This reinforcement activity has been used by students from the elementary school level to the graduate school level who possess intermediate level ability in programming Logo. The activity, which consists of writing Logo programs that animate an object, can have several positive effects as it: (1) helps develop problem-solving skills; (2) encourages students to work together and share ideas; (3) can motivate accelerated students; and (4) offers excellent practice in use of variables, procedures, conditionals, and iteration/recursion. While the six sample procedures included for animated Logo are written for LogoWriter, they can be easily adapted to other versions of Logo. (CGD)
Animation in Logo: A Reinforcement Activity

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Paper presented at Great Lakes/East Coast Logo Conference,
Cleveland, OH, May, 1988
Animation in Logo: A Reinforcement Activity

This activity is both interesting to students and useful in reinforcing several important concepts. While animation is easily achieved with LogoWriter using shapes, the approach presented here works well with several versions of Logo and enables the student to practice programming skills.

Students must be able to program in Logo at an intermediate level. They are first introduced to animation as a three-step process: (1) draw the figure, (2) erase the figure, (3) move and repeat. Students are given a graph of screen coordinates and the assignment is to move an object on the screen.

This activity is conducted in a problem-solving orientation. Students are given the general assignment, and required to organize their existing knowledge in new and different ways to solve the problem. Once the problem has been solved in one way, different methods and embellishments may be suggested. Students are encouraged to work together and to share ideas.

In order to animate the object students use variables and procedures. They use either iteration or recursion to repeat the steps. They use a conditional to stop the object at the edge of the screen.
This project is motivating for accelerated students. Some student projects have included addition of color, addition of a background picture, variation of the speed, variation of the starting point and direction, moving multiple objects simultaneously, and moving an object randomly.

This activity has been included in Logo courses with students from elementary school to graduate school level. It has been a favorite project for the students. It provides excellent practice in use of variables, procedures, conditionals, and iteration/recursion.

The following are six sample procedures for animated Logo. All are written for LogoWriter, but can easily be adapted for other versions of Logo.
Example 1: Simple Iterative

TO FASIEST
    PU
    SETH 90
    REPEAT 50[WAIT 10 FD 5]
END

Example 2: Simple Recursive

TO DRAWIT
    SETH 90
    FD 10
    BK 3
    LT 135
    FD 5
    BK 5
    RT 90
    FD 5
    BK 5
    LT 45
    FD 7
END

TO EASYMOVE
    HT
    PD
    DRAWIT
    WAIT 10
    PE
    DRAWIT
    SETH 90
    PU
    FD 5
    EASYMOVE
END
Example 3: Intermediate Iterative

TO BUG
  SETH 0
  REPEAT 4 [FD 3 RT 90]
END

TO MOVEBUG :X
  PU
  SETX :X
  PD
  BUG
  PE
  BUG
END

TO DOIT
  MAKE "X -120
  PU
  SETX -120
  SETY 10
  PD
  REPEAT 30 [MOVEBUG :X MAKE "X :X+10]
END

Example 4: Intermediate Recursive

TO BUG
  SETH 0
  REPEAT 4 [FD 3 RT 90]
END

TO MOVEBUG :X
  PU
  SETX :X
  PD
  BUG
  PE
  BUG
  MAKE "X :X + 10
  IF :X > 139 [STOP]
  MOVEBUG :X
END

TO DOIT
  MAKE "X -120
  PU
  SETX -120
  SETY 10
  PD
  MOVEBUG :X
END
Example 5. Advanced Spiderweb

TO WEB :SIZE
  TRI :SIZE
  RIGHT 120
  IF :SIZE > 100 [STOP]
  WEB :SIZE + 10
END

TO TRI :SIZE
  REPEAT 3[FD :SIZE RT 120]
END

TO MAKEWEB
  WEB 10 RT 30
  WEB 10 RT 30
  WEB 10
END

TO SPIDER
  RT RANDOM 360
  FD RANDOM 100
END

TO CHASE
  PD MAKEWEB PU
  REPEAT 30[ST SPIDER WAIT 10]
END
Example 6: Advanced Honeybee

TO FLOWER
  HT
  SETSH 24
  PU BK 80 RT 90 BK 120
  REPEAT 8[PD STAMP PU FD 25]
  FD 15
END

; available in LogoWriter

; stamps flower shape

TO TREETOP
  REPEAT 25[RT 5 FD 5]
END

; draws an arc

TO TREE
  LT 90 PD
  FD 100 LT 110
  TREETOP
END

; draws tree trunk

; draws tree top

TO OVAL :W :X :Y :Z
  REPEAT :Z[RT :Y FD 1]
  RT :W FD :X
  RT :W REPEAT :Z[RT :Y FD 1]
  FD :X
END

; used to draw bee hive

TO HIVE
  PU RT 165 FD 75 LT 90 FD 40
  PD OVAL 20 10 10 16
  PU FD 3 RT 90 FD 10 LT 90
  PD OVAL 0 20 9 20
  PU FD 3 RT 90 FD 10 LT 90
  PD OVAL 0 25 9 20
  PU BK 3 RT 90 FD 10 LT 90
  PD OVAL 0 20 9 20
  PU BK 6 RT 90 FD 10 LT 90
  PD OVAL 20 10 10 16
END

; moves into position

; calls OVAL

TO BACKGROUND
  FLOWER
  TREE
  HIVE
END

; draws background parts
TO BEE

BACKGROUND
SETSH 0 ST
PU BK 7 RT 90 REPEAT 30[FD 1] ; sets shape and shows
LT 90 REPEAT 150[FD 1] ; moves bee
RT 45 REPEAT 30[FD 1] WAIT 10
LT 90 REPEAT 50[FD 1]
RT 90 REPEAT 50[FD 1] WAIT 10
LT 75 REPEAT 60[FD 1]
REPEAT 270[RT 1]
FD 20
HT
END