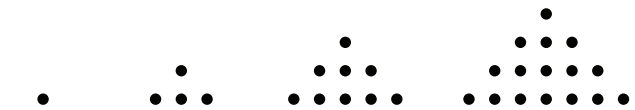
Patterns Stretch

11. _____ dots The first four stages of a dot pattern are shown. How many more dots are in the figure at Stage 47 than in the figure at Stage 27?



12. _____ The first three terms of a sequence are 1, 2 and 3. Each subsequent term is the sum of the three previous terms. What is the 11th term of this sequence?

13. _____ What is the sum of the terms in the arithmetic series $2 + 5 + 8 + 11 + 14 + \ldots + 89 + 92$?

14. _____ Three consecutive terms in an arithmetic sequence are x, $2x + 11$ and $4x - 3$. What is the constant difference between consecutive terms in this sequence?

15. _____ What is the sum of the terms in the geometric series $1 + 4 + 16 + \ldots + 1024$?

16. _____ What is the sum of the first 51 consecutive odd positive integers?

17. _____ What is the sum of the terms in the infinite series $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \ldots$?

18. _____ What is the sum of the terms in the infinite series $1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \frac{1}{256} + \ldots$? Express your answer as a common fraction.

19. _____ Let $f(x) = 2x + 3$ and $f^2(x) = f(f(x)) = f(2x + 3) = 2(2x + 3) + 3 = 4x + 9$. If $f^5(x) = ax + b$, what is the value of $a + b$?

20. _____ degrees The degree measures of the interior angles of a quadrilateral form a geometric sequence whose terms have integer values and are all integer multiples of the first term. What is the largest possible degree measure of an angle in this quadrilateral?