

Title: Pattern Bracelet Buddies

Brief Overview:

These lessons will deal with identifying, describing, extending and creating repeating patterns. Lessons will incorporate real life experiences. The students will create friendship bracelets to share with classmates.

NCTM Content Standard/National Science Education Standard:

[Understand patterns](#), relations, and functions

Grade/Level:

Grade 3

Duration/Length:

Three 50- 60-minute periods

Student Outcomes:

Students will:

- Identify and describe repeating patterns
- Continue repeating patterns
- Create bracelets using a repeating pattern with no more than 4 terms in the core.

Materials and Resources:

Lesson 1

- Snap cubes
- Transparencies of Teacher Resource Sheet 1
- Chart of Teacher Resource Sheet 2 (may be copied on the chalkboard or chart paper)
- Student copies of Student Resource Sheet 1
- Student copies of Student Resource Sheet 2
- Teacher Resource Sheet 3 – answer key for Student Resource Sheet2

Lesson 2

- Snap cubes
- Pattern blocks
- Overhead of Teacher Resource Sheet 4
- Overhead of Teacher Resource Sheet 5

- Student copies of Student Resource Sheets 3 and 4
- Teacher Resource Sheet 6 – answer key for Student Resource Sheet 4
- Teacher Resource Sheet 8 – Kid Speak Rubric
- Copies of Student Resource Sheet 5 for groups of 4 or 5 students (laminated if you wish to keep for future lessons)
- Overhead colored chips
- Math Talk chart from yesterday's lesson
- Crayons, markers, colored pencils

Lesson 3

- Stringing beads in a variety of colors
- Long pipe cleaners, elastic or yarn for stringing the beads (NOTE: Make sure that the beads you choose are able to be strung on the material you choose!)
- Transparency and student copies of Student Resource Sheet 6
- Student copies of Student Resource Sheet 7 -Summative assessment
- Teacher Resource Sheet 7 – Answer Key for Summative Assessment
- Teacher Resource Sheet 8 – Kid Speak Rubric

Development/Procedures:

Lesson 1

Preassessment –

- Show students Transparency of Teacher Resource Sheet 1.

Say: I saw this cool necklace in a store, and wanted to tell my best friend about it, but I wasn't sure how to describe it to her. Talk with your team and see if you can describe my necklace, so I can tell her about it when I call her tonight.

- Have students share ideas with team, and then share their ideas with the class. Possible answers: (It has shapes in it. The shapes are in a pattern. It keeps repeating). Record any math terms (i.e. pattern, repeating, shape names) on the Math Talk chart (Teacher Resource Sheet2).

Launch –

- Give students snap cubes and ask them to pretend the cubes are beads in a necklace.

*Say: Now, you will pretend that your cubes are beads in a necklace. Choose two or three colors to make a necklace. Try to see if you can make a pattern with your beads. Remember – no more than **THREE** different colors may be used!*

- Have one or two students share their necklaces, and describe what they look like.

Teacher Facilitation –

- Use the overhead necklace (Teacher Resource Sheet1) to explain how to describe the necklace.
Say: Now let's look at my necklace again. I can see that the necklace is made of one triangle, then 1 rhombus, then 2 octagons, and then back to a triangle. Each bead on the necklace is called a "term". So, the first term of my necklace is a triangle. The third term is an octagon. What would the 5th term be? (Triangle).
- *I can also see that my necklace has a pattern – it begins to repeat itself over and over. I can look at the first term (Point to the triangle) and see that it is repeated after the octagons. (Point to second triangle). Now I have to look at the next term and see if that is the same as the second term. It is a rhombus, too. The next one is an octagon, like the third term, and the next one is an octagon, like the 4th term. Then it goes back to triangle again. The pattern goes Triangle, rhombus, octagon, octagon, triangle, rhombus, octagon, octagon.... IT keeps repeating the same thing. That is called the core. So, my core is: triangle, rhombus, octagon, octagon. See if you can identify the core on your necklace. Allow students to look for the core of their necklaces, and call on one or two students to share their cores.*
- *I can use letters to describe my pattern. For example, the first term of my pattern would be called A, the second term would be called B and the third term would be called C. Notice that the 4th term is an octagon, too, so that's another C. So my pattern is ABCC. It repeats ABCC three times. Can you describe your pattern? Remember that each color in your pattern should have a different letter name. Call on students to share their pattern description.*

Student Application –

- Distribute Student Resource Sheet 1 and have students complete.
- Have each student share his/her pattern with a partner, tell him/her the core, and describe the pattern using letter symbols.
- Those who are proficient may do the extension (Student Resource Sheet2). Answers can be found on Teacher Resource Sheet 3.
- Bring class together and have them categorize patterns by their core. Discuss how the cores are the same/different. Encourage students to lead the discussion and use Math vocabulary. (EG. *I have a red/blue core, and "Susie" has a green/purple core. Even though they're different colors, they have the same AB core that repeats*)

Embedded Assessment –

- Observe students as they share their patterns. Note students who are struggling, so they can be pulled for reteaching component.

Reteaching/Extension –

- **Reteach** – pull a group and make a simple pattern (AB or ABC) with snap cubes. Have the students copy your pattern exactly. Then identify the terms, core and describe the pattern using letters. Do one or two more, then ask them to make a simple pattern and describe it.

- **Extend** using Student Resource Sheet 2

Lesson 2

Preassessment –

- Make an ABBC pattern with overhead colored chips (or drawn on overhead) in the form of a bracelet. (Show 3 repeats of the core)
- Have the students think/pair/share with a partner everything they know about the pattern in the bracelet. Encourage them to use the Math vocabulary from yesterday's Math Talk chart

Launch –

- Discuss student's answers, and record on chalkboard.
- Pose the following question: *How would I turn this bracelet into a necklace?* (Make it longer) *How could I make it longer?* (Add more beads, repeat the core of the pattern.)
- Show transparency of Teacher Resource Sheet 4 and have students help you continue the pattern. Then have them Think/Pair/Share answers to question below the pattern. (I looked for the core to repeat. Then I put each term in the correct order.)

Teacher Facilitation –

- Think aloud-using Teacher Resource Sheet 4. Say: *When I look at this pattern, I see that the core has 4 terms. They are ABBC. I see that the next term is A, which means I need to see if the core is repeating. The next term is B, so I can be pretty sure that it is repeating. The next one was blank, so I knew it should be a B, because a B comes between the first B and the C in the core. The pattern just keeps getting stamped over and over, so I can fill in the rest of the letters by "stamping the core over and over.*
- Show overhead of Teacher Resource Sheet 5. Explain that you must check to see if a core is repeated in order to tell if something has a pattern or not.
- Look at the first example. Say: *I can see that this is a pattern, because there is a core that repeats. I see triangle, rhombus, square, rhombus. Then the first term repeats --- there's my big clue that I may have a pattern!!! Now I'm seeing rhombus and square and rhombus again, so I know I have a pattern! I can even describe it as ABCB, ABCB*
- Move on to second example. Say: *This one is NOT a pattern. I see that the first term is rhombus, then there is another rhombus. It IS possible to have two A's, but then I get to rhombus again, I see a triangle next to it. That doesn't look like the first part of the pattern. There is no stamping of the same thing over and over, so it can't be a repeating pattern .I can't describe it because it doesn't repeat.*
- Have students analyze the next example and decide yes or no (thumbs up/down) if it is or isn't a pattern. Discuss why it is or is not a pattern. (It is not a pattern because it does not have a repeating core. You can't describe it using symbols.)

- Repeat thumbs up/down with the next few examples. If students are proficient, not all examples need to be used.

Answers to Teacher Resource Sheet 5

Yes	No
1,4, 6, 9	2,3,5,7,8

Student Application –

- Have students make a pattern with snap blocks (no more than 4 terms and repeat the core twice) and snap it together. Have them choose a partner and give the partner their snap block pattern.
- Distribute Student Resource Sheet 3 and have them color their partner’s pattern at the top. Go over directions, and have them complete independently.
- Students who are proficient may try the extension. Reteach group will work with the teacher.
- All students complete Student Resource Sheet 4 – BCR
- Answer Key will be on Teacher Resource Sheet 6.

Embedded Assessment –

- Observe students in launch and Student application. Use Student Resource Sheet 4 to assess and summarize lesson.

Reteaching/Extension –

Reteach - Construct a pattern with snap cubes. Have students construct the same pattern. Have them identify the terms and the core of the pattern. Show them how to extend the pattern one term at a time, by looking back at the first core. Have them do this with their cubes as well.

Do a few more examples, and then have them create and exchange with a partner, and extend their partner’s pattern. Have them explain why they used the cubes they did.

Extend by using Student Resource Sheet 5 to create stations with pattern blocks. Have students go to pattern block station and work out the problems on Student Resource Sheet 5.

Lesson 3

Preassessment –

- Put a pattern on the overhead, using color chips. Have students draw it in their journal, and label the 5th term and the core of the pattern.

Launch –

- Tell students that they will become jewelers today. First they will fill out an order form to tell the bracelet company what kind of bracelets they like.
- Distribute Student Resource Sheet 6, and have students fill out the order form. Be sure to let them know what color beads are available, so they don't pick a color that the "company" doesn't have! Demonstrate how to fill out the order form by using the transparency of Student Resource Sheet 6. Say: *I like yellow, blue and purple. So I am going to write them as my favorite colors. I would like my bracelet to be pretty simple, so I don't want any more than 3 terms in my pattern. I will circle 3. I don't really care what the pattern is, so I'm going to leave this blank. What if I DID want a certain pattern? What could I write? (AAB or ABC...) Other special instructions might include not putting certain colors together. For example, I might not want blue and purple to touch in my bracelet, so I might write that .Now I am going to sign my name next to customer!*
- Collect all the order forms.

Teacher Facilitation –

- Demonstrate how to use the order form to make the bracelet for the "customer". Use your order as an example. Say: *My customer likes blue, yellow and purple. She wants three terms in her pattern, so I can use all her favorite colors. She didn't leave any special instructions, so I think I'll make an ABC pattern, with A being blue, B being yellow, and C being purple. I need to get the beads and materials together, then begin with blue.* Continue showing how to string the beads, and repeating the pattern until the string is complete.

Student Application –

- Give out forms (make sure no one gets the form he/she filled out!), and have students make the bracelets for their customers.
- Have the bracelet maker sign the form next to "jeweler"

Embedded Assessment –

- Check bracelets to see if the "jeweler" followed the customer's order
- Summative Assessment

Reteaching/Extension –

Reteach - Students who are struggling may need to use snap cubes to build the pattern first. Work with the students in a group to have them build the pattern with snap cubes from the order form. Check and correct as necessary. Then show them how to transfer the snap cubes into beads.

Extension – Have the students draw a picture of the bracelet they made on the back of the order form, and describe the pattern..

Summative Assessment:

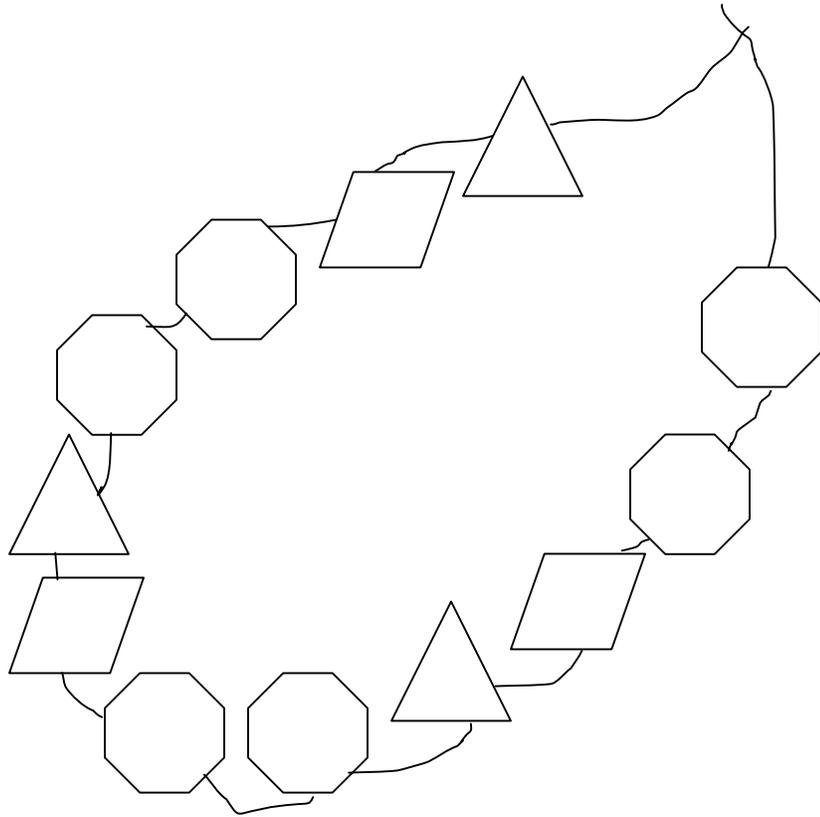
The students will demonstrate understanding of patterns by identifying, describing and extending repeating patterns. They will be able to identify the terms and core of a repeating pattern. They will complete a BCR to explain their understanding of repeating patterns. (Student Resource Sheet 7) Answer Key may be found on Teacher Resource Sheets 7 & 8.

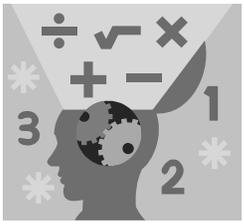
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My Nifty Necklace





MATH TALK



Pattern Practice

1. Use snap cubes to create your own repeating pattern using up to four colors. Color your repeating pattern below.

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Look back at your snap cube pattern to answer the following questions.

1. What is the core of your pattern?

2. What is the second term of your pattern?

3. Describe your pattern using symbols.

Name: _____ Date: _____



Pattern Posing

Use the bracelet pattern below to answer the following questions.

red	blue	white	blue	red	blue	white	blue	red	blue	white	blue
-----	------	-------	------	-----	------	-------	------	-----	------	-------	------

1. What is the core of the pattern?

2. What is the sixth term?

3. Describe the pattern using symbols/letters.

CHALLENGE!

NOW try creating your own beaded repeating pattern using no more than four colors.

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

Write two or more questions on the lines below using vocabulary from the Word Box about your repeating pattern. Answer your questions on the back of this worksheet.

Name: _____

Date: _____

WORD BOX

term core describe
repeating pattern



Pattern Posing

Use the bracelet pattern below to answer the following questions.

red	blue	white	blue	red	blue	white	blue	red	blue	white	blue
-----	------	-------	------	-----	------	-------	------	-----	------	-------	------

1. What is the core of the pattern?

Red, blue, white, blue

2. What is the sixth term?

blue

3. Describe the pattern using symbols/letters.

A, B, C, B

CHALLENGE!

NOW try creating your own beaded repeating pattern using no more than four colors.

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

Write two or more questions on the lines below using vocabulary from the Word Box about your repeating pattern. Answer your questions on the back of this worksheet.

Answers will vary.

Name: _____

Date: _____

WORD BOX

term core describe
repeating pattern



From Bracelet to Necklace...

How can we change our bracelet into a necklace?

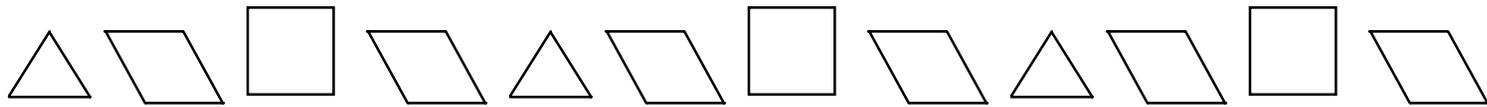
A	B	B	C	A	B		C	A		C								
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What clues helped you complete the pattern?

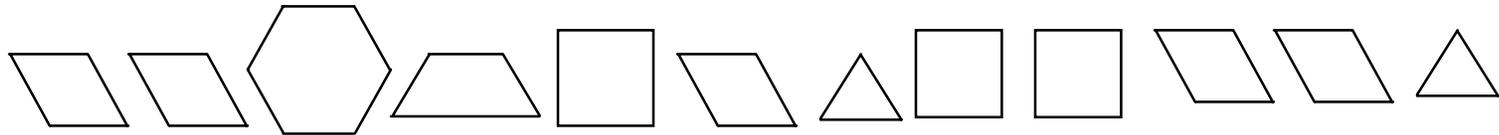


Pattern or Not?

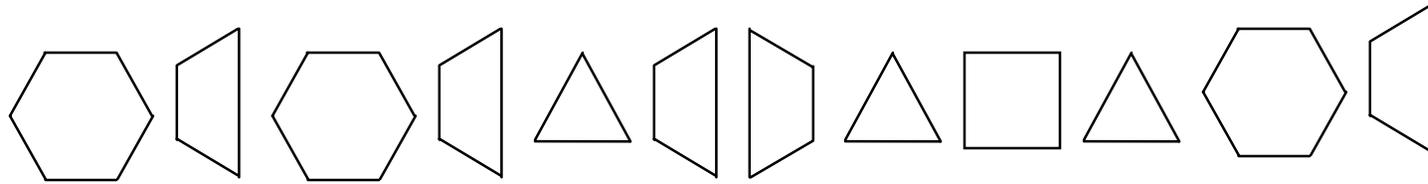
1.



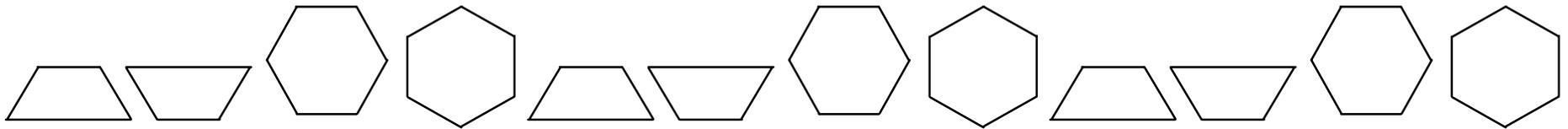
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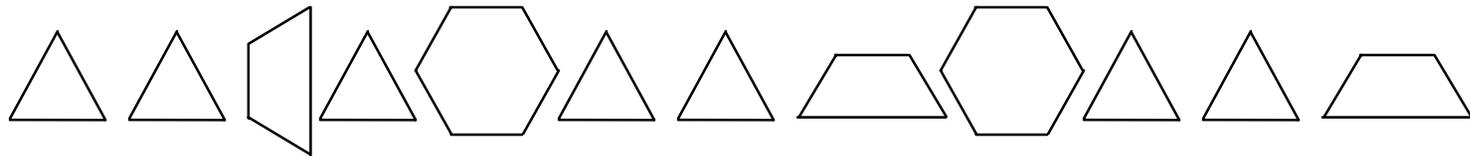
3.



4.



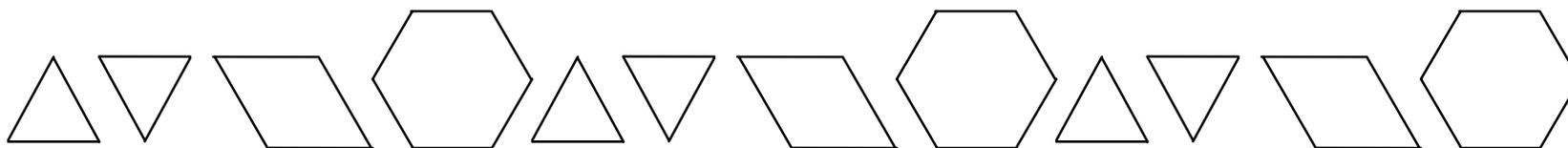
5.



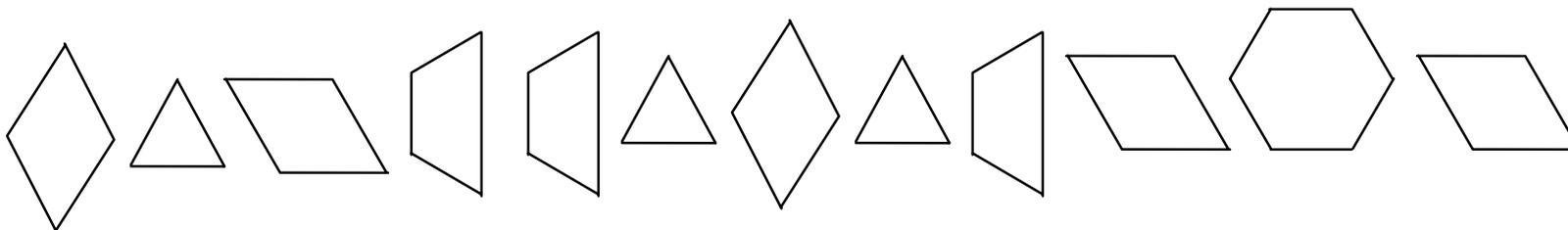


Pattern or Not?

6.



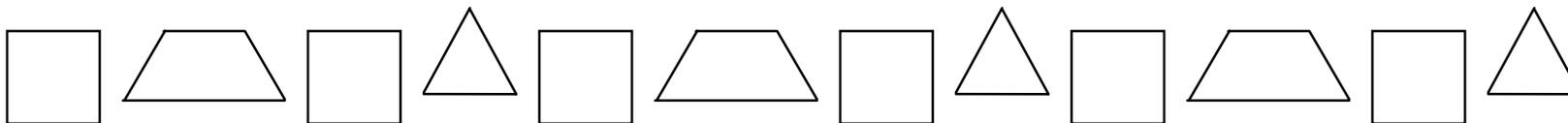
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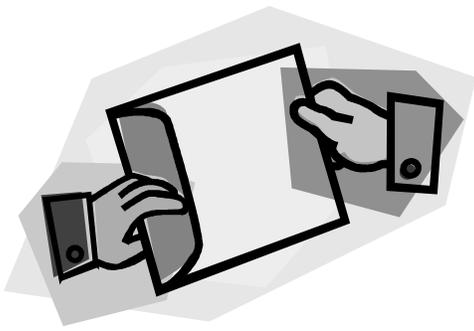


8.



9.





My Partner's Pattern

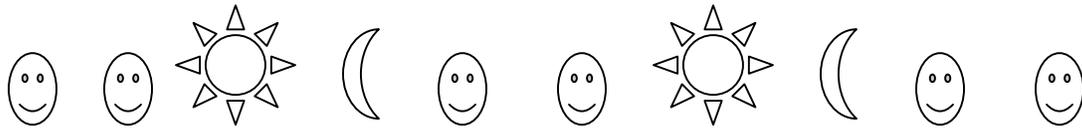
Color your partner's repeating pattern below. Continue the pattern so all squares are colored.

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

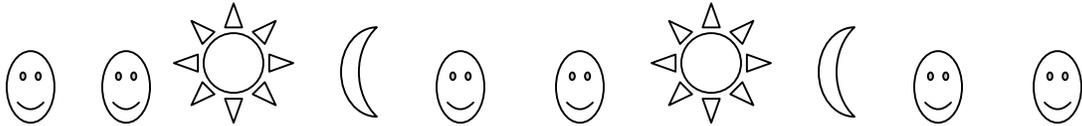
Explain how you knew how to complete the pattern. Use the Word Box below to help you.

<u>Word Box</u>		
term	core	repeat
	pattern	

Name: _____ Date: _____



Name: _____ Date: _____





Pattern Puzzle Challenge!

Follow the clues below to see if you can create the pattern!

CLUES:

1. Use yellow and green blocks.
2. The yellow block is the first term.
3. Create an ABB pattern.
4. Repeat the core three times.

QUESTION:

How many more green blocks would you need if you repeated the pattern three more times?

Make your own pattern and ask your partner two questions about it.



Pattern Puzzle Challenge!

Follow the clues below to see if you can create the pattern!

CLUES:

1. Use yellow and green blocks.
2. The yellow block is the first term.
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4. Repeat the core three times.

QUESTION:

How many more green blocks would you need if you repeated the pattern three more times?

Make your own pattern and ask your partner two questions about it.

Complete your order form carefully to make sure your jeweler knows exactly what you want!



A large rectangular box with a black border, intended for a student to write their jewelry order details. The box is mostly empty, with decorative floral borders in the top-left and top-right corners.

Complete your order form carefully to make sure your jeweler knows exactly what you want!



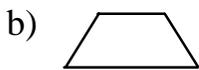
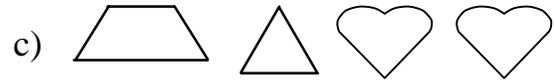
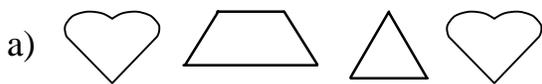
A large rectangular box with a black border, identical to the one above, intended for a student to write their jewelry order details. It features decorative floral borders in the top-left and top-right corners.

Summative Assessment: Repeating Patterns

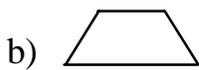
Use the pattern below to answer questions 1-2.



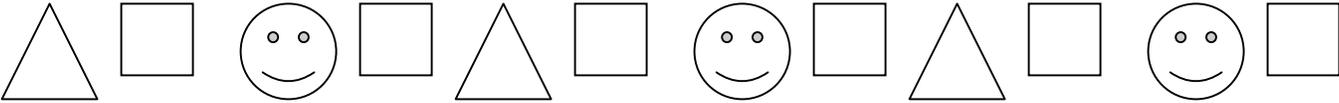
1. Identify the core of the above pattern.



2. What is the fifth term of the pattern?



3. Jorge created a beaded bracelet for Manpreet. Below is his design.



Part A

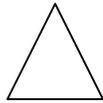
What will the next three terms in Jorge’s pattern be? Write them in the space below.

Part B

Use what you know about repeating patterns in order to explain how you know your answer is correct. Use words, numbers, symbols, or pictures to explain your answer.

Summative Assessment Answer Key

1. c
2. b
3. Part A



Part B

This is one written example of a possible exemplary response. Students may also list their answers, use pictures, symbols, or diagrams with labels, or other means explaining how they identified the core and continued the pattern. See Teacher Resource Sheet 4 for Brief Constructed Response criteria using friendly "KID SPEAK".

ANSWER: *The core has an ABCB repeating pattern because it has one triangle that is A. Next comes a square that is B, and the smiley face that is C. There is another square but it is already named B. The core is repeated three times ABCBABCBCB. To continue the pattern, I needed to repeat the first three terms of the core, which is ABC or triangle, square, smiley face.*

**NSA Brief Constructed Response “Kid Speak”
Mathematics Rubric
Grades 1 through 8**

Score	
2	<p>My answer shows I completely understood the problem and how to solve it:</p> <ul style="list-style-type: none">• I used a very good, complete strategy to correctly solve the problem.• I used my best math vocabulary to clearly explain what I did to solve the problem. My explanation was complete, well-organized and logical.• I applied what I know about math to correctly solve the problem.• I used numbers, words, symbols or pictures (or a combination of them) to show how I solved the problem.
1	<p>My answer shows I understood most of the problem and how to solve it:</p> <ul style="list-style-type: none">• I used a strategy to find a solution that was partly correct.• I used some math vocabulary and most of my reasons were correct to explain how I solved the problem. My explanation needed to be more complete, well-organized or logical.• I partly applied what I know about math to solve the problem.• I tried to use numbers, words, symbols or pictures (or a combination of them) to show how I got my answer, but these may not have been completely correct.
0	<p>My answer shows I didn't understand the problem and how to solve it:</p> <ul style="list-style-type: none">• I wasn't able to use a good strategy to solve the problem.• My strategy wasn't related to what was asked.• I didn't apply what I know about math to solve the problem.• I left the answer blank.