

Arithmetic with Polynomials - Worksheet 5

Answer Key

1. Use Pascal's Triangle to expand $(x + y)^5$.
 $(x+y)^5 = 1x^5 + 5x^4y + 10x^3y^2 + 10x^2y^3 + 5xy^4 + 1y^5$.
2. Write out all combinations of 2 x 's and 2 y 's.
 $xxxy, xyxy, yxyx, xyxy, yxyx, yyxx$.
 Pascal's Triangle tells us that $(x+y)^4 = x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$.
3. If you flip a coin 20 times, in how many ways can you get 7 heads?
 ${}_{20}C_7 = 4.83 \times 10^{14}$
4. Use Pascal's Triangle to expand $(2x - 3y)^4$.
 $(2x - 3y)^4 = 1(2x)^4 + 4(2x)^3(-3y) + 6(2x)^2(-3y)^2 + 4(2x)(-3y)^3 + 1(-3y)^4$.
5. A woman plans to have four children. Assuming each child is either male or female, write out all the different possibilities of having boys and girls in the different orders. How many possibilities is this?
 This is a total of $1 + 4 + 6 + 4 + 1 = 16$ possibilities.
6. A train has 15 cars, all of which are either red or blue. In how many ways can red and blue cars be ordered?
 $2^{15} = 32,768$ ways.
7. Explain why summing the n th row of Pascal's Triangle results in 2^n .
 Each number in the n th row of Pascal's Triangle is the number of combinations with k of one option and $n - k$ of the other (there are only two options). The total number of combinations is then the summation of that row. The calculation 2^n also represents this total number of combinations since there are 2 options out of n events.
8. What is the coefficient of x^3y^2 in the expansion of $(-x + 2y)^5$?
 The coefficient is -40.
9. In the expansion of $(-3a + 4b)^8$, which terms containing the following are possible - $a^2b^3, a^5b^3, ab^8, b^8, a^4b^4, a^8, ab^7, a^6b^5$.
 The only ones that work are a^5b^3, b^8, a^4b^4, a^8 , and ab^7 .
10. In the expansion of $(-3a + 4b)^8$, what is the probability of getting 5 a 's and 3 b 's?
 $\frac{56}{256} = 0.21875$.

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