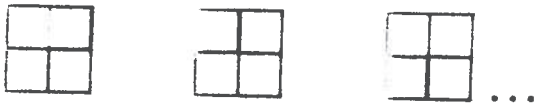
# Pattern Sleuthing

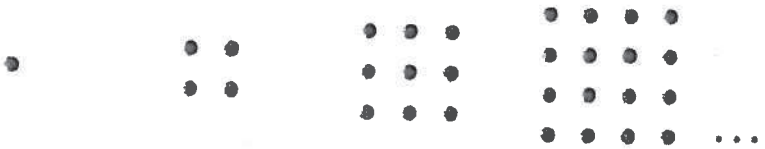
*A Mathematician, like a painter or a poet, is a maker of patterns. If his patterns are more permanent than theirs, it is because they are made with ideas.*

G. H. Hardy (number theorist)

Look for a pattern in each sequence of diagrams and draw the one that comes next. Explain the pattern that you find in each case.

1. 

2. 

3. 

4. 

Look for a pattern in each sequence. Describe the pattern that you discover. Then fill in the next three numbers.

5. 7, 14, 21, 28, ☐, ☐, ☐, ...
6. 3, 7, 11, 15, ☐, ☐, ☐, ...
7. 3, 6, 10, 15, ☐, ☐, ☐, ...
8. 1, 4, 9, 16, ☐, ☐, ☐, ...
9. 3, 8, 15, 24, ☐, ☐, ☐, ...
10. 2, 4, 8, 16, ☐, ☐, ☐, ...
11. 4, 6, 10, 18, ☐, ☐, ☐, ...
12. 2, 6, 12, 20, ☐, ☐, ☐, ...

## Extension

*Watch out for this one* ☛ 1, 1, 2, 3, 5, ☐, ☐, ☐, ...

Write an algebraic expression for the $n^{th}$ term for as many of the sequences from 5 to 12 as you can.