

no. A-168



clock works

instructional computing courseware
for the **apple**® II computer

This manual is compatible
with
the *Clock Works* diskette
Version 1.x

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INTRODUCTION

Clock Works is a collection of four programs designed to provide drill and practice for both analog and digital clocks. The level of difficulty for the problems presented is easily controlled through Teacher Options. See pages 2-4 for instructions to access and use these Teacher Options. These options allow you to modify the time intervals practiced, the expressions used for time, and the design of the actual clock face.

WHAT'S THE TIME? drills students in reading the time shown on an analog clock. Ten problems are presented using a multiple choice format. The problem difficulty and type of expressions used as choices are controlled through a teacher option.

SET THE CLOCK gives practice in setting the hands of an analog clock. Students are given ten problems. The correct clock setting is shown after any problem has been missed twice.

DIGITAL DRILL gives practice in setting a digital clock. Ten problems are given using the time expressions set through the Teacher Options. The correct setting is shown after any problem has been missed twice.

THE CLOCK FACTORY allows students to explore the many ways of designing a clock face. It also provides students with a chance to set an alarm and observe analog clock hand movement. A variety of clock cases and program endings provide motivation.

Students can leave a program by pressing the Escape (Esc) Key twice anytime the program is waiting for a response. You may turn the sound effects off **before** you begin a program by selecting Option 6 on the main menu, or you may turn them off **during** a program by holding down the Control Key and typing the letter S (Control-S).

To use Clock Works, you will need the Clock Works program diskette, a 64K Apple II series computer, a monochrome or color monitor, and a disk drive.

TEACHER OPTIONS

Accessing Teacher Options

There are several teacher options available that can be easily modified to meet the needs of your students. You can access the Teacher Options menu while viewing the main menu of Clock Works (Figure 1). Simply press Control-A (hold down the Control Key and then press the A Key) and the Teacher Options menu will appear (Figure 2). The current settings on your diskette will be indicated in **inversed** text.

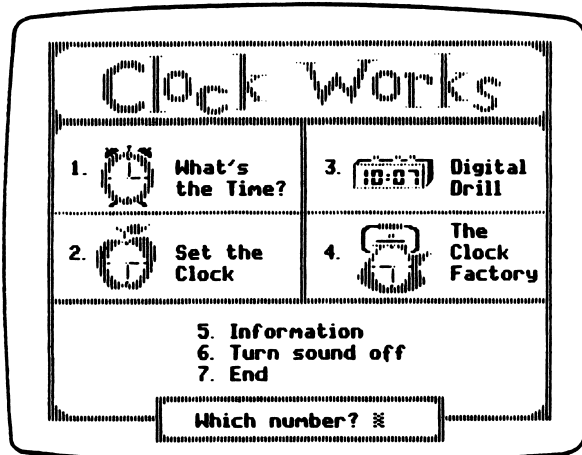


Figure 1

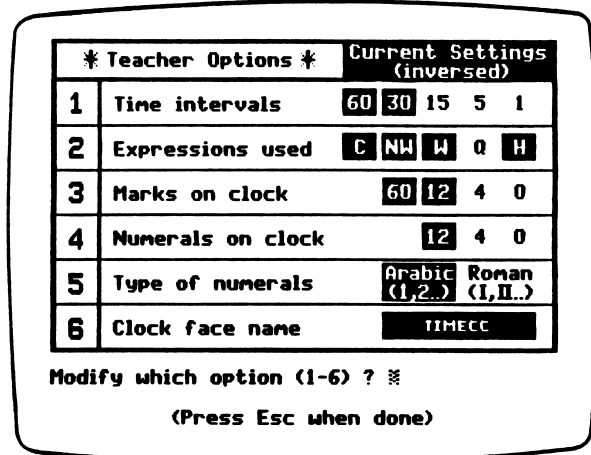


Figure 2

Option 1: Time intervals

You can modify this option so that any combination of intervals is used (Figure 3). The smallest interval selected will also be the increment used when moving the minute hand. You should also be aware that in generating problems to use with the WHAT'S THE TIME? program, appropriate distractors are generated. For example, a problem such as 4:00 produced by the "60 minute" interval would have distractors in the hourly form (Figure 4). However, if 4:00 was produced by the "5-minute" interval, a distractor such as 12:20 could appear.

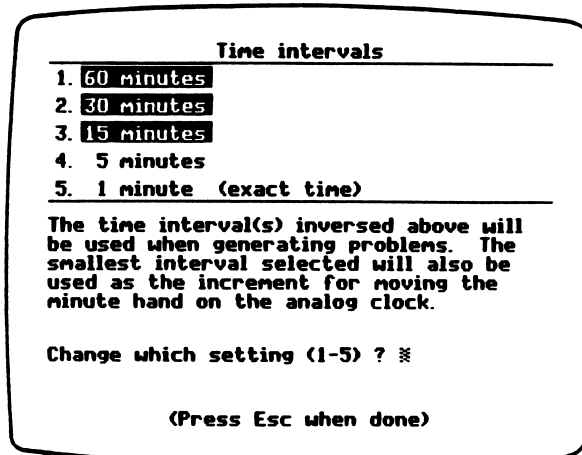


Figure 3

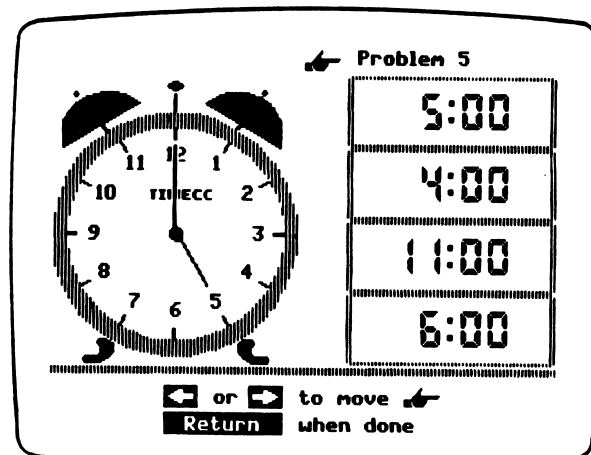


Figure 4

TEACHER OPTIONS (continued)

Option 2: Expressions used

This option allows you to control the types of expressions seen by the student when problems are presented. At least one of the first three types must be chosen (Figure 5). The last two types, quarter and half hours, are special cases and will be applied when appropriate. The programs will randomly select from the types of expressions being used for each problem. However, WHAT'S THE TIME? will use the same type of expressions for each problem (Figure 6).

Type	Examples
1. Clock	Digital or Analog
2. Numbers and words	3 o'clock 10 minutes after 2 o'clock
3. Words	Three o'clock Ten minutes to one o'clock
4. Quarter hours	Quarter past 2 o'clock Quarter to nine o'clock
5. Half hours	Half past ten o'clock Half past 4 o'clock Ten-thirty

The types inversed above will be used.
Change which setting (1-5) ?

(Press Esc when done)

Figure 5

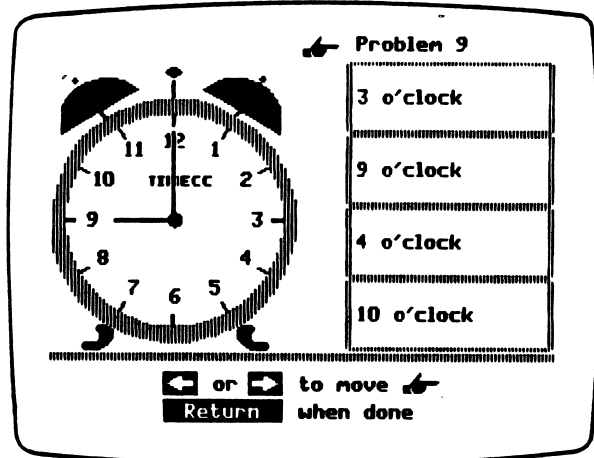


Figure 6

The first expression type (Clock) will represent time with either a digital clock display or an analog clock, depending on which is appropriate. For example, the digital clock display could be used to represent the problem choices in WHAT'S THE TIME? (Figure 7). The analog clock, on the other hand, is one way to represent time in DIGITAL DRILL (Figure 8).

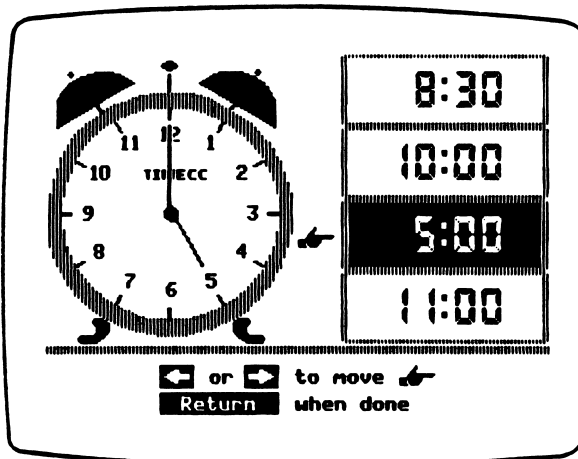


Figure 7

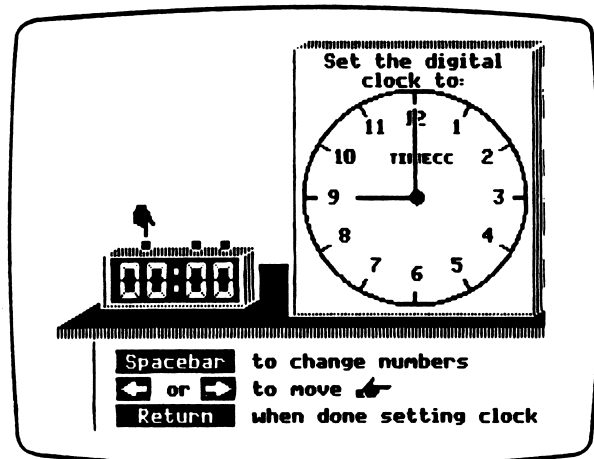


Figure 8

TEACHER OPTIONS (continued)

Option 3: Marks on clock

Option 4: Numerals on clock

These two options (Figure 9 and 10) allow you to customize the design of the clock faces seen by the students. If more than one setting is selected for either option, the computer will randomly select each time an analog clock face is used. Limiting the number of marks and numerals will increase the difficulty of the problems.

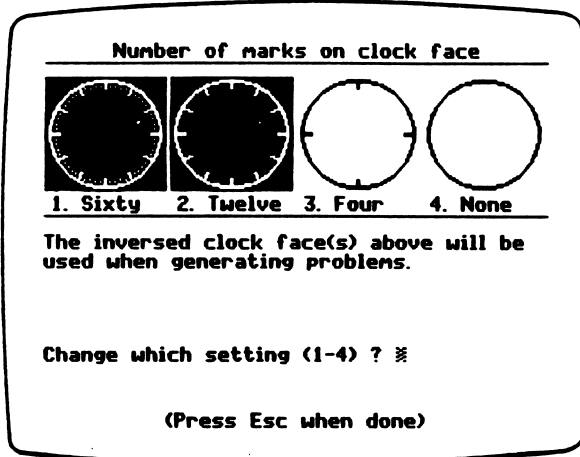


Figure 9

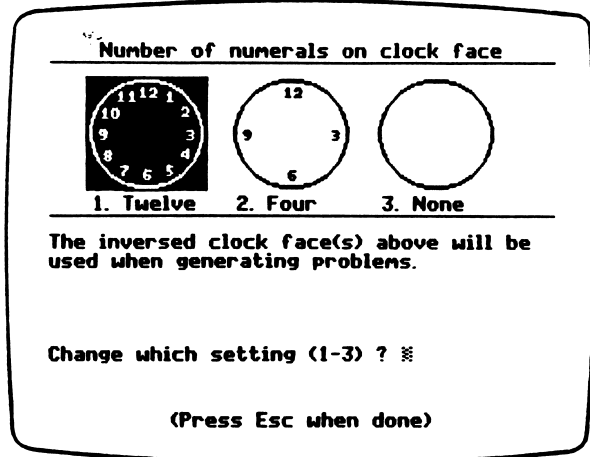


Figure 10

Option 5: Type of numerals

Option 6: Clock face name

These two options allow you to further customize the clock faces seen by the students. The use of Roman numerals may provide an enrichment activity for some students (Figure 11). You can have any name, up to eight characters long, appear on the clock faces (Figure 12). You might want to have your school name, town name, or teacher's name appear.

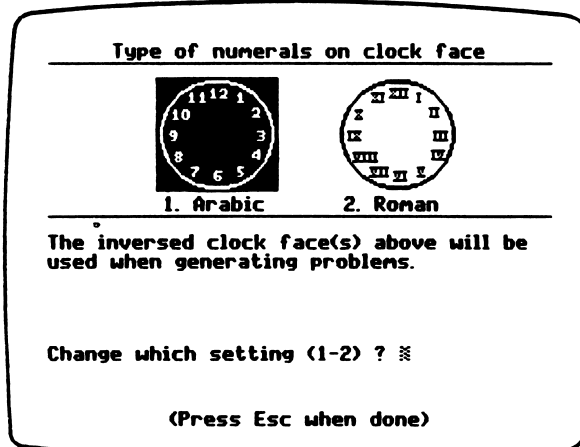


Figure 11

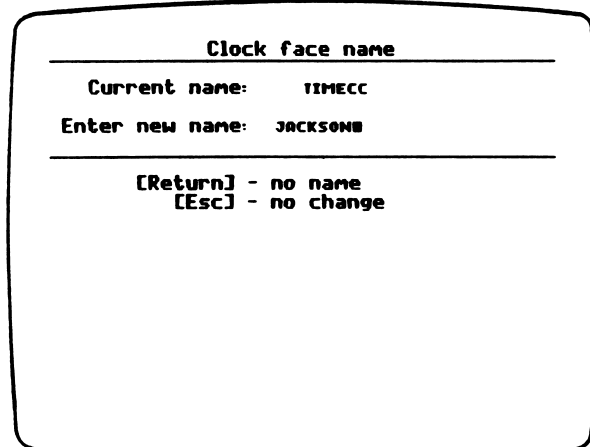


Figure 12

DESCRIPTION

WHAT'S THE TIME? drills students on reading an analog clock. Ten multiple choice questions are given that ask the student to select the time shown on an analog clock. The design of the clock face and the type of expressions seen by the students are controlled through the Teacher Options.

Curriculum Area: Mathematics
Subject: Measurement
Topic: Time
Type: Drill and Practice
Grade Range: 1-3
Classroom Use: Individual

LEARNING OBJECTIVES

After using this program, the student will have received practice in:

- telling time on an analog clock using the time intervals set by the teacher;
- telling time on an analog clock using various expressions for time.

WHAT'S THE TIME?

PROGRAM PREVIEW

WHAT'S THE TIME? drills students on telling analog time. Ten problems are presented in the multiple choice format (Figure 1). The problem types and expressions that appear as choices are controlled by the Teacher Options. For each correct response on the first try, the alarm will ring (Figure 2).

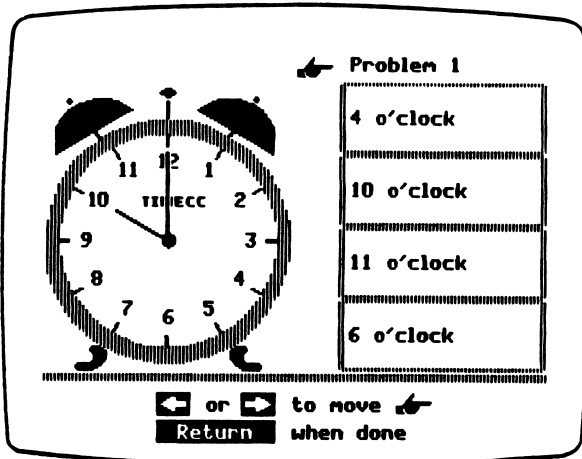


Figure 1

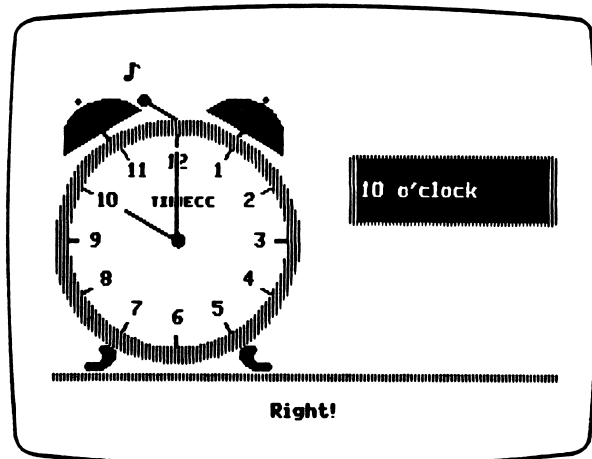


Figure 2

If a problem is missed, the student continues trying until the correct answer is selected or it is the only remaining choice (Figure 3). At the conclusion of the lesson, a summary indicates how many problems the student got right on the first try (Figure 4). If the student had all ten right on the first try, the Wuzzle will appear and ring the alarm.

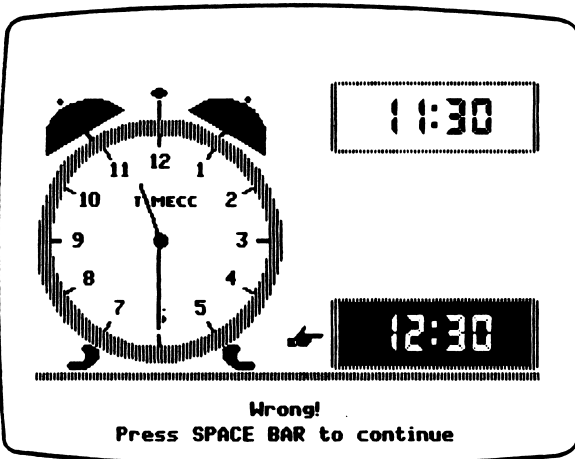


Figure 3

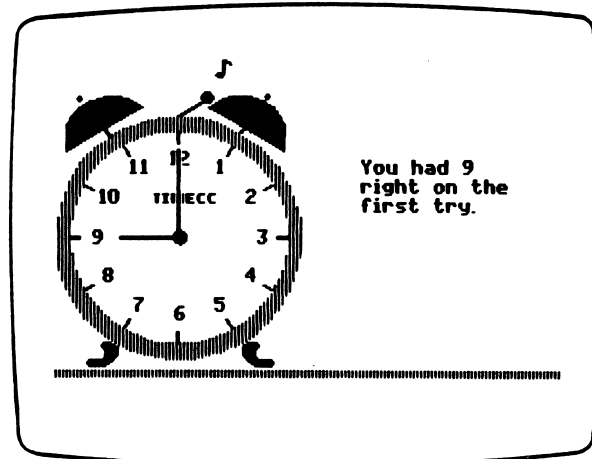


Figure 4

USE IN AN INSTRUCTIONAL SETTING

Preparation

Before students use this program, you should access the Teacher Options and modify the settings to meet the needs of your students. This is extremely important since these settings can change the programs from beginning first grade lessons into very challenging third grade lessons. Be sure to choose the appropriate time intervals being studied and design the clock faces so that they are familiar to your students.

Beginning readers might need help the first time they run the programs. Review with them the keys that must be used to move and select. Either set of arrow keys or the Space Bar can be used to move the cursor (pointing hand). The Return Key is used to select their choice of answers.

When appropriate, you may want to review the use of many different expressions for any given time. For example, you can use 7:00, seven o'clock, and 7 o'clock interchangeably.

Using the Program

This program is capable of producing sound each time the alarm rings. If this is not a desirable feature, instruct students to turn the sound off by using the option on the main menu or by pressing Control-S.

Follow-up

Once students demonstrate that they can read an analog clock, have them run SET THE CLOCK and practice setting the time.

If you have studied Roman numerals, this program can provide practice in recognizing them. (See Option 5 on page 4.)

DESCRIPTION

SET THE CLOCK gives students practice in converting both time expressions and digital time into analog time. Ten problems are presented that ask the student to set the hands on an analog clock. The design of the clock face and the type of expressions seen by the students are controlled through the Teacher Options.

Curriculum Area: Mathematics
Subject: Measurement
Topic: Time
Type: Drill and Practice
Grade Range: 1-3
Classroom Use: Individual

LEARNING OBJECTIVES

After using this program, the student will have received practice in:

- converting digital time into analog time;
- converting time expressions into analog time;
- setting the time on an analog clock.

SET THE CLOCK

PROGRAM PREVIEW

SET THE CLOCK gives students practice in setting the time on an analog clock. Ten problems are given using the format shown in Figure 1. The type of problems and the expressions shown to represent the time are controlled by the Teacher Options settings. The amount of movement by the minute hand is regulated by the time interval settings. Feedback and motivation are provided by the worm (Figure 2).

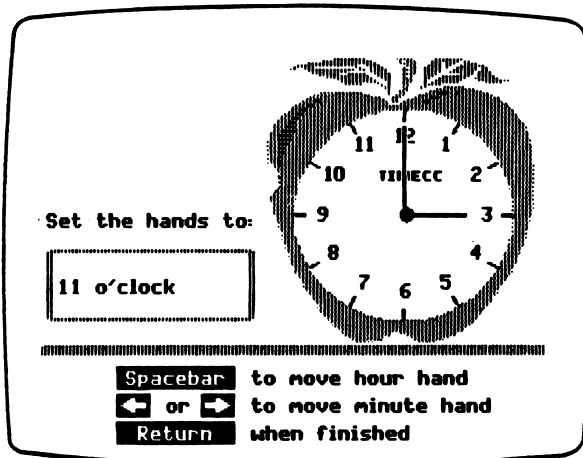


Figure 1

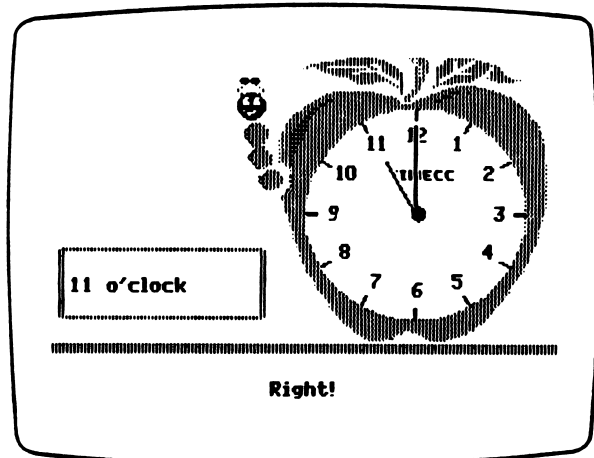


Figure 2

The student is given two opportunities to correctly set the time. After two misses, the clock will display the correct setting so that the student can see the correct answer (Figure 3). Each time the student gets two correct answers on the first try, the worm will emerge further from the apple. If all ten problems are answered correctly on the first try, the worm will hop out of the apple and do a most unusual dance (Figure 4).

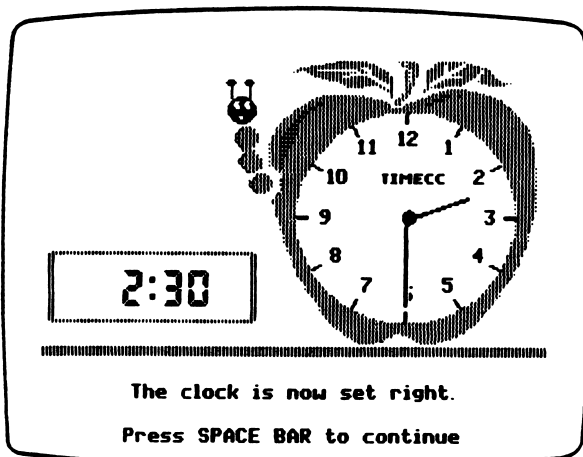


Figure 3

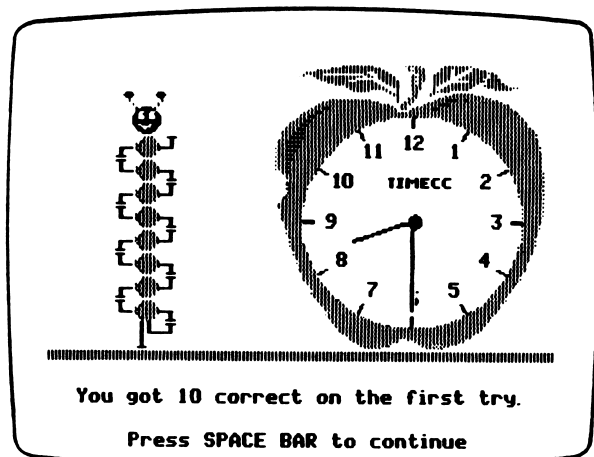


Figure 4

SET THE CLOCK

USE IN AN INSTRUCTIONAL SETTING

Preparation

Before students use this program, you should access the Teacher Options and modify the settings to meet the needs of your students. This is extremely important since these settings can change the programs from beginning first grade lessons into very challenging third grade lessons. Be sure to choose the appropriate time intervals being studied and design the clock faces so that they are familiar to your students.

Beginning readers might need help the first time they run the programs. Review with them the keys that must be used to move the hour and minute hands. When "60 minutes" is the **only** time interval being used, the arrow key directions are removed from the screen. The Return Key is pressed once they are satisfied with the hand settings.

When appropriate, you may want to review the use of many different expressions for any given time. For example, you can use 7:00, seven o'clock, and 7 o'clock interchangeably.

Using the Program

Encourage students to experiment with the minute and hour hands until they become familiar with their behavior. While the minute hand can be moved in either direction, the hour hand can only be moved in a clockwise direction. However, moving the minute hand will cause the hour hand to move relatively in either direction.

Follow-up

An interesting activity involving estimation can be developed using this program. Modify the Teacher Options so that the clock faces have minimal or no marks and numerals. This can be a very challenging task when using the "1 minute" intervals.

If you have studied Roman numerals, this program can provide practice in recognizing them. (See Option 5 on page 4.)

DESCRIPTION

DIGITAL DRILL gives students practice in converting both analog time and time expressions into digital time. Ten problems are presented that ask the student to set a digital clock. The design of the clock face and the type of expressions seen by the students are controlled through the Teacher Options.

Curriculum Area: Mathematics
Subject: Measurement
Topic: Time
Type: Drill and Practice
Grade Range: 1-3
Classroom Use: Individual

LEARNING OBJECTIVES

After using this program, the student will have received practice in:

- converting analog time into digital time;
- converting time expressions into digital time;
- setting the time on a digital clock.

DIGITAL DRILL

PROGRAM PREVIEW

DIGITAL DRILL provides students with practice in setting a given time on a digital clock. Ten problems are presented in the format shown in Figure 1. If the correct answer is given on the first try, the Wuzzle provides feedback and performs a trick (Figure 2).

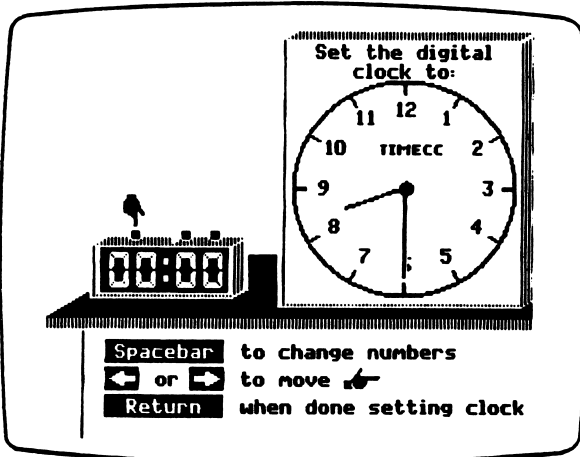


Figure 1

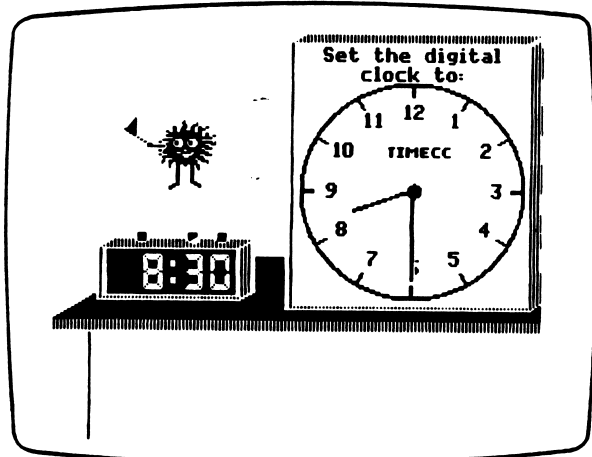


Figure 2

Students are given two opportunities to set the right time for each problem. If they are wrong after the second try, the correct time is set for them to study (Figure 3). At the conclusion of the lesson, a summary screen shows how many problems were done correctly on the first try (Figure 4). If all ten problems were correct on the first try, the Wuzzle will do a variety of tricks following the summary.

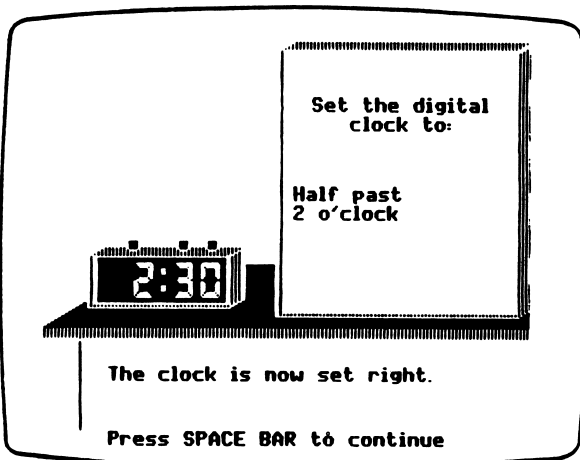


Figure 3

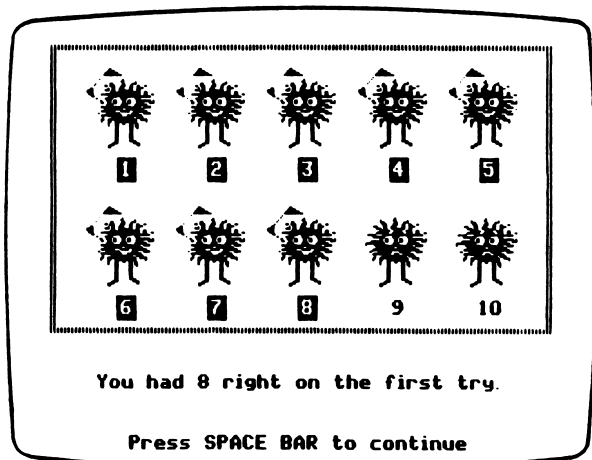


Figure 4

USE IN AN INSTRUCTIONAL SETTING

Preparation

Before students use this program, you should access the Teacher Options and modify the settings to meet the needs of your students. This is extremely important since these settings can change the programs from beginning first grade lessons into very challenging third grade lessons. Be sure to choose the appropriate time intervals being studied and design the clock faces so that they are familiar to your students.

Beginning readers might need help the first time they run the programs. Review with them the keys that must be used to move the cursor (pointing hand) and change the numbers on the digital clock. The procedure for changing the numbers was designed to allow students to quickly enter a time, yet retain a certain realism. This is primarily used in setting the minutes so that a student would not have to press the Space Bar 59 times to change from ":00" to ":59."

When appropriate, you may want to review the use of many different expressions for any given time. For example, you can use 7:00, seven o'clock, and 7 o'clock interchangeably.

Using the Program

Encourage students to experiment with changing the numbers until they become familiar with how they appear. The hours start at "00" and then rotate from 1 to 12. The tens place in the minutes will rotate from 0 to 5 since these are the only acceptable digits. The ones place in the minutes will rotate from 0 to 9.

Follow-up

An interesting activity involving estimation can be developed using this program. Modify the Teacher Options so that the clock faces have minimal or no marks and numerals. This can be a very challenging task when using the "1 minute" intervals.

If you have studied Roman numerals, this program can provide practice in recognizing them. (See Option 5 on page 4.)

THE CLOCK FACTORY

DESCRIPTION

THE CLOCK FACTORY allows students to explore the many ways of designing an analog clock face. This is done by choosing from a variety of clock faces shown. Once the clock face is designed, a clock case is selected and an alarm is set. It is then time to sit back and watch time go by!

Curriculum Area: Mathematics

Subject: Measurement

Topic: Time

Type: Exploratory

Grade Range: 1-3

Classroom Use: Individual

PURPOSE

This program is primarily an enrichment activity that combines the use of both analog and digital clocks.

THE CLOCK FACTORY

PROGRAM PREVIEW

THE CLOCK FACTORY provides students with an activity that yields both variety and exploration. Students are given essentially the same set of choices available to the teachers in the Teacher Options. Students begin by choosing the numeral style (Figure 1), number of marks, and number of numerals that will appear on the clock they are building. Next, they select a clock case (Figure 2) and give the clock a name of their choice that contains up to eight characters.

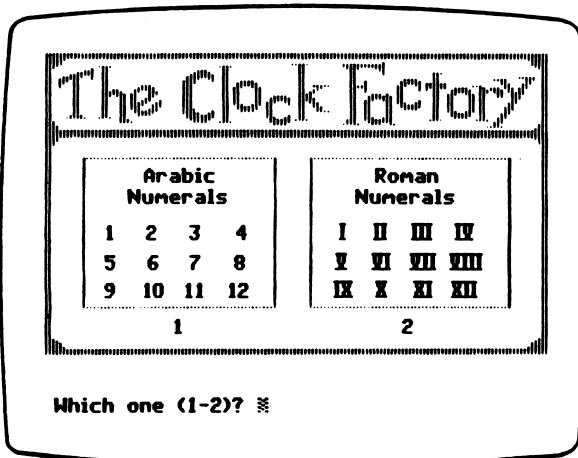


Figure 1

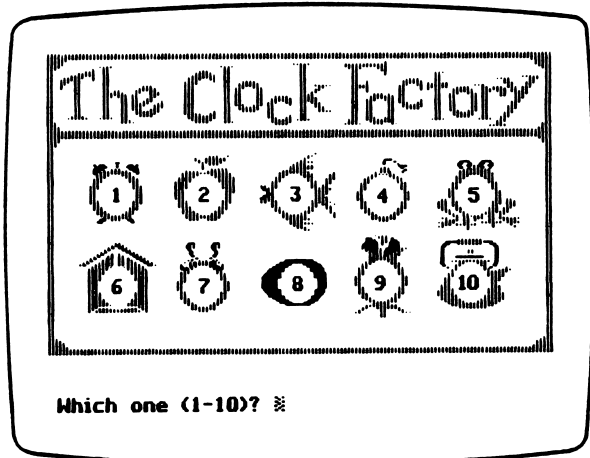


Figure 2

Since these are alarm clocks, the student must then set the alarm to go off at the time of their choice (Figure 3). All new clocks built start with the hands set at 12:00, so students can set the alarm accordingly. Once all the choices have been made, their newly designed clock is displayed (Figure 4). The time then ticks away until the alarm goes off. What happens next? You'll just have to build all the different clocks and find out yourself! Oh, yes . . . endings are not always the same.

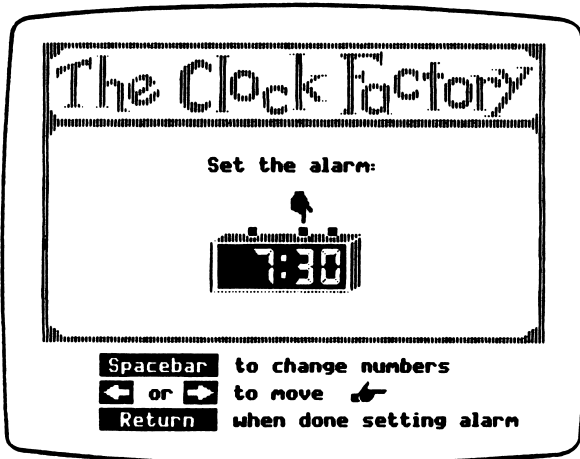


Figure 3

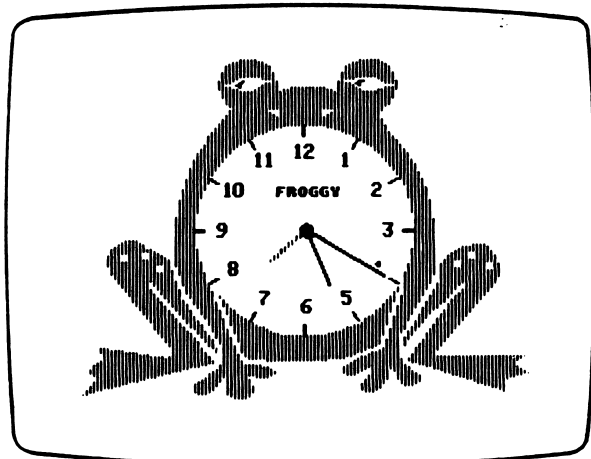


Figure 4

THE CLOCK FACTORY

USE IN AN INSTRUCTIONAL SETTING

Preparation

Since this program is designed to let students experiment, no special preparation should be needed.

Using the Program

Beginning readers may need some instruction in how to set the alarm and in naming their clock.

Students should be encouraged to try several different clocks. If they use the same case again, they may discover that the same event does not always take place when the alarm goes off.

Follow-up

Have students find pictures of different clock face designs and put them on a bulletin board.

Have students draw a picture depicting an alarm clock they have designed. If it is a special purpose alarm clock, have them describe its use and how it operates.

APPENDICES

CREDITS

Clock Works was produced by a MECC development team that included Susan Gabrys, Scott Jensen, Charolyn Kapplinger, and Craig Solomonson.

MECC wishes to extend a special thanks to the following teachers and their students for their assistance in developing this package: Joyce Robinson, Sandy Fritscher, and Sherri Hoffmann, Island Lake School, Shoreview, Minnesota.

TO THE READER:

MECC has made every effort to ensure the instructional and technical quality of this courseware package. Your comments—as user or reviewer—are valued and will be considered for inclusion in any future version of the product. Please address comments to:

MECC Courseware Development
3490 Lexington Avenue North
St. Paul, MN 55126

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