



# M2C3 Project

## Making Picture Frames Task

### Student Work

This file includes different organizational charts and solution paths for students in grades 3, 4, and 5. Students used whole number addition, multiplication, and division to determine the number of packages of popsicle sticks needed to make picture frames for their loved ones.

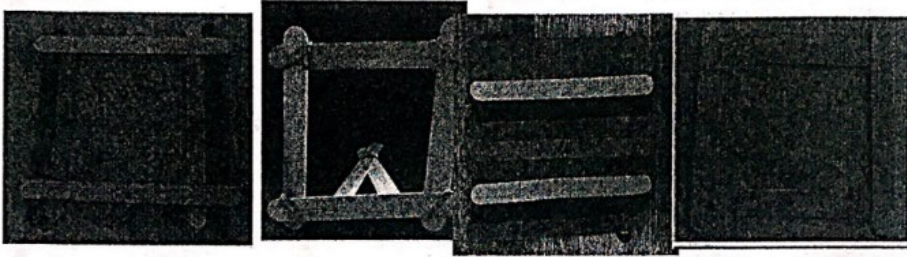
# Factors that Students Considered

- What the design and size of the picture frame will be
- How many popsicle sticks are required for each frame
- How the frame would be displayed (hung or standing on table) and how this affected other materials needed (e.g. magnets, ribbon)

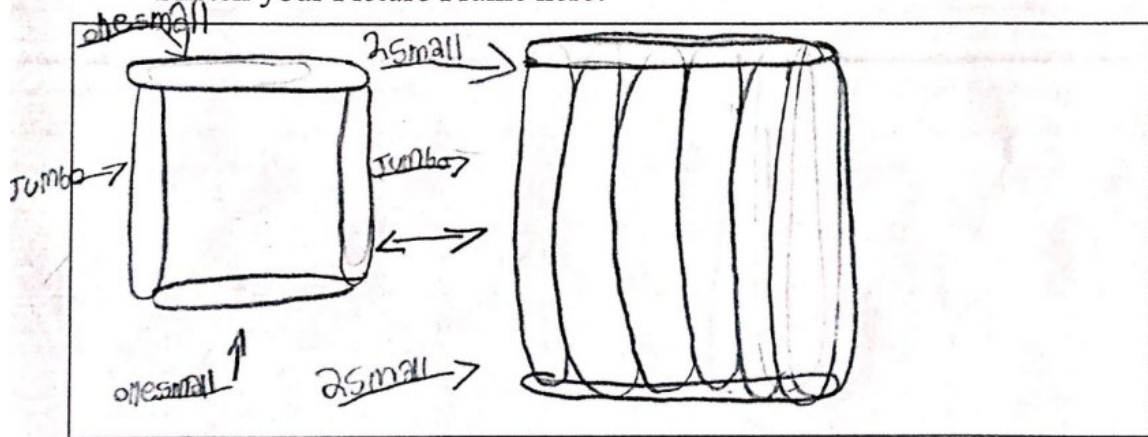
# Connections to Students' Experiences

- Having an *ofrenda* or other picture display area to celebrate family and loved ones.
- Creating frames and giving them as gifts to others.
- Using popsicle sticks as craft materials

## Making Picture Frames: ONE FRAME



Sketch your Picture Frame here:



1. How many popsicle sticks do you need to make 1 frame?

Number of Plain Jumbo Sticks	Number of Multi-Color Sticks
8	4

2. What **other materials** do you need to make 1 frame?

How many magnets? • 4

How many rubber bands?

How much ribbon? • 1

redo

# Warm-up: Making Sense of the Task

Grade 3 students drew a design of their picture frame and identified the number and type of popsicle sticks required to construct it. There were two types of sticks: jumbo and multi-colored. Students also identified other materials they would need. This group needed 8 jumbo sticks, 4 multi-colored sticks, 4 magnets, and one piece of ribbon.

# What do you Know, Need to Know, Assume?

Grade 4 students made sense of the task by brainstorming a chart of what they knew, what they needed to know or find out, and what they could assume.

This class recognized that one of their questions in the 'need to know' column could be answered by gathering more information about the materials they were using.

Know	Need to Know	Assume <small>Decide</small>
• How many popsicle sticks to make 1 frame.	• How many total jumbo sticks multi-colored sticks?	• How many frames will be made?
• There are 26 students in our class	• How many frames?	• Only student
• Jumbo sticks multi-colored sticks	• How much of the other materials? magnets, ribbon, rubber bands	
• Sticks come in packs/boxes	• How many packs of sticks do we need?	
• 100 multi-colored sticks in a pack	• How many sticks in 1 box/pack?	
• 60 jumbo in a pack		• Other materials

# What do you Know, Need to Know, Assume?

Grade 5 students decided that everyone would make two frames so that there would be enough for all the veterans to whom they were giving them. They asked questions about their designs to ensure there would be enough supplies, accounting for unusable sticks.

## What do know?

Giving to Veterans  
Don't want leftovers  
Everyone makes 2.  
Making a frame is difficult  
There are 19 students.  
Groups know their design.  
Veterans get 1 frame.

## What do we need to know?

How many packages?  
How many total sticks will groups use altogether?  
How many come in a package?  
Which design will we use?  
What other supplies do we need to make the designs?

## What will we assume?

There will be enough for all the Veterans.  
• Colored sticks in packs of 100 Jumbo = 60  
Some will be unusable (bent, broken, discolored)  
Use ↑ for decoration

## Grade 3 Solution

This group of students completed a table to clearly share the total number of sticks and packages needed so that all 23 students in the class could make one frame. They also calculated how many sticks would be left over.

DESCRIBE YOUR FRAME: \_\_\_\_\_

How many of this frame will you make? 23

	How many sticks for one frame?	How many sticks for all the frames?	How many packages do we need?	How many sticks leftover?
<b>Plain Jumbo Sticks</b>	8	184	4	16
<b>Multi-Color Sticks</b>	4	92	1	8

# Grade 4 Solution

These students used a graphic organizer to list relevant information and show their work. They decomposed 26 (the number of students in the class) into 20 and 6 and multiplied these numbers by 8 (the number of jumbo sticks required by their frame). They determined 208 sticks, or 4 packages, are required with 32 leftover sticks.

<p>Know:</p> <ul style="list-style-type: none"><li>• How many Jumbo sticks we need</li><li>• 26 Students in class</li><li>• 60 Jumbo sticks in a pack</li></ul>	<p>Need to know:</p> <ul style="list-style-type: none"><li>• How many sticks in a pack</li><li>• How many frames</li></ul>	<p>Assumptions:</p> <ul style="list-style-type: none"><li>• only students</li><li>• 1 frame each</li></ul>
<p>How many packages of popsicle sticks will the class need to make your design?</p> <p>4 packs of Jumbo sticks</p>	<p>Mathematical thinking:</p> $8 \times 26$ $\begin{array}{r} 20 \\ 6 \end{array}$ $20 \times 8 = 160$ $6 \times 8 = 48$ $160 + 48 = 208$ $60 + 60 = 120 + 60 + 60 = 240$ $240 - 208 = 32$ <p>there will be 32 sticks left. We need 4 packs of jumbo sticks.</p>	<p>How would you change your plan if we were going to make picture frames for ourselves and the Javelinas?</p>

# Grade 5 Solution

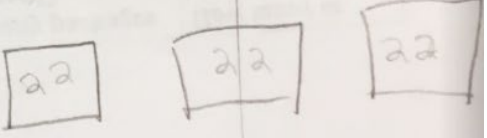
	How many or how much for one frame?	How many or how much do we need for all the frames?	How many packages do we need?	How many or how much is leftover?
Other Material: Rubber bands	10 [10] [10]	$\begin{array}{r} 190 \\ \times 20 \\ \hline 380 \end{array}$ $\begin{array}{r} 19 \\ \times 2 \\ \hline 38 \end{array}$ $(19 \times 20) = 380$	$\begin{array}{r} 50 \overline{) 50} \\ 50 \\ \hline 0 \end{array}$ 8 Packages $(8 \times 50) = 400$	$\begin{array}{r} 3400 \\ - 380 \\ \hline 020 \end{array}$ 20 leftover

$\begin{array}{r} 47810 \\ - 432 \\ \hline 048 \end{array}$
---

	sticks for one frame?	all the frames? (36)	do we need?	How many sticks leftover?
Plain Jumbo Sticks 36 frames	12	$\begin{array}{r} 36 \\ \times 12 \\ \hline 72 \\ + 360 \\ \hline 432 \end{array}$	$\begin{array}{r} 60 \overline{) 60} \\ 60 \\ \hline 0 \end{array}$ $\begin{array}{r} 60 \overline{) 60} \\ 60 \\ \hline 0 \end{array}$ $\begin{array}{r} 60 \overline{) 60} \\ 60 \\ \hline 0 \end{array}$ 8	48
Multi-Color Sticks	10	$(36 \times 10) = 360$	$\begin{array}{r} 100 \overline{) 100} \\ 100 \\ \hline 0 \end{array}$ $\begin{array}{r} 100 \overline{) 100} \\ 100 \\ \hline 0 \end{array}$ $\begin{array}{r} 100 \overline{) 100} \\ 100 \\ \hline 0 \end{array}$ 4	$\begin{array}{r} 3400 \\ - 360 \\ \hline 040 \end{array}$

- 1. 22
- 2. 44
- 36:

$$\begin{array}{r} 36 \\ \times 22 \\ \hline 72 \\ + 720 \\ \hline 792 \end{array}$$



These students used equations and pictures to calculate how many packages of sticks and rubber bands they needed for 36 frames. They subtracted from the total number of materials they needed to buy to find out how much would be left over.



This class designed two frames. This solution shows that one frame required 12 sticks and the other 14. The students wrote an expression to represent the frames, using parentheses to group operations for each frame component. Then they calculated how many total sticks are needed for all 27 students across both frame designs: 9 packages of jumbo sticks and 2 of the multi-colored sticks.

# Grade 5 Solution

Conceptual Model- Sketch each frame

Frame 1

back front

Frame 2

front back

Frame 1		Frame 2	
# of Jumbo Sticks	# of Multi-Color Sticks	# of Jumbo Sticks	# of Multi-Color Sticks
10	2	10	4

Can you write an expression to communicate your plan mathematically for each frame?

Frame 1:

$$(3 \times 3) + (2 \times 2) + (1 \times 2)$$

bottom base

Jumbo frame

Multi-color

Frame 2:

$$(5 \times 2) + (2 \times 2)$$

6 stripe multi

back of frame

Suppose we want everyone in the class to make both of your frames. How would you alter your expression to accommodate everyone in the class?

$$12 \times 27 = 324$$

$$100 \times 27 = 2700 = 9 \text{ packages}$$

$$16 \times 27 = 432 = 2 \text{ packages}$$

$$48 =$$

60 = Jumbo  
100 = color sticks

$$\begin{array}{r} +100 \\ 60 \\ \hline 160 \end{array} \times \begin{array}{r} 160 \\ 27 \\ \hline 420 \\ 2700 \\ \hline 2620 \end{array}$$

$$\begin{array}{r} 10 \\ +12 \\ \hline 22 \end{array}$$

$$\begin{array}{r} 10 \\ +4 \\ \hline 14 \end{array}$$

$$\begin{array}{r} 540 \\ 90 \\ \hline 60 \end{array}$$

$$\begin{array}{r} 27 \\ \times 4 \\ \hline 108 \end{array}$$

$$\begin{array}{r} 22 \\ +14 \\ \hline 36 \end{array} \times \begin{array}{r} 36 \\ 25 \\ \hline 720 \\ 252 \\ \hline 972 \end{array}$$

# Analyzing and Comparing Solutions

This **third-grade** class made a chart to compare and analyze solutions after all groups completed the task. The chart showed the number of each type of stick, the packages required, and how many sticks were left over. Students noticed what was different or the same across solutions. All frame designs included a stand and two solutions required the same number of jumbo sticks. Other solutions needed different amounts.

Group	# of Jumbo Sticks	Packages of Jumbo Sticks	Extra Jumbo Sticks	# of Regular Sticks	Packages of Regular Sticks	Extra Regular Sticks
	132	<del>2</del> 3	12	88	1	12
	176	3	4	0	0	0
	80	2	0	$12 \times 22$ 0	$100 \div 12 = 11$ 11	2
	<del>132</del> 102	2	12	44	1	56
	176	<del>2</del> 3		176	2	24

# Created Frames

This fifth-grade class shared their completed frames, which they planned to give to their family members. Some had stands and others used ribbon as hangers. A couple frames (bottom right) were created to display two photos at once!

