



MATHEMATICAL SUPERHEROES

**Karen Goff, Gretchen Brunner,
Trish Haugh, Marcy Wood**
NCTM – San Diego
April 4, 2019

Put your name
on scrap paper
for raffle!

MATHEMATICAL SUPERHEROES

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CURRENT GROUPWORK

- Very few **superheroes**
- **Few superpowers**
- Many **helpless** citizens



JUSTICE LEAGUE

- **Many** superheroes
- **Different** superpowers
- Working **together**
- Defeat **complex** problem



~~JUSTICE~~ LEAGUE

JUSTIFICATION

- **Many** superheroes
- **Different** superpowers
- Working **together**
- Defeat **complex** problem
- **Justify** ideas!



WHY HELPLESS CITIZENS & SOLO SUPERHEROES?

- Different experiences
- Individual think time
- Language
- ...
- **STATUS**



STATUS

- **Ranking** relative to others
 - Based on **perceptions of competence**

EVALUATION OF COMPETENCE

- **Physical appearance** – skin color, body, clothes (race, gender, height, etc.)
- **Speech** (accent, fluency)
- **Gender** performance
- **Social skills**
- **Emotional control**

STATUS

- **Ranking** relative to others
 - Based on **perceptions of competence**
 - **Pervasive**
 - **Dynamic**
 - But kids know their current ranking

IN SUPERHERO TALK

- **Low Status → Underparticipator → Helpless Citizen**
- **High Status → Overparticipator → Solo Superhero**



IN SUPERHERO TALK

- **Low Status → Underparticipator → Helpless Citizen**
- **High Status → Overparticipator → Solo Superhero**

We are the main
SUPERHEROES in
our classrooms!

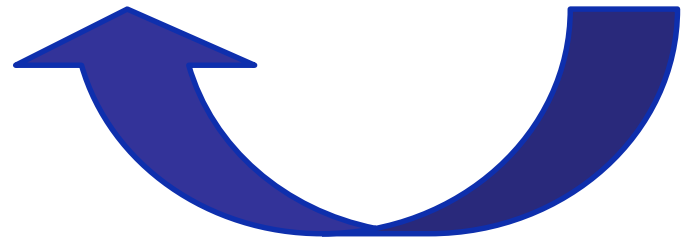
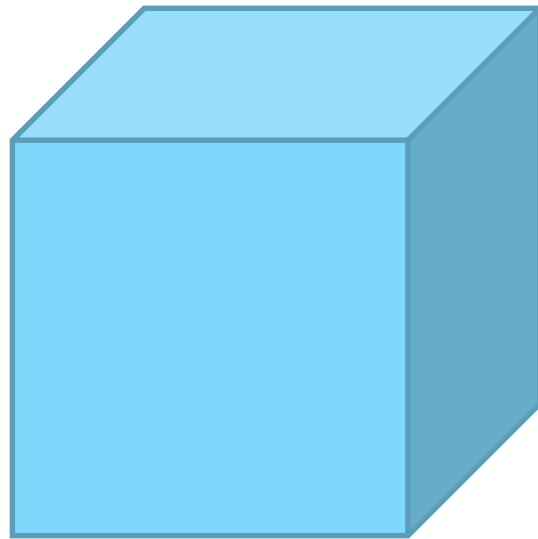


WHAT TO DO?

**Help everyone
find & use their
Mathematical
Superpowers!**

LET'S DO A TASK

- What do you see?
- What might be on the bottom?



YOUR TURN

Listen, explain, take turns

No touching the cube!!

- What does **each person** see?
- **Everyone** should **draw several pictures** to show what might be on the bottom.

CURIOSITY CUBES

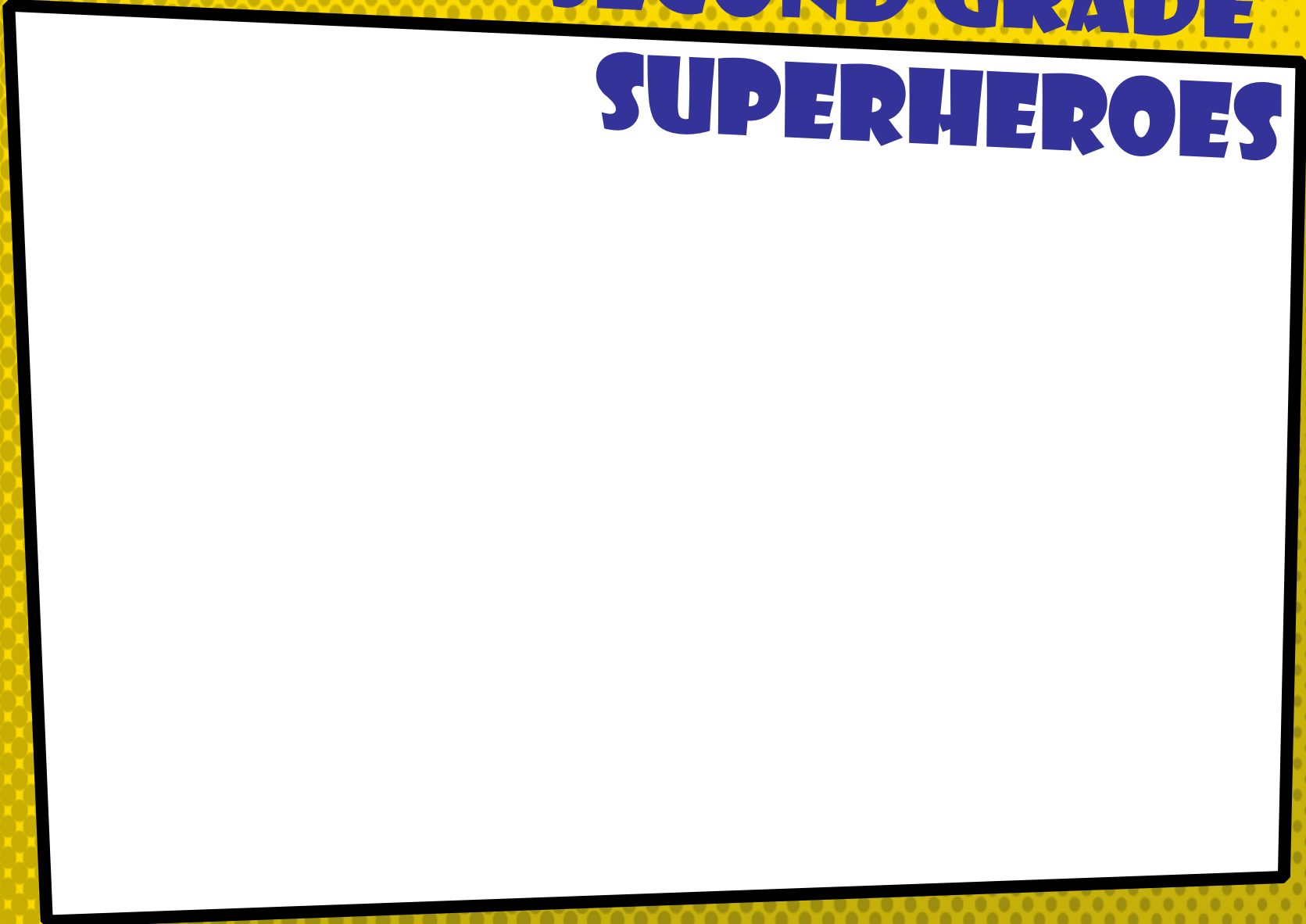
How did your group function as a justification league?

- Multiple superheroes (everyone participated?)**
- Multiple superpowers (different mathematical strengths?)**



**SUPERPOWERS
IN OUR
CLASSROOMS**

SECOND GRADE SUPERHEROES



JUSTIFICATION LEAGUE REFLECTIONS

Name: _____


Date: _____

In math, I am SUPER at:

In math, I am a SUPER HERO when I:

What do you want me, your teacher, to know about Justification League work?

How would you explain a Math Justification League to a student who is new to our class?



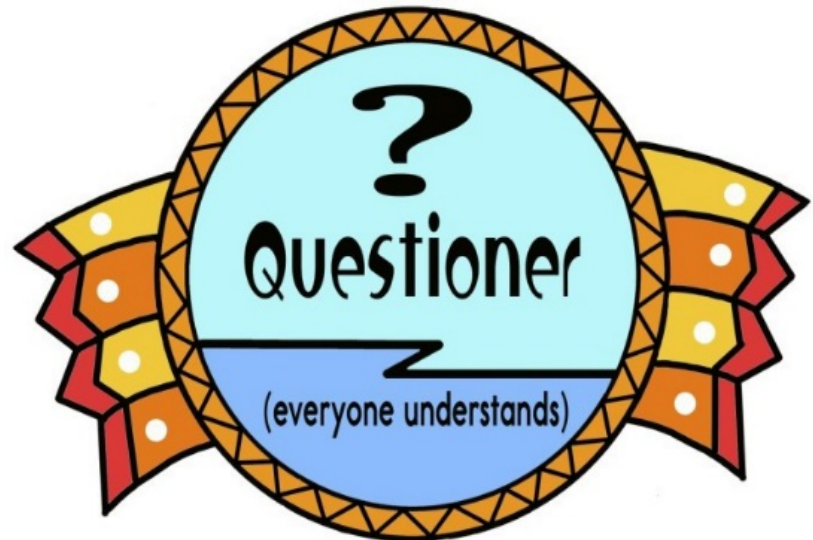
**FIRST
GRADE
SUPERHEROES**

KINDERGARTEN SUPERHEROES



**TOOLS FOR
CREATING
JUSTIFICATION
LEAGUES**

ROLES AS SUPERPOWERS



MONSTER TASKS

Tasks that **require** multiple superpowers

Match **superpowers** to your **students**

Strengths of **Underparticipants**

Stretches of **Overparticipants**

Drawing & Listening/Reflecting
Manipulatives & Asking Questions



EXAMPLE MONSTER TASK



Raise hand for group questions.

Does anyone have an answer to Pat's question? Should I call the teacher over?



Make sure the task card gets read.

Does everyone know what to do?

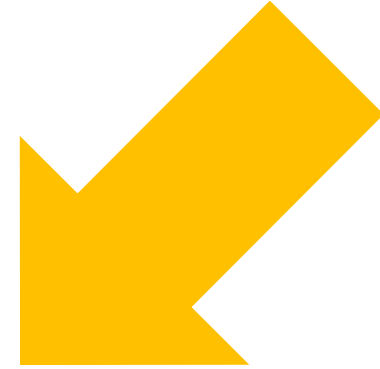


Tell superheroes what they are doing well.

We are listening to each other!

EX MONS

**#2 most
important take-
home idea for
today!!**



Raise hand for group questions.

Does anyone have an answer to Pat's question? Should I call the teacher over?



Make sure the task card gets read.

Does everyone know what to do?



Tell superheroes what they are doing well.

We are listening to each other!

MATERIALS FOR TASK

- **7 purple clue cards**
- **3 white dice cards**
- **4 blue dice cards**
- **3 role cards**
- **1 task card**
- **3-5 recording sheets**

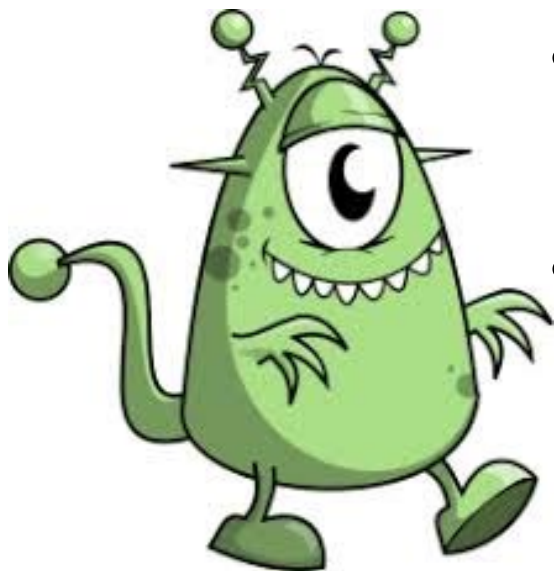
If you have all of your materials, please start the task.

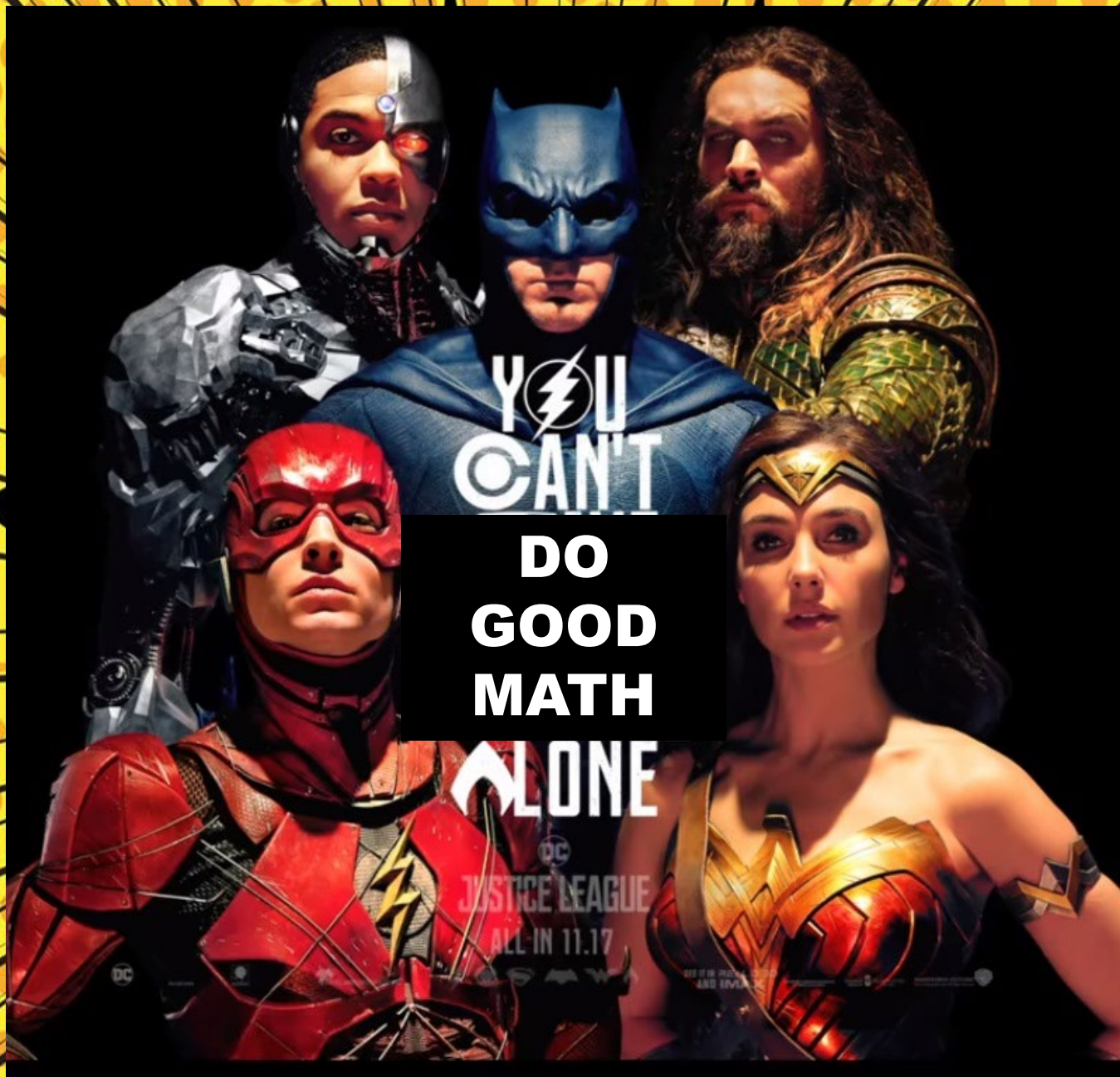
EXAMPLE MONSTER TASK

Was this a **MONSTER TASK** for your group?

Did it require a **JUSTIFICATION LEAGUE**?

- What helped **everyone participate**?
- What different **SUPERPOWERS** were required?
- What could you do if you had **helpless citizens** or a **solo superhero**?





**YOU
CAN'T**

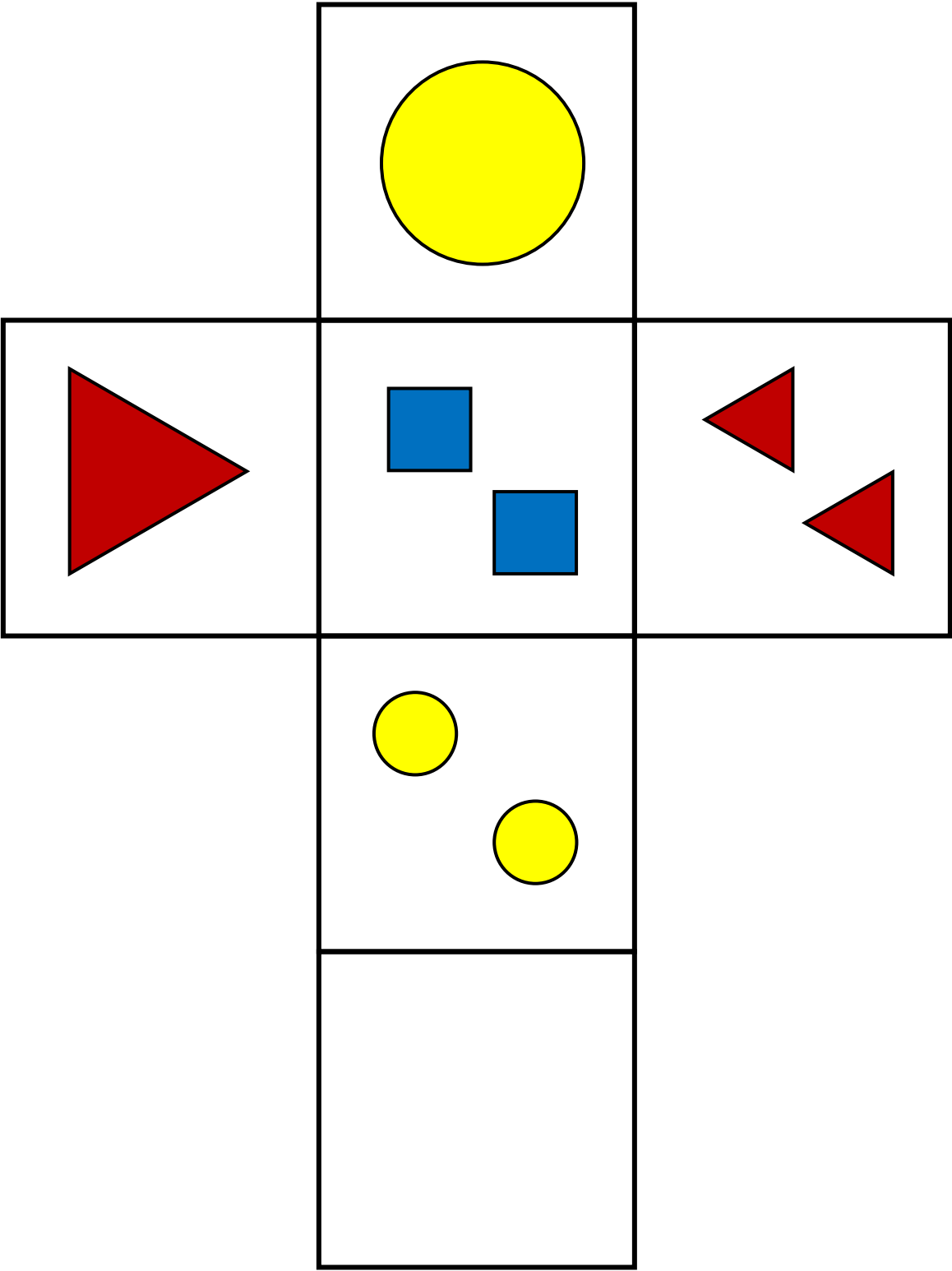
**DO
GOOD
MATH
ALONE**

**DC
JUSTICE LEAGUE
ALL IN 11.17**

Raffle!

Questions?
mbwood@email.arizona.edu

cimath.org



WHAT'S THE ORDER?

Teacher page

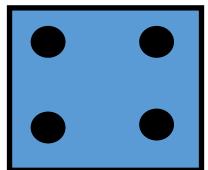
Materials:

- One set of dot cards for each small group of students
- One set of clue cards for every student
- One copy of norms and task for each small group
- Recording sheet for every student

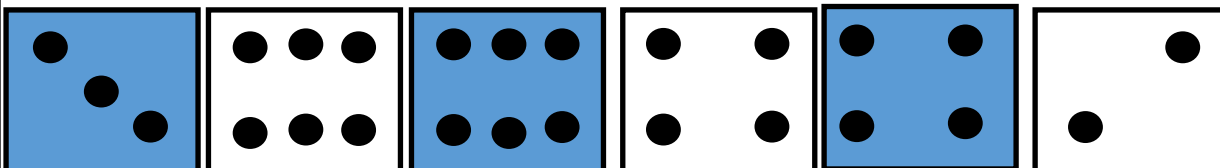
Hints:

- Review Justification League super powers with your students before you begin.
- While this task has students working on logical reasoning, subitizing, and adding 3 numbers the focus is on strengthening their skills as Justification League members.
- Be sure students are rotating the roles through out the activity. This may be different from other tasks where the roles remain the same throughout.

Solution:



discard



WHAT'S THE ORDER?

Norms

Everyone in the Justification League will take a turn being the INCLUDER and will have a chance to read a clue card.

Other League members are
QUESTIONER and PRAISE MONITOR

Only the person whose name is on the card can move the card.

Everyone will Record and Reflect on their own recording sheet.

Task

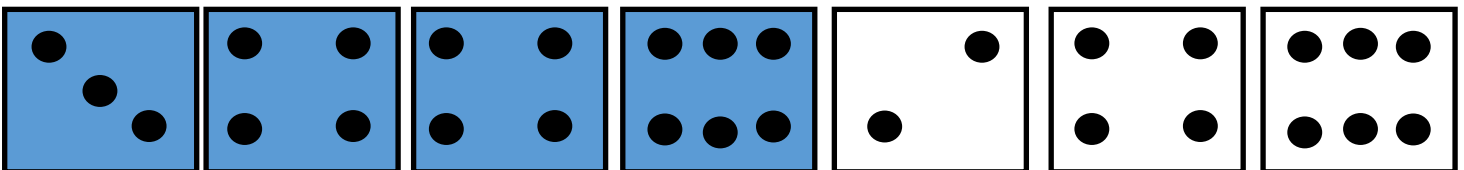
Use the seven cutouts of dot cards. Students write their names on 2 or 3 cards each.

Take turns reading a card and arrange the dot cards as a team.

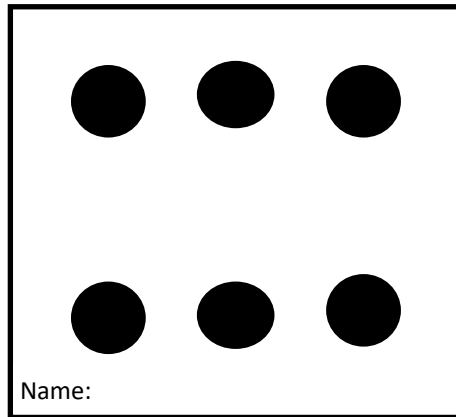
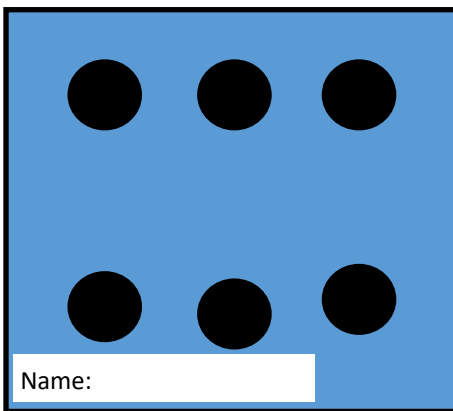
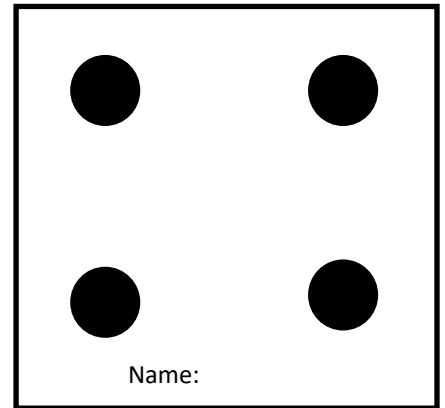
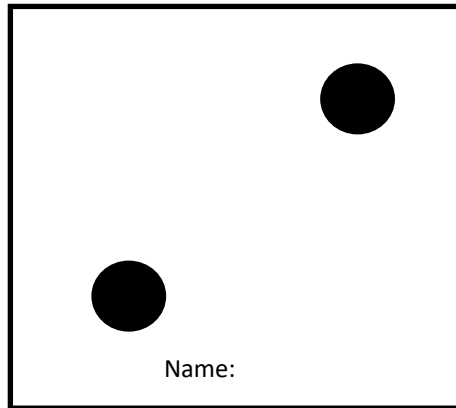
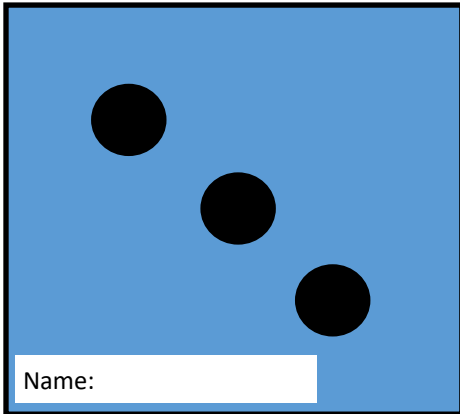
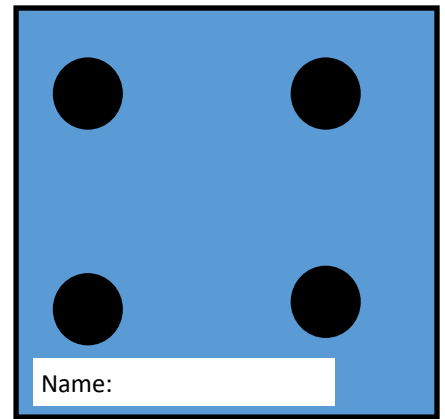
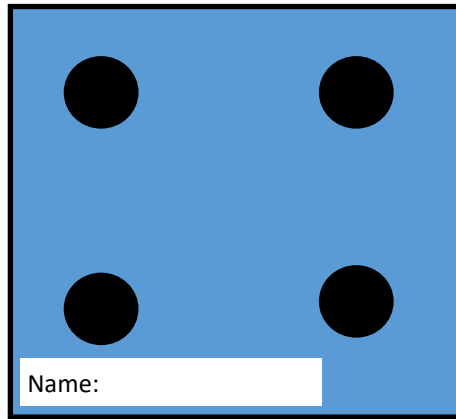
Check that each team member can justify your current arrangement before you move to the next card.

When you have the cards arranged in your final order help your group members practice their justification.

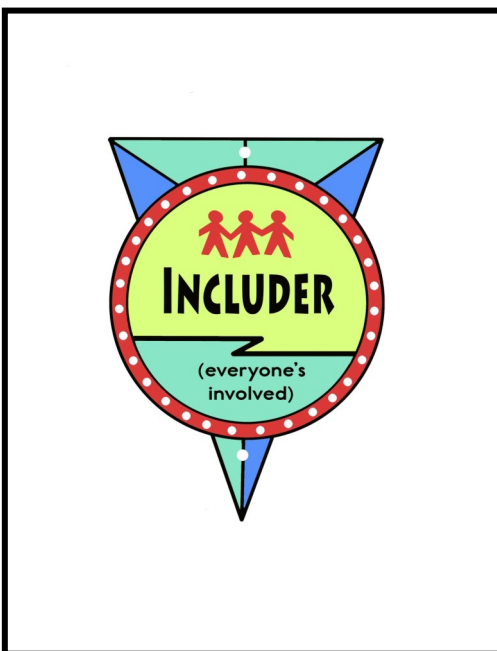
Signal me over so I can choose one team member to justify your final order.



Each **Justification League** needs on set of dot cards and role cards cut out.



WHAT'S THE ORDER?



WHAT'S THE ORDER?

The first dot card is blue and shows an odd number of dots.

WHAT'S THE ORDER?

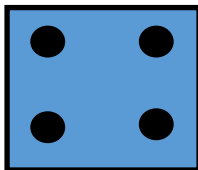
The last dot card is white and shows an even number of dots.

WHAT'S THE ORDER?

White dot cards are never next to other white dot cards.

WHAT'S THE ORDER?

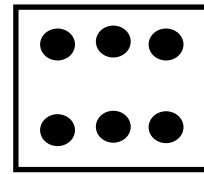
You only need one of these dot cards.



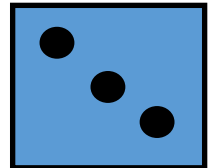
WHAT'S THE ORDER?

The third, fourth, and fifth dot card add up to 14.

WHAT'S THE ORDER?



is next to



to

WHAT'S THE ORDER?

Dot cards with the same number of dots are always next to each other.

WHAT'S THE ORDER?

Recording Sheet

Name: _____

Other League Members : _____

Shade and show the dots in the spaces below. Have the cards in the same order your league agreed upon.

Cross out any dice you did not use.

--	--	--	--	--	--	--

What was your super power during this task?

How did you put your super power to work?