

1. Expand out $(2y^2 - 3)^4$.

$$4C_0(2y^2)^4(-3)^0 + 4C_1(2y^2)^3(-3)^1 + 4C_2(2y^2)^2(-3)^2 + 4C_3(2y^2)^1(-3)^3 + 4C_4(2y^2)^0(-3)^4$$

$$1(16y^8) + 4(8y^6)(-3) + 6(4y^4)(9) + 4(2y^2)(-27) + 1(81)$$

$$16y^8 - 96y^6 + 216y^4 - 216y^2 + 81$$

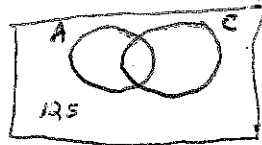
2. Find the coefficient of y^4 in $(3y + 2)^{10}$.

$$10C_6(3y)^4(2)^6$$

$$210 \cdot 81y^4 \cdot 64$$

$$1088640y^4$$

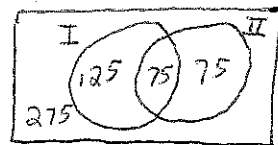
3. In a consumer survey of 500 people, 200 indicated that they would be buying a major appliance within the next month; 150 indicated that they would buy a car, and 125 said that they would not be making any major purchases within the next month. How many people will purchase both a major appliance and a car? Show the Venn Diagram.



$$P(A \cup C) = P(A) + P(C) - P(A \cap C)$$

$$375 = 200 + 150$$

4. In a student survey, 200 indicated that they would attend Summer Session I and 150 indicated that they would attend Summer Session II. If 75 students plan to attend both summer sessions and 275 indicated that they would attend neither session, how many students participated in the survey? Show the Venn Diagram.



$$550$$

5. In the National Baseball League, the pitcher usually bats ninth. If this is the case, how many batting orders is it possible for a manager to use?

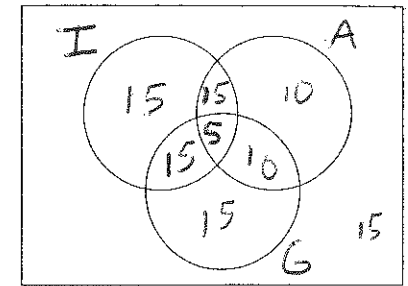
$$8!$$

$$\underline{8} \cdot \underline{7} \cdot \underline{6} \cdot \underline{5} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1} =$$

$$40320$$

6. In a survey of 100 investors in the stock market:

- 50 owned shares of IBM
- 40 owned shares of AT&T
- 45 owned shares of GE
- 20 owned shares of IBM and GE
- 15 owned shares of AT&T and GE
- 20 owned shares of IBM and AT&T
- 5 owned shares of all three



- a. How many of the investors surveyed did not have shares in any of the three companies?

$$15$$

- b. How many owned just IBM shares?

$$15$$

- c. How many owned just GE shares?

$$15$$

- d. How many owned neither IBM nor GE shares?

$$25$$

- e. How many owned either IBM or AT&T but not GE shares?

$$40$$

7. How many six digit numbers can be formed if you can't start with zero, the second number must be odd and the last number has to be divisible by 3 but not 0?

$$9 \cdot 5 \cdot 10 \cdot 10 \cdot 10 \cdot 3 = 135000$$

8. How many seven digit numbers (not starting with zero) have at least ^{one} 3's?

$$9 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 - 8 \cdot 999999 = 474840$$

9. In how many ways can a committee of 4 students be formed from a pool of 7 students?

$$7C_4 = 35$$

10. How many ways can you answer a multiple-choice test with 5 questions, each of which has 4 possible answers and you could omit questions?

$$5^3 =$$

3125

11. How many different license plate numbers can be made using 4 digits followed by 4 letters if:
a. Letters and digits may be repeated?

$$10 \cdot 10 \cdot 10 \cdot 10 \cdot 26 \cdot 26 \cdot 26 \cdot 26$$

$$4569760000$$

- b. Letters may be repeated, but digits may not be repeated?

$$10 \cdot 9 \cdot 8 \cdot 7 \cdot 26^4$$

$$2303159040$$

- c. Neither letters nor digits may be repeated?

$$10 \cdot 9 \cdot 8 \cdot 7 \cdot 26 \cdot 25 \cdot 24 \cdot 23$$

$$1808352000$$

12. How many ways can 7 people sit in a row of 5 desks?

$$\frac{7!}{2!} = 2520$$

13. 100 people participate in a raffle. Each person can only win once. How many ways can 10 regular prizes, 2 runner up prizes and 1 grand prize be given out?

~~100!~~

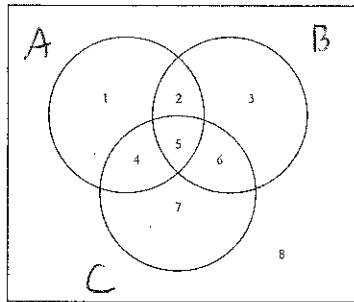
$$\frac{100!}{87! \cdot 10! \cdot 2!}$$

14. Shade the appropriate regions.

$$(\overline{A \cup C}) \cap (B \cup \overline{C})$$

$$3, 8 \quad 2, 3, 5, 6, 1, 8$$

$$3, 8$$



15. How many permutations are there of the letters in the word DEFINITION.

$$\frac{10!}{2!3!}$$

16. How many ways can the letters be rearranged in the word

- a) GREAT

$$5!$$

- b) GREET

$$\frac{5!}{2!}$$

- c) Are they the same or different? Why or why not?

Different

repeated letters.

17. a) How many 4-digit numbers have no 1's or 2's?

$$8^4 = 4096$$

- b) How many 4-digit numbers have at least one 1 or 2?

$$10^4 - 8^4 =$$

18. If there are 7 people in a meeting, how many handshakes will occur if every person shakes hands with each other?

$$6 + 5 + 4 + 3 + 2 + 1$$

$$21$$

19. How many ways can you vote for one or none of the following choices for each position; 3 presidents, 4 senators and 2 county clerks.

$$4 \cdot 5 \cdot 3 = 60$$

20. Expand $(x^3 - 2y^2)^3$

$$\begin{aligned} & {}^3C_0 (x^3)^3 (-2y^2)^0 + {}^3C_1 (x^3)^2 (-2y^2)^1 + {}^3C_2 (x^3)^1 (-2y^2)^2 + {}^3C_3 (x^3)^0 (-2y^2)^3 \\ & x^9 + 3(x^6)(-2y^2) + 3(x^3)(4y^4) + (-8y^6) \\ & x^9 - 6x^4y^2 + 12x^3y^4 - 8y^6 \end{aligned}$$