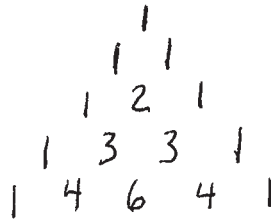
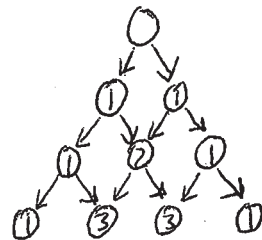


Pascal's Triangle

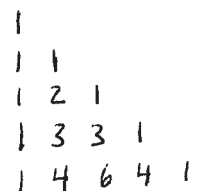


The French mathematician Blaise Pascal (1623-1662) wrote a book about this triangle, but it was known in many other cultures (e.g. Persian, Chinese) hundreds of years earlier.

- 1) Continue Pascal's Triangle as far as you can. Check line by line! Make a neat final copy.
- 2) Write the rule for forming the triangle.
- 3) What is the sum of the numbers in each row? Explain!
- 4) Can you find these in Pascal's Triangle: counting numbers, triangular numbers, tetrahedral numbers?
- 5) Do some research about Blaise Pascal and about this triangle in different cultures.
- 6) What kind of symmetry does Pascal's Triangle have?
- 7) Photocopy your finished triangle. Highlight all the odd numbers. What do you get?
- 8) Make a triangle without numbers but with one-way paths from the top down. In each circle fill in the total number of paths that lead down to that circle.
- 9) What is special about the prime numbered rows?
- 10) Calculate 11^0 ; 11^1 ; 11^2 ; 11^3 ; etc. What do you notice?
- 11) There are seven kids in your singing group. How many different trios could be formed? Where will you find the answer in Pascal's Triangle?
- 12) If you flip six coins, what is the probability of getting exactly two heads? How can you use Pascal's Triangle to get this answer?
- 13) Expand $(x+y)^0$, $(x+y)^1$, $(x+y)^2$, $(x+y)^3$, etc. How high can you go using Pascal's Triangle?
- 14) You can write Pascal's Triangle in a "left justified" format. This can help you find the Fibonacci numbers in Pascal's Triangle--if you look at things from a different angle.



Have fun!



Number Patterns

Can you guess the next two numbers in the following number patterns?

Can you find a rule?

Can you make a pattern of your own?

1. 2, 4, 6, 8, __, __
2. 12, 11, 10, 9, __, __
3. 1, 2, 4, 8, __, __
4. 5, 10, 15, 20, __, __
5. 1, 4, 7, 10, __, __
6. 1, 2, 3, 6, 7, 14, 15, __, __
7. 0, 1, 4, 9, 16, __, __
8. 0, 1, 3, 6, 10, 15, __, __
9. 0, 1, 1, 2, 3, 5, 8, __, __
10. 1, 3, 2, 6, 5, 15, __, __
11. 2, 3, 5, 7, 11, 13, 17, __, __
12. 1, 2, 2, 4, 8, 11, 33, 37, __, __
13. 1, 2, 6, 24, 120, __, __
14. 31, 28, 31, 30, 31, __, __
15. 1, 8, 27, 64, __, __
16. 1, 4, 27, 256, __, __
17. 2, 5, 10, 17, 26, __, __
18. 1, 4, 8, 13, 19, 26, __, __
19. 3, 2, 5, 7, 12, __, __
20. __, __, __, __, __, __