

Homework Questions 2.4

TILE FIGURES AND ALGEBRAIC EQUATIONS

See the Student Electronic Resources for:

- ✓ Electronic version of this homework assignment (.doc file), including sketch pages
- ✓ Electronic images of all algebra pieces (Algebra Pieces.doc)
- ✓ Two Column Algebra Piece-Symbolic Work Paper
- ✓ Graph Paper

1. Model the following sequence, I_s , with black tiles and:

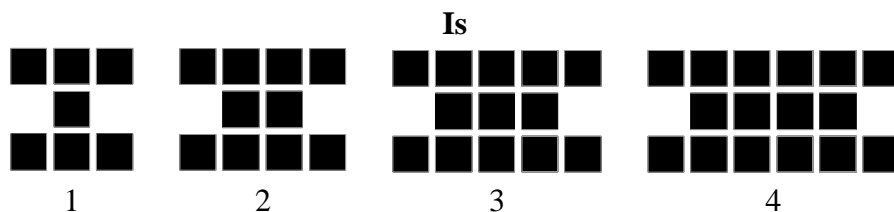
a.

Step One: Loop and number each figure and **Numerically** determine the total number of black tiles in each figure. Mark your number counts on the figures.

Step Two: Convert your looping ideas into **Words**.

Step Three: Convert your looping and word ideas into **Symbols**. Simplify your symbolic equation and check it for $n = 1, 2, 3$ and 4.

- ✓ See the provided sketch pages for figures that you can draw on to show your work



- b. Describe the 100th I figure. What does it look like? How many black tiles are in it?
- c. Which I figure will have 202 tiles? Describe the figure.
- d. What does the n th I figure look like? Use your black n -strips and black tiles, as needed, to model the figure, be sure to have the pieces oriented to look like the other tile figures in the I_s sequence. You do not need to show edge pieces. Sketch and describe the n th I figure. Label the pieces clearly.
- e. If the collection of tiles in a certain I figure is doubled and 4 more black tiles are added, there will be a total of 192 black tiles. Use your algebra pieces to help determine which I figure this is. Use a two column table and sketch your algebra piece work in the left column (include brief notes about what you are doing) and write the corresponding symbolic steps in the right column. Check your final solution.
- f. Two consecutive I figures have a total of 131 black tiles. Which two figures are they? Use your algebra pieces to help determine which I figures these are. Use a two column table and sketch your algebra piece work in the left column (include brief notes about what you are doing) and write the corresponding symbolic steps in the right column. Check your final solution.

2. Model the following sequence, Z_s , with black tiles and:

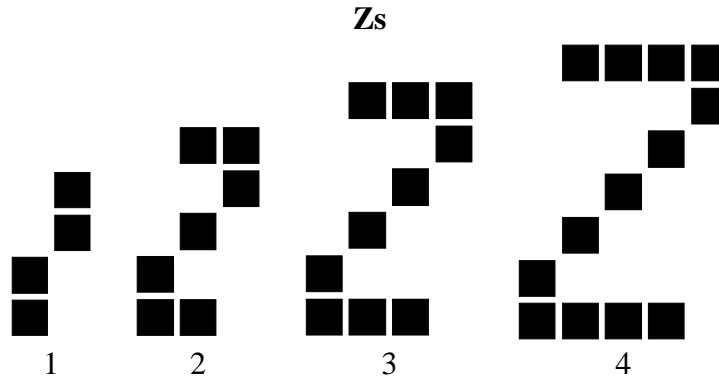
a.

Step One: Loop and number each figure and **Numerically** determine the total number of black tiles in each figure. Mark your number counts on the figures.

Step Two: Convert your looping ideas into **Words**.

Step Three: Convert your looping and word ideas into **Symbols** Simplify your symbolic equation and check it for $n = 1, 2, 3$ and 4 .

✓ See the provided sketch pages for figures that you can draw on to show your work

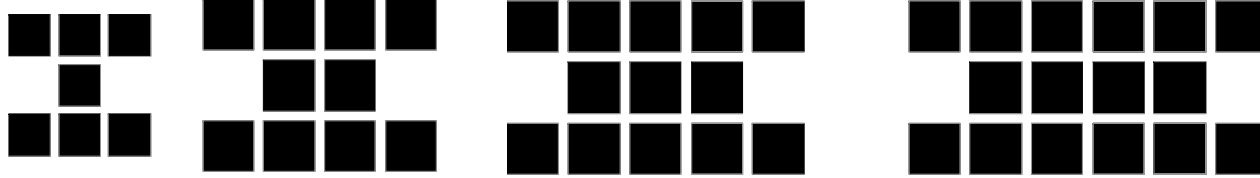


- b. Describe the 100th Z figure. What does it look like? How many black tiles are in it?
- c. Which Z figure will have 202 tiles? Describe the figure.
- d. What does the n th Z figure look like? Use your black n -strips and black tiles, as needed, to model the figure, be sure to have the pieces oriented to look like the other tile figures in the Z_s sequence. You do not need to show edge pieces. Sketch and describe the n th Z figure. Label the pieces clearly.
- e. If 4 black tiles are added to four copies of a certain Z figure, there will be a total of 152 black tiles. Use your algebra pieces to help determine which Z figure this is. Use a two column table and sketch your algebra piece work in the left column (include brief notes about what you are doing) and write the corresponding symbolic steps in the right column. Check your final solution.
- f. Two consecutive Z figures have a total of 269 black tiles. Which two figures are they? Use your algebra pieces to help determine which Z figures these are. Use a two column table and sketch your algebra piece work in the left column (include brief notes about what you are doing) and write the corresponding symbolic steps in the right column. Check your final solution.

Homework 2.4: Tile Figures and Algebraic Equations

3. Consider the equation $T = 4n + 5$.
 - a. Use your black tiles to build figures 1, 2, 3 and 4 for a tile sequence that corresponds to the equation $T = 4n + 5$. Try to make your figures “look like” $4n + 5$ and use a consistent orientation for each figure. Sketch the figures and give the number of black tiles in each figure.
 - b. Use algebra pieces to model the n th figure for $T = 4n + 5$ that matches your tile figures. Sketch the figure. Label the algebra pieces clearly.
 - c. Describe the 100th figure for $T = 4n + 5$. What does it look like? How many black tiles are in it?
 - d. Which $T = 4n + 5$ figure will have 2005 tiles? Describe the figure.
 - e. Two consecutive $T = 4n + 5$ figures have a total of 262 black tiles. Which two figures are they? Use your algebra pieces to help determine which figures these are. Use a two column table and sketch your algebra piece work in the left column (include brief notes about what you are doing) and write the corresponding symbolic steps in the right column. Check your final solution.
 - f. Create a t-table for the total number of black tiles, T , for figure number inputs $n = 1, 2 \dots 6$.
 - g. Plot the ordered pairs from the t-table on graph paper. Label the axes with appropriate numbers.
 - h. Inspect the plotted ordered pairs and visually extend the pattern you see to $n = 10$. What T (output) value do you estimate for $n = 10$ by just looking at the pattern of the graph? Check this value by using the symbolic formula $T = 4n + 5$.
4. For any tile sequence whose n th figure can be modeled with just black n -strips and black tiles:
 - a. What is the shape of the graph if you plot coordinate pairs for $n = 1, 2, 3, \dots$? Explain why you think this is the case.
 - b. What is the difference between the n th figure and the $(n + 1)$ st figure? Explain. How does this relate to the graph of the coordinate pairs?

Homework 2.4: Black Tile Figure Sequences
Is SKETCH PAGE



1

2

3

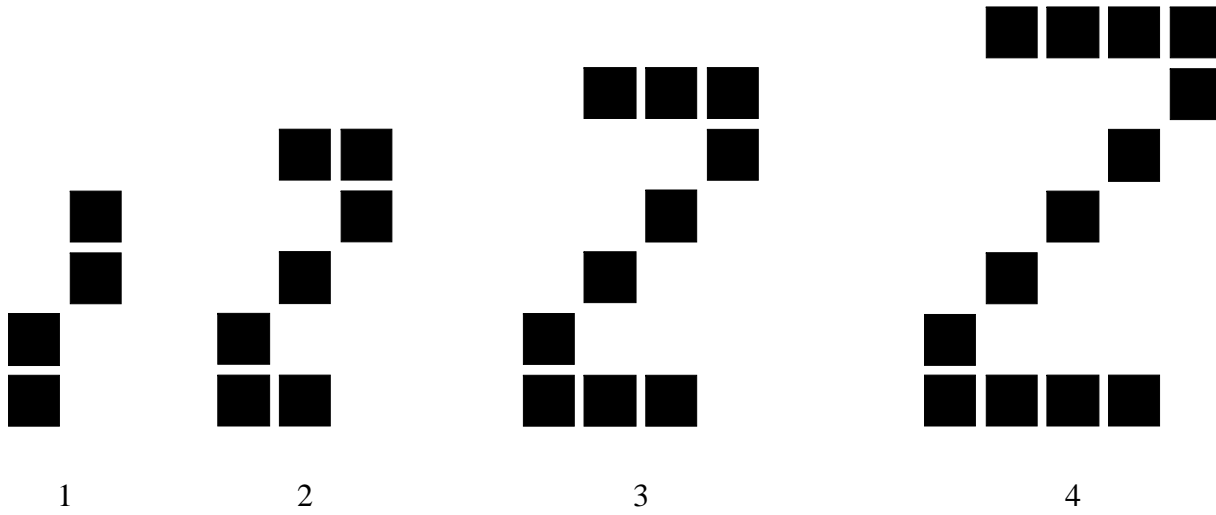
4

Tile count

Words

Symbols

Homework 2.4: Black Tile Figure Sequences
Zs SKETCH PAGE



Tile count

Words

Symbols