

# An Application of Inductive Reasoning: Number Patterns

## *Contemporary Math (MAT-130)*

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Use the method of successive differences to determine the next number in each sequence.

1. 1, 2, 7, 16, 29
2. 5, 8, 13, 20, 29
3. 1, 2, 10, 25, 47
4. 20, 30, 43, 59
5. 9, 14, 22, 38, 67, 114
6. 2, 3, 7, 19, 44
7. 3, 7, 16, 31, 53, 83
8. 3, 11, 21, 33, 47, 63, 81
9. 1, 2, 4, 7, 11, 16
10. 7, 10, 19, 38, 77, 152

Find the sum.

11.  $1+2+3+\dots+450$
12.  $1+2+3+\dots+800$
13.  $1+2+3+\dots+127$
14.  $2+4+6+\dots+200$
15.  $3+6+9+\dots+900$
16.  $4+8+12+\dots+1000$
17.  $1+3+5+\dots+49$
18.  $1+3+5+\dots+199$
19.  $1+3+5+\dots+799$
20.  $51+52+53+\dots+100$

Use the formulas for figurate numbers to find each of the following.

21. The 4<sup>th</sup> triangular number.
22. The 9<sup>th</sup> square number.
23. The 5<sup>th</sup> pentagonal number.
24. The 12<sup>th</sup> triangular number.
25. The 15<sup>th</sup> square number.
26. The 10<sup>th</sup> pentagonal number.
27. The 8<sup>th</sup> hexagonal number.
28. The 6<sup>th</sup> heptagonal number.
29. The 3<sup>rd</sup> octagonal number.

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**Solutions:**

1. 46
2. 40
3. 76
4. 78
5. 184
6. 87
7. 122
8. 101
9. 22
10. 285
11. 101475
12. 320400
13. 8128
14. 10100
15. 135450
16. 125500
17. 625
18. 10000
19. 160000
20. 3775
21. 10
22. 81
23. 35
24. 78
25. 225
26. 145
27. 120
28. 81
29. 21