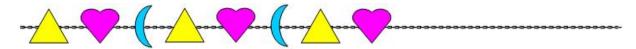
Name:	Date:	

Student Exploration: Pattern Flip

Vocabulary: least common multiple, multiple, pattern, sequence

Prior Knowledge Questions (Do these BEFORE using the Gizmo.) Frances is making a charm bracelet. Her bracelet so far is shown below.



- A pattern is a repeated group of objects or numbers. What pattern do you see on the charm bracelet?
- 2. If Frances continues the pattern, what should the next two charms be? _____
- 3. Frances wants the bracelet to have 12 charms. What will the last charm be? _____

Gizmo Warm-up

Step right up and play the Pattern Flip Card Game! In the *Pattern Flip* Gizmo, the challenge is to find the pattern in the cards you see, and then figure out what's on the cards that are face down.

To see more cards, click and drag the string of cards left or right. Or use the arrow keys to scroll back and forth. To change the number of cards you see, click zoom out (-) or zoom in (+).



- 1. Check that pattern **A** is selected. What is the pattern?
- 2. What animal will be on card 8? _____ Card 9? ____ Card 23? ____

To check your answers, flip the cards by clicking on the numbers below the cards. You can also click the **Show all** button to see all the cards.

3. Each pattern is a repeating **sequence**, or group, of cards. Turn on **Show groups**. For pattern **A**, how many cards are in each group?

Activity A:

Get the Gizmo ready:

• Turn off **Show groups**.

Pattern predictions

• At the bottom of the Gizmo, select pattern **B**.



If the cards follow a pattern, you should be able to predict what the next cards in the sequence will be. In fact, you can figure out *any* card in the sequence!

1.	Look a	t pattern B	Write down the first 10 cards			rds in spa	in spaces 1 through 10 below.				
	1	2	3	4	5	6	7	8	9	10	
2.	Look a	t the numb	ers of the	elephant	cards. V	What do	they all have	in comm	on?		
3.	Based	on this, wh	nich of the	cards lis	ted belov	w will hav	ve elephants	s? Circle y	our choic	es first.	
	14	17 23	32	45	67	88	Check by	clicking c	n each nu	ımber.	
4.		s pattern, h	•				at repeats?				
5.							nd a pattern		umbers.		
	B.	Where wil	l you find t	he next	three cov	ws?		(Che	ck your ar	nswers.)	
6.	Now tr	y to find a p	oattern in t	he numb	ers of th	ne bear c	ards.				
	A.	What is th	e pattern?								
	B.	Where wil	l you find t	he next	three bea	ars?		(Che	ck your a	nswers.)	
7.	Predic	t which ani	mal is on e	each card	d below.	Check yo	our answers	by flippin	g the card	ls.	
	Card 2	5		Ca	ard 31			Card 5	8		

Now that you have explored this pattern, you are ready to play a carnival game. Choose a game

(Name it or Flip it) in the Gizmo. Follow the directions carefully, and play. Good luck!

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Act	ivity	B:
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Get the Gizmo ready:



Multiples

- If you are playing a game, finish and click **Done**.
- At the bottom of the Gizmo, click Edit.

You have been hired to produce a new **Pattern flip** game for a carnival. The carnival wants a pattern with a group that is three cards long, with a different animal on each of these cards.

1.	After clicking Edit you are in the pattern editor. Create a pattern of three cards, each with a					
	different animal. Which did you pick?					
2.	Click Done to view your pattern. Focus on the third animal in your pattern. At what numbers					
	does this animal appear?					
3. To find the multiples of a number, multiply that number by 1, 2, 3, 4, 5, and so of example, the multiples of 7 include 7, 14, 21, 28, 35, etc.						
	A. Look at your list from question 2. All of these are multiples of what number?					
	B. Which other cards will have this animal? (Check answers.)					
4.	Now look at the second animal in your pattern.					
	A. At what numbers does this animal appear?					
	B. Which other cards will have this animal? (Check answers.)					
5.	Notice that these numbers are not multiples of 3. But all of them <i>are</i> 1 less than a multiple of 3. Based on this fact, which of the following cards will look the same as the second card?					
	Circle your choices: 36 23 41 56 28 65 (Check answers.)					
6.	Figure out the pattern for the animal on the first card. Which cards will have this animal?					
	Circle your choices: 19 45 22 52 31 71 (Check answers.)					
7.	Predict which animal is on each card below. Check your answers by flipping the cards.					
	Card 75 Card 38 Card 100					

Now that you have explored your pattern, play the Name it and Flip it games. Good luck!



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Double patterns

Get the Gizmo ready:

- Select pattern D.
- Turn off **Show groups**.



At the Pattern Flip World Championship, the patterns are complex. Are you up to the challenge? 1. Look at pattern **D**. Focus on the crab on the top row, and the pig on the bottom row. A. At what numbers can you find a crab? B. At what numbers can you find a pig? C. At what numbers can you find a crab over a pig? ____ ___ ____ ____ 2. Based on your lists, fill in the blanks: The crab numbers are all multiples of . The pig numbers are all multiples of _____. The crab over pig numbers are all multiples of _____. The last number is called the **least common multiple**, or LCM, of the two other numbers. 3. Based on what you have discovered, at which of the following numbers would you expect to 22 54 (Check your answers.) find a crab over a pig? 36 4. Now try to figure out a rule of thumb for finding a lion over a bear. A. At what numbers do you see a lion over a bear? ____ ___ ____ B. Describe the pattern. C. Based on your rule, at which of the following numbers would you see a lion over a bear? 25 29 37 43 51 (Check your answers.) 5. Challenge: Click Custom and click Edit. In the Pattern editor, click Clear patterns and turn on the Two patterns checkbox. Create a pattern that will have an elephant over a crab once every 10 cards. Then click **Done**. Describe your pattern below. Top row: _____ Bottom row:

On your own, play the **Name it** and **Flip it** games for a double pattern. (You can use your custom pattern or pattern **D**.) Good luck!

