

# Math Art Posters

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This activity connects mathematics and art by using clock arithmetic, basic geometry and basic symmetry concepts.

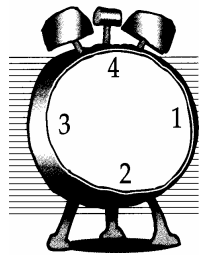
## Materials Needed

- √ Student pages
- √ Crayons, markers or paint
- √ Colored paper
- √ Scissors & glue

## Warm Up 12 Hour Clock Arithmetic Activity

Review adding and subtracting hours on a 12 hour clock as a class activity.

## Warm Up 4 Hour Clock Arithmetic Activity

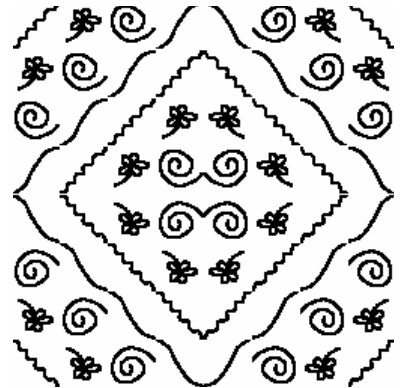


*Clock by Joe Spooner*

Have the students explore a new idea: The 4 hour clock. Pass out only the numbers 1, 2, 3 and 4. Ask questions emphasizing the idea that, on the new 4 hour clock, you "start over" at 4 o'clock such as:

- √ If it is 3 o'clock now, what time will it be in 5 hours on the 4 hour clock?  
Students with "3" and "4" will hold up their number signs.
- √ If it is 2 o'clock now, what time will it be in 9 hours on the 4 hour clock?  
Students with "2" and "3" will hold up their number signs.
- √ If it is 1 o'clock now, what time was it 3 hours ago on the 4 hour clock?  
Students with "1" and "2" will hold up their number signs.

Encourage all the students to help with the answers (not just the students holding the signs).



**4 Hour Clock Reflection Poster**

## 4 Hour Clock Arithmetic Questions & Poster Making, Teacher Notes for Student Pages

### Student Pages: 4 Hour Clock Arithmetic & the Rotation Poster

*Students can work in small cooperative groups*

1. The students practice adding and subtracting hours on the new 4 hour clock.
2. The students fill out the 4 hour clock addition table. Check that the students are filling out this table with only the numbers 1, 2, 3 and 4.
3. The students create designs for each number on the 4 hour clock. Simple, bold designs work best.
4. The students create four copies of a colored 4 hour clock addition table by substituting their number designs from #3 for the numbers in the 4 hour clock addition table. For this poster check that the students are redrawing their colored table four times.
5. The students make the Rotation Poster by cutting out their four colored tables, choosing a rotation configuration they like and gluing the colored tables onto a colored background. One interesting configuration is to place the four colored tables like this:

Original Table 	Rotate Original 90° 
Rotate Original 270° 	Rotate Original 180° 

**Student Pages: Reflection Practice & the Reflection Poster**

Students can work in small cooperative groups

1. The students practice reflecting patterns across vertical and horizontal lines as a warm up to coloring the reflection poster. Students may find small mirrors to be helpful.
2. The students create (new) designs for each number on the 4 hour clock.
3. The students practice vertically and horizontally reflecting their personal designs.
4. The students create a new colored 4 hour clock addition table by substituting their designs from #2 for the numbers in the 4 hour clock addition table.
5. The students color three more tables by vertically and horizontally reflecting their (entire) colored addition table from #4. Check that the students are correctly reflecting the whole table. For example, for vertically reflecting the first line in the colored addition table.:

Reflect patterns and positions



6. The students make the Reflection Poster by cutting out their four colored tables and gluing them, in their reflected positions, on a colored background.

Original Table	→	Vertical Reflect
Horizontal Reflect	↓	↓ Horizontal Reflect

**Extensions**

√ For examples of completed Math Art Posters see:

[http://www.wou.edu/las/natsci\\_math/math/burton/mathart/mathart.html](http://www.wou.edu/las/natsci_math/math/burton/mathart/mathart.html)

√ Students may also practice making and designing Math Art Reflection Posters by using the Java Applet

at: [http://www.wou.edu/las/natsci\\_math/math/burton/ca.html](http://www.wou.edu/las/natsci_math/math/burton/ca.html)

√ You are invited to experience making math art posters during Laurie Burton's session at the 41st

Northwest Mathematics Conference (October 10 - 12, 2002, Portland, Oregon) "The Poster Art of Clock

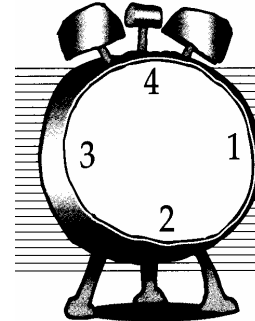
Arithmetic, Reflections, Rotations and More!"

**References**

1. Forseth, S; Adams, P. "Symmetry," The Arithmetic Teacher, Volume 17, February 1970
2. Forseth, S; Troutman, A. "Designs Exhibiting Mathematical Structure," School Science and Mathematics, Volume 74, December 1974
3. Forseth-Helton, S., "Making Patterns Using Mathematical Structures" Master's Thesis
4. Forseth, S; Troutman, A. "Math / Art Posters, Teacher's Guide" Creative Publications, 1973
5. Venters, D., Ellison, E. "Mathematical Quilts, No Sewing Required," Key Curriculum Press, 1999, ISBN: 155953317X

4 Hour Clock Arithmetic & The Rotation Poster

1. Practice adding and subtracting hours on the 4 hour clock:
  - a. If it is 1 o'clock now, what time will it be in 3 hours on the 4 hour clock?
  - b. If it is 4 o'clock now, what time will it be in 30 hours on the 4 hour clock?
  - c. If it is 2 o'clock now, what time will it be in 48 hours on the 4 hour clock?
  - d. If it is 2 o'clock now, what time was it 7 hours ago on the 4 hour clock?
  - e. If it is 3 o'clock now, what time was it 13 hours ago on the 4 hour clock?
2. Use the 4 hour clock to fill out the 4 hour clock addition table:



*Clock by Joe Spooner*

4-hour clock addition table

Add these hours →	1 hour	2 hours	3 hours	4 hours
1 o'clock				
2 o'clock				
3 o'clock				
4 o'clock				

2. Create a simple design for each hour on the 4-hour clock. Bright, bold designs work best.

Designs for the 4 hour clock

1	2	3	4

4. Fill in the 4 hour clock addition tables below. Substitute your designs from step 3 for the numbers.





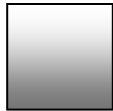
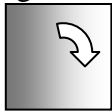
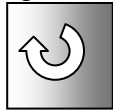

✓ Color 4 exact copies of your colored 4-hour clock addition table

5. Make your Rotation Poster

✓ Cut out your four colored 4-hour clock addition tables

✓ Arrange your colored tables on a colored paper background. Try rotating your tables. One nice poster comes from rotating your tables like this picture.

How does it look? When you like your arrangement, glue your four colored tables on the colored paper background!

Original Table 	Rotate Original 90° 
Rotate Original 270° 	Rotate Original 180° 

**Reflection Poster**

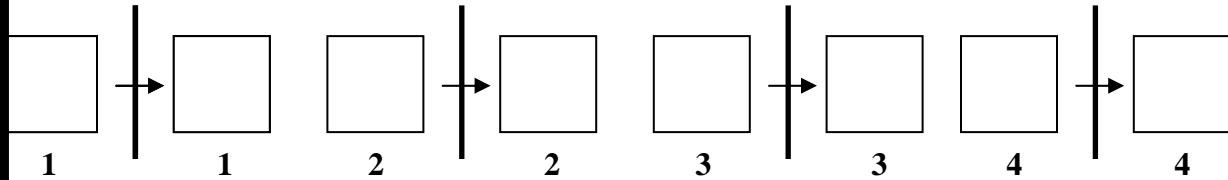
1. Create a simple design for each hour on the 4 hour clock. Bright, bold designs work best.

Designs for the 4 hour clock

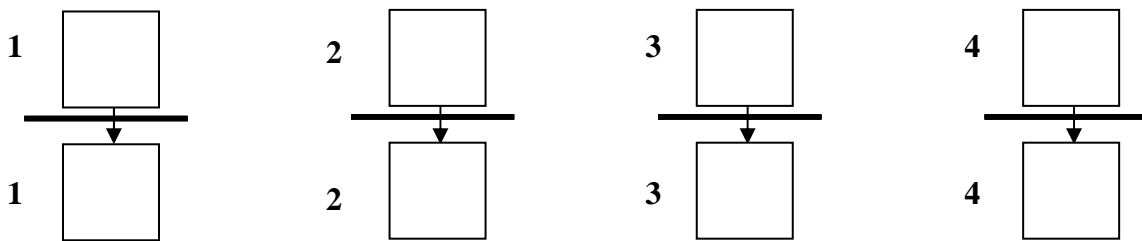
1	2	3	4

2. Practice vertically and horizontally reflecting each of your designs:

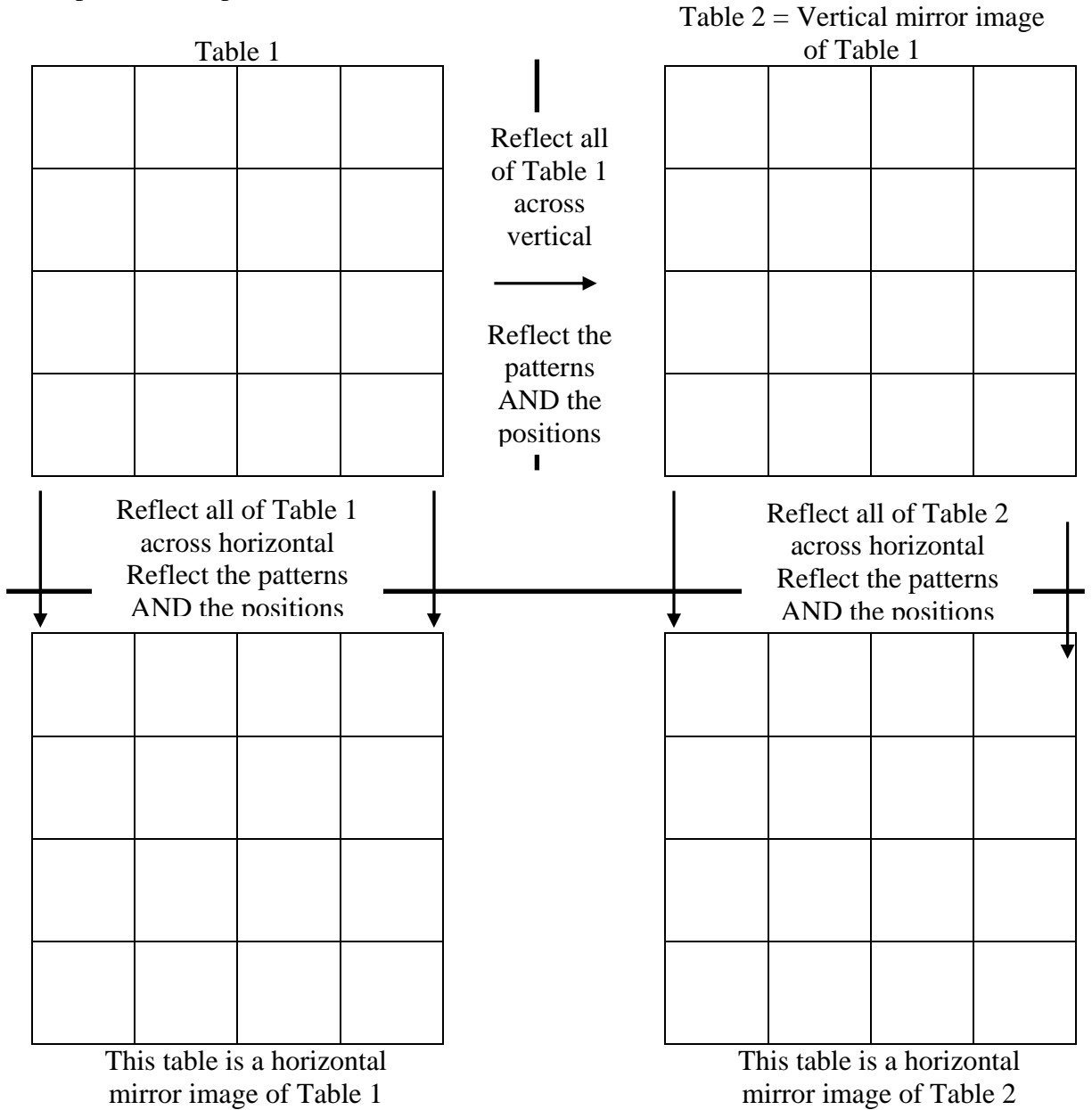
**HORIZONTAL REFLECTIONS ACROSS VERTICAL LINES**



**VERTICAL REFLECTIONS ACROSS HORIZONTAL LINES**



3. Fill in one of the 4 hour clock addition tables below by substituting your designs from step 1 for the numbers.
4. For the other three grids, color by vertically or horizontally reflecting the entire tables (patterns and positions) as directed.



**Make your Reflection Poster**  
 ✓ Cut out your four Reflection colored 4 hour clock addition tables  
 ✓ Glue your colored tables on a colored paper background like this!

Original	Vertical
Horizontal	Horizontal