

CONSTRUCTIVE RATIONAL NUMBER TASKS

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The following number tasks are the last of a series which first appeared in the March 1979 issue of delta-k and again in the May 1979 issue.

FRACTION TASK 6:

Units

1. Take a set of 10 different rods. Choose one rod to be your unit. Write fractional number names for all the other 9 rods in terms of your unit.

Have your partner choose a longer rod as a unit and do the same task.

Compare your green rods. Do they have the same name in both systems?

Why or why not?

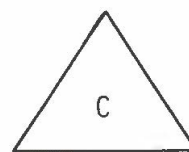
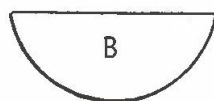
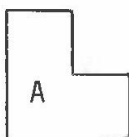
2. Could the following sentences ever be true? Explain.



$$3/4 < 1/2$$

$$5/4 = 1$$

$$2/3 > 3/4$$

3. What kinds of learning problems are posed by the aspect of fractions as described above?
4. Find the piece of yarn at your table. If that piece is represented by $4/5$, cut a piece of yarn from the ball which would represent 1. Describe how you did this.
5. Make up similar problems for children of age 10 or 11 to help them focus on the notion of unit.
6. On the table, find shapes labelled A, B, and C. Below draw the shapes of the figures represented by the given fractions if A, B, or C were considered as units.



<i>Unit</i>	<i>Number</i>	<i>Shape</i>
C	1	
A	$\frac{2}{3}$	
B	$\frac{1}{2}$	
C	$\frac{3}{4}$	
B	—	

7. Make up interesting and motivating exercises, similar to those in 6, but appropriate for Division II students. Use humor or fantasy.

FRACTION TASK 7:

Teaching

- Make up fraction representation problems and fraction addition problems using
 - Cuisenaire rods
 - Graduated beakers or cans (what is the problem here?).

FRACTION TASK 8:

Ratio Numbers*

- From the box of rods, select a set, one of each color and order them. Associate a number from 1 to 9 with each rod.
- Take a red and a light green rod. Describe the relationship between them in as many ways as you can.

$$\text{red} = \underline{\quad} \text{light green} \quad (\text{a})$$

$$\text{light green} = \underline{\quad} \text{red} \quad (\text{b})$$

$$\underline{\quad} \text{red} = \underline{\quad} \text{green} \quad (\text{c})$$

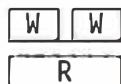
$$\text{The ratio of red to light green is } \underline{\quad} \text{ to } \underline{\quad}. \quad (\text{d})$$

$$\text{The ratio of light green to red is } \underline{\quad} \text{ to } \underline{\quad}. \quad (\text{e})$$

**The idea for this task sheet was taken from the work of Alan Bell and the South Nottingham Project in England.*

How are the numbers used to describe the relationships in (a) and (b) and (d) and (e) related?

3. Select two other pairs of rods and write mathematical sentences which describe the relationship between them.
4. a) How are the red and white rods related? We can picture this relationship as follows:



Find all the other rod pairs which have the same relationship.

List the set of ratio numbers used to describe these rod pairs:

{white to red, _____, _____, . . . }
 { $\frac{1}{2}$, _____, _____}

How do you know physically that the rod pairs are in the relationship?

What can you say about the ratio numbers used to describe these rod pairs?

b) Test two ratio numbers used to describe the relationships between pink and dark green rods.

Write an equation which describes this picture.



Find all the other rod pairs which share the relationship pictured above.

What can you say about the ratio numbers which describe these rod pairs?

c) Suppose there were a silver rod and a violet rod which were related in the following way:

$$3 S = 7 V$$

Write two sets of ratio numbers which would describe rod pairs having the same relationship.

{ $\frac{3}{7}$, _____, _____, _____, _____, _____}
 { $\frac{7}{3}$, _____, _____, _____, _____, _____}

How many ratio numbers would fall in such sets if one included all possible ones?

d) How would you know physically that rod pairs would be represented by equivalent ratio numbers?

Extra for experts: Suppose we have a rod pair of colors x and y, such that

$$ax = by$$

Give a ratio number which relates x and y and give five equivalent ratio numbers.