

Objectives:

Using the **DECIMALS** applet, the student will explore patterns & symmetry by ordering pairs of digits from the decimal expansion of fractions with periodic decimals.

Functionality:

When the student selects **START**, the **DECIMALS NOTE** will be displayed.

VIEWS displays a menu which allow exploration of the families of periodic decimals for sevenths, thirteenths, and twenty-firsts.

After selecting a fraction family, a choose box will appear to prompt the student to look at specific decimal expansions. At the right, the student can look the decimal expansion of $1/7$, $2/7$ or $3/7$.

After this selection, the calculator will display basic information about the decimal pattern for the fraction and a list of ordered pairs that will be plotted.

Note: The list comes from taking the digits in order so that the second coord. of one ordered pair is the first coord. of the next.

A connected plot of the set of ordered pairs is then graphed on the screen. Have the student compare and contrast the graphs of the different sevenths as well as the thirteenths and twenty-firsts. They can then explore the properties of symmetry for the given shapes.

DECIMALS NOTE
Fractions that have periodic decimals can be expressed as ordered pairs. The shapes they make are great for
SPACE PAGE 1/2 BKSP

Sevenths
Thirteenths
+ Twenty-firsts
Start
CANCL OK

SEVENTHS
1/7
2/7
3/7
CANCL OK

Decimal numbers for sevenths are the same, but occur in a different order.
 $1/7 = .142857142857$
(1,4), (4,2), (2,8), (8,5), (5,7), (7,1), (1,4), (4,2), (2,8), (8,5), (5,7), (7,1)
T: 1 (1,4) MENU

T: 1 (1,4) MENU

Additional Exploration:

Students can investigate other fractions that create periodic decimals and their families. In the list L1, enter the ordered pairs. After choosing an appropriate window for the sketch, plot the set of ordered pairs in **Parametric** mode where $X1(T) = L1(T)$ and $Y1(T)=0$.

Eg. Explore the patterns and/or symmetry of $\frac{1}{35}$.

L1
1: (4,3)
2: (3,9)
3: (9,8)
4: (8,2)
5: (2,4)
EDIT INS

PARAMETRIC PLOT SETUP
TRNG: 1 6
TSTEP: 1
XRNG: 0 11
YRNG: -2 11
ENTER MINIMUM TIME VALUE
EDIT PAGE

T: 1 (4,3) MENU

Note: It is important when choosing an appropriate window that the T range is from 1 to the total number of ordered pairs in your list with a set of 1.

Programs associated with this applet:

.DE.C7, .DE.C21, .DE.C13, .DE.S, .DE.SV