indpt and Depend are both Auto.



Step 3: View the table by pressing



and use the display to complete the blank table.

TABLE S TblSta	ETUP rt=-2	Ask Ask



Answer:



Example 4: Scroll down in the automatic table for y = 3x + 4 and fill in the given table.



When the desired x-values are not in order or are not equally spaced, we could scroll up and down in an automatic table, but an Ask table will probably be quicker. To set up an Ask table, in TBLSET, set Indpt to Ask, but leave Depend Auto.

Example 5: Create an Ask table for y = 3x + 4 and use it to fill in this table.

2nd

5	(-72	-15	46	-3	103
	/					

Step 2: TblStart and Tbl can be any values. Change Indpt to Ask and leave Depend as Auto.

GRAPH

, input the desired values of x, and use the



<u>Step 3:</u> View the table by pressing display to complete the blank table.



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Example 5, continued.

Answer:

X	-72	-15	46	-3	103
у	-212	-41	142	-5	313

NOTE: Sometimes, an Ask table will already have values in it. Just press the desired x-value and the GC will display it where the cursor is.

CAUTION: Setting Indpt to Auto and Depend as Ask (the reverse of what we just did) is useful only for checking y-values you already know. If your table doesn't behave as you expect, this might be your mistake. Setting both to Ask is similarly unhelpful.

Tables can help us guess which values of x are closest to a target value of y.

CAUTION: Sometimes it's difficult to make the table show exactly the desired value of y. Then you have to use your brain.

Example 6: Use an automatic table with \triangle Tbl=5 to determine the two multiples of 5 for which y = 3x + 4 is closest to 57.

WINDOW 2nd 0 5 ENTER ENTER ENTER 2nd GRAPH TABLE SETUP Y١ TblStar ú 4 ⊿Tb1=5 19494 1949 1949 19479 19479 10 Indent: Ask 15 20 25 30 Ask Х=Й

x=15 gives y=49, and x=20 gives y=64. Since 57 is between 49 and 64, the x-value which results in a y-value of 57 is between 15 and 20.

Answer: between x=15 and x=20

When the same values of x are being used for two (or more) different equations, we can calculate them at the same time by putting all the desired equations into the Y= menu. The table still displays ordered-pair information, but the x-values are not printed twice.

Example 7: What ordered pairs are represented by this table?

X	:	$y_1 = 3x + 4$	$y_2 = -3x + 4$
		7	1
-	3	-5	13

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[™]blStart can be any value.

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Example 7, continued.

Answer: (1,7) and (-3,-5) are ordered pairs on the graph of $y_1 = 3x + 4$. (The first column) (1,1) and (-3,13) are ordered pairs on the graph of $y_2 = -3x + 4$. (The second column)

Example 8: Fill in an Ask table for $y_1 = 3x + 4$ and $y_2 = -3x + 4$ simultaneously and list the ordered pairs for each function.

X	$y_1 = 3x + 4$	$y_2 = -3x + 4$
-34		
46		
-12		
0		
1003		

<u>Step 1:</u> Input both equations into the Y= menu. $y_1 = 3x + 4$ is already there.

Y= ENTER (-) 3 X,T,0,n + 4

Step 2: TblStart and △Tbl can be any values. Set Indpt to Ask and Depend as Auto.

<u>Step 3:</u> View the table by pressing 2nd (GRAPH), input the desired values of x, and use the display to complete the blank table. Notice that $y_2 = -3x + 4$ is in the second column.

Plot1 Plot2 Plot3 \Y183X+4 \Y28-3X+4 \Y3= \Y4= \Y5= \Y6=	TABLE SETUP TblStart=-2	X -34 46 -12 0 1003	Y1 -98 142 -32 4 3013	Y2 106 -134 40 4 -3005
\Y7=		X=	L	

Answer:

X	$y_1 = 3x + 4$	$y_2 = -3x + 4$
-34	-98	106
46	142	-134
-12	-32	40
0	4	4
1003	3013	-3005

(-34, -98), (46,142), (-12,-32), (0,4) and (1003,3013) are ordered pairs on the graph of $y_1 = 3x + 4$. (-34,106), (46,-134), (-12,40), (0,4) and (1003,-3005) are ordered pairs on the graph of $y_2 = -3x + 4$.

Note: If you scroll right on the table, you'll see extra decimal places at the bottom of the screen.

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Practice

- 1) Complete the following table for y = 2x 5x -2 -1 0 1 2
- 2) Complete the following table for y = 2x 5x 20 21 22 23 24
- 3) Complete the following table for y = 2x-5x -72 -15 46 -3 103
- 4) Complete the following table for $y = x^2 1$ x 0 5 10 15 20
- 5) Complete the following table for $y = \sqrt{100 x^2}$. Round to the nearest hundredth if necessary. $x \quad 0 \quad 2 \quad 4 \quad 6 \quad 8$ $y \quad 1 \quad 0 \quad 2 \quad 4 \quad 6 \quad 8$
- 6) Complete the following table for $y = 3x^2 x + 9$

X	-12	-36	52	-1	98
V					

- 7) Use an automatic table with \triangle Tbl=5 to determine the two multiples of 5 for which y = 2x 5 is closest to 57.
 - 8) Use an automatic table with \triangle Tbl=1 to determine the two integers for which y = 2x 5 is closest to 108.
 - 9) List the ordered pairs represented by this table.



10) Fill in an Ask table for $y_1 = -2x + 7$ and $y_2 = 3x - 4$ simultaneously and list the ordered pairs for each function.

X	$y_1 = -2x + 7$	$y_2 = 3x - 4$
-34		
46		
-12		
0		
1003		

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TI-84+ GC 10+ Using the Y= menu, Automatic and Ask Tables page 8 Solutions

	X	Y1	Y2
	-34	75 -85	-106
	-12	31	-40
	<u>1003</u>	-1999	3005
		1	
10)	X=		

X	$y_1 = -2x + 7$	$y_2 = 3x - 4$
-34	75	-106
46	-85	134
-12	31	-40
0	7	-4
1003	-1999	3005

The ordered pairs for y_1 in this table are (-34,75), (46,-85),(-12,31),(0,7),and (1003,-1999). The ordered pairs for y_2 in this table are (-34,-106), (46,134),(-12,-40),(0,-4),and (1003,3005).

Name	·
Date	

TI-84+ GC 11 Interest Formulas and Editing Using Answer, Entry, Delete, and Insert

Objectives: Review the simple and compound interest formulas Use the GC's automatic recall of the previous answer, ANS Review using a previous calculation using Entry (ENTRY = 2nd ENTER) Review editing a previous calculation using Delete (DEL) and Insert (INS = 2nd DEL)

Interest is the cost of using someone else's money. Interest is paid in two situations:

1. If I deposit money with a bank, credit union, investment fund, stock purchase, etc., I am investing. I allow that institution to use my money and they will pay interest to me.

2. If I borrow money from a bank, credit union, mortgage lender, car dealership, etc., I am using someone else's money. I will pay interest to them.

The <u>simple interest formula</u> I = PRT is used to calculate the amount of money earned (or paid) as interest when amount of money *P* is deposited (or borrowed) for *T* years in an account earning (or owing) *R* percent interest per year. Round all money answers to the nearest penny.

"Compounding" or "Compound Interest" refers to calculating the interest accrued and adding that interest to the account so that both the interest and principle earn interest in the future.

Example 1: If you deposit \$200 in an account earning 3% compounded monthly, after the first month, you will earn interest calculated using the simple interest formula, I = PRT.

Substitute P = \$200, R = 0.03, and T = $\frac{1}{12}$ into the formula I = PRT to get $I = (200)(.03)\left(\frac{1}{12}\right)$.

This example will be used for the first four practice problems, which you must do in order.

1) Calculate the interest earned in the first month.



Answer: _____

The balance of an account is the amount of money in the account.

 Calculate the balance after first month by adding the interest you just calculated to the original deposit.



(Notice: the GC automatically used ANS, the answer from the previous calculation.)

Answer:

Rev 12-2-11 TI-84+ GC 11 Interest Formulas and Editing Using Answer, Entry, Delete, and Insert page 2

3) Calculate the interest earned in second month, using the simple interest formula I = PRT with the new balance (including last month's interest), which happens to be stored as Ans on the GC.

Substitute P = \$200.50, R = 0.03, T =
$$\frac{1}{12}$$
 into $I = PRT$

$$\mathbf{X} \cdot \mathbf{0} \mathbf{3} \div \mathbf{1} \mathbf{2}$$
 ENTER

Answer: _____

4) Calculate the balance after second month by adding the interest you just found to the previous balance.

Answer: _____

t =

To save the time of calculating the interest after each compounding period, we can derive a formula that does the compounding for us. It calculates all the interest, without rounding, to give an exact final amount in (or balance of) the account.

The <u>compound interest formula</u> $A = P\left(1 + \frac{r}{n}\right)^{nt}$ is used to calculate the amount of money A in an

account after *t* years have passed, if the initial deposit *P* earns *r* interest rate (given as a percentage, calculated as a decimal), compounded *n* times per year.

Watch for the word "compounded" in the problem.

Round all money answers to the nearest penny.

P=

5) Calculate the balance in an account when \$1000 is deposited for 10 years earning 7% interest compounded monthly.

n =

r =_____

IMPORTANT NOTE: We need to multiply nt before we can take the exponent.
So when we type into the GC, we must use extra parentheses around the exponent: (nt).



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IMPORTANT: To use the keystrokes in the	se examples, vou must do	problems 5-9 in order.
6) Calculate the balance in an account who	en \$1000 is deposited for 1	0 years earning 8% interest
compounded monthly.	n =	t =
		•
Substitute into the formula: $A = ___ \begin{pmatrix} 1 + \\ \end{pmatrix}$)	
Only r has changed from the previous calcu	ulation. So let's edit that en	try by typing an 8 over the 7.
First we recall the previous calculation usin	g ENTRY, which is 2nd	ENTER
) 8 ENTER	
		Answer:
 Calculate the balance in an account who compounded daily 	en \$1000 is deposited for 1	0 years earning 8% interest
P= r=	n =	t =
Substitute into the formula: $A = _ (1 + $)	
	$\bigcirc \bigcirc $	\rightarrow \rightarrow 3 6
2nd DEL 5)) 3 6 2nd	DEL 5 ENTER Answer:
8) Coloulate the belance in an account wh	on \$1000 is denosited for 9	veore corning 8% interest
compounded daily.	en a roou is deposited for a	years earning o% interest
P= r=	n =	t =
Substitute into the formula: $A = $ (1+)	
Edit the previous: 2nd ENTER (Answer:

9) Calculate the balance in an account when \$1200 is deposited for 9 years earning 8% interest compounded daily.

Answer:

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-

TI-84+ GC 11 Interest Formulas and Editing Using Answer, Entry, Delete, and Insert, solutions page 4

- 1) \$0.50
- 2) \$200.50
- 3) \$0.50 (rounded from \$0.50125)
- 4) \$201.00 (rounded from \$201.00125)
- 5) \$2009.66
- 6) \$2219.64
- 7) \$2225.35
- 8) \$2054.27
- 9) \$2465.13

Name	

Date _____

FI-84+ GC 9 Percent Increase and Decrease and Using Tables with the Ask Feature (TI-84+)

Objectives: Review percent equation, percent decrease and percent increase equations Use the TBLSET menu to set up an empty table on the GC Create an user-filled table using TABLE on the GC

IMPORTANT: Write the percent as a decimal when using any of these formulae.

The <u>percent equation</u> is used to calculate simple percents. percent times base = amount Example: (cost before tax) x (tax rate) = amount of tax Formula: a = pb

The percent increase equation is used when a percentage of the base is added to the base.			
base + percent times base = amount			
Example: $(\cos t \text{ before } tax) + (tax \text{ rate}) x (\cos t \text{ before } tax) = (\cos t \text{ after } tax)$			
Formula: $b + pb = a$, or if you factor out b: $b(1 + p) = a$			

The percent decrease equation is used when a percentage of the base is subtracted from the base.				
base – percent times base = amount				
Example:	(cost before discount) - (discount ra	te) x (cost before discount) = (sale price)		
Formula:	b - pb = a, or if you factor out b:	b(1-p) = a		

- Hortense has been shopping for tools at Home Depot. Next month, Home Depot is having a sale and all tools will be discounted 35%. Hortense plans to purchase the tools during the sale.
 - a) Using x to represent the original price, write an expression for the amount that will be discounted next month. Is this amount a percent, percent increase, or a percent decrease?
 - b) Write an algebraic representation for the sale price, y_1 , in terms of the original price x. Is the sale price a percent, percent increase or a percent decrease?
 - c) Set up an Ask table in your GC.

First, put the expression into the Y= menu.



Second, go to the TBLSET menu. The starting value and increment will not be used, so skip them.

Each y-value is calculated using a value of x, so y "depends" on x, or is "dependent".

Rev 8-5-13

TI-84+ GC 9 Percent Increase and Decrease and Using Tables with the Ask Feature (TI-84+) p.2

Use Ask for the Independent Variable (x)

) ENTER ENTER 2nd MODE

and Automatic for the Dependent Variable (y)

Third, use the Ask table, using the second function for TABLE.



The table may be blank or have leftover numbers; either is okay. At the bottom of the screen, it says "X=". The calculator is waiting for you to type values of x.

d) Find the sale price of each item to complete the table below. If necessary, round answers to the nearest penny. Include units.

Item	Hammer	Drill	Sander	Glue gun	Screwdriver set	Socket wrench set
Original Price	\$8.25	\$39.95	\$46.75	\$18.45	\$21.60	\$76.65
Sale price						

Type each original price (x) into the Ask table. The calculator will find the sale price (y) for the item.



Use the completed table, arithmetic, and algebra to answer the rest of the questions.

- e) If he purchases all the items when on sale, what will his total bill be before taxes?
- f) What is the total purchase price after taxes if 7% tax is added to the bill? Is this a percent, percent increase or a percent decrease? Round to the nearest penny, and write the units.
- g) How much did he save (before taxes) by waiting for the sale?
- h) How much did he save, including taxes, by waiting for the sale?

Rev 8-5-13

TI-84+ GC 9 Percent Increase and Decrease and Using Tables with the Ask Feature (TI-84+) p.3

Solutions

)

a) Percent. 0.35x

6.65

|X=

d)

49.823

b) Percent decrease. $y_1 = x - 0.35x$ or $y_1 = (1 - 0.35)x$ or $y_1 = 0.65x$



tem	Hammer	Drill	Sander	Glue gun	Screwdriver	Socket
					set	wrench set
Original Price	\$8.25	\$39.95	\$46.75	\$18.45	\$21.60	\$76.65
Sale price	\$5.36	\$25.97	\$30.39	\$11.99	\$14.04	\$49.82

e) 5.36 + 25.97 + 30.39 + 11.99 + 14.04 + 49.82 = \$137.57

- Percent increase. 137.57 + (0.07)(137.57) = (1.07)(137.57) = \$147.20f)
- g) Total before sale: 8.25 + 39.95 + 46.75 + 18.45 + 21.60 + 76.65 = \$211.65Amount saved, without including taxes: 211.65 - 137.57 = \$74.08
- h) Total of original prices, with 7% tax: (211.65)(1.07) = \$226.47Amount saved, including taxes: \$226.47 - 147.20 = \$79.27

Mary Brewster is considering a job as a real estate agent. She is offered a monthly salary of \$500 plus 8% commission on sales of homes. She would like to know her possible gross pay if the homes in the area range from a sales price of \$570,000 to \$750,000, and she averages selling one home per month. **a.** Use the table and the Ask feature on your graphing calculator to complete the table below.

Sales (In thousands)	570	600	650	700	750
Gross Pay					

b. If she sells at least one home a month, what will her gross salary be between?

a. Complete the table.

Sales (In thousands)	Gross Pay (Dollars)	
570		-\$46,100
600		
650		
700		
750		

b. If she sells at least one home a month, her gross salary will be between \$ and \$

Salary function
$$S(x) = .08x + 500$$

 $S=salary$
 $x=amount of sales$
 $ex: 570 + foousand \implies x=570,000$
 $(*we need the zeros)$ to calculate
the correct percentage
 $Tn GC:$
 $V=$ $Y_1 = .08x + 500$
 $TBLSET$ [Ask] (Independent variable)
 $TABLE$ type in 570,000=x $Y=$ \$46100
tamet for remaining x-values

1.7.9