17. Archery

General Description

This program is designed to demonstrate the effect of speed and gravity on the course of a moving object. The simulation is in the form of an archery contest. The instructions for the game appear on the screen when the program is started. The game requires for the user to set the angle of elevation (from 20 to 70), and the speed of the arrow's flight (which can be from 50 to 140). Points are awarded according to which part of the target (if any) is hit with each of your five arrows:- 30 for a bullseye, 20 for the middle ring and 10 for the outer edge.

Press any key to start.

Detailed Description

Lines 10-60 Credits.

70-100 Set up variables.

110-120 GOTO procedure for instructions.

130-150 Setup colours, sounds and characters.

160 Set D = distance and X = distance to plot target, also goes to procedure to display target.

170-260 Display score, distance and asks for angle of trajectory, and speed in metres per second.

270 Changes degrees to radians.

280-320 Erases old arrow.

330-360 Has arrow hit target?

370-390 Display arrow in new position.

440-430 Do it again until arrow hits something.

440-540 Procedure to display target.

550-590 Add to score.

600-670 Display ratings.
680-850 Procedure to display instructions.

Educational Note

Whilst this simulation is primarily just for fun, its use does encourage users to take into account the consequences of two different variables on their arrows' flight, and witness the outcome of their decision before their very eyes! The game is probably best run with two players taking alternate goes.

NB For projectiles under gravity the following formula was used:
Y = X * TAN(a) - (X * X * G) / (2 * U * U * COS(a) * COS(a))
Where x=distance from target; U=initial velocity; a=angle of trajectory; G=9.81 (force of gravity); Y=height of projectile.

Program Listing

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>
   10 REM ******************************
   20 REM *           ARCHERY            *
   30 REM *           =======            *
   40 REM *     WRITTEN FOR THE BBC-A    *
   50 REM *   BY ANDREW PUSEY FEB 1983   *
   60 REM ******************************
   70 O=50
   80 MG=9.8
   90 SCORE=0
  100 MODE7
  110 PROC_instructions
  120 MODE5:VDU23;8202;0;0;0;
  130 VDU19,2,2,0,0,0
  140 ENVELOPE 1,1,0,0,0,20,20,20,125,-1,0,0,100,100
  150 VDU23,240,232,228,100,254,228,196,200,224
  160 D=RND(10)+20:X=D*30:PROC_BOARD
  170 FOR SHOT=1TO5
  180   PRINT TAB(1,28);CHR$240
  190   PRINT TAB(2,0);SPC(100);TAB(2,0);"DISTANCE="D
  200   PRINT TAB(1,6);"SCORE=";SCORE
  210   SOUND 1,0,0,0
  220   INPUTTAB(2,1)"ANGLE   =" AN
  230   IF AN<20 ORAN>70THENVDU7:GOTO190
  240   INPUTTAB(2,2)"SPEED   =" U
  250   PRINT TAB(0,0);SPC(255)
  260   IF U<50 OR U>140THENVDU7:GOTO190
  270   A=RAD(AN)
  280   FOR X=150TO1279*(D/25)STEP8
  290     Y=X*TAN(A)-(X^2*MG)/(2*U^COS(A)^2)
  300     MOVE X/(D/25)-30,O+50
  310     PLOT 6,X/(D/25),Y+50
  320     SOUND 1,1,Y/2+5,1
  330     C=POINT(X/(D/25)+9,Y+42)
  340     IF C>0THEN550
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  350      E=POINT(X/(D/25)+9,Y+34)
  360      IF E>0THENC=E:GOTO550
  370      MOVE X/(D/25)-30,O+50
  380      PLOT 6,X/(D/25),Y+50
  390      IF C=-1ORE=-1THEN550
  400      O=Y
  410      IF Y<-10 THEN 590
  420    NEXT
  430    GOTO 590
  440    DEFPROC_BOARD
  450    MOVE X,100
  460    GCOL0,3
  470    DRAW X+150,250
  480    GCOL0,2
  490    MOVE X+30,130
  500    DRAW X+120,220
  510    GCOL0,1
  520    MOVE X+60,160
  530    DRAW X+90,190
  540    ENDPROC
  550    IF C=-1 THEN 590
  560    SCORE=SCORE+(4-C)*10
  570    SOUND1,-15,100,1:A$=INKEY$(100)
  580    PRINT TAB(0,0);SPC(100)
  590 NEXT SHOT
  600 MODE6
  610 SOUND1,0,0,0
  620 PRINT TAB(4,4);"You scored "SCORE" points."
  630 IF SCORE>120 PRINT''" Are you Robin Hood ??!!":END
  640 IF SCORE>90 PRINT''" Not bad - I can see you've been p
ractising.":END
  650 IF SCORE>50 PRINT''" Not too bad, try getting a better
 bow.":END
  660 IF SCORE>20 PRINT''" If I was you, I would try taking
some    lessons before you come here again !!!":END
  670 PRINT"Try looking next time !!!";CHR$(7):END
  680 DEFPROC_instructions
  690 CLS
  700 PRINTTAB(10,1);CHR$(141);CHR$(130);"ARCHERY"
  710 PRINTTAB(10,2);CHR$(141);CHR$(130);"ARCHERY"
  720 PRINTCHR$(131);"  Welcome to the game of Archery."
  730 PRINT'CHR$(131);"The idea of this game is to fire all"
  740 PRINT'CHR$(131);"your arrows into the target."
  750 PRINT'CHR$(131);"If you hit the white (outside) then"
  760 PRINT'CHR$(131);"you score 10 points"
  770 PRINT'CHR$(131);"the green 20 points"
  780 PRINT'CHR$(131);"the red (Bullseye) 30 points."
  790 PRINT'CHR$(131);" You start with 5 arrows so the"
  800 PRINT'CHR$(131);"maximum score is 150."
  810 PRINT'CHR$(131);"The angle is from 20 to 70."
  820 PRINT'CHR$(131);"and the speed is from 50 to 140."
  830 PRINTCHR$(136);CHR$(129);"Press any key to begin."
  840 A$=GET$
  850 ENDPROC
```