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0001:00 REM
0002:00 REM THIS IS PROGRAM HOLECALC.BAS. IT CALCULATES THE PROPERTIES OF
0003:00 REM A NEWTONIAN BLACK HOLE (MASS DENSITY OR RADIUS) GIVEN ONE OF
0004:00 REM THOSE PROPERTIES.***THIS IS VERSION # 2***
0005:00 REM IT CAN BE SHOWN THAT IF  $K = 3 * C^2 / (4 * \pi * G) = 3.22 * \text{TEN}(27)$  GM/CC
0006:00 REM THAT  $R^2 * D = K$ , WHERE C IS THE VELOCITY OF LIGHT, G IS
0007:00 REM NEWTON'S GRAVITATIONAL CONSTANT,  $\pi = 3.1415926$ , R IS THE
0008:00 REM IS THE CRITICAL RADIUS AND D IS THE CRITICAL DENSITY AT THAT
0009:00 REM RADIUS.
0010:00 REM PREVIOUS ESTIMATES WERE BASED ON A MISTAKE BY THE REV MR
0011:00 REM MICHELL IN PROCEEDINGS OF ROYAL ACADEMY (LONDON), WHO ASSUMED
0012:00 REM THAT IF THE ESCAPE VELOCITY WAS C, BODIES WOULD BE UNABLE TO
0013:00 REM LEAVE THE BLACK HOLE. IT IS PATENTLY OBVIOUS FROM CELESTIAL
0014:00 REM MECHANICS THAT SUBLUMINAL VELOCITY OBJECTS WOULD BE ABLE TO
0015:00 REM ORBIT UNTIL THE ESCAPE VELOCITY REACHED  $2^{.5} * C$ , AT WHICH
0016:00 REM NOT EVEN LIGHT WOULD BE ABLE TO ORBIT.
0017:00 REM THIS PROGRAM WAS WRITTEN BY MIKE FINERTY, 11/25/84 IN S-BASIC
0018:00 REM 200 YEARS AFTER MR MICHELL'S MISTAKE. REVISED 4/23/85.
0019:00 REM *****
0020:00 REM
0021:00 10 VAR K,G,RLOG,DLOG,MLOG,QUANT,SOLS,L = REAL
0022:00 VAR ANS, RESPONSE = STRING:10
0023:00     LET L = 2.302585
0024:00     LET K = 3.22E+27
0025:00 REM
0026:00     PRINT "PROGRAM RETURNS CRITICAL VALUE OF R,D&M IN CGS SYSTEM"
0027:00     PRINT "PLEASE SELECT INPUT"
0028:00     PRINT
0029:00     PRINT "R ..... RADIUS IN CM"
0030:00     PRINT
0031:00     PRINT "D ..... DENISTY IN GRAMS/CC"
0032:00     PRINT
0033:00     PRINT "M ..... MASS IN GRAMS"
0034:00     PRINT
0035:00     PRINT "MLOG .... LOGARITHM OF MASS IN GRAMS"
0036:00     PRINT
0037:00 REM
0038:00     INPUT "PLEASE INPUT LETTER OF CHOICE"; RESPONSE
0039:00     INPUT "PLEASE INPUT QUANTITY OF CHOICE"; QUANT
0040:00     IF ABS(LOG(QUANT)/L) > 34 THEN PRINT "OUT OF RANGE"
0041:00     IF ABS(LOG(QUANT)/L) > 34 THEN GOTO 20
0042:00     PRINT RESPONSE;" = ";QUANT
0043:00 REM
0044:00     CASE RESPONSE OF
0045:00 "R": BEGIN
0046:01     DLOG = LOG(K)/L - (2*LOG(QUANT)/L)
0047:01     MLOG = .6220886 + LOG(K)/L + LOG(QUANT)/L
0048:01     PRINT "DENSITY=";10^(DLOG-INT(DLOG));"TEN";INT(DLOG);" GMS/CC"
0049:01     PRINT "MASS = ";10^(MLOG-INT(MLOG));"TEN";INT(MLOG);" GMS"
0050:01     SOLS = MLOG - 33.29885
0051:01     PRINT "SOLAR MASSES = ";10^(SOLS-INT(SOLS));"TEN";INT(SOLS);" SOLS"
0052:01     END
0053:00 "D": BEGIN
0054:01     RLOG = 0.5*(LOG(K)/L - LOG(QUANT)/L)
0055:01     MLOG = .6220886 + 0.5*(3*LOG(K)/L-LOG(QUANT)/L)
0056:01     SOLS = MLOG - 33.29885
0057:01     PRINT "RADIUS = ";10^(RLOG-INT(RLOG));"TEN";INT(RLOG);" CM"
0058:01     PRINT "MASS = ";10^(MLOG-INT(MLOG));"TEN";INT(MLOG);" GMS"
0059:01     PRINT "SOLAR MASSES = ";10^(SOLS-INT(SOLS));"TEN";INT(SOLS);" SOLS"
0060:01     END

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