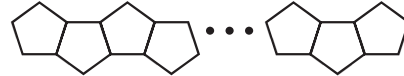


Patterns Stretch

The following problems are from previous School Handbooks and competitions. Enjoy!

1. _____ One digit of the decimal representation of $\frac{5}{7}$ will be chosen at random. What is the probability that the digit will be a 4? Express your answer as a common fraction. (1998 Chapter Countdown)

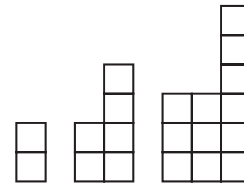
2. _____ inches A pentagon train is made by attaching regular pentagons with 1" sides so that each pentagon, except the two on the ends, is attached to exactly two other pentagons along sides, as shown. How many inches are in the perimeter of a pentagon train made from 85 pentagons? (1996 Chapter Target)



3. _____ What is the value of $x + y$ if the sequence 2, 6, 10, ..., x , y , 26 is an arithmetic sequence? ('04-'05 School Handbook)

4. _____ For what value of x is the equation $x + 2x + 3x + \dots + 99x + 100x = 100$ true? Express your answer as a common fraction. ('03-'04 School Handbook)

5. _____ blocks The first three towers in a sequence are shown. The n^{th} tower is formed by stacking n blocks on top of an n -by- n square of blocks. How many blocks are in the 99th tower? (1997 State Sprint)



6. _____ diagonals A diagonal of a polygon is a line containing two non-consecutive vertices. How many diagonals does a regular decagon have? ('02-'03 School Handbook)

7. _____ What is the value of the expression $\left(1 - \frac{1}{2}\right)\left(1 - \frac{1}{3}\right)\left(1 - \frac{1}{4}\right)\dots\left(1 - \frac{1}{n+1}\right)$ when $n = 12$? Express your answer as a common fraction. ('01-'02 School Handbook)

8. _____ The 25th day of the year 2003 fell on a Saturday. What day of the week did the 284th day of the year 2003 fall? (1995 State Countdown)

9. _____ If the pattern shown is continued, what is the sum of the terms in Row 12? ('00-'01 School Handbook)

Row 1 ... 2
 Row 2 ... 2 + 4
 Row 3 ... 2 + 4 + 6
 Row 4 ... 2 + 4 + 6 + 8
 Row 5 ... 2 + 4 + 6 + 8 + 10

10. _____

x	y
-4	23
1	20
6	17

According to the linear function represented in this table, what is the value of x when $y = 8$? ('04-'05 School Handbook)