

Calculate the following.

1. $P(7, 7)$

2. $P(7, 3)$

3. $C(10, 7)$

4. $\binom{12}{8}$

5. $\binom{32}{17}$

6. $\binom{3}{0} + \binom{3}{1} + \binom{3}{2} + \binom{3}{3}$

7. $\binom{4}{0} + \binom{4}{1} + \binom{4}{2} + \binom{4}{3} + \binom{4}{4}$

8. Expand: $(a + b)^3 = \binom{3}{0} a^3 b^0 + \binom{3}{1} a^2 b^1 + \binom{3}{2} a^1 b^2 + \binom{3}{3} a^0 b^3$

9. Expand:

$$(a + b)^4 = \binom{4}{0} a^4 b^0 + \binom{4}{1} a^3 b^1 + \binom{4}{2} a^2 b^2 + \binom{4}{3} a^1 b^3 + \binom{4}{4} a^0 b^4$$

$$(a+b)^n = \sum_{k=0}^n \binom{n}{k} a^{n-k} b^k = \binom{n}{0} a^n b^0 + \binom{n}{1} a^{n-1} b^1 + \cdots + \binom{n}{n-1} a^1 b^{n-1} + \binom{n}{n} a^0 b^n$$

10. Expand: $(x + 2y)^5$ using the binomial theorem

11. Find the $x^5 y^7$ term when $(x + 3y)^{12}$ is expanded.

12. Find the $x^3 y^{10}$ term when $(2x - y)^{13}$ is expanded.

13. A basketball player has a .85 free throw average. What is the probability that this player makes at least 8 out of 9 free throws in a game?

Hint: Let $h = .85$ and $m = .15$, the probability of missing and hitting a free throw. Then,

expand $(h + m)^9 = \sum_{k=0}^9 \binom{9}{k} h^{n-k} m^k$ and calculate the $h^8 m$ and h^9 terms.