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An Introduction to the Use of Computers

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Introduction

It is becoming increasingly important for all students to have some level of computer literacy. It is reasonable to predict that within the life-time of the children now in New Haven Public Schools, most homes will have a microcomputer. Even for those students who may not use computers, the influence of computers on their lives will be enormous. It is incumbent on us now to begin making our students familiar with the powers and limitations of computers.

This unit contains three computer programs which can be used by any teacher interested in introducing the computer to a classroom. The programs are math-related, but they could be used in any type of classroom, because the objectives of this unit are to expose students to the process of computer use and to make students familiar with the hardware. The purpose does not include teaching programming or technical information.

In each case, the teacher loads the program from a cassette tape ahead of time, and the students only need to type appropriate information in response to directions given on the video screen. The machine used is the TRS-80 Model I, Level II, although the programs will also work on a TRS-80 Model III. The cassette is available from the Yale Institute office. A sample run of each program is listed here, plus a listing of the first program, for reasons given in Part I, below. Listings of the other two programs can be made from the tape, or can be obtained from the author.

Part I

The first program given here is intended to introduce the student to the operation of the computer as an aid in arithmetic calculation. The student types words or numbers on the keyboard; the computer responds with results, comments, or directions. The kinds of problems allowed are those which any simple calculator could handle. The student has the choice of doing addition, subtraction, multiplication, or division, and can type in either whole numbers or decimals.

The most appropriate audience is students in grades 5-8, although the program could be used with either younger or older students. The program is intended to be student-proof, *i.e.* , all kinds of possible student errors are anticipated and the computer will respond with helpful comments or suggestions.

In addition to the general objectives described in the introduction, this program was written with the thought that some students might want to see the program itself. Almost every allowable Radio Shack BASIC Level II command has been included in this program, and it is liberally sprinkled with “remarks” to make each step in the logic clear. Thus an interested student could look at particular parts of the program (or the whole thing, but that’s a lot), to see how one person has used different commands to solve a particular kind of problem. For this reason, a listing of this program is included, after the sample run which follows. Entries made by the student or teacher are shown in lowercase type and underlined.

run

(clear screen)

HELLO. MY NAME IS SAM.

I CAN HELP YOU DO ALL KINDS OF

ARITHMETIC PROBLEMS.

IF YOU HAVE USED ME BEFORE,

YOU MAY WANT TO SKIP THE

DETAILED INSTRUCTIONS. HOWEVER,

HERE IS ONE RULE I WILL SAY NOW:

ALWAYS HIT THE ‘ENTER’ KEY

(THAT’S THE WHITE KEY)

WHEN YOU HAVE FINISHED

TYPING AN ANSWER.

PRESS ‘ENTER’ NOW TO CONTINUE?

(clear screen)

FIRST, LET’S GET ACQUAINTED.

I’VE TOLD YOU MY NAME IS SAM.

WOULD YOU PLEASE

TYPE IN YOUR NAME? *geoff*

IT IS A PLEASURE TO MEET YOU,

GEOFF.

I WILL DO MANY ARITHMETIC

PROBLEMS FOR YOU AS YOU

LEARN HOW TO USE ME.

PRESS ‘ENTER’ TO CONTINUE?

(clear screen)

NOW, DOWN TO BUSINESS, GEOFF

DO YOU WANT THE DETAILED

INSTRUCTIONS? yes

(clear screen)

THERE ARE JUST THREE RULES YOU

NEED TO REMEMBER FOR NOW.

1. ALWAYS HIT THE ‘ENTER’ KEY

WHEN YOU HAVE FINISHED

TYPING THE NUMBERS OR WORDS

YOU WANT TO TELL ME.

(clear screen)

2. HIT THE ‘BREAK’ KEY IF YOU

WANT TO STOP FOR THE DAY

OR IF I START TO ACT CRAZY.

(ME? CRAZY? HO! HO! HO!)

(clear screen)

3. USE THE ‘BACK ARROW’ KEY

IF YOU WANT TO ERASE

SOMETHING YOU HAVE TYPED.

(THAT’S THE KEY ON THE RIGHT

SIDE OF THE BOARD WITH THE

ARROW POINTING TO THE LEFT)

DO YOU THINK YOU CAN

REMEMBER THESE RULES, NOW? *yes*

(clear screen)

WOULD YOU LIKE TO DO:

1. ADDITION

2. SUBTRACTION

3. MULTIPLICATION

4. DIVISION

WHICH KIND OF PROBLEM (NUMBER 1, 2, 3, OR 4) DO YOU WANT TO TRY? *1*

(clear screen)

ADDITION IT IS, GEOFF.

TYPE IN THE TWO NUMBERS YOU

WANT ADDED, SEPARATED BY A

COMMA.

I WILL SHOW YOU WHAT I MEAN:

(clear screen)

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*******************************

 * EXPLANATION FOR    *
 * TYPING IN NUMBERS *
*******************************
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IF YOU WANT TO HAVE ME

(FOR EXAMPLE)

USE THE NUMBERS SIX AND THREE

THEN TYPE: 6,3

PRESS ‘ENTER’ TO CONTINUE?

DO NOT USE COMMAS IN WRITING LARGE NUMBERS.

(clear screen)

IF YOU WANT TO HAVE ME

(FOR ANOTHER EXAMPLE)

USE THE NUMBERS TWENTY THOUSAND

AND THIRTY THOUSAND,

THEN TYPE: 20000,30000

(NOTE JUST ONE COMMA BETWEEN THE NUMBERS)
IF YOU TYPE: 20,000, 30,000

THE EXTRA COMMAS WILL JUST

CONFUSE ME. OKAY?

PRESS 'ENTER' TO CONTINUE?

WHAT ARE THE NUMBERS? *54,32*

(clear screen)

54 + 32 = 86

WANT TO TRY ANOTHER ADDITION

PROBLEM? *no*

WANT TO TRY ANOTHER KIND OF

PROBLEM? yes

(clear screen)

WOULD YOU LIKE TO DO:

1. ADDITION

2. SUBTRACTION

3. MULTIPLICATION

4. DIVISION

WHICH KIND OF PROBLEM

(NUMBER 1, 2, 3, OR 4) DO

YOU WANT TO TRY? *4*

(clear screen)

YOU REALLY WANT ME TO WORK, DON'T YOU, GEOFF? DIVISION IS HARD, BUT I'LL SHOW YOU HOW FAST IT CAN BE DONE!

TYPE THE TWO NUMBERS YOU WANT DIVIDED, SEPARATED BY A COMMA.

WHAT ARE THE NUMBERS? *24,6*

(clear screen)

24 / 6 = 4

THAT WASN'T SO HARD, GEOFF!

WANT TO SEE ME DO ANY MORE

DIVISION PROBLEMS? *yes*

WHAT ARE THE NUMBERS? 24,7

(clear screen)

DON'T WORRY, I'LL DO THAT PROBLEM, GEOFF. I'M NOT STALLING - BUT FIRST YOU HAVE TO MAKE A DECISION ABOUT THE REMAINDER.

(YES, YOU GAVE ME

A PROBLEM THAT HAS

A REMAINDER.)

I CAN DO REMAINDERS THREE WAYS.

PRESS 'ENTER' FOR EXPLANATION

OF THREE WAYS?

(clear screen)

DO YOU WANT THE REMAINDER AS

1. A WHOLE NUMBER

LIKE: 6/4 = 1 R 2

2. A DECIMAL FRACTION

LIKE: 6/4 = 1.5

3. A COMMON FRACTION

IN SIMPLEST FORM

LIKE: 6/4 = 1 1/2

TYPE THE NUMBER FOR THE WAY YOU

WANT THE REMAINDER EXPRESSED.

WHICH? *1*

(clear screen)

24 / 7 = 3 R 3

SEE, I TOLD YOU I COULD DO IT.

WANT TO SEE ME DO ANY MORE

DIVISION PROBLEMS? *no*

WANT TO TRY ANOTHER KIND OF

PROBLEM? *no*

WELL, I'M READY NOW TO MEET SOMEONE ELSE.

SO, GOODBYE, GEOFF,

WE CAN WORK AGAIN ON

ANOTHER DAY. LET A NEW PERSON HAVE A TURN FOR AWHILE.

NEXT .. . .

FIRST, LET'S GET ACQUAINTED.

I'VE TOLD YOU MY NAME IS SAM.

WOULD YOU PLEASE

TYPE IN YOUR NAME?

BREAK IN 90

READY

list

(listing begins on next page)

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5 REM - INTRODUCTORY PROGRAM -
10 REM - SAM, THE COMPUTER, CAN HELP YOU DO ARITHMETIC.
20 REM - STRING VARIABLES USED IN THIS PROGRAM:
25 DEFSTR N,R
30 ON ERROR GOTO 8000
35 ST=O: T=1
36 REM - 'ST' WILL COUNT THE STUDENTS USING THE PROGRAM
37 REM - 'T' IS USED TO LOCATE WHERE YOU ARE IN THE PROGRAM
38 REM (USEFUL FOR 'RETURN' AFTER ERROR SUBROUTINE)
39 CLS: PRINT CHR$(23)
40 PRINT "HELLO. MY NAME IS SAM.": PRINT
45 PRINT "I CAN HELP YOU DO ALL KINDS OF"
46 PRINT "ARITHMETIC PROBLEMS."
47 FOR I=1 TO 2000: NEXT I: PRINT
50 PRINT "IF YOU HAVE USED ME BEFORE,"
51 PRINT "YOU MAY WANT TO SKIP THE"
55 PRINT "DETAILED INSTRUCTIONS. HOWEVER,"
60 PRINT "HERE IS ONE RULE I WILL SAY NOW:"
65 PRINT: PRINT TAB(5) "ALWAYS HIT THE 'ENTER' KEY"
70 PRINT TAB(5) "(THAT'S THE WHITE KEY3"
75 PRINT TAB(5) "WHEN YOU HAVE FINISHED"
76 PRINT TAB(5) "TYPING AN ANSWER."
78 PRINT: INPUT "PRESS 'ENTER' NOW TO CONTINUE";N1
80 REM - MUTUAL INTRODUCTION FOLLOWS:
82 CLS: PRINT CHR$(23): T=2
84 PRINT "FIRST, LET'S GET ACQUAINTED."
86 PRINT "I'VE TOLD YOU MY NAME IS SAM."
88 PRINT "WOULD YOU PLEASE"
90 INPUT "TYPE IN YOUR NAME";NM
92 IF NM="YES" THEN 90
94 IF NM="NO" THEN 86
96 PRINT "IT IS A PLEASURE TO MEET YOU,"
98 PRINT NM;".": IF NM="SAM" PRINT " WHAT A GREAT NAME!"
100 ST=ST+1: REM - COUNTING THE STUDENTS USING SAM
102 PRINT: PRINT
104 PRINT "I WILL DO MANY ARITHMETIC"
106 PRINT "PROBLEMS FOR YOU AS YOU"
108 PRINT "LEARN HOW TO USE ME."
110 PRINT: PRINT: INPUT "PRESS 'ENTER' TO CONTINUE";N2
112 CLS: PRINT CHR$(23): T=3
114 PRINT "NOW, DOWN TO BUSINESS, ";NM
116 PRINT "DO YOU WANT THE DETAILED"
118 INPUT "INSTRUCTIONS";R1
120 IF R1="YES" THEN 200
122 REM - DETAILED INSTRUCTIONS FOLLOW LINE 200
124 IF R1="NO" THEN 395
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126 PRINT “TYPE YES OR NO, PLEASE.”
128 GOTO 116
200 REM - DETAILED INSTRUCTIONS:
205 CLS: PRINT CHR$(23): LV=1
206 REM - ‘LV’ IS THE STUDENT LEVEL. ‘1’ MEANS BEGINNER
207 REM (BECAUSE STUDENT REQUESTED INSTRUCTIONS)
210 PRINT “THERE ARE JUST THREE RULES YOU”
211 PRINT “NEED TO REMEMBER FOR NOW.”
215 PRINT 320, “ “
220 PRINT “1. ALWAYS HIT THE ‘ENTER’ KEY”
221 PRINT “ WHEN YOU HAVE FINISHED”
225 PRINT “ TYPING THE NUMBERS OR WORDS”
230 PRINT “ YOU WANT TO TELL ME.”
231 FOR I=1 TO 3000: NEXT I
232 IF LV=2 GOTO 245
240 PRINT 320, “ “
245 PRINT “2. HIT THE ‘BREAK’ KEY IF YOU”
246 PRINT “ WANT TO STOP FOR THE DAY”
247 PRINT “ OR IF I START TO ACT CRAZY.”
248 IF LV=2 GOTO 250
249 PRINT “ (ME? CRAZY? HO! HO! HO!)”
250 FOR I=1 TO 3000: NEXT I
251 IF LV=2 GOTO 255
253 PRINT 320, “ “
255 PRINT “3. USE THE ‘BACK ARROW’ KEY”
256 PRINT “ IF YOU WANT TO ERASE”
257 PRINT “ SOMETHING YOU HAVE TYPED.”: IF LV=2 THEN 261
258 PRINT “ (THAT’S THE KEY ON THE RIGHT”
259 PRINT “ SIDE OF THE BOARD WITH THE”
260 PRINT “ ARROW POINTING TO THE LEFT)”
261 FOR I=1 TO 3000: NEXT I
262 PRINT: PRINT: T=4
263 PRINT “DO YOU THINK YOU CAN”
264 INPUT “REMEMBER THESE RULES, NOW”;R2
265 IF R2=”YES” THEN 397
270 IF R2=”NO” THEN 280
275 PRINT “TYPE YES OR NO, PLEASE.”: GOTO 263
280 LV=2: CLS: PRINT CHR$(23): PRINT “HERE THEY ARE AGAIN:”
282 GOTO 220
285 REM - ‘LEVEL 2, BECAUSE THE STUDENT IS REVIEWING THE RULES
395 LV=3
396 REM - ‘LEVEL 3’ BECAUSE THE STUDENT SKIPPED INSTRUCTIONS
397 PR=0
398 REM - ‘PR’ WILL COUNT THE NUMBER OF PROBLEMS DONE
399 REM (MAXIMUM OF SIX PER STUDENT)
400 REM - CHOICE OF OPERATIONS FOLLOWS:
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410 CLS: PRINT CHR$(23): PRINT “WOULD YOU LIKE TO DO:”
420 PRINT TAB(5) “1. ADDITION”
430 PRINT TAB(5) “2. SUBTRACTION”
440 PRINT TAB(5) “3. MULTIPLICATION”
450 PRINT TAB(5) “4. DIVISION”
460 PRINT: PRINT: T=5
470 PRINT “WHICH KIND OF PROBLEM”
471 PRINT “(NUMBER 1, 2, 3, OR 4) DO”
475 INPUT “YOU WANT TO TRY”;C1
480 ON C1 GOTO 500, 600, 700, 800
490 PRINT “PERHAPS YOU MISUNDERSTOOD.”
495 PRINT “TYPE ONLY THE NUMBER 1, 2,”
496 PRINT “3, OR 4.”: GOTO 470
500 REM - ADDITION PROBLEMS
510 CLS: PRINT CHR$(23): PRINT “ADDITION IT IS, “;NM;”.”
520 PRINT “TYPE IN THE TWO NUMBERS YOU”
521 PRINT “WANT ADDED, SEPARATED BY A”
522 PRINT “COMMA.”
530 IF LV=1 OR LV=2 GOSUB 9000
535 PRINT: INPUT “WHAT ARE THE NUMBERS”;A1,A2
540 CLS: PRINT CHR$(23)
545 PRINT 260, A1;” + “;A2;” = “;A1+A2
550 PR=PR+1
555 IF PR>5 GOTO 1000
560 PRINT: PRINT: PRINT: T=6
565 PRINT “WANT TO TRY ANOTHER ADDITION”
566 INPUT “PROBLEM”;R3
570 V=0: REM - ‘V’ DEFINED BY AND FOR SUBROUTINE 9100
575 IF R3=”YES” THEN 535
580 IF R3=”NO” GOSUB 9100
585 ON V+1 GOTO 590, 400, 1000
590 INPUT “TYPE YES OR NO, PLEASE”;R3
595 GOTO 575
600 REM - SUBTRACTION PROBLEMS
605 CLS: PRINT CHR$(23)
606 PRINT “OKAY, COMING RIGHT UP, “;NM;”.”
607 PRINT TAB(5) “- - - SUBTRACTION - - -”
610 PRINT: PRINT “TYPE IN THE TWO NUMBERS YOU”
611 PRINT “WANT SUBTRACTED, SEPARATED”
615 PRINT “BY A COMMA.”
620 IF LV=1 GOSUB 9000
625 PRINT: INPUT “WHAT ARE THE NUMBERS”;M,S
630 IF M>=S THEN 642
631 PRINT “DID YOU MEAN TO HAVE THE LARGER”
632 PRINT “NUMBER SUBTRACTED FROM THE”
633 INPUT “SMALLER NUMBER”;R4
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635 IF R4=”YES” THEN 642
637 PRINT “I’LL SWITCH THEM AROUND THE”
638 PRINT “OTHER WAY, “;NM;”.”
639 H=M: M=S: S=H
640 FOR I=1 TO 1000: NEXT I
642 CLS: PRINT CHR$(23)
645 PRINT 260, M;” - “;S;” = “;M-S
650 PR=PR+1
655 IF PR>5 THEN 1000
660 PRINT: PRINT: PRINT: PRINT
665 PRINT “WANT TO TRY ANOTHER”
667 INPUT “SUBTRACTION PROBLEM”;R5
670 V=0: T=7
675 IF R5=”YES” THEN 625
680 IF R5=”NO” GOSUB 9100
685 ON V+1 GOTO 690, 400, 1000
690 INPUT “TYPE YES OR NO, PLEASE”;R5
695 GOTO 675
700 REM - MULTIPLICATION PROBLEMS
705 CLS: PRINT CHR$(23)
706 PRINT “OKAY, “;NM;”,”
707 PRINT “WE’LL DO MULTIPLICATION.”
710 PRINT “TYPE IN THE TWO NUMBERS YOU”
711 PRINT “WANT MULTIPLIED, SEPARATED BY”
715 PRINT “A COMMA.”
720 IF LV=2 GOSUB 9000
725 PRINT: INPUT “WHAT ARE THE NUMBERS”;F1 ,F2
735 CLS: PRINT CHR$(23)
745 PRINT 260, F1;” X “;F2;” = “;F1*F2
750 PR=PR+1
755 IF PR>5 GOTO 1000
760 PRINT: PRINT: PRINT: PRINT
765 PRINT “WANT TO HAVE ME DO MORE”
766 INPUT “MULTIPLICATION”;R6
770 V=0: T=8
775 IF R6=”YES” THEN 725
780 IF R6=”NO” GOSUB 9100
785 ON V+1 GOTO 790, 400, 1000
790 INPUT “TYPE YES OR NO, PLEASE”;R6
795 GOTO 775
800 REM - DIVISION PROBLEMS
805 CLS: PRINT CHR$(23)
806 PRINT “YOU REALLY WANT ME TO WORK,”
807 PRINT “DON’T YOU, “;NM;”? DIVISION”
810 PRINT “IS HARD, BUT I’LL SHOW YOU”
812 PRINT “HOW FAST IT CAN BE DONE!”
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815 PRINT: PRINT “TYPE THE TWO NUMBERS YOU”
816 PRINT “WANT DIVIDED, SEPARATED BY”
820 PRINT “A COMMA.”: T=9: DP=1: REM - ‘DP’ COUNTS IN 9200 SUBR
825 IF LV=3 GOTO 850
830 PRINT “BE SURE TO PUT THE NUMBER YOU”
831 PRINT “WANT DIVIDED FIRST AND THE”
832 PRINT “NUMBER YOU WANT TO DIVIDE BY”
833 PRINT “SECOND.”
834 FOR I=1 TO 4000: NEXT I
835 IF LV=1 GOTO 848
836 CLS: PRINT CHR$(23)
837 PRINT “FOR EXAMPLE, IF YOU TYPE: 6,3”
838 PRINT TAB(5) “I WILL SAY: 6/3 = 2”
840 PRINT “HOWEVER, IF YOU TYPE: 3,6”
842 PRINT TAB(5) “I WILL SAY: 3/6 = 1/2”
844 PRINT “SO YOU SEE, “;NM;,”
845 PRINT “IT MAKES A DIFFERENCE”
846 PRINT “WHICH ORDER YOU USE.”
847 FOR I=1 TO 3000: NEXT I
848 LV=3: RKM - ‘LEVEL 3’ TO AVOID REPEATING INSTRUCTIONS
849 PRINT: PRINT “NOW, BE CAREFUL -”
850 PRINT: INPUT “WHAT ARE THE NUMBERS”;DIV,DVI
852 IF DVI>0 THEN 856
854 PRINT “YOU CAN NOT DIVIDE BY ZERO.”
855 PRINT “TRY AGAIN.”: GOTO 849
856 Z=DIV/DVI
858 IF Z=INT(Z) THEN 900
859 IF DIV>INT(DIV) OR DVI>INT(DVI) THEN 900
860 GOSUB 9200
865 ON C3 GOTO 870, 900, 930
870 Q=INT(Z): LF=DIV - Q*DVI
875 CLS: PRINT CHR$(23)
880 PRINT 260, DIV;”/”;DVI;” = “;Q;” R “;LF
885 PRINT: PRINT: PRINT
890 PRINT “SEE, I TOLD YOU I COULD DO IT.”
895 GOTO 968
900 CLS: PRINT CHR$(23)
905 PRINT 260, DIV;”/”;DVI;” = “;Z
910 PRINT: PRINT: PRINT
915 PRINT “THAT WASN’T SO HARD, “;NM:”!”
920 GOTO 968
930 CLS: PRINT CHR$(23)
932 PRINT “OKAY, HOLD ON. I’M WORKING ON”
934 PRINT “FINDING THE SIMPLEST FRACTION.”
936 V2=ABS(DIV): D2=ABS(DVI)
938 W=SGN(DIV*DVI)
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940 REM - 'W' INDICATES SIGN OF ANSWER
942 Q=INT(V2/D2): LF=V2-Q*D2
944 L2=LF: C2=0
950 FOR F=L2 TO 2 STEP -l
952 IF C2=1 THEN 960
954 IF L2/F>INT(L2/F) THEN 960
956 IF D2/F>INT(D2/F) THEN 960
958 L2=L2/F: D2=D2/F: C2=l
960 NEXT F
961 IF LF26 THEN 966
962 PRINT "WHEW! THAT WAS REALLY HARD!"
963 PRINT "BUT I GOT IT AT LAST,"
964 PRINT "AND THE ANSWER IS . . ."
966 PRINT: PRINT " ";DIV;"/";DVI;" = ";W*Q;" ";L2;"/";D2
968 PR=PR+1
970 IF PR>5 THEN 1000
972 PRINT: PRINT: PRINT
974 PRINT "WANT TO SEE ME DO ANY MORE"
975 INPUT "DIVISION PROBLEMS";R7
976 V=0: T=10
978 IF R7="YES" THEN 850
980 IF R7="NO" GOSUB 9100
985 ON V+1 GOTO 990, 400, 1000
990 INPUT "TYPE YES OR NO, PLEASE";R7
995 GOTO 978
1000 REM - CHANGING STUDENTS
1010 IF ST>5 THEN 1100
1012 REM - MAXIMUM OF SIX STUDENTS ALLOWED
1020 PRINT: PRINT "WELL, I'M READY NOW TO MEET"
1022 PRINT "SOMEONE ELSE.": FOR I=1 TO 1000: NEXT I
1025 PRINT "SO, GOODBYE, ";NM;","
1030 PRINT "WE CAN WORK AGAIN ON"
1040 PRINT "ANOTHER DAY. LET A NEW PERSON"
1041 PRINT "HAVE A TURN FOR AWHILE."
1050 PRINT
1060 PRINT "NEXT . . . ."
1070 GOTO 84
1100 REM - STOPPING FOR THE DAY
1105 CLS: PRINT CHR$(23)
1110 PRINT "I'M TIRED NOW, AND I WOULD"
1111 PRINT "LIKE TO STOP WORK."
1120 PRINT "MAYBE AT ANOTHER TIME WE COULD"
1121 PRINT "WORK TOGETHER AGAIN."
1122 PRINT: PRINT "BYE-BYE, ";NM;"."
1123 PRINT "SAM IS NOT NOW"
1130 GOTO 9999
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1998 END
1999 REM - ALL SUBROUTINES FOLLOW -
8000 REM - ERROR MESSAGE SUBROUTINE
8010 CLS: PRINT CHR$(23)
8020 PRINT “YOU GOOFED!!!”
8030 PRINT “I DON’T KNOW HOW IT HAPPENED”
8035 PRINT “BUT SOMETHING YOU ARE DOING”
8040 PRINT “IS CONFUSING ME.”
8050 PRINT
8060 PRINT “GET HELP FROM YOUR TEACHER”
8065 PRINT “AND I WILL TRY TO GET YOU BACK”
8066 PRINT “WHERE YOU WERE BEFORE.”
8067 FOR I=1 TO 3000: NEXT I
8070 ON T GOTO 8081, 8082, 8083, 8084, 8085, 8086, 8087, 8088
8071 ON T-8 GOTO 8089, 8090, 8091, 8092
8072 T=1
8081 RESUME 40
8082 RESUME 90
8083 RESUME 116
8084 RESUME 263
8085 RESUME 410
8086 RESUME 565
8087 RESUME 665
8088 RESUME 765
8089 RESUME 815
8090 RESUME 974
8091 RESUME 9120
8092 RESUME 9265
8099 RESUME
9000 REM - EXPLANATION FOR TYPING IN NUMBERS SUBROUTINE
9010 LV=3
9015 REM - LEVEL 3 SO THIS WILL NOT BE REPEATED FOR ANY STUDENT
9016 PRINT “I WILL SHOW YOU WHAT I MEAN:”
9017 FOR I=1 TO 3000: NEXT I
9020 CLS: PRINT CHR$(23)
9025 PRINT “******************************”
9026 PRINT “* EXPLANATION FOR *”
9027 PRINT “* TYPING IN NUMBERS *”
9028 PRINT “******************************”
9030 PRINT 384, “IF YOU WANT TO HAVE ME”
9032 PRINT “(FOR EXAMPLE)”
9035 PRINT “USE THE NUMBERS SIX AND THREE”
9040 PRINT “THEN TYPE: 6,3”
9045 PRINT: INPUT “PRESS ‘ENTER’ TO CONTINUE”;N3
9050 PRINT “DO NOT USE COMMAS IN WRITING”
9051 PRINT “LARGE NUMBERS.”
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9052 FOR I=1 TO 2000: NEXT I
9055 PRINT 448, "(FOR ANOTHER EXAMPLE)"
9056 PRINT "USE THE NUMBERS TWENTY THOUSAND"
9057 PRINT "AND THIRTY THOUSAND,"
9060 PRINT "THEN TYPE: 20000,30000"
9065 PRINT " (NOTE JUST ONE COMMA"
9066 PRINT "BETWEEN THE NUMBERS)"
9070 PRINT "IF YOU TYPE:20,000, 30,000"
9075 PRINT "THE EXTRA COMMAS WILL JUST"
9076 PRINT "CONFUSE ME. OKAY?"
9080 INPUT "PRESS 'ENTER' TO CONTINUE";N4
9099 RETURN
9100 REM - CHANGING TYPE OF PROBLEM SUBROUTINE
9110 V=0
9115 REM - 'V' WILL SPECIFY WHICH BRANCH THE PROGRAM FOLLOWS
9116 T=11
9120 PRINT "WANT TO TRY ANOTHER KIND OF"
9121 INPUT "PROBLEM";R8
9130 IF R8="YES" THEN V=1
9140 IF R8="NO" THEN V=2
9150 ON V+1 GOTO 9160, 9199, 9199
9160 INPUT "TYPE YES OR NO, PLEASE";R8
9170 GOTO 9130
9199 RETURN
9200 REM - DIVISION REMAINDER SUBROUTINE
9202 IF DP>1 THEN 9233
9204 CLS: PRINT CHR$(23)
9206 PRINT "DON'T WORRY, I'LL DO THAT"
9210 PRINT "PROBLEM, ";NM;". I'M NOT"
9215 PRINT "STALLING - BUT FIRST YOU"
9216 PRINT "HAVE TO MAKE A DECISION ABOUT"
9220 PRINT "THE REMAINDER.": PRINT
9221 PRINT TAB(5) "(YES, YOU GAVE ME"
9222 PRINT TAB(6) "A PROBLEM THAT HAS"
9225 PRINT TAB(6) "A REMINDER.)"
9230 PRINT: PRINT "I CAN DO REMAINDERS THREE WAYS."
9231 PRINT: PRINT "PRESS 'ENTER' FOR EXPLANATION"
9232 INPUT "OF THREE WAYS";N5
9233 CLS: PRINT CHR$(23): IF DP>2 THEN 9265
9235 PRINT "DO YOU WANT THE REMAINDER AS:"
9236 PRINT "1. A WHOLE NUMBER"
9237 PRINT TAB(6) "LIKE: 6/4 = 1 R 2"
9240 PRINT "2. A DECIMAL FRACTION"
9245 PRINT TAB(6) "LIKE: 6/4 = 1.5"
9250 PRINT "3. A COMMON FRACTION"
9251 PRINT " IN SIMPLEST FORM"
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9255 PRINT TAB(6) “LIKE: 6/4 = 1 1/2
9260 T=12
9265 PRINT “TYPE THE NUMBER FOR THE WAY YOU”
9266 PRINT “WANT THE REMAINDER EXPRESSED.”
9267 IF DP3 THEN 9271
9268 PRINT “1 - WHOLE NUMBER”
9269 PRINT “2 - DECIMAL”
9270 PRINT “3 - FRACTION”
9271 INPUT “WHICH”;C3
9275 IF C3=1 OR C3=2 OR C3=3 THEN 9290
9280 PRINT “PERHAPS YOU MISUNDERSTOOD.”
9285 PRINT “TYPE ONLY THE NUMBERS 1, 2, OR 3.”
9286 GOTO 9271
9290 IF C3=1 AND (DIV0 OR DVIO) THEN 9291 ELSE 9297
9291 PRINT “SORRY, “;NM;”;.I CANNOT DO”
9292 PRINT “WHOLE NUMBER REMAINDERS ON”
9293 PRINT “PROBLEMS INVOLVING NEGATIVE”.
9294 PRINT “NUMBERS. (I GET CONFUSED.)”
9296 PRINT “CHOOSE 2 0R 3.”: GOTO 9271
9297 DP=DP+1
9298 REM - ‘DP’ WILL COUNT THE TIMES THESE DIRECTIONS ARE GIVEN
9299 RETURN
9999 END
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Part II

This second program will randomly generate arithmetic problems for the student to do. The intended audience is 7th and 8th Grade students or remedial high school students.

Students can pick the kind of problem they want to work with (whole numbers, fractions, decimals, or percents), the level of difficulty, and the number of problems (up to 10) that they want to do. These choices could also be made by the teacher, as a practice drill for the student. After each student finishes, his/her raw score and percentage score are printed out, with an appropriate comment. The student then can do more problems at the same level, switch to a different level, do a different kind of problem, or stop.

The program also has the capability of allowing students to estimate rather than give precise answers. Depending on the level of difficulty, answers within 10%, 7%, or 4% of the correct response are accepted. In keeping score a penalty of point is subtracted for each wrong guess. Students are given three chances on each problem.

A sample run follows. Entries made by the student or teacher are shown in lowercase type and underlined.

run

(clear screen)

HELLO

WOULD YOU PLEASE

TYPE IN YOUR NAME? *vicki*

HOW DO YOU DO, VICKI.

DO YOU WANT TO WORK WITH:

1. WHOLE NUMBERS

2. FRACTIONS

3. DECIMALS

4. PERCENTS

5. WHATEVER I CHOOSE FOR YOU

TYPE 1, 2, 3, 4, OR 5? *5*

(clear screen)

DECIMALS

NOTE - IT IS OKAY TO ESTIMATE

YOUR ANSWER ON ANY DECIMAL

PROBLEM THAT YOU TRY TO DO.

OKAY, VICKI, NOW

DO YOU WANT TO DO:

1. ADDITION
2. SUBTRACTION
3. MULTIPLICATION
4. DIVISION
5. WHATEVER I CHOOSE FOR YOU

TYPE 1, 2, 3, 4, OR 5? *2*

- SUBTRACT DECIMALS -

CHOOSE THE LEVEL OF DIFFICULTY,

VICKI:

1. BEGINNER
2. MEDIUM
3. EXPERT

WHICH (TYPE 1, 2, OR 3)? *2*

HOW MANY PROBLEMS (1 TO 10)

DO YOU WANT TO DO? *4*

31.3 - 6.32 = ? *25.02*

CLOSE ENOUGH

THE EXACT ANSWER IS 24.98

16.54 - .09 =? *16.45*

CORRECT

29.76 - 9.92 =? *20*

CLOSE ENOUGH

THE EXACT ANSWER IS 19.84

21.96 - 8.76 =? *30.72*

NO, VICKI. TRY AGAIN.

? *29.2*

NO, VICKI. TRY AGAIN.

? *27.20*

SORRY, VICKI,

THE CORRECT ANSWER IS 13.2

(clear screen)

VICKI, YOUR SCORE IS

2.25 OUT OF 4, OR 56%

YOU GOT 1 WRONG

YOU'RE CLOSE TO PASSING,

BUT YOUR SCORE IS STILL NOT

OKAY. KEEP WORKING AT THESE,

VICKI.

(clear screen)

DO YOU WANT TO:

1. DO THE SAME KIND OF PROBLEM

2. CHANGE THE DIFFICULTY LEVEL

3. DO ANOTHER KIND OF PROBLEM

4. STOP

TYPE 1, 2, 3, OR 4? *3*

DO YOU WANT TO WORK WITH:

1. WHOLE NUMBERS

2. FRACTIONS

3. DECIMALS

4. PERCENTS

5. WHATEVER I CHOOSE FOR YOU

TYPE 1, 2, 3, 4, OR 5? *2*

(clear screen)

FRACTIONS

OKAY, VICKI, NOW

DO YOU WANT TO DO:

1. ADDITION

2. SUBTRACTION

3. MULTIPLICATION

4. DIVISION

5. WHATEVER I CHOOSE FOR YOU

TYPE 1, 2, 3, 4, OR 5? *3*

* MULTIPLY FRACTIONS *

CHOOSE THE LEVEL OF DIFFICULTY,

VICKI:

1. BEGINNER

2. MEDIUM

3. EXPERT

WHICH (TYPE 1, 2, OR 3)? *3*

HOW MANY PROBLEMS (1 TO 10)

DO YOU WANT TO DO? *5*

TYPE NUMERATOR,COMMA,DENOMINATOR

4/6 X 2/8 = ? *8,48*

OKAY, BUT NOT IN SIMPLEST FORM.

TRY AGAIN, VICKI.

? *1,6*

VERY GOOD

TYPE NUMERATOR,COMMA,DENOMINATOR

7/7 X 6/9 = ? *2,3*

VERY GOOD

TYPE NUMERATOR,COMMA,DENOMINATOR

4/10 X 8/7= ? *16,35*

VERY GOOD

TYPE NUMERATOR,COMMA,DENOMINATOR

9/4 X 1/6 = ? *3,8*

VERY GOOD

TYPE NUMERATOR,COMMA,DENOMINATOR

5/3 X 7/10 = ? *6,7*

NO, NOT RIGHT. TRY AGAIN . .

? *35,30*

OKAY, BUT NOT IN SIMPLEST FORM.

TRY AGAIN, VICKI.

? *7,6*

VERY GOOD

(clear screen)

VICKI, YOUR SCORE IS

4.25 OUT OF 5, OR 85%

YOU GOT 0 WRONG

VERY NICE JOB.

KEEP IT UP.

(clear screen)

DO YOU WANT TO:

1. DO THE SAME KIND OF PROBLEM

2. CHANGE THE DIFFICULTY LEVEL

3. DO ANOTHER KIND OF PROBLEM

4. STOP

TYPE 1, 2, 3, OR 4? *4*

DOES SOMEONE ELSE WANT A TURN?

TYPE 1 FOR YES, 0 FOR NO? *0*

OKAY, THEN, VICKI.

GOODBYE .. .

READY

Part III

This final program will draw the graph of any linear equation, whether given in standard form (AX + BY + C = 0) or in slope-intercept form (Y = MX + B). Students enter the coefficients of the equation and the computer draws the graph. The program is intended to be used in conjunction with an Algebra I class. It is most useful in demonstrating how the picture of the equation changes as the coefficients change. However, it can be used simply as an example of the picture drawing capability of the computer, with students who may or may not have taken Algebra I.

If the x-intercept or the y-intercept is greater than 500, the graph will not be drawn, but a message will be printed indicating the approximate location of the line. The program works best when the intercepts are less than five.

A sample run follows. Entries made by the student or teacher are shown in lowercase type and underlined.

run

(clear screen)

***** CARTESIAN GRAPH *****

DO YOU WANT TO USE (1) STANDARD FORM: AX + BY + C
OR (2) SLOPE-INTERCEPT FORM: Y = MX + B

TYPE 1 OR 2? *2*

(clear screen)

GIVEN AN EQUATION IN SLOPE-INTERCEPT FORM:

Y = MX + B

TYPE IN THE VALUES OF M AND B, SEPARATED BY A COMMA.

? *2,10*

(clear screen)

SL= 2

YI= 10

(figure available in print form)
BREAK IN 990

READY

run

(clear screen)

***** CARTESIAN GRAPH *****

DO YOU WANT TO USE (1) STANDARD FORM: TYPE 1 OR 2? *1*
OR (2) SLOPE-INTERCEPT FORM: Y = MX + B

TYPE 1 OR 2? *1*

(clear screen)

GIVEN AN EQUATION IN STANDARD FORM:

AX + BY + C = 0

TYPE IN THE VALUES OF A, B, AND C, SEPARATED BY COMMAS.

? *1,2,-3*

(clear screen)

SL= -.5

YI= 1.5

(figure available in print form)
BREAK IN 990

READY

Teacher Bibliography

Booklets:

Ahl, David H. (ed.); *Computers in Mathematics: A Sourcebook of Ideas* ; Creative Computing Press; Morristown, NJ; 1979

- an excellent source for a multitude of computer applications

Rogowski, Stephen J.; *Problems for Computer Solution* (teacher edition); Creative Computing Press; Morristown, NJ; 1980

- the companion volume to the student edition listed below

Level II BASIC Reference Manual ; Radio Shack; Fort Worth, TX; 1979

- a necessity if more than an introduction to computers is planned

Magazines:

The Computing Teacher ; International Council for Computers in Education; Eastern Oregon State College; La Grande, OR 97850

- many thought-provoking articles on the uses of computers in education

Creative Computing ; Creative Computing Press; P.O. Box 789-M, Morristown, NJ 07960

- as the name implies, many creative ideas every month

Student Bibliography

Lien, Dr. David A.; *Users Manual for Level I Radio Shack TRS- 80* ; Radio Shack; Fort Worth, TX; 1978

- even though the name implies that this is only for Level I BASIC, it is still an excellent introduction to Level II BASIC, so long as the teacher has the *Manual* listed above

McQuigg, James D. and Alta M. Harness; *Flowcharting* ; Houghton Mifflin Co.; Boston, MA; 1970

- a good introduction to the first step in computer programming, and it does not require any computer use

Rogowski, Stephen J.; *Problems for Computer Solution* (student edition); Creative Computing Press; Morristown, NJ; 1979

- a wonderful source of computer problems at any level of ability

Materials Developed

As indicated in the main body of the paper, three programs were written for this curriculum unit. They are available on cassette tape and given the following titles:

1. “Intro to Sam”, from Part I of the paper

2. “Test of Skills”, from Part II of the paper

3. “Cartesian Graph”, from Part III of the paper