Growing visual patterns

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. For the square train, find stage 4. [2 marks]



Stage 1 Stage 2 Stage 3

Stage 3 has 10; add 3.

Answer: 13 matchsticks.

2. For the square train, find stage 10. [2 marks]



Stage 1 Stage 2 Stage 3

$3\times10+1=31$.

Answer: 31 matchsticks.

3. A pattern follows $5n + 2$. Find stages 1 and 4. [2 marks]

5×1+2=7.

5×4+2=22.

Answer: 7 and 22.

4. Counts are 6,10,14,18 at stages 1,2,3,4 and keep rising by 4. Give a rule and stage 7. [3 marks]

4n gives 4 at stage 1, so add 2.

4×7+2=30.

Answer: $4n + 2$; 30 pieces.

5. Which rule matches 3,5,7,9 at stages 1,2,3,4: $2n + 1$ or $3n$? Explain. [2 marks]

At stage 2, 2n+1 gives 5 but 3n gives 6.

Answer: $2n + 1$.

6. Jai says the square train uses $4n$ sticks. Explain why this works at stage 1 but fails at stage 2. [3 marks]



Stage 1 Stage 2 Stage 3

Two separate squares need 8 sticks.

Joining them shares one stick, leaving 7.

Answer: Both give 4 at stage 1. Stage 2 uses 7, not 8, because one side is shared.