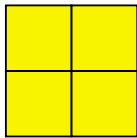


# Solves Problems

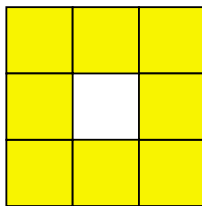
This task assesses your **problem-solving** ability. You will show your best work when you:

- *Read the task completely before starting.*
- *Show and explain how you solved this task.*
- *Double check your calculations.*
- *Review the reflections section after completing the task.*

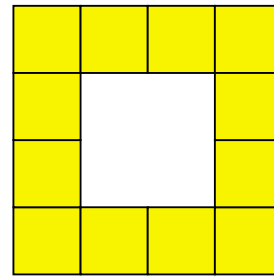
**HOLE in the BOX!** Examine the geometric pattern shown below.



1st figure



2nd figure



3rd figure

**Draw the 4th figure in this geometric pattern. Describe the geometric pattern shown and explain why your figure follows this pattern.**

## Solves Problems: HOLE in the BOX continued ...

If this pattern were to continue, how many shaded squares would there be in the 5th and 6th figures?

5th figure: \_\_\_\_\_ 6th figure: \_\_\_\_\_

Explain how you found these numbers.

Find an algebraic expression to determine the number of shaded squares in the  $n^{\text{th}}$  figure for this pattern. Explain how you arrived at this expression.


### Reflections

My response is good because I ...

- drew the 4th figure and described the geometric pattern;
- identified the number of shaded squares in the 5th and 6th figure;
- wrote an algebraic expression for the  $n^{\text{th}}$  figure;
- was clear and complete in my explanations.

# 2001 Math Power Scoring Guide: Hole in the Box • Solves Problems • Grade 9

	Criteria	4 Points <i>very fine work</i>	3 Points <i>fully acceptable work</i>	2 Points <i>partially acceptable</i>	1 Point <i>response attempted</i>	0 Points <i>none or insufficient</i>
Identify Pattern	<ul style="list-style-type: none"> <li>Does the student draw the 4th figure correctly and accurately describe the geometric pattern?</li> </ul>	<ul style="list-style-type: none"> <li>Correctly draws 4th figure <b>and</b> clearly and accurately describes the pattern; AND</li> </ul>	<ul style="list-style-type: none"> <li>Correctly draws 4th figure <b>and</b> accurately describes the pattern; AND</li> </ul>	<ul style="list-style-type: none"> <li>Correctly draws 4th figure <b>and</b> accurately describes the pattern; AND</li> </ul>	<ul style="list-style-type: none"> <li>Correctly draws 4th figure <b>or</b> accurately describes the pattern; AND</li> </ul>	<ul style="list-style-type: none"> <li>Incorrectly draws 4th figure <b>or</b> no evidence of attempt to identify or apply a pattern; OR</li> </ul>
Extend Pattern	<ul style="list-style-type: none"> <li>Does the student correctly identify values for the 5th and 6th figure and use the pattern to explain how the values were found?</li> </ul>	<ul style="list-style-type: none"> <li>Correctly identifies values for the 5th and 6th figures <b>and</b> accurately explains how the pattern was extended to determine the values; AND</li> </ul>	<ul style="list-style-type: none"> <li>Correctly identifies values for the 5th and 6th figures <b>and</b> explains how the pattern was extended to determine the values, but may lack some clarity or detail; AND</li> </ul>	<ul style="list-style-type: none"> <li>Correctly identifies values for the 5th and 6th figures <b>and</b> explanation is accurate, but may be minimal; AND</li> </ul>	<ul style="list-style-type: none"> <li>Values for the 5th and/or 6th figures may be incorrect <b>and</b> work indicates attempt to recognize or apply a pattern, but may not be the correct pattern; AND</li> </ul>	<ul style="list-style-type: none"> <li>No attempt to identify values for 5th or 6th figure or explain extension of a pattern; OR</li> </ul>
Represent Pattern	<ul style="list-style-type: none"> <li>Does the student correctly identify an algebraic expression and explain how the expression was determined?</li> </ul>	<ul style="list-style-type: none"> <li>Identifies an algebraic expression of <math>4n</math> or equivalent <b>and</b> clearly and accurately explains how the pattern was used to determine an expression.</li> </ul>	<ul style="list-style-type: none"> <li>Identifies an algebraic expression that may include a minor error or requires knowledge of the perimeter of the figure before the <math>n^{\text{th}}</math> (e.g., <math>x + 4 = n</math>) <b>and</b> explanation may lack detail.</li> </ul>	<ul style="list-style-type: none"> <li>Identifies an algebraic expression <b>or</b> does not identify an algebraic expression, but describes an accurate one for the <math>n^{\text{th}}</math> figure <b>and</b> includes an explanation that may be minimal (or may omit explanation where algebraic expression clearly follows from work provided).</li> </ul>	<ul style="list-style-type: none"> <li>No algebraic expression is identified <b>or</b> algebraic expression is incorrect, with no support offered.</li> </ul>	<ul style="list-style-type: none"> <li>No attempt to determine an algebraic expression <b>or</b> work is unrelated to the task.</li> </ul>

<b>Solution Notes:</b>	The 4th figure: 	The 5th and 6th figures have 20 and 24 shaded squares, respectively.	A correct algebraic expression will be equivalent to $4n$ . Examples: $(n+1)^2 - (n-1)^2 = 4n$ ; or $4(n-1) + 4$ ; or $2(n+1) + 2(n-1)$
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