

# Patterns on a Hundreds Chart

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**Strand:** Pattern, Function, and Algebra

**Topic:** Exploring patterns

**Primary SOL:** 3.16 The student will identify, describe, create, and extend patterns found in objects, pictures, numbers, and tables.

## Materials

- A large hundreds chart for display
- Counters in at least two colors
- Crayons or markers
- Pencils and paper clips for the spinners
- 0–99 Chart (attached)
- Hundreds Chart (attached)
- Blank Hundreds Chart (attached)
- Broken Hundreds Chart Puzzle Cards (attached)
- Pattern Game Directions (attached)
- Pattern Game Board (attached)
- Pattern Game Cards (attached)

## Vocabulary

*even, extending, geometric pattern, growing, input, missing term, numeric pattern, odd, output, pattern, repeating, rule, table*

## Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Distribute the hundreds chart and a handful of counters. Create and display a pattern (e.g., 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, ...) and ask students to duplicate the pattern by covering up the numbers in this pattern on their charts, using counters. Ask, “*What do you notice?*” Repeat with a couple other patterns and have students share what they notice about each pattern when numbers are covered on their Hundreds Chart. Ask, “*Are these repeating or growing patterns?*”  
*Note: Pattern rules should be limited to addition and subtraction with whole numbers.*
2. Ask them to look for other patterns on the chart (A pattern in the third row, where 2 is always in the tens place and the ones place digits increase from 1 to 9).
3. Put students into pairs or small groups, and have groups explore other patterns on the chart formed by multiples of other numbers. Give each group a number. Have the students cover that number and its multiples with counters (e.g., have students skip count by multiples of 2, 3, 4, etc.). If two groups have the same number, have the two groups compare their patterns and discuss any similarities or differences they find. If there are differences, have them explain why.
4. Ask students to place counters on all numbers that have a 3 in the ones place or a 3 in the tens place and explain the resulting pattern. Ask how many numbers have a counter on them. Next, have students place counters on all numbers that contain the digit 7 and

describe the resulting pattern. Ask how many numbers have a counter on them. Have students try this with other digits to see whether they get the same result. Ask them to explain why or why not.

5. Ask students to cover the multiples of 2 with counters of one color and then cover the multiples of 3 with counters of a different color. Have students identify the numbers that have two counters on them and explain why there are two counters on those numbers.
6. Ask students to cover 8, 17, 26, 35, 44, 53, 62, and 71 with counters and describe the resulting pattern. (Each number is one row down and one column to the left.) Ask students whether there is a rule for this pattern, and guide them to see that the numerical pattern or rule is “nine more than” or “counting on by nines.” Ask students whether they could describe the rule in another way (adding 10 and then subtracting 1).
7. Ask students to cover 3, 14, 25, 36, 47, 58, and 69 with counters and describe the resulting pattern. (Each number is one row down and one column to the right.) Ask students to describe the numerical pattern or rule for this pattern. (“Eleven more than” or “counting on by elevens”) Ask students whether there is another way to describe this pattern. (Adding 10 and then adding 1.)
8. For closure, ask, “How do you know if a set of numbers is a pattern?” or “What have you learned about patterns today?”

### Assessment

- **Questions**

- On a hundreds chart, which skip count or rule makes the column pattern?
- What is the rule for the pattern 7, 13, 19, 25 ...? What would be the next three numbers in the pattern?
- What is the rule for the pattern 8, 13, 18, 23, 28? If this pattern continues, what would be the eighth number in this pattern?

- **Journal/writing prompts (include a minimum of two)**

- Explain which skip count or rule makes the diagonal pattern on a hundreds chart.
- For any number between 1 and 100, explain how you can determine whether your pattern will include that number.

- **Other**

- Have students work in groups of two to four to play the Pattern Game, using the Pattern Game Directions, a pencil and paper clip for the spinner, the Pattern Game Board, and the Pattern Game Cards. *(Note: There are two cards that involve multiplication by 2 and multiplication by 3. This provides students the opportunity to make connections between addition and multiplication. The two multiplication rule cards exceed the expectation for SOL 3.16.)*

### Extensions and Connections (for all students)

- Inform students that different patterns emerge with a different configuration of the chart. Distribute copies of the 0–99 chart, and have students try some of the same patterns on it. Additional patterns to explore include the following:

- Cover all numbers with two identical digits.
- Cover all numbers with digits that add up to 8.
- Cover all numbers with a first digit that is larger than the second digit.
- Cover all numbers containing the digit 4.
- Cover all numbers with digits that add up to 10.
- Distribute the cards provided on the Broken Hundreds Chart Puzzle Cards sheet, and have students work in pairs or small groups to determine the missing numbers puzzle on each card. The cards contain “broken” portions of a hundreds chart. (*Note: Some students may need a hundreds chart in order to complete the missing numbers.*) Students need to justify their reasoning on how they solved each puzzle.
- Distribute a blank hundreds chart and crayons or markers. Ask each student to write his/her first name in the chart, putting the first letter in the first square, writing one letter per square, and leaving no spaces. Then, have students repeat this process, continuing to fill in all 100 squares with the letters of their first name, again and again. Next, instruct each student to color the squares containing the first letter of his/her name. Ask each student to describe the pattern the first letters of his/her name makes on the chart.

### Strategies for Differentiation

- Provide students with an enlarged hundreds chart.
- Have students start with an enlarged chart of 0–50 to practice patterns.
- **Multisensory**
  - Have students use cotton balls to mark their patterns on the hundreds charts.
  - Display a list of numbers that have been called for ongoing reference.
- **Community Connections**
  - Arrange for students to visit a candy factory where candy is packaged in groups of three and four or to a donut factory where donuts are packaged in groups of 12. There, students could observe workers packing food items in boxes in specific patterns and learn that if the pattern is incorrect, the items cannot be packaged.
  - Have students create a box that would hold the candy or donuts in a particular pattern? Then problem solve for the number of boxes to hold a particular number of items? For example, if they have six donuts in a box, can they figure out how many donuts they would have if they had two, three, or four boxes of donuts?
- **Small-group Learning**
  - Have groups of four students look for new patterns in hundreds charts.
- **Vocabulary**
  - Students need to know the following vocabulary: *hundred*, *pattern*, *even*, and *odd*. Add these words to the classroom’s mathematics word wall.
  - Determine word patterns, and have students find words that fit the patterns.

*Mathematics Instructional Plan – Grade Three*

- Create pattern examples on display charts, or, if appropriate, have students do it.
- **Student Organization of Content**
  - Provide each student with a personal hundreds chart marked with color-coded patterns to keep in their notebooks (e.g., 2, 4, 6, 8 ... in red, 1, 3, 5, 7 ... in blue).

**Note: The following pages are intended for classroom use for students as a visual aid to learning.**

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### Hundreds Chart

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>
<b>31</b>	<b>32</b>	<b>33</b>	<b>34</b>	<b>35</b>	<b>36</b>	<b>37</b>	<b>38</b>	<b>39</b>	<b>40</b>
<b>41</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>45</b>	<b>46</b>	<b>47</b>	<b>48</b>	<b>49</b>	<b>50</b>
<b>51</b>	<b>52</b>	<b>53</b>	<b>54</b>	<b>55</b>	<b>56</b>	<b>57</b>	<b>58</b>	<b>59</b>	<b>60</b>
<b>61</b>	<b>62</b>	<b>63</b>	<b>64</b>	<b>65</b>	<b>66</b>	<b>67</b>	<b>68</b>	<b>69</b>	<b>70</b>
<b>71</b>	<b>72</b>	<b>73</b>	<b>74</b>	<b>75</b>	<b>76</b>	<b>77</b>	<b>78</b>	<b>79</b>	<b>80</b>
<b>81</b>	<b>82</b>	<b>83</b>	<b>84</b>	<b>85</b>	<b>86</b>	<b>87</b>	<b>88</b>	<b>89</b>	<b>90</b>
<b>91</b>	<b>92</b>	<b>93</b>	<b>94</b>	<b>95</b>	<b>96</b>	<b>97</b>	<b>98</b>	<b>99</b>	<b>100</b>

## Hundreds Chart

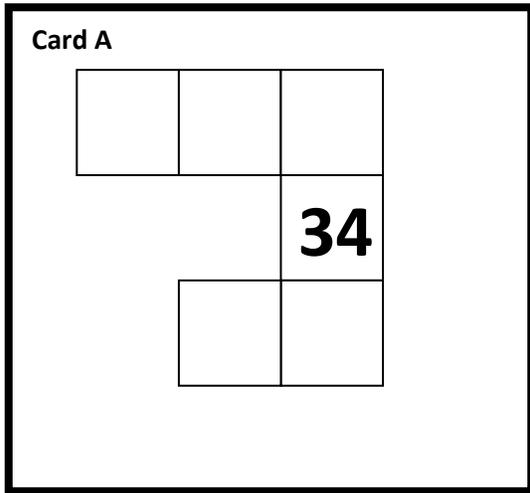

0–99 Chart

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>
<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>
<b>30</b>	<b>31</b>	<b>32</b>	<b>33</b>	<b>34</b>	<b>35</b>	<b>36</b>	<b>37</b>	<b>38</b>	<b>39</b>
<b>40</b>	<b>41</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>45</b>	<b>46</b>	<b>47</b>	<b>48</b>	<b>49</b>
<b>50</b>	<b>51</b>	<b>52</b>	<b>53</b>	<b>54</b>	<b>55</b>	<b>56</b>	<b>57</b>	<b>58</b>	<b>59</b>
<b>60</b>	<b>61</b>	<b>62</b>	<b>63</b>	<b>64</b>	<b>65</b>	<b>66</b>	<b>67</b>	<b>68</b>	<b>69</b>
<b>70</b>	<b>71</b>	<b>72</b>	<b>73</b>	<b>74</b>	<b>75</b>	<b>76</b>	<b>77</b>	<b>78</b>	<b>79</b>
<b>80</b>	<b>81</b>	<b>82</b>	<b>83</b>	<b>84</b>	<b>85</b>	<b>86</b>	<b>87</b>	<b>88</b>	<b>89</b>
<b>90</b>	<b>91</b>	<b>92</b>	<b>93</b>	<b>94</b>	<b>95</b>	<b>96</b>	<b>97</b>	<b>98</b>	<b>99</b>

### Broken Hundreds Chart Puzzle Cards

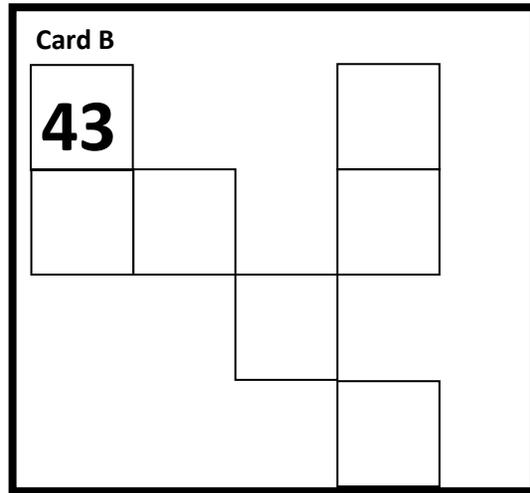
Copy cards onto card stock, and place sets in baggies to use for group work. This sheet could be used as the recording sheet.

**Card A**



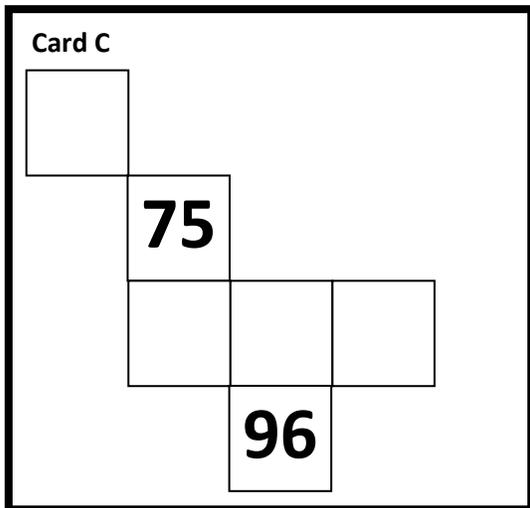
A broken hundreds chart with a grid of 10 squares. The number 34 is written in the square that is 3 squares right and 4 squares down from the top-left corner. The other 9 squares are empty.

**Card B**



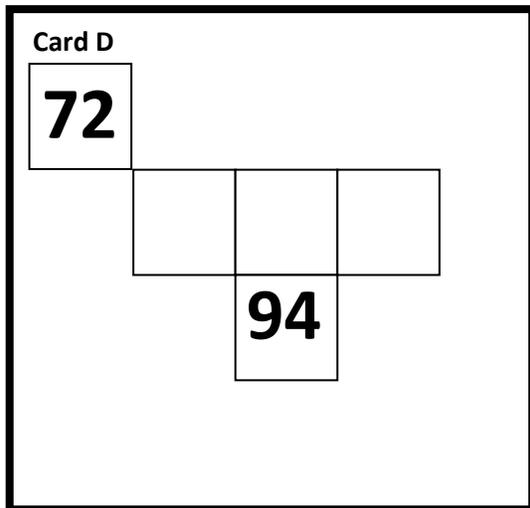
A broken hundreds chart with a grid of 10 squares. The number 43 is written in the top-left square. The other 9 squares are empty.

**Card C**



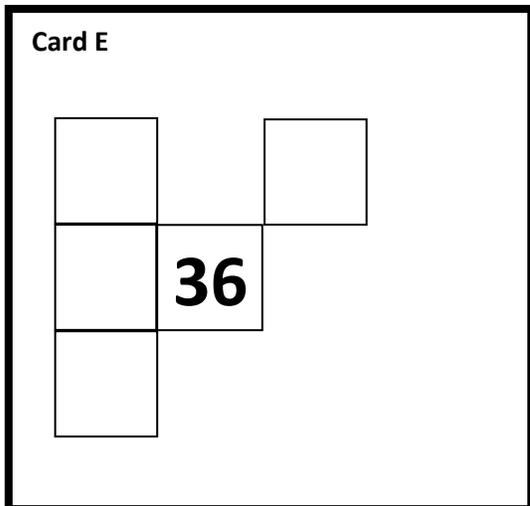
A broken hundreds chart with a grid of 10 squares. The number 75 is written in the square that is 2 squares right and 5 squares down from the top-left corner. The number 96 is written in the square that is 3 squares right and 6 squares down from the top-left corner. The other 8 squares are empty.

**Card D**



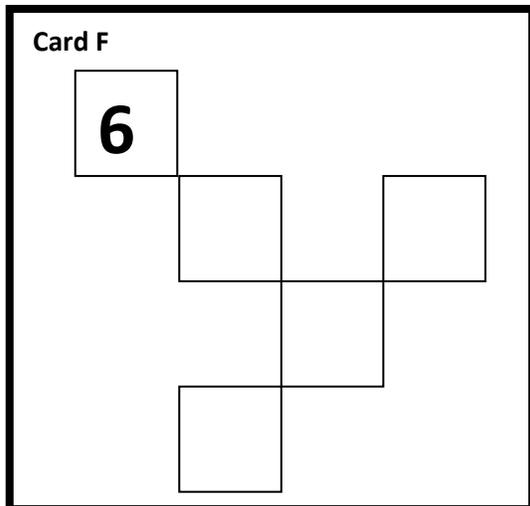
A broken hundreds chart with a grid of 10 squares. The number 72 is written in the top-left square. The number 94 is written in the square that is 2 squares right and 4 squares down from the top-left corner. The other 8 squares are empty.

**Card E**



A broken hundreds chart with a grid of 10 squares. The number 36 is written in the square that is 2 squares right and 6 squares down from the top-left corner. The other 9 squares are empty.

**Card F**

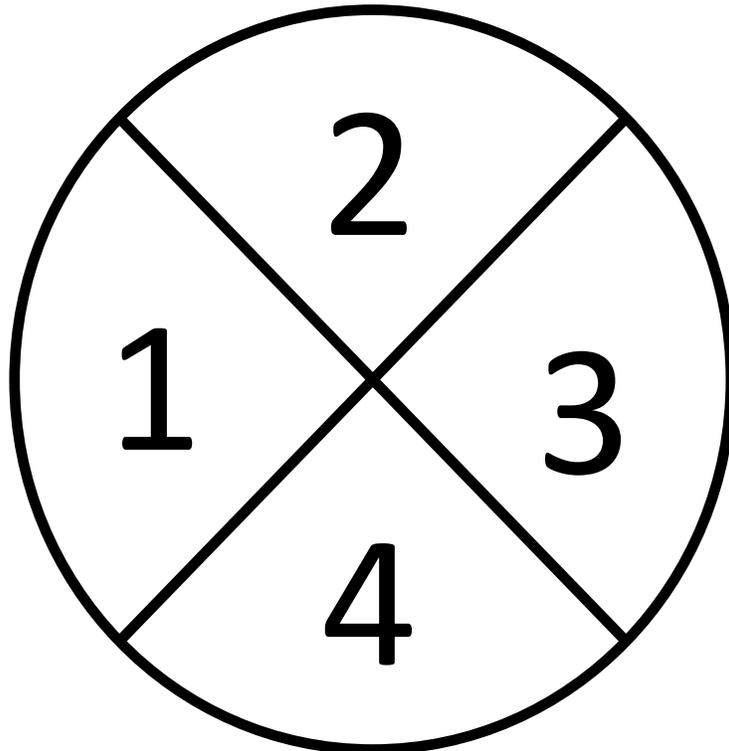


A broken hundreds chart with a grid of 10 squares. The number 6 is written in the top-left square. The other 9 squares are empty.

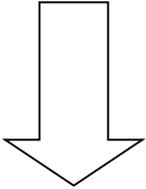
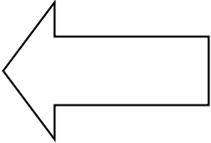
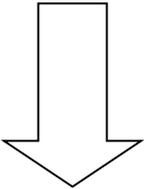
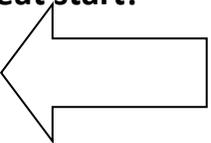
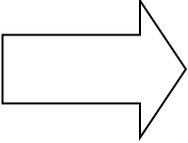
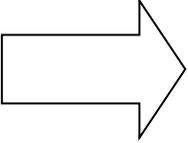
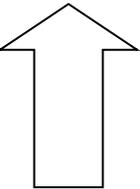
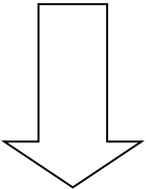
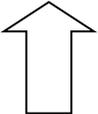
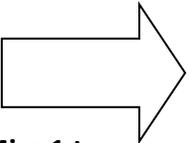
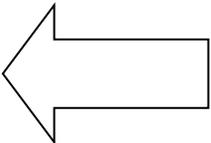
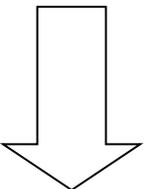
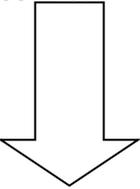
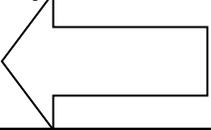
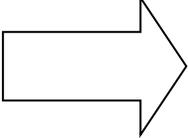
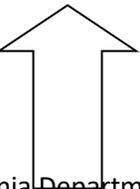
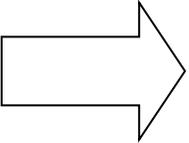
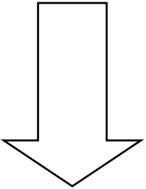
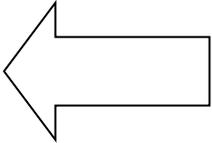
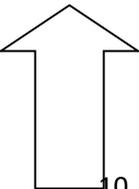
**Directions for 2–4 players:**

1. Place the Pattern Game Cards face down in a stack on the table. Each player places his/her game piece at the start line.
2. Each player spins the spinner one time to determine who goes first.
3. The first player draws a card and answers the question. If the answer is correct, the player spins the spinner and moves ahead that many spaces. If the answer is incorrect, the player stays put.
4. Play continues clockwise around the group until one player reaches FINISH.

**Pattern Game Directions**



### Pattern Game Board

	 <b>Time's running out. Miss 1 turn.</b>		
<b>You're off to a great start!</b> 			
			 <b>Hurry, Hurry! Go ahead 2 spaces.</b>
 <b>Miss 1 turn.</b>			
	<b>Pattern Game Board</b>		<b>Miss 1 turn.</b> 
<b>Go ahead 1 space.</b> 			
			<b>Lose 1 turn.</b> 
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**Pattern Game Cards**

<p>What is the rule for this pattern?</p> <p>13, 16, 19, 22, 25 ...</p>	<p>What is the rule for this pattern?</p> <p>42, 40, 38, 36 ...</p>	<p>What is the rule for this pattern?</p> <p>35, 40, 45, 50 ...</p>
<p>What is the rule for this pattern?</p> <p>15, 17, 19, 21 ...</p>	<p>What is the rule for this pattern?</p> <p>19, 16, 13, 10 ...</p>	<p>What is the rule for this pattern?</p> <p>1, 2, 4, 7, 11, 16 ...</p>
<p>What is the rule for this pattern?</p> <p>2, 4, 8, 16, 32 ...</p>	<p>What is the rule for this pattern?</p> <p>1, 5, 25, 125, 625 ...</p>	<p>What is the rule for this pattern?</p> <p>50, 100, 150, 200 ...</p>
<p>What is the next number in this pattern?</p> <p>18, 24, 30, 36, ___</p>	<p>What is the next number in this pattern?</p> <p>21, 28, 35, 42, ___</p>	<p>What is the next number in this pattern?</p> <p>64, 56, 48, 40, ___</p>
<p>What is the next number in this pattern?</p> <p>126, 128, 130, 132, ___</p>	<p>What is the next number in this pattern?</p> <p>36, 45, 54, 63, ___</p>	<p>What is the next number in this pattern?</p> <p>37, 49, 61, ___, 85</p>

<p><b>Finish the pattern according to the rule:</b></p> <p><b>Add 8.</b></p> <p>13, __, __, __</p>	<p><b>Finish the pattern according to the rule:</b></p> <p><b>Subtract 3.</b></p> <p>86, __, __, __</p>	<p><b>Finish the pattern according to the rule:</b></p> <p><b>Multiply by 2.</b></p> <p>1, __, __, __</p>
<p><b>Finish the pattern according to the rule:</b></p> <p><b>Add 16.</b></p> <p>21, __, __, __</p>	<p><b>Finish the pattern according to the rule:</b></p> <p><b>Multiply by 3.</b></p> <p>1, __, __, __</p>	<p><b>Finish the pattern according to the rule:</b></p> <p><b>Add 75.</b></p> <p>20, __, __, __</p>
<p><b>Finish the pattern according to the rule:</b></p> <p><b>Subtract 15.</b></p> <p>90, __, __, __</p>	<p><b>Finish the pattern according to the rule:</b></p> <p><b>Subtract 9.</b></p> <p>100, __, __, __</p>	<p><b>Finish the pattern according to the rule:</b></p> <p><b>Add 31.</b></p> <p>77, __, __, __</p>
<p><b>What are the missing numbers in this pattern?</b></p> <p>6, 9, __, 15, 18, __, 24, 27</p>	<p><b>What are the missing numbers in this pattern?</b></p> <p>1, 2, 4, __, 11, __, 22, 29</p>	<p><b>What are the missing numbers in this pattern?</b></p> <p>3, 6, __, 24, __, 96, 192</p>

<p><b>What are the missing numbers in this pattern?</b></p> <p>12, 16, ____, 24, 28, ____, 36</p>	<p><b>What are the missing numbers in this pattern?</b></p> <p>27, 36, ____, 54, 63, ____, 81</p>	<p><b>What are the missing numbers in this pattern?</b></p> <p>36, 32, ____, 24, 20, ____, 12</p>
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