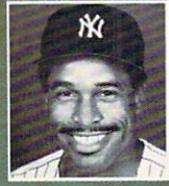A Hands-On Review
COMMODORE 128
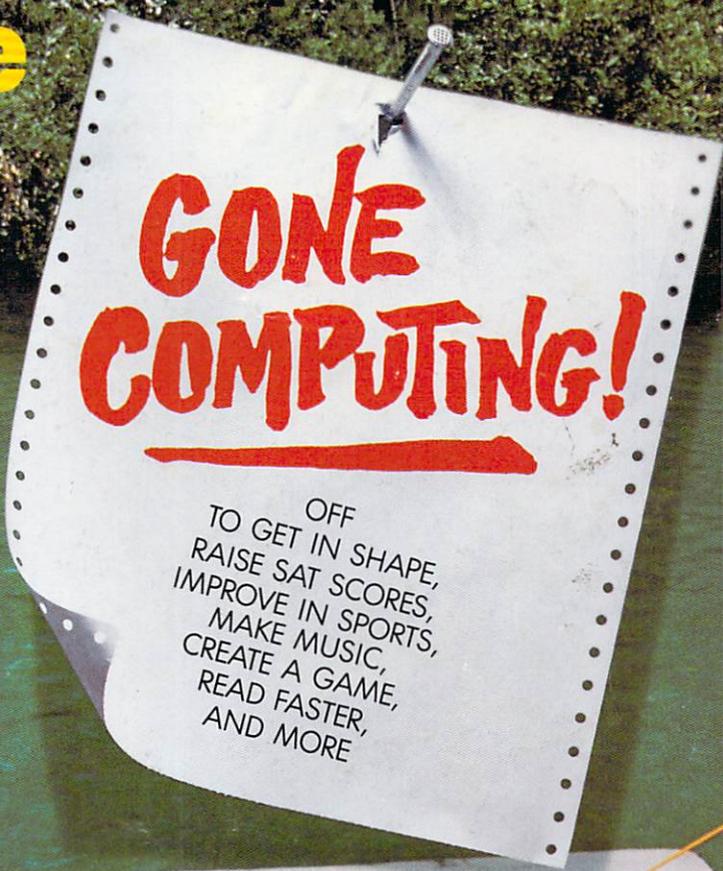
FAMILY COMPUTING

Leisure Time and Your Computer

Yankee Dave Winfield Takes on Computers

What Are You Worth? Find Out With Our Original Programs for Apple, C 64, IBM PC/PCjr, TRS-80 Models III & 4

Build Math Skills With Software

Customize Your Computer

Plus: K-POWER for Kids

GONE COMPUTING!

OFF TO GET IN SHAPE, RAISE SAT SCORES, IMPROVE IN SPORTS, MAKE MUSIC, CREATE A GAME, READ FASTER, AND MORE

INSIDE: ORIGINAL PROGRAMS FOR ADAM, APPLE, ATARI, C 64 AND VIC-20, IBM PC/PCjr, TRS-80 COCO & MODELS III AND 4

FAMILY COMPUTING

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Direction? 0 to end

Page 25

EDITOR'S NOTE
NO REGRETS

"Dave passed through town this afternoon and wanted to make sure you knew that IBM went out of the personal computer market."

I was in London, on vacation, when I heard those words. Although I knew that message had to be severely garbled, you can imagine its effect on my good time. Distracted over dinner, distressed at the theater, and sleepless back at the hotel. That's what I was. Finally, at 2 a.m., Shirrel Rhoades, our publisher, called and set the record straight—it was the PCjr. : discontinued

While I fretted over the Editor's Note in the May issue, due to reach readers any minute, in which I'd praised IBM for sticking with the *jr*, Shirrel seemed totally calm. On a personal level, he had a real investment at stake. He owns a PC*jr*.

Shirrel has more than once found himself in a position not uncommon among computer owners— he'd bought a computer that was taken out of production. In addition to the *jr*, Shirrel owns an ADAM, a TI-99/4A, TRS-80 Model III and 100, a TS 1500—and an Apple IIe.

When Coleco announced it would no longer manufacture the ADAM, Texas Instruments the 99/4A, Timex the 1500 and 2068 (1000s were already out of production), and IBM the *jr*, Shirrel rushed out and expanded his system and added to his software library. All of his computers still are being used.

I say, "Three cheers for computer enthusiasts!" Shirrel typifies them. He's thankful for all his computing feats. No regrets on his part. Even with computers no longer found on store shelves, Shirrel and/or members of his family boast a novel, improved SAT scores, a collection of home-brewed computer games, a more efficient workday, work-free weekends, better control of their finances, and a host of other computer-related accomplishments.

That brings us to this issue and some of the additions you can make to your computer accomplishments. For many of us, the approach of summer means a slower pace and more leisure time. You can put that time to better use than ever with the help of your computer. Managing Editor June Rogoznica and Reviews Editor John Wallace have, with tremendous help from Research and Copy Associate Linda "Fax" Williams, assembled a special leisure-time section. With the right software package to help you, you'll find it a lot easier to achieve some long-held goals, ranging from athletic feats to a mastery of music or an increased reading rate. You'll find their editorial feats begin on page 25.

Our increased financial and business coverage is getting a strong response from readers, so you might want to read this month's Home/Money Management column on page 14, which shows you how to figure out what you're worth.

Since almost all readers are eager to know more about the newest computer models, our review of the Commodore 128 is a "must read." Each month we try to put together an entire issue that's a "must read." In large part, we do this by keeping you as well informed as we can.
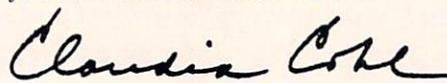
Claudia Cohl

CLAUDIA COHL
EDITOR-IN-CHIEF

HOME/MONEY MANAGEMENT

WHAT ARE YOU WORTH?
Use Our Original Program to Set Up a Personal Balance Sheet and Find Out

BY KIMBALL J. BEASLEY

If someone asks you what you're worth today, will you know? Probably not. Your financial picture changes every day. Few of us, however, have the time or energy to devote to tracking our daily cash flow, nor do we need to. But keeping monthly tabs on your finances makes good sense; over the long term, it could help you plan a healthy financial future or avert an economic disaster.

As a matter of business survival, corporations routinely use a variety of financial statements to examine and control their economic strength and, ultimately, their survival. Your family, as a sort of minicorporation, should do the same. Though your family doesn't have a team of accountants to do the analysis, it does have a computer, which can be an extremely useful tool.

A FINANCIAL SNAPSHOT

With the accompanying program and your computer, you can set up a personal balance sheet—the first step in analyzing your financial status. Think of a balance sheet as a snapshot of your personal finances at any given moment in time. You'll need to input the market or current value of your assets (cash and other liquid assets, investments, and property) and list your liabilities (short-term and long-term debt). Your net worth is simply your assets less your liabilities.

Personal Balance Sheet will do more than create an orderly tabulation of assets and debt. It can provide important financial indicators, as well. For example, it may show a decline in your family's net worth. Of course, that's not the end of the

KIMBALL J. BEASLEY *is a senior engineer at a consulting firm in Princeton, N.J. He wrote last month's Home/Money Management column, "Financial Decision-Making."*
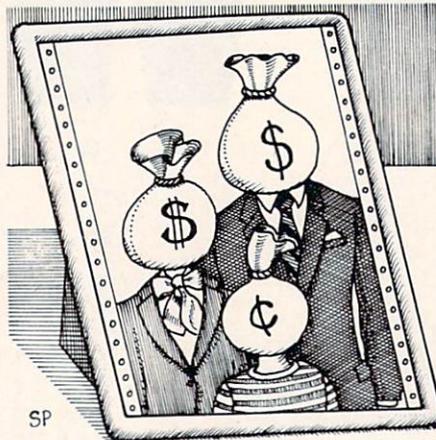
world, but it may be a signal that you've made some poor investments, or that your interest earnings are not as high as they should be. Also, tracking the percentage of assets defined as growth or as liquid can help keep your investment goals on target.

However, one of the greatest benefits of a personal balance sheet lies in its ability to compare current and past financial data. With your computer, you'll be able to input data, do mathematical calculations, and print a record of your results to help in your long-term investment planning.

HOW TO USE THE PROGRAM

Before you sit down at your computer, it's a good idea to work out and write down the numbers you plan to include in your balance sheet. Your figures should represent a reasonable estimate of your current debt and asset values (the amount you would receive if you sold your investments or property today). Though it's not necessary for your numbers to be accurate to the penny, a good round number based on solid data will provide useful results. (The program will round off each category to the nearest dollar.)

The accompanying printout shows the various categories of information you will have to input. Though much of the balance sheet is self-explanatory, such as the value of jewel-

ry and your collectibles, some categories may seem a bit confusing. For example, what does liquid mean? By definition, it's cash or something which can be easily converted to cash within a short period of time, without incurring a loss or penalty. A money-market account, for example, is liquid. On the other hand, bank CDs are not liquid because in most cases there is a substantial penalty for early withdrawal.

Nongrowth and growth investments are other categories that may confuse you. For instance, a tax shelter is labeled nongrowth since you haven't invested with the intention of making a capital gain. In contrast, your investment in a mutual fund under an IRA would be categorized as growth because you expect it to increase in value. (In this case, it also serves as a tax shelter.) Basically, whether you decide to place something in a nongrowth or growth category is a statement of your objectives.

When you're inputting your short-term liabilities, make sure you only include your *unpaid* rent, utilities and charge-account payments for the month—those items not yet deducted from your cash assets.

Once you've determined the proper categories for your investments, you're ready to move to your computer keyboard. First, type in *Personal Balance Sheet* and SAVE it. Make sure your printer is hooked up and switched on. Now, you're ready to run the program. You can input one or multiple values for each category. After each entry, press RETURN or ENTER. (The program will show subtotals after each entry.) When you're ready to go on to the next category, just press RETURN or ENTER without inputting an amount.

The program does not allow you to save your information to disk or cassette. The only record of your infor-

mation is your printout, so be sure to save it for future financial comparisons.

It's a good idea to work on your personal balance sheet at the same time each month. This will give you a better feel for your cash flow (in-coming and outgoing funds). You'll find that preparing a balance sheet will become habit-forming. And, after you've saved some money or made some as a result of financial planning, you'll discover it's a habit you won't want to break.

This article and program are not meant to serve as advice, but rather as guidelines to aid you in planning your financial future. It's best to consult your accountant before you make any major financial decisions.

SAMPLE PRINTOUT

```
--------------------------------------------------------
---------------- PERSONAL BALANCE SHEET ----------------
--------------------------------------------------------
AS OF 7/1/85
        <ASSETS>                          <LIABILITIES>

CASH ASSETS                   | SHORT-TERM DEBT
-----------                   | ---------------

CASH                   = $  700 | UNPAID RENT           = $      0
CHECKING ACCOUNTS      = $  900 | UNPAID UTILITIES      = $    342
SAVINGS ACCOUNTS       = $ 1500 | UNPAID CHARGE ACCT. DEBT = $  675
OTHER LIQUID DEPOSITS  = $ 1650 | OTHER SHORT-TERM DEBT = $      0
                         ------ |                         ------
              TOTAL = $   4750  |           TOTAL = $    1017
TIME DEPOSITS AND INVESTMENTS | LONG-TERM DEBT
                              | --------------

BANK CD'S AND NOTES    = $15000 | BALANCE OF MORTGAGE   = $  27000
STOCKS AND BONDS       = $12000 | BALANCE OF AUTO LOAN  = $   1200
OTHER GROWTH INVESTMENTS = $ 5250 | OTHER LONG-TERM DEBT = $  2400
NONGROWTH INVESTMENTS  = $ 1700 |
                         ------ |                         ------
              TOTAL = $  33950  |           TOTAL = $   30600
VALUE OF PROPERTY             |
-----------------             |

HOME                   = $85000 |
AUTO/VEHICLE           = $ 6000 |
HOME FURNISHINGS       = $ 5200 |
JEWELRY/COLLECTIBLES   = $ 1250 |
OTHER PROPERTY         = $  700 |
                         ------ |
              TOTAL = $  98150  |
--------------------------------------------------------
TOTAL ASSETS           = $136850 | TOTAL LIABILITIES    = $  31617
              NET WORTH = $ 105233

--------------------------------------------------------
------------------------ ANALYSIS ----------------------
GROWTH ASSETS AS PERCENT OF TOTAL ASSETS =  87.9 %
LIQUID ASSETS AS PERCENT OF TOTAL ASSETS =  12.2 %
```

Base Version (Commodore 64 w/printer)/ Personal Balance Sheet

```
10 DIM P$(20),LP(20),A(20),HD$(5),LH(5),ST(5)
20 D$=" = $":TL$="TOTAL":SP$=CHR$(32)
30 FOR X=1 TO 40:L$=L$+CHR$(45):S$=S$+SP$:NEXT X:FM$=CHR
$(124)+SP$
40 UL$=LEFT$(S$,27)+LEFT$(L$,11)+SP$+FM$+LEFT$(S$,27)+LE
FT$(L$,11)
50 BR$=LEFT$(S$,39)+FM$
60 FOR X=1 TO 20:READ P$(X):LP(X)=LEN(P$(X)):NEXT X
70 FOR X=1 TO 5:READ HD$(X):LH(X)=LEN(HD$(X)):NEXT X
80 W=0:PRINT CHR$(147);LEFT$(S$,9)
90 PRINT "PERSONAL BALANCE SHEET":PRINT LEFT$(L$,40-W*2)
100 PRINT "BALANCE SHEET DATE (MM/DD/YY)"
110 INPUT DT$:IF DT$="" THEN 100
120 PRINT "PRESS <RETURN> TO MOVE TO NEXT CATEGORY."
130 FOR X=1 TO 20:A(X)=0
140 IF X=1 THEN PRINT:PRINT LEFT$(L$,14-W);HD$(1);LEFT$(
L$,15-W)
150 IF X=5 THEN PRINT:PRINT LEFT$(L$,6-W);HD$(3);LEFT$(L
$,5-W)
160 IF X=9 THEN PRINT:PRINT LEFT$(L$,12-W);HD$(5);LEFT$(
L$,11-W)
170 IF X=14 THEN PRINT:PRINT LEFT$(L$,13-W);HD$(2);LEFT$
(L$,12-W)
180 IF X=18 THEN PRINT:PRINT LEFT$(L$,13-W);HD$(4);LEFT$
(L$,13-W)
190 PRINT P$(X);" = ";
200 PRINT "$";:T$="":INPUT T$
210 V=VAL(T$):IF V=0 THEN 230
220 A(X)=A(X)+VAL(T$):PRINT SP$;SP$;SP$;"SUBTOTAL";D$;A(
X):GOTO 200
230 PRINT LEFT$(L$,40-W*2);TL$;SP$;P$(X);D$;A(X):PRINT
240 A(X)=INT(A(X)+0.5):NEXT X
249 REM --TOTAL CASH ASSETS--
```

```
250 ST(1)=A(1)+A(2)+A(3)+A(4)
259 REM --TOTAL TIME DEPOSITS AND INVESTMENTS--
260 ST(3)=A(5)+A(6)+A(7)+A(8)
269 REM --TOTAL VALUE OF PROPERTY--
270 ST(5)=A(9)+A(10)+A(11)+A(12)+A(13)
279 REM --TOTAL ASSETS--
280 TASSTS=ST(1)+ST(3)+ST(5)
289 REM --TOTAL SHORT-TERM DEBT--
290 ST(2)=A(14)+A(15)+A(16)+A(17)
299 REM --TOTAL LONG-TERM DEBT--
300 ST(4)=A(18)+A(19)+A(20)
309 REM --TOTAL LIABILITIES--
310 LIAB=ST(2)+ST(4)
319 REM --NET WORTH EQUALS ASSETS MINUS LIABILITIES--
320 NETWRTH=TASSTS-LIAB
327 REM --GROWTH ASSETS (SAVINGS+OTHER LIQUID ASSETS--
328 REM -- +CD'S & NOTES+STOCKS & BONDS+OTHER GROWTH--
329 REM -- INVESTMENTS+HOME) AS % OF TOTAL ASSETS    --
330 PG=INT(1000*(A(3)+A(4)+A(5)+A(6)+A(7)+A(9))/(TASSTS+
0.000001))/10
338 REM --LIQUID ASSETS (CASH ASSETS + STOCKS &--
339 REM -- BONDS) AS % OF TOTAL ASSETS          --
340 PL=INT(1000*((ST(1)+A(6))/(TASSTS+0.000001)))/10
350 PRINT "PRESS ANY KEY WHEN PRINTER IS READY."
360 GET T$:IF T$="" THEN 360
370 OPEN 4,4:CMD 4
380 PRINT L$;L$:PRINT LEFT$(L$,28);
390 PRINT " PERSONAL BALANCE SHEET ";LEFT$(L$,28):PRINT
L$;L$
400 PRINT:PRINT "AS OF ";DT$:PRINT:PRINT LEFT$(S$,15);"<
ASSETS>";LEFT$(S$,32);
410 PRINT "<LIABILITIES>":PRINT L$;L$:PRINT BR$:PRINT BR
$
420 FOR X=1 TO 2:PRINT HD$(2*X-1);
430 PRINT LEFT$(S$,39-LH(2*X-1));FM$;HD$(2*X)
440 PRINT LEFT$(L$,LH(2*X-1));LEFT$(S$,39-LH(2*X-1));
450 PRINT FM$;LEFT$(L$,LH(2*X)):PRINT BR$
460 FOR Y=4*X-3 TO 4*X
470 PRINT P$(Y);:T=A(Y):L=LP(Y):GOSUB 1000:PRINT FM$;
480 IF Y=8 THEN 500
490 PRINT P$(Y+13);:L=LP(Y+13):T=A(Y+13):GOSUB 1000
500 PRINT:NEXT Y:PRINT UL$
510 PRINT LEFT$(S$,18);TL$;:T=ST(2*X-1):L=23:GOSUB 1000
520 PRINT FM$;LEFT$(S$,18);TL$;:T=ST(2*X):GOSUB 1000
530 PRINT:PRINT BR$:NEXT X
540 PRINT HD$(5);RIGHT$(BR$,24):PRINT LEFT$(L$,LH(5));RI
GHT$(BR$,24)
550 FOR Y=9 TO 13
560 PRINT P$(Y);:L=LP(Y):T=A(Y):GOSUB 1000:PRINT FM$
570 NEXT Y
580 PRINT LEFT$(UL$,40):PRINT LEFT$(S$,18);TL$;:T=ST(5):
L=23:GOSUB 1000
590 PRINT FM$:PRINT LEFT$(L$,38);SP$;FM$;LEFT$(L$,39)
600 PRINT "TOTAL ASSETS";:L=12:T=TASSTS:GOSUB 1000
610 PRINT FM$;"TOTAL LIABILITIES";:L=17:T=LIAB:GOSUB 100
0
620 PRINT:PRINT:PRINT LEFT$(S$,27);"NET WORTH = ";
630 T$="":IF NETWRTH<0 THEN PRINT "(";:T$=")"
640 PRINT "$";ABS(NETWRTH);T$:PRINT:PRINT L$;L$
650 PRINT LEFT$(L$,35);" ANALYSIS ";LEFT$(L$,35):PRINT L
$;L$
660 PRINT:PRINT "GROWTH ASSETS AS PERCENT OF TOTAL ASSET
S = ";PG;"%"
670 PRINT "LIQUID ASSETS AS PERCENT OF TOTAL ASSETS = ";
PL;"%"                                              →
```

```
680 PRINT#4:CLOSE 4:PRINT CHR$(147);
690 PRINT "SEE YOU NEXT MONTH!":END
1000 PRINT LEFT$(S$,25-L);"= $";LEFT$(S$,10-LEN(STR$(T))
);T;
1010 RETURN
2000 DATA CASH,CHECKING ACCOUNTS,SAVINGS ACCOUNTS
2010 DATA OTHER LIQUID DEPOSITS,BANK CD'S AND NOTES
2020 DATA STOCKS AND BONDS,OTHER GROWTH INVESTMENTS
2030 DATA NONGROWTH INVESTMENTS,HOME,AUTO/VEHICLE
2040 DATA HOME FURNISHINGS,JEWELRY/COLLECTIBLES
2050 DATA OTHER PROPERTY,UNPAID RENT,UNPAID UTILITIES
2060 DATA UNPAID CHARGE ACCT. DEBT,OTHER SHORT-TERM DEBT
2070 DATA BALANCE OF MORTGAGE,BALANCE OF AUTO LOAN
2080 DATA OTHER LONG-TERM DEBT,CASH ASSETS
2090 DATA SHORT-TERM DEBT,TIME DEPOSITS AND INVESTMENTS
2100 DATA LONG-TERM DEBT,VALUE OF PROPERTY
```

MODIFICATIONS FOR OTHER COMPUTERS
ADAM
Use the base version, changing lines 30, 80, 150, 190, 230, 350, 370, 680, and 1010 to read as follows:

```
30 FOR x=1 TO 40:L$=L$+CHR$(45):s$=s$+sp$:NEXT x:fm$=CHR
$(0)+sp$
80 w=5:HOME:PRINT LEFT$(s$,5);
150 IF x=5 THEN PRINT:PRINT LEFT$ (l$,6-w);hd$(3);LEFT$(
l$,6-w)
190 PRINT p$(x):PRINT " = ";
230 PRINT LEFT$(l$,41-w*2);tl$;sp$;p$(x):PRINT d$;a(x):P
RINT
350 PRINT "PRESS ANY KEY":PRINT "WHEN PRINTER IS READY."
370 PRINT:PR #1
680 PR #0:HOME
1010 PRINT sp$;:RETURN
```

Apple w/printer
Change lines 80, 370, 680, and 1010 to read

```
80 W=0:HOME:PRINT LEFT$(S$,9);
370 PRINT:PRINT CHR$(4);"PR#1"
680 PRINT CHR$(4);"PR#0":HOME
1010 PRINT SP$;:RETURN
```

IBM PC & PCjr w/printer
Omit line 370. Change "PRINT" to "LPRINT" wherever it occurs in Lines 380-670, and in Line 1000. Add line 5:

```
5 WIDTH 40:KEY OFF:WIDTH "LPT1:",255
```

(If your printer is configured other then "LPT1:", use "LPT2:", "LPT3:", "COM1:", or "COM2:" as appropriate.)

Finally, change lines 80, 120, 360, and 680 to read as follows:

```
80 W=0:CLS:PRINT LEFT$(S$,9);
120 PRINT "PRESS <ENTER> TO MOVE TO NEXT CATEGORY."
360 IF INKEY$="" THEN 360
680 CLS
```

TRS-80 Model III & 4 (in Model III mode) w/printer
Use the modifications given above for the IBM PC & PCjr, except change Line 5 to

```
5 CLEAR 2000
```

TRS-80 Color Computer w/printer
Change "PRINT" to "PRINT#-2," wherever it occurs between Lines 380-670 inclusive and in Line 1000, except wherever "PRINT:" ("PRINT" immediately followed by a colon) occurs (lines 400, 480, 500, 530, 620, and 640-650), change it to "PRINT#-2:" (note: comma omitted). For example, line 500 becomes

```
500 PRINT#-2:NEXT Y:PRINT#-2,UL$
```

Add line 5:

```
5 CLEAR 2000
```

Finally, change lines 80, 120, 190, 230, 350-360, and 680 to read as follows:

```
80 W=4:CLS:PRINT LEFT$(S$,5);
120 PRINT "PRESS <ENTER> TO MOVE TO NEXT CATEGORY."
190 PRINT P$(X):PRINT " = ";
230 PRINT LEFT$(L$,40-W*2);TL$;SP$;P$(X):PRINT D$;A(X):P
RINT
350 PRINT "PRESS ANY KEY":PRINT "WHEN PRINTER IS READY."
360 IF INKEY$="" THEN 360
680 CLS
```
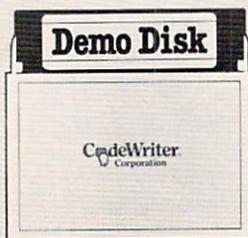
FC

the Programmer

ILLUSTRATION BY BARTON STABLER

ILLUSTRATION BY JIM CHERRY III

AGE SPLITTER

BY JOEY LATIMER
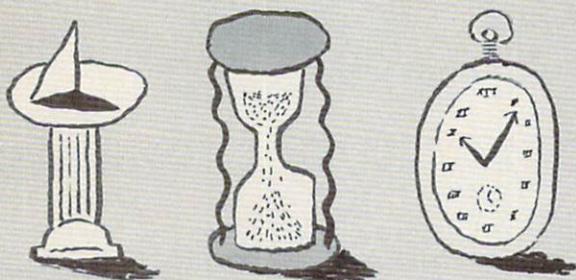
How old are you in minutes? In seconds? *Age Splitter* will tell you what your age is in these units—and in months, weeks, days, and hours, too! Just type in the program listing for your computer, and SAVE it to disk or cassette. When you type RUN, the program will ask you to type in your age in years. Use numerals only, and press RETURN or ENTER when you're done. Your computer will churn away for a split instant, and then print out the results. Press "P" to go back to the beginning and start over, or "Q" to quit.

PROGRAM NOTES

Age Splitter demonstrates how PRINT statements can be used to evaluate and display the results of mathematical expressions. The program starts by asking for your age in years, accepting this number via an INPUT statement, and placing it in a variable called AGE. Then a series of PRINT statements multiply the value in AGE by different numbers, to calculate how many months, weeks, days, hours, minutes, or seconds old you are, and print these figures out on the screen in combination with text. Semicolons are used to keep the result of each expression and its identifying text together on the same screen line.

If you keep playing with the program, you'll sooner or later enter a number for years that's so great that your computer will be unable to print out the number of seconds it contains in normal fashion. Instead, you'll see an expression something like this where the seconds should be: 1.5768E+10.

This is a form of scientific notation that your computer uses to save printing unnecessary zeroes when displaying very large or very small numbers. The left-hand side of the expression contains only the significant digits of the figure, expressed as a decimal number between 1 and 10. The right-hand side of the expression stands for the power of 10 the left-hand side is multiplied by to achieve the final value. 1.5768E+10 simply means 1.5768×10 to the 10th, which translates to 1.5768×10 billion, or 15 billion, 768 million. That's a BIG number: the number of seconds in 500 years!

Programmers may enjoy the challenge of finding out the biggest and smallest numbers their computers can display normally. Different machine brands have different maximum and minimum limits.

If you devise a good enhancement of one of our beginner programs, we might mention it in a future issue. Send a printout of your program (no tapes or disks, please) to:
Beginner Programs
FAMILY COMPUTING
730 Broadway
New York, NY 10003

ADAM/*Age Splitter*

```
10 HOME
20 PRINT "Type your answer;"
30 PRINT "then press <RETURN>."
40 PRINT
50 PRINT "How many years old are you";
60 INPUT age
70 HOME
80 PRINT "If you are ";age;" years old,"
90 PRINT "you have lived more than ..."
100 PRINT
110 PRINT age*12;" months, or"
120 PRINT age*52;" weeks, or"
130 PRINT age*365;" days, or"
140 PRINT age*365*24;" hours, or"
150 PRINT age*365*24*60;" minutes, or"
160 PRINT age*365*24*60*60;" seconds."
170 PRINT
180 PRINT "Press <P> to play again,"
190 PRINT "or <Q> to quit."
200 GET k$
210 IF k$ = "P" OR k$ = "p" THEN 10
220 IF k$ <> "Q" AND k$ <> "q" THEN 200
230 END
```

Apple/*Age Splitter*

```
10 HOME
20 PRINT "TYPE YOUR ANSWER; THEN PRESS <RETURN>."
30 PRINT
40 PRINT "HOW MANY YEARS OLD ARE YOU";
50 INPUT AGE
60 HOME
70 PRINT "IF YOU ARE ";AGE;" YEARS OLD,"
80 PRINT "YOU HAVE LIVED MORE THAN ..."
90 PRINT
100 PRINT AGE*12;" MONTHS, OR"
110 PRINT AGE*52;" WEEKS, OR"
120 PRINT AGE*365;" DAYS, OR"
130 PRINT AGE*365*24;" HOURS, OR"
140 PRINT AGE*365*24*60;" MINUTES, OR"
150 PRINT AGE*365*24*60*60;" SECONDS."
160 PRINT
170 PRINT "PRESS <P> TO PLAY AGAIN,"
180 PRINT "OR <Q> TO QUIT."
190 GET K$
200 IF K$ = "P" THEN 10
210 IF K$ <> "Q" THEN 190
220 END
```

Atari/*Age Splitter*

```
10 OPEN #1,4,0,"K:"
20 PRINT CHR$(125);
30 PRINT "TYPE YOUR ANSWER; THEN PRESS <RETURN>.";
40 PRINT
50 PRINT "HOW MANY YEARS OLD ARE YOU";
60 INPUT AGE
70 PRINT CHR$(125);
80 PRINT "IF YOU ARE ";AGE;" YEARS OLD,"
90 PRINT "YOU HAVE LIVED MORE THAN ..."
100 PRINT
110 PRINT AGE*12;" MONTHS, OR"
120 PRINT AGE*52;" WEEKS, OR"
130 PRINT AGE*365;" DAYS, OR"
140 PRINT AGE*365*24;" HOURS, OR"
150 PRINT AGE*365*24*60;" MINUTES, OR"
160 PRINT AGE*365*24*60*60;" SECONDS."
170 PRINT
180 PRINT "PRESS <P> TO PLAY AGAIN,"
190 PRINT "OR <Q> TO QUIT."
200 GET #1,K
210 IF K=ASC("P") THEN 20
220 IF K<>ASC("Q") THEN 200
230 END
```

DOCTOR KURSOR'S KLINIC

CRACKLE!

SNAP!

POP!

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ILLUSTRATION BY SAM VIVIANO

What is a sprite?

DR. KURSOR: Hmmm . . . "scribble" . . . "southern corn rootworm" . . . "splotch" . . . ah, here it is. Gasp! "Sprite. n. (from *spirit*) A ghost, elf, or fairy." Is my computer haunted?

Actually, there's nothing supernatural about computer sprites—though it seems like they do have magical powers! They're little characters that have been programmed to glide around on your screen. In fact, in a fast-action arcade game, it's usually sprites that enable objects to whiz around.

The special hardware built into computers with sprites (ADAM, Atari, Commodore 64 and 128, and TI-99/4A) lets them move independently of anything else being displayed. Clear the screen? That won't stop sprites! Switch to text mode? They'll dance right through the words on your screen until your program stops them.

You can create your own sprites using machine language or a series of POKES. Special sprite commands are built into TI Extended BASIC and the new Commodore 128.

First you design what you want the sprite to look like. (You can do this on paper or use a special program called a "sprite editor.")

Then you choose its color, size, position on the screen, and whether it should go over or under other objects. Some micros also let you set the direction and speed of a sprite's motion.

Commodore and TI manuals have the details. And there's lots more about the Atari's sprites

(called "players" and "missiles") in The Programmer this month (page 53).

Although info about the ADAM's sprites is hard to come by, both ADAMs and Apples have less-powerful animation aids called "hi-res shapes," which are written up in their BASIC manuals.

Doing animation on other computers can be *agonizing* by comparison. Without the sprite hardware to do most of the work for you, you have to "draw" objects onto a bit-mapped screen yourself.

What is a bit-mapped computer?

DR. KURSOR: When your computer PRINTS or PLOTS something on the screen, what it actually does is store numbers in a special block of memory called "screen RAM." Many times each second, the contents of screen RAM are translated into patterns of dots, which are then turned into a video signal that goes to your TV or monitor.

The way stuff is stored in screen RAM, and the way it's turned into pictures, depends on how your computer was designed. On most inexpensive computers, text is stored and translated one way, and various graphics modes in other ways, all of which are incompati-

ble. This makes it difficult or impossible to mix them on the same screen but saves memory and microprocessor time.

Computers with lots of screen memory and more powerful processors (the Macintosh is a good example) store all graphics and text in a uniform way called *bit-mapping* (thus the expression "bit-mapped computer"). Each dot (pixel) on a bit-mapped screen is represented in screen RAM by a single bit, which may be set to 0 or 1. When the bit is set to 1, the corresponding pixel is turned on; when it's set to 0, the pixel is turned off. Mathematicians call this one-bit-to-one-pixel relationship a "mapping" or "map."

Less-expensive computers often have a bit-mapped graphics mode like this but can't "draw" text letters on that screen automatically for you.

ON

OFF

A
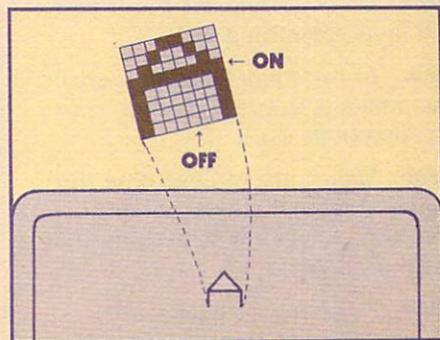
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ASTRO-GROVER CBS Software One Fawcett Place Greenwich, CT 06836 (203) 622-2500 $34 ©1984	Preschoolers count using a vinyl keyboard overlay, aided by lovable Grover from "Sesame Street." Five activities proceed from simple counting to adding and subtracting numbers up to 10. —RASKIN	Reviewed on Atari, 48K (d., cart., cass.). Also for Apple II series, 48K; C 64.	90-day warranty; $5 fee thereafter or if user-damaged.	★★★	★★★★	★★★★	★★★★	A	★★★
BLAZING PADDLES Baudville 1001 Medical Park Drive SE Grand Rapids, MI 49506 (616) 957-3036 $49 (Apple); $34 (C 64) ©1984	Computerized paint program lets kids as young as 6 create pictures, alter the design pixel by pixel, add text in a variety of fonts, and use preprogrammed sets of shapes.† —FRANK	Reviewed on Apple II series, 48K. Also for C 64. Mouse, graphics tablet, touchpad, or light pen.	90-day warranty; $5 for backup or if user-damaged.	★★★★	★★★★	★★★	★★★★	E	★★★★
GETTING READY TO READ AND ADD Sunburst Communications 39 Washington Ave., Room AB Pleasantville, NY 10570 (800) 431-6616 $39 ©1984	Prereading and math activities make for a good introduction to the computer keyboard, as well. Shape and letter-matching, simple counting, and left to right movement presented. —BUMGARNER	Reviewed on Apple II series, 48K. Also for Atari, 48K; C 64; IBM PC, 64K/PCjr, 128K.	Lifetime warranty (includes user-damaged); $10 fee for backup.	★★★★	★★★★	★★★★	★★★★	E	★★★★
JUST IMAGINE Commodore 1200 Wilson Drive West Chester, PA 19380 (215) 431-9100 $34 ©1984	Kids 10 and up, younger with help, create colorful animated tableaux, and write an accompanying story with package that helps motivate kids to write.† —SUMMERS	C 64.	90-day warranty; $5 fee thereafter or if user-damaged.	★★★	★★	★	★★★★	A	★
KERMIT'S ELECTRONIC STORY MAKER Simon & Schuster 1230 Ave. of the Americas New York, NY 10020 (212) 245-6400 $29 (C 64); $34 (Apple) ©1984	Miss Piggy, Kermit, and friends fly, bounce, run, and cavort through a number of different scenes in a colorful, musical, introductory reading package.† —SUMMERS	Reviewed on C 64. Also for Apple II series, 48K.	30-day warranty; $5 fee thereafter or if user-damaged.	★★★★	★★★★	★★★★	★★★	E	★★★★
LETTER-GO-ROUND CBS Software One Fawcett Place Greenwich, CT 06836 (203) 622-2500 $34 ©1984	Letter-recognition, uppercase and lowercase, and simple spelling reinforced for kids ages 3–6, with the help of the "Sesame Street" gang and a keyboard overlay. —RASKIN	Reviewed on Atari, 48K (d., cart., cass.). Also for C 64 (d., cart.).	90-day warranty; $5 fee thereafter or if user-damaged.	★★	★★★★	★★★	★★★★	A	★★
MEMORY MANOR Fisher Price P.O. Box 1327 Cambridge, MA 02238 (617) 494-1222 $19 ©1984	Children ages 5–8 wash windows, earning points for washing those with prizes and birds in them, losing water for washing those with the grouchy face, in a game intended to reinforce memory. —SUMMERS	Reviewed on C 64 (cart.) Also for Atari (cart.); Coleco ADAM.	30-day warranty; $5 fee thereafter or if user-damaged.	★★	★★	★★	★★	A	★★
MICROZINE NO. 7 Scholastic Software 730 Broadway New York, NY 10003 (212) 505-3567 $39 ©1984	Magazine on a disk includes a mystery space adventure, a survey-taking program, a city scene building set, plus puzzles and cartoons for ages 10+. —FRANK	Apple II series, 48K.	60-day warranty; $10 fee for 10 subsequent months.	★★★	★★★	★★★	★★★★	E	★★
THE MUSIC SHOP Broderbund Software 17 Paul Drive San Rafael, CA 94903-2101 (415) 479-1170 $44 ©1985	Write, edit, print, and play music. Fun, versatile tool lets you enter your piano lessons, for instance. Use joystick, keyboard, or combination of both to enter notes, change voices, and more. —SUMMERS	C 64.	90-day warranty (includes user-damaged); $5 fee thereafter.	★★★★	★★★★	★★★★	★★★★	A	★★★★

RATINGS KEY O Overall performance; **D** Documentation; **EH** Error-handling; **GQ** Graphics quality; **EU** Ease of use; **V** Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★ Excellent; N/A Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

Title Manufacturer Price	Brief description	Hardware/ Equipment required	Backup policy	Ratings O	D	PS	GQ	EU	V
ADVENTURE CONSTRUCTION SET Electronic Arts 2755 Campus Drive San Mateo, CA 94403 (415) 571-7171 $39 (C 64); $49 (Apple, IBM) ©1984	Innovative build-it-yourself role-playing adventure lets you create an unlimited number of your very own fantasy challenges. Clumsy design system makes this best for serious role-playing fans, ages 10+.†	C 64. Planned for Apple II series; IBM PC/PCjr.	90-day warranty; $7.50 thereafter or if user-damaged.	★ ★ ★	★ ★ ★	★ ★ ★	★	A	★ ★
DREADNOUGHTS Avalon Hill 4517 Harford Road Baltimore, MD 21214 (301) 254-5300 $30 ©1985	Excellent introductory strategy and tactics game for ages 10+, puts you in control of the great W.W. II German vessel, *Bismarck*, as you prowl through the Atlantic in search of British convoys.†	Reviewed on Apple II series. Also for C 64.	Unlimited warranty; $10 fee if user-damaged.	★ ★ ★ ★	★ ★ ★	★ ★ ★	★ ★	E	★ ★ ★ ★
H.E.R.O. Activision 2350 Bayshore Frontage Rd. Mountain View, CA 94043 (415) 960-0410 $24–$39 ©1984–85	Explore caverns, using dynamite, phasers, special lamps, and more in colorful maze/flying game. Fun and easily played by ages 10+.	Reviewed on C 64. Also for Apple II series, 48K; Atari, 32K (cass.).	1-year warranty.	★ ★ ★	★ ★	★ ★ ★	★ ★	A	★ ★ ★
INCUNABULA Avalon Hill 4517 Harford Road Baltimore, MD 21214 (301) 254-5300 $30 ©1985	Trade goods, forge alliances, wage war by controlling a pre-Christian culture in a superb historical/economic/financial game for 1–7 players, ages 12+.†	IBM PC/PCjr, 128K.	Unlimited warranty; $10 fee if user damaged.	★ ★ ★ ★	★ ★ ★ ★	★ ★ ★ ★	★	D	★ ★ ★ ★
INFIDEL Infocom 55 Wheeler St. Cambridge, MA 02138 (617) 492-1031 $39–$44 ©1983	Set off across the desert in search of a lost tomb in this challenging text adventure—filled with the usual Infocom puzzles and dry humor. Good intermediate level challenge for adventurers, ages 12+.	Reviewed on Apple II series, 48K. Also for Atari, 48K; Macintosh, 128K; C 64; IBM PC, 64K/PCjr, 128K; TI-99/4A, 48K; TRS-80 Models I/III, 48K.	90-day warranty; $5 fee thereafter or if user-damaged.	★ ★ ★	★ ★ ★	★ ★ ★	N/A	D	★ ★
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POGO JOE Screenplay 1095 Airport Road Minden, NV 89423 (800) 334-5470 $29 ©1983	Hop around a wide variety of screens from precipice to precipice, avoiding bouncing foes in compelling game, especially good for young joystick pros, ages 8+.	Reviewed on Atari, 48K. Also for C 64. Joystick.	90-day warranty; $12.50 fee thereafter, if user-damaged, or for backup.	★ ★ ★	★ ★	★ ★ ★	★ ★ ★	A	★ ★ ★
ROCK N' BOLT Activision 2350 Bayshore Frontage Rd. Mountain View, CA 94043 (415) 960-0410 $29 ©1985	Fun, nonviolent, building game requires 1–2 players, ages 5+, to connect moving girders to complete a 100-floor building.	C 64.	1-year warranty.	★ ★	★ ★	★ ★ ★	★ ★ ★	E	★ ★
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STARCLASH II Baen Software 8 West 36th St. New York, NY 10018 (212) 947-8244 $29 ©1984	Try to gain control of a corner of the universe in flexible, outerspace strategy and tactics game for 1–2 players, ages 12+.	IBM PC, 64K.	30-day warranty; $5 fee thereafter; user makes backup.	★ ★ ★	★ ★ ★	★ ★ ★ ★	★ ★ ★	A	★ ★ ★

RATINGS KEY **O** Overall performance: **D** Documentation: **PS** Play system: **GQ** Graphics quality: **EU** Ease of use: **V** Value for money: ★ Poor: ★★ Average: ★★★ Good: ★★★★ Excellent: (@ ★★★ to ★★★★ depending on price: N/A Not applicable: E Easy: A Average: D Difficult: † Longer review follows chart

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