

Show your work for the following:

1. Expand: $(a+b)^6$

$$a^6 + 6a^5b + 15a^4b^2 + 20a^3b^3 + 15a^2b^4 + 6ab^5 + b^6$$

2. Expand: $(2x-5y)^6$

$$64x^6 - 960x^5y + 6000x^4y^2 - 20000x^3y^3 + 37500x^2y^4 - 37500xy^5 + 15625y^6$$

3. Find the coefficient of the a^5 term in the expansion $(3a-b)^8$.

$${}^8C_3 \cdot (3a)^5 \cdot (-b)^3 = 312,741$$

4. Write the 5th term in the expansion $\left(\frac{c}{5} + 10d\right)^8$.

$${}^8C_4 \cdot \left(\frac{1}{5}c\right)^4 \cdot (10d)^4 = 1120c^4d^4$$

5. Write the term in the expansion of $(4c+2d)^6$ that contains c^4d^2 .

$${}^6C_2 \cdot (4c)^4 \cdot (2d)^2 = 15,360c^4d^2$$

6. In how many different ways can the subjects of math, English, government, & physics be scheduled during the first four periods of the school day?

$$4! = 24$$

7. The probability of drawing a red card from a standard deck of 52 cards is $\frac{1}{2}$. The probability of throwing a 4 on a die is $\frac{1}{6}$. What is the probability of drawing a red card and throwing a 4?

$$\frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$$

8. A letter is chosen at random from the "REGENTS." Find the probability that the letter chosen is an E.

$$\frac{2}{7}$$

9. From a standard deck of 52 cards, one card is drawn. What is the probability the card will either be an ace or a red king?

$$\frac{4}{52} + \frac{2}{52} = \frac{3}{26}$$

10. A gumball machine contains six yellow gumballs and 5 orange gumballs. What is the probability of obtaining, at random and without replacement, two yellow gumballs?

$$\frac{6}{11} \cdot \frac{5}{10} = \frac{3}{11}$$

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11. A pencil holder contains six blue pencils and three red pencils. If two pencils are drawn at random, what is the probability both are blue?

$$\frac{6}{9} \cdot \frac{5}{8} = \frac{5}{12}$$

12. The expression ${}_{11}C_2$ is equivalent to

- A. ${}_{11}P_2$ B. ${}_{11}C_9$ C. ${}_{11}P_9$ D. $\frac{11!}{2!}$ E. None of these.

13. A committee of 5 is to be chosen from 4 men & 3 women.

- a. What is the probability that the committee will consist of 2 men & 3 women?

$$\frac{{}_4C_2 \cdot {}_3C_3}{{}_7C_5} = \frac{6}{21}$$

- b. What is the probability that the committee will include all 4 men?

$$\frac{{}_4C_4 \cdot {}_3C_1}{{}_7C_5} = \frac{1}{7}$$

- c. What is the probability that the committee will consist of men only?



14. Simplify the following expressions:

a. $\frac{x^2 - 8x + 12}{3x^2 - 12} \cdot \frac{2}{x - 6}$

$$\frac{2}{3(x+2)}$$

b. $\frac{2x}{x+3} + \frac{x-3}{x-5}$

$$\frac{3x^2 - 10x - 9}{(x+3)(x-5)}$$

15. What is the remainder when a polynomial, $p(x)$, is divided by $x - 96$?

$$p(96)$$