

POSTER PROBLEMS

Poster problems add variety to classwork as students out of their seats for group review and practice. See <https://www.youtube.com/watch?v=hoXjEomWGzk&t=2s> for more details about how to implement poster problems, or use the slide deck provided. Poster Problems are located in the Review section of all *MathLinks* packets.

Why: Encourage students to share ideas in safe, small group conversations, confront misconceptions, and critique the reasoning of their peers. Additionally Poster Problems allow teachers to informally assess learning and identify areas for follow up

Materials: Markers in different colors, poster paper (or butcher paper, multiple sheets of smaller paper taped together, or board space)

Prepare ahead:

- Create 4, 8, or 12 numbered posters and post them around the room on walls or at table stations.
- Plan for groups of students no larger than 4 and equal to the number of posters.
- Give one colored marker to each group. Groups working on the same posters should have a different color marker to distinguish which group did what work.

Launch the activity: Use any of the introductory Poster Problems to establish the routine. Two of them are non-mathematical and two contain mathematics from prior grades.

Part 1:

- Put students into groups no larger than 4.
- Identify group members as A, B, C, or D. (If groups have less than 4 students, one or more students will be in the writing role more than once.
- Number the groups. This will be their “start” poster.
- Give each group that will work on the same posters a different colored marker (for accountability purposes).

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Continued

Part 2:

- Each group begins at their start poster. Remind students that ALL group members are expected to collaborate on ALL steps, no matter who is holding the pen.
- (Step 1) Student A writes part A of the poster problem with the group's colored marker. Other members support and help.
- (Step 2) After an appropriate amount of time, give a signal for all groups to move to the next poster. At the next poster, the entire group checks the previous work on part A of the poster for that problem. Then Student B writes part B for that problem with the group's colored marker. Other members support and help.
- Repeat Step 2 twice more to complete parts C and D.

Part 3:

- Groups return to their start posters to review the work completed. Then—as a class—compare, contrast, and discuss solutions and strategies.
- Groups return to their seats and complete follow up problems or work related to the posters.

Accountability/Follow-up Ideas:

- Group work is transparent because each group is using a different color marker.
- Poster problems typically include problems (Part 3) for groups or individuals to complete.
- Watch for misconceptions as students work together on posters. Follow up as needed.

POSTER PROBLEM: NAME CHAIN

Part 1: Your teacher will divide you into groups.

- Identify members of your group as A, B, C, or D.
- Each group will start at a numbered poster. Our group start poster is _____.
- Each group will have a different colored marker. Our group marker is _____.

Part 2: Do the problems on the posters by following your teacher's directions.

- Write the name of a movie. Circle the LAST letter in the movie's name.
- Write the name of a singer or musical group that begins with the circled letter from Part A. (If you cannot think of one, you will need to change the movie and then proceed.) Put a circle around the first letter and a square around the last letter in the name.
- Write the name of a sport or game whose name begins with the letter squared in Part B. (If you cannot think of one, you will need to change the previous step(s) and then proceed.) Put a square around the first letter and a triangle around the last letter of the activity.
- Write the name of a snack or food that begins with the triangled letter from Part C. (If you cannot think of one, you will need to change the previous step(s) and then proceed. Put a triangle around the first letter of the snack's name.

Part 3: Return to your seats. Work with your group. Use your "start problem."

Write a sentence or two that incorporates the movie, music, sport/game, person, and snack/food. Be prepared to share with the class. *Answers will vary*

TOP GUN[Ⓢ]

[Ⓢ]IRVANA[Ⓢ]

[Ⓢ]ARM WRESTLING[Ⓢ]

[Ⓢ]UM

The pilots in Top Gun listened to Nirvana and chewed gum during their arm wrestling tournament.

POSTER PROBLEM: PLACE CHAIN

Part 1: Your teacher will divide you into groups.

- Identify members of your group as A, B, C, or D.
- Each group will start at a numbered poster. Our group start poster is _____.
- Each group will have a different colored marker. Our group marker is _____.

Part 2: Do the problems on the posters by following your teacher's directions.

- Write the name of a city in the United States. Circle the LAST letter.
- Write the name of a city outside the United States that begins with the circled letter from Part A. (If you cannot think of one, you will need to change the Part A answer and then continue.) Put a circle around the first letter and a square around the last letter.
- Write the name of a state in the United States whose name begins with the letter squared in Part B. (If you cannot think of one, you will need to change the previous step(s) and then continue.) Put a square around the first letter and a triangle around the last letter.
- Write the name of a country that begins with the triangled letter from Part C. (If you cannot think of one, you will need to change the previous step(s) and then continue. Put a triangle around the first letter.

Part 3: Return to your seats. Work with your group. Use your "start problem."

Write a few facts that relate to one or more of the places you listed. Facts can include where these locations are. Be prepared to share your facts with the class.

Answers will vary. An example:

MINNEAPOLIS

A city in Minnesota.

SEOUL

A city in South Korea

LOUISIANA

A southern state in the US.

ANGOLA

A country in Africa.

POSTER PROBLEM: FRACTIONS

Part 1: Your teacher will divide you into groups.

- Identify members of your group as A, B, C, or D.
- Each group will start at a numbered poster. Our group start poster is _____.
- Each group will have a different colored marker. Our group marker is _____.

Part 2: Do the problems on the posters by following your teacher's directions.

Poster 1 (or 5)	Poster 2 (or 6)	Poster 3 (or 7)	Poster 4 (or 8)
$\frac{3}{5}$	$\frac{3}{4}$	$\frac{3}{10}$	$\frac{3}{2}$

- A. Copy the “start” fraction. Draw an “area model” diagram using a rectangle that represents the fraction.
Area models will vary. Look for equal sized parts.
- B. Represent the fraction with a “number line” diagram.
Number lines may vary. Look for correct scaling.
- C. Write a fraction that is equivalent to the start fraction. Justify with pictures, numbers, or words that they are equivalent.
Fractions may vary. Look for high quality justifications.
- D. Write a decimal that is equivalent to the start fraction. Justify with pictures, numbers, or words that they are equivalent.
Decimals may vary. Look for high quality justifications.

Part 3: Return to your seats. Work with your group. Use your “start problem” fraction.

Critique the poster.

1. Which do you think more clearly shows the fraction visually, an area model or a number line? Why?
2. What do you think is easier to justify, the equivalent fraction or decimal? Why?

POSTER PROBLEM: RECTANGLES

Part 1: Your teacher will divide you into groups.

- Identify members of your group as A, B, C, or D.
- Each group will start at a numbered poster. Our group start poster is _____.
- Each group will have a different colored marker. Our group marker is _____.

Part 2: Do the problems on the posters by following your teacher's directions.

Use graph paper.

Poster 1 (or 5)	Poster 2 (or 6)	Poster 3 (or 7)	Poster 4 (or 8)
(0,0), (8,0) (8,2), (0,2)	(3,2), (9,2) (9,6), (3,6)	(1,1), (10,1) (10,2), (1,2)	(4,3), (11,3) (11,6), (4,6)

- Make a coordinate graph. Plot the four coordinates and connect them to make a rectangle.
- Label side lengths with numbers. What are some different names for the two dimensions? *length and width, base and height (L, W, B, H)*
- Write a formula for the perimeter (P) of a rectangle. Then, find the perimeter.
 $P = L + L + W + W$ or $P = 2L + 2W$ or $P = 2(L + W)$
- Write a formula for the area (A) of a rectangle. Then find the area.
 $A = LW$ or $A = BH$

Part 3:

Walk around the room. Discuss and compare the different rectangles.

- What is the same about all the rectangles?
Answers may vary. All rectangles have the same perimeter. ($P = 20$ units)
- What is different about all the rectangles?
Answers may vary. All rectangles have a different area.

Return to your seats.

- Can you find a rectangle with perimeter equal to 20 units that has a larger area than any of those made? State its dimensions and find its area.
A square with dimensions 5 by 5 will have maximum area (25 square units).
- Can you find a rectangle with perimeter equal to 20 units that has a smaller area than any of those made? State its dimensions and find its area.
One possibility is rectangle a 9.5 by 0.5. Area = 4.75 square units