42.

Fraction Circles

Level: Introductory Grade 7

Time: 1–2 class periods (40–80 minutes)

Objective: To add 2 fractional numbers.

Materials: Class set of fraction circles, at least 1 circle for each 2 students; 1 larger scale; tracer fraction circle

NOTE: A basic model for developing tracer circles is provided.

Procedure:

1. Empty the contents of the fraction circle envelope onto the desk.

2. Identify the fraction circle parts by placing them on the unit circle. On a piece of paper, have 1 of the partners prepare a chart that lists the color of each piece and its associated fraction.

3. To reinforce the notion of equivalent fractions, have the students find large pieces that can replace combinations of smaller pieces. One partner replaces, while the other records. (For example, one 1/2 piece could replace two 1/4 pieces or four 1/8 pieces or three 1/6 pieces, and so on. The second partner would write true statements such as $1/2 = 2/4$. . . .

4. Have the students demonstrate and record some fraction addition questions and answers.

   (a) $1/4 + 1/4 =$ (c) $1/2 + 1/2 =$ (e) $3/8 + 4/8 =$
   (b) $1/3 + 1/3 =$ (d) $2/4 + 1/4 =$ (f) $1/6 + 3/6 =$

   NOTE: $1/4 + 1/4$ is demonstrated by placing the first 1/4 piece at the zero mark and the second 1/4 piece adjacent to the first. The sum is read by proceeding from the zero mark clockwise to the end of the second piece.

5. Have the students replace each answer above with an equivalent fraction wherever possible.

6. Have the students write a rule that explains how to add fractions. Demonstrate the rule by preparing 5 examples. Record the examples. At this point, you may wish to have the class do questions from the Exercises for Students.

7. Have the students demonstrate the following to further verify their rule:

   (a) $1/2 + 1/4 =$ (c) $1/3 + 1/6 =$ (e) $1/4 + 1/6 =$
   (b) $1/8 + 1/4 =$ (d) $1/3 + 1/4 =$

8. Have the students demonstrate each of the above examples using only one kind of fraction piece. For example, $1/4 + 1/2$ can be shown as $1/4 + 2/4$ because $1/2$ can

be replaced by two 1/4 pieces, as was previously shown. (At this point, the students should revise their adding fraction rules to accommodate all possible questions.)

9. Have the students prepare a chart to illustrate which fraction parts would be necessary to add combinations of given fractions:

addend 1	addend 2	possible answer (equivalent parts)
1/2	1/4	1/4
1/2	1/3	1/6

Have the students list all combinations of halves, thirds, quarters, sixths, and eighths.

10. Have the students examine their addition rule, revise it if necessary, then demonstrate its accuracy by writing 5 more examples.

NOTE: This activity can be adapted to subtraction of fractions.

Exercises for Students

1. List fractions equivalent to:

(a) 3/6 (c) 2/4 (e) 1/2
(b) 6/8 (d) 1/3 (f) 1/4

2. Use your fraction circles to add the following. Make sure that your answer is expressed as a basic fraction.

(a) 1/8 + 3/8 = (d) 3/4 + 1/8 = (g) 5/8 + 1/4 =
(b) 1/6 + 5/6 = (e) 1/2 + 1/4 = *(h) 1/4 + 1/3 =
(c) 1/3 + 1/3 = (f) 1/2 + 1/3 =

*If this answer is not on your circle, what additional lines will you have to add to determine the correct answer?

3. A student has suggested that 1/2 + 1/4 = 2/6. Can this be correct? Use your fraction circle to demonstrate your answer.

4. Describe how you can determine what fraction parts will be needed to add any two fractions together. For example:

quarters + thirds: parts needed _____
fifths + eighths: parts needed _____

5. Use your fraction circles to show the following:

(a) 1/4
(b) 3/4
(c) 1 1/4
(d) Could you show 2 3/4? How many quarters be required?
(e) 1/8
(f) 5/8
(g) Could you show 4 1/8?
(h) How many parts would be required?

6. Use your fraction circles to add:

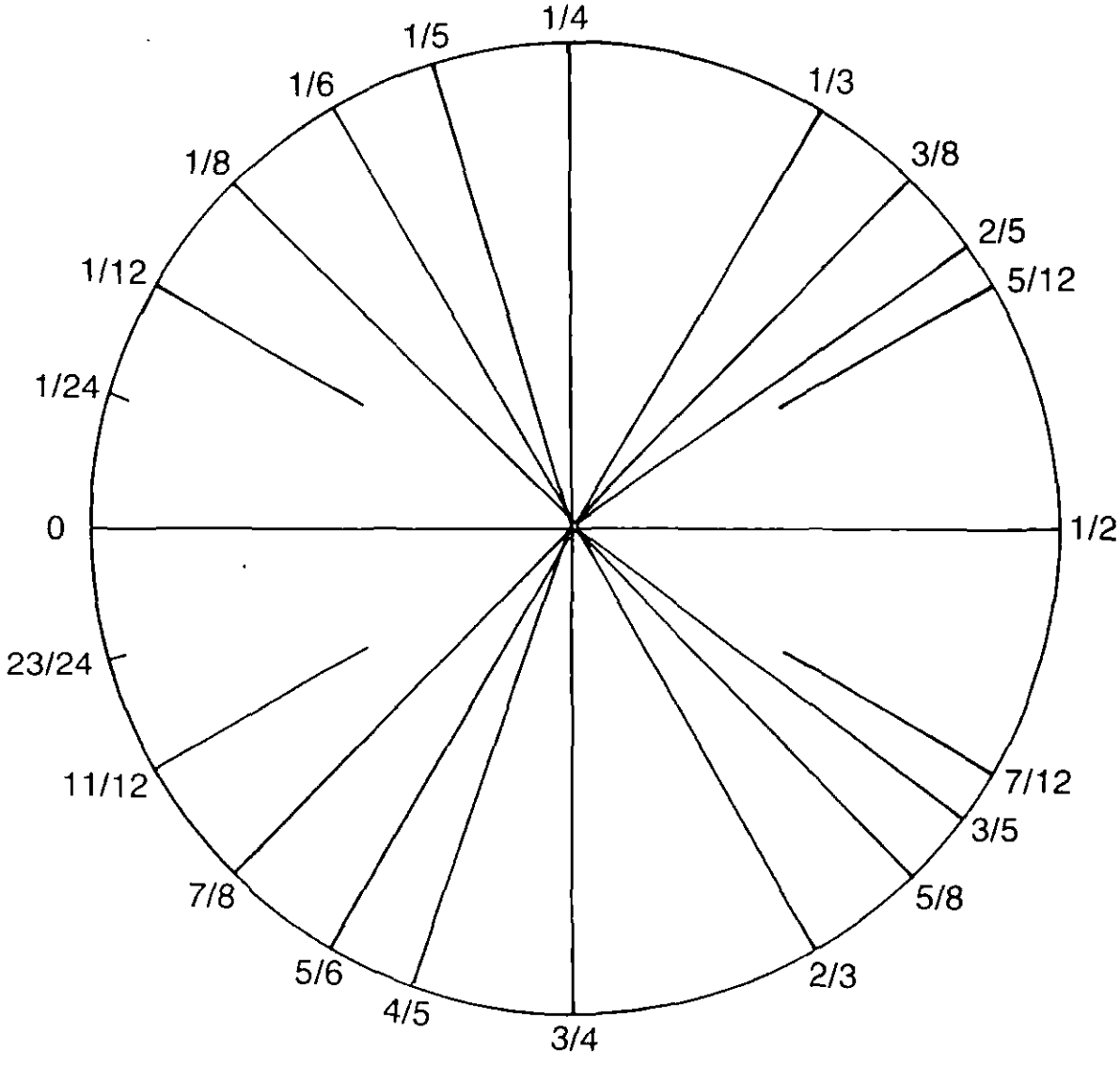
   (a) 1/3 + 1 1/3 = (b) 3/4 + 2 1/4 = (c) 1 3/8 + 2 1/4 =

7. If you had fraction circle parts that included all fractions from 1/2 to 1/100 (1/2, 1/3, 1/4 . . . 1/99, 1/100), is there any pair of fractions for which you could not find the sum? If yes, list one such example, then tell what parts would be required to show this sum.

Preparation Notes

1. Copy the following fraction circle in sufficient quantity to allow one for each two students.

Fraction Circle Model



2. For consistency, it is suggested that the circles be duplicated according to the following color scheme:

1/2—green	1/4—yellow	1/8—tan
1/3—red	1/6—purple	1/12—orange

3. Duplicate the unit circle onto manila tag, if possible.

4. A larger copy, which could serve as a teacher demonstrator, could be prepared. The central angle for each fraction is listed below.

1/2 = 180°	1/6 = 60°	2/8 = 90°	1/12 = 30°	7/12 = 210°
1/3 = 120°	2/6 = 120°	3/8 = 135°	2/12 = 60°	8/12 = 240°
2/3 = 240°	3/6 = 180°	4/8 = 180°	3/12 = 90°	9/12 = 270°
1/4 = 90°	4/6 = 240°	5/8 = 225°	4/12 = 120°	10/12 = 300°
2/4 = 180°	5/6 = 300°	6/8 = 270°	5/12 = 150°	11/12 = 330°
3/4 = 270°	1/8 = 45°	7/8 = 315°	6/12 = 180°	

For the teacher demonstration model, attaching some felt to the backs of the circle parts and the centre of the unit circle helps to keep the parts from falling off.

For extended work, you may wish to build a secondary set containing thirds, fifths, fifteenths, and twentieths. For example:

1/5 = 72°
1/15 = 24°
1/20 = 18°