Patchwork

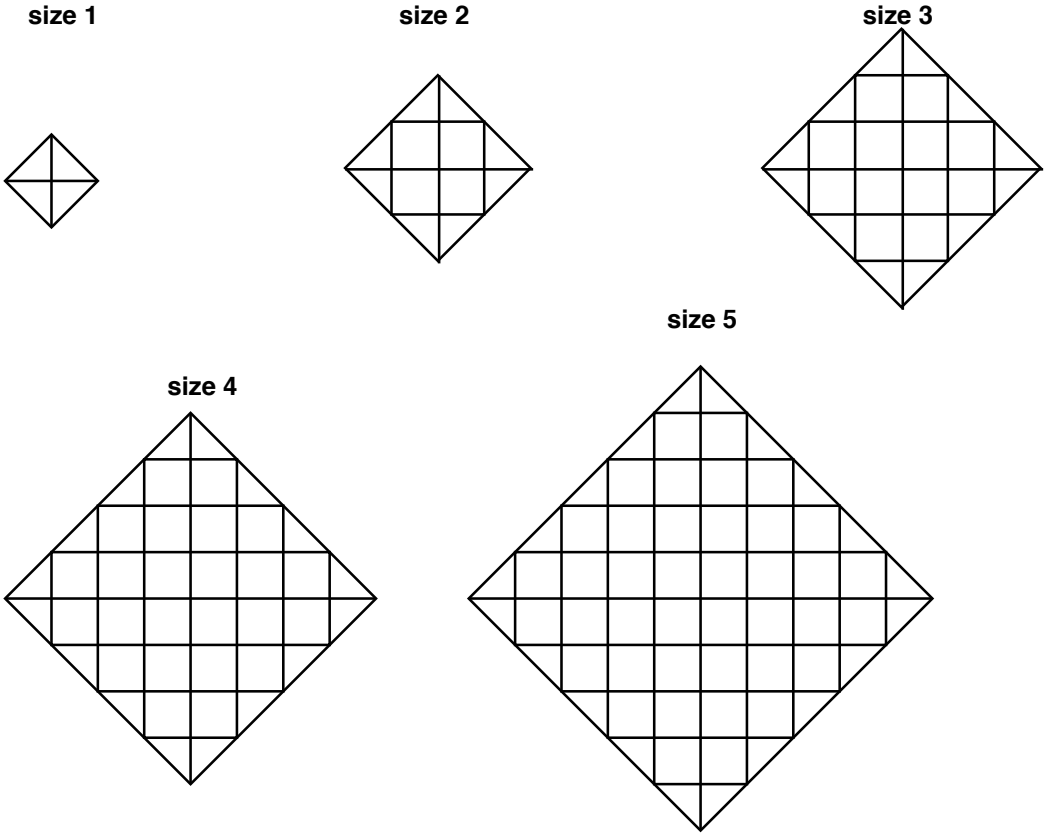
A sheet of square dot paper is provided for use with this item.

Kate makes patchwork cushions.
She uses right triangles  and squares. 

She uses triangles along the edges of each cushion. The rest is made from squares.

The backs of the cushions are made of plain material, not patchwork.

Here are the first five sizes of patchwork cushions.



Kate makes cushions in many other different sizes.

She begins to figure out how many triangles and squares she needs for each size.

For size 1, she needs 4 triangles and 0 squares.

For size 2, she needs 8 triangles and 4 squares.

1. Complete this table to show how many triangles and squares she needs for each of these five sizes?

Size *(n)*	**Number of triangles *(t)***	**Number of squares *(s)***
1		
2		
3		
4		
5		

2. Find a rule, or a formula, that will help Kate figure out the number of triangles that she needs for cushions of different sizes. Explain how you figured it out.

_____

_____

_____

_____

_____

3. Use the number patterns in the table to find a rule, or a formula, that will help Kate figure out the number of squares she needs for cushions of different sizes. Explain why your rule works.

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4. Kate has a cushion made with 180 squares.
   How many triangles are in this cushion? _____
   Show how you found the number of triangles.

	Patchwork	Rubric	
		Points	Section points
1.	Correctly completes the table: 1 point triangles , 2 points squares Size (n) | Number of triangles (t) | Number of squares (s) 1 | **4** | **0** 2 | **8** | **4** 3 | **12** | **12** 4 | **16** | **24** 5 | **20** | **40**	1 2	3
2.	Verbal rule: The number of triangles is four times the size of the cushion. **or** An algebraic rule: $t = 4n$ Explanation: Each cushion has four edges: each edge has the same number of triangles as the size. **or** From the table, as the size of the cushion increases by 1' the number of t riangles increases by 4.	1 **or** 2 1 **or** 1	3
3.	A stepwise verbal rule: The number of squares increases by 4, then 8, then 12, then 16 ....: increasing multiples of 4. **or** The number of squares + the number of triangles for any size is equal to the number of squares for the next size. e.g.: 16 + 24 = 40 **or** An algebraic rule: $s = 2n(n - 1)$ or equivalent algebraic rule. Explanations relating to the cushion design, such as the following. Stepwise rule: Each triangle of one size becomes a square in the next size. **or** Algebraic rule: Each cushion has four sections: if we put two sections together, we get two rectangles, size n by $(n - 1)$.	1 **or** 1 **or** 2 1	3
4.	Stepwise rule: continues sequence to find that when $s = 180$, t **= 40** **or** Algebraic rule: finds that when $s = 180$, $n = 10$: when $n = 10$, $\boldsymbol{t}$ **= 40.**	1 **or** 1	1
	Total Points		**10**