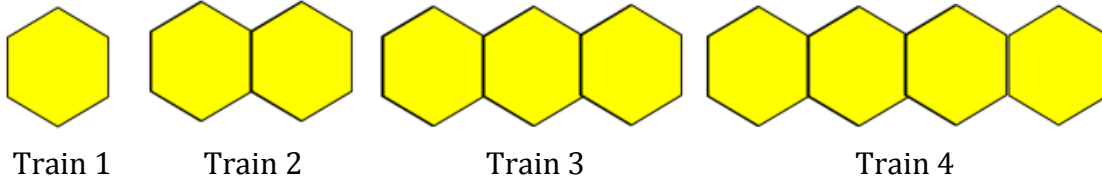


## Hexagon Task<sup>1</sup>

Trains 1, 2, 3 and 4 (shown below) are the first 4 trains in the hexagon pattern. The first train in this pattern consists of one regular hexagon. For each subsequent train, one additional hexagon is added.



1. Compute the perimeter for each of the first four trains.
2. Draw the fifth train and compute the perimeter of the train.
3. Determine the perimeter of the 10th train without constructing it.
4. Write a description that could be used to compute the perimeter of any train in the pattern.
5. Determine which train has a perimeter of 110.

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<sup>1</sup> This task was adapted from *Visual Mathematics Course 1, Lessons 16-30* published by the Math Learning Center. Copyright © 1995 by The Math Learning Center, Salem, Oregon.

## Hexagon Pattern Task

Teacher: Patricia Rossman

District: Austin Independent School District

Grade: 6

- 1 Student: Twenty-two plus 4 is 26; 26 plus 4 is 30, and 30 plus 4 is 34, 34 plus 4, 38; and 38  
2 plus 4 is 42.
- 3 Teacher: Okay. So you're telling me you saw a pattern here in the numbers?
- 4 Student: Yeah.
- 5 Teacher: Well, how could you find the perimeter of the tenth train if you didn't have this  
6 information? Would there be another way to find the perimeter of the train?  
7 Like you're telling me that this perimeter is four more (*points to the fourth train*)  
8 than this one (*points to the third train*). What's another way to find the  
9 perimeter if you don't know this?
- 10 Student: The – we can start with one, and we know that's six, and then we put a two in  
11 [*Inaudible*] and then we think that kinda we can get it. (*Student pointing to*  
12 *hexagon.*)
- 13 Teacher: Why do you think it is that you add four from the picture?
- 14 Student: Because right here, we count six, and then we count like this, all the way, and  
15 then we – he said that count by four, and you get all the answers.
- 16 Teacher: I'm wondering where this thing that you're talking about, the four all the time,  
17 where is the four in the picture?
- 18 Student: Right here. One, two, three –
- 19 [*Crosstalk*]
- 20 Teacher: Like this is – this is (*points to the third train*) four more than this one (*points to*  
21 *the second train*), right?
- 22 Student: Yes.
- 23 Teacher: But where in the picture is it four more than this one?
- 24 Student: In the middle?
- 25 Teacher: What do you mean in the middle? What do you see?

- 26 *Student:* Oh, yeah, because right here, when that is –
- 27 *Student:* Right here is five (*points to the hexagon at the beginning and at the end*), and  
28 right here is four (*points to sides in the middle*).
- 29 *Student:* Five, and then five, four, four, five... (*points to the sides of a hexagon*)
- 30 *Student:* Because we have to put in another one right here, and this one has got to be  
31 one, two, three, four.
- 32 *Teacher:* Ah. What do you think?
- 33 *Student:* Yeah. He's right.
- 34 *Teacher:* What does he mean, where's the four in the picture?
- 35 *Student:* That because if we –
- 36 *Teacher:* How much is on this one, on the end?
- 37 *Students:* Five.
- 38 *Teacher:* How much on this one?
- 39 *Students:* Five.
- 40 *Teacher:* How much here?
- 41 *Students:* Four.
- 42 *Students:* Four.
- 43 *Teacher:* So how could you think about that for the tenth one?
- 44 *Student:* The –
- 45 *Teacher:* Can you imagine in your mind what it looks like?
- 46 *Student:* Yes.
- 47 *Student:* Yeah. No, no, no, no.
- 48 *Student:* The first and the last one is going to be –
- 49 *Students:* Five.
- 50 [*Crosstalk*]

- 51 Student: And the other one is going to be four.
- 52 *[Crosstalk]*
- 53 Student: In the middle.
- 54 Teacher: You should write about that, because that's what it says to do here. Without  
55 building the tenth train, write about how you find that perimeter. Can you write  
56 that?
- 57 Student: Yeah.
- 58 Student: Yes.
- 59 Teacher: Good. Go ahead.
- 60 Teacher: What did you do?
- 61 Student: The two—we did— the first two are going to five because it's just – it's just one  
62 because the first, the last one is five because they are just one with the first and  
63 the last one, and the other ones has two, and then we're going to be four.
- 64 Teacher: Okay. Can you come on up here? I want to – I want to post this on the board,  
65 and maybe you can come and point what you're talking about.
- 66 Student: I'm talking about those two numbers *(points to the first and last hexagon)*,  
67 because those has five, and the other one just has four in each one *(points to the*  
68 *two segments on the top and bottom of a hexagon)*. The number who – the  
69 every number who is it.
- 70 Teacher: Okay. So where did Daniel say he was getting a five from?
- 71 Student: The first one and the last one.
- 72 Teacher: Can you come point to the fives? Come on and point to where the fives are. You  
73 can stay here for a second, Daniel.
- 74 Student: Here and here *(points to the first and last hexagon)*.
- 75 Teacher: Okay. Show me where the five is in the first one. Can you – One, two, three, four,  
76 five. Okay. And show me where the five is in the last one.
- 77 Student: One, two, three, four, five. *(points to the sides of the hexagon)*
- 78 Teacher: Okay, show me where the five is in the last one?
- 79 Student: *(Student points to the five sides.)* One, two, three, four, five...

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- 80 *Teacher:* Do you understand what he's saying?
- 81 *Students:* Yes.
- 82 *Teacher:* Which train is this?
- 83 *[Crosstalk]*
- 84 *Student:* Ten.
- 85 *Student:* He said that here in the middle, on the hexagon that has four sides, and you  
86 know, the side (*points to the sides of the hexagon*), and the – yeah, right here  
87 and right here (*points to the hexagon at the beginning and end of the train*), that  
88 is the hexagon that has five sides.
- 89 *Teacher:* Aha. So how many of the hexagons have five side lengths?
- 90 *Student:* Five. Two.
- 91 *Teacher:* Two of them. And then how many of the hexagons have the four?
- 92 *[Crosstalk]*
- 93 *Student:* Eight.
- 94 *Students:* Eight.
- 95 *Student:* Because there is ten hexagons.
- 96 *Teacher:* Okay. So does Miguel have your idea pretty good?
- 97 *Students:* Yes.
- 98 *[End of Audio]*