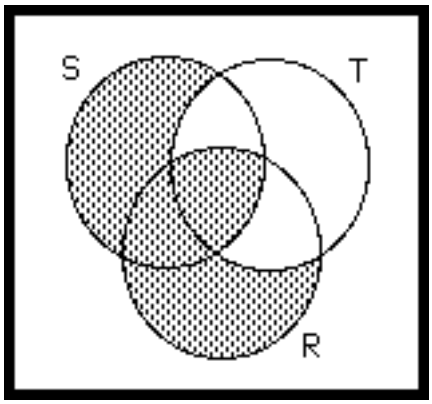
1. Let U = {1,2,3,4,5,6,7,8,9}
   Let A = {3,6,9}
   Let B = {3,4,5,6,7}
   What is $A' \cup B'$

a. {3,4,5,6,7,9} b. {3,6} c. {1,2,4,5,7,8,9}

d. {4,5,7,9} e. $\varnothing$

2. Which of the following is the set-theoretic expression describing the shaded region of the Venn diagram?



a. $S \cap R \cap T'$ b. $(S \cap T') \cup R$

c. $R \cap T'$ d. $(T \cap R) \cup S$ e. $(S \cup R) \cap T$

3. $n(S \cup T) = 12$, $n(S \cap T) = 2$, $n(T) = 3$
What is $n(S' \cap T)$?

a. 1 b. 9 c. 7 d. 5 e. 11

4. If $n(U) = 55$, $n(A') = 25$, $n(B') = 20$, and $n(A \cap B) = 15$, then what is $n(A \cup B)$?

a. 30 b. 45 c. 40 d. 35 e. 50

5. A group of 100 people touring Europe includes 40 people who speak French, 55 who speak German, and 15 who speak neither language. How many people in the group speak both French and German?

a. 25 b. 35 c. 15 d. 10 e. 5

6. 100 students were asked which movies they had seen recently. Results indicated that 50 saw "The Fugitive", 30 saw "Rising Sun" and 35 saw "The Firm". 15 saw both "The Fugitive" and "Rising Sun", 15 saw "The Fugitive" and "The Firm", and 10 saw "Rising Sun" and "The Firm". Finally, 10 saw "The Fugitive" and "The Firm" but not "Rising Sun". How many did not see any of the three movies?

a. 5 b. 20 c. 15 d. 10 e. 50

7. In how many ways can a president, vice president and secretary be chosen from a committee of 7 people?

a. 35 b. 343 c. 70 d. 210 e. 21

8. A company has 7 senior and 5 junior officers. An ad hoc legislative committee is to be formed. In how many ways can a 4-officer committee be formed so that there is at most 1 junior officer?

a. 210 b. 175 c. 140 d. 75 e. 35

9. A catering service offers 8 appetizers, 10 main courses, and 7 desserts. A banquet committee is to select 3 appetizers, 4 main courses and 2 desserts. How many ways can this be done?

a. $8 \cdot 10 \cdot 7$ b. $P(8,3) \cdot P(10,4) \cdot P(7,2)$

c. $C(8,3) \cdot C(10,4) \cdot 2$ d. $3 \cdot 4 \cdot 2$ e. $\binom{8}{3}\binom{10}{4}\binom{7}{2}$

10. From a standard 52 card deck, how many 7 card hands have exactly 5 cards from one suit and 2 cards from a different suit?

a. $\binom{13}{5}\binom{13}{2}$ b. $\binom{52}{5}\binom{47}{2}$ c. $\binom{13}{5} \cdot 4 \cdot \binom{13}{2} \cdot 3$

d. $\binom{13}{5} \cdot 4$ e. $\binom{13}{5} \cdot 4 + \binom{13}{2} \cdot 3$

11. The coefficient of $x^3 y^6$ in the expansion of $(x+y)^9$ is

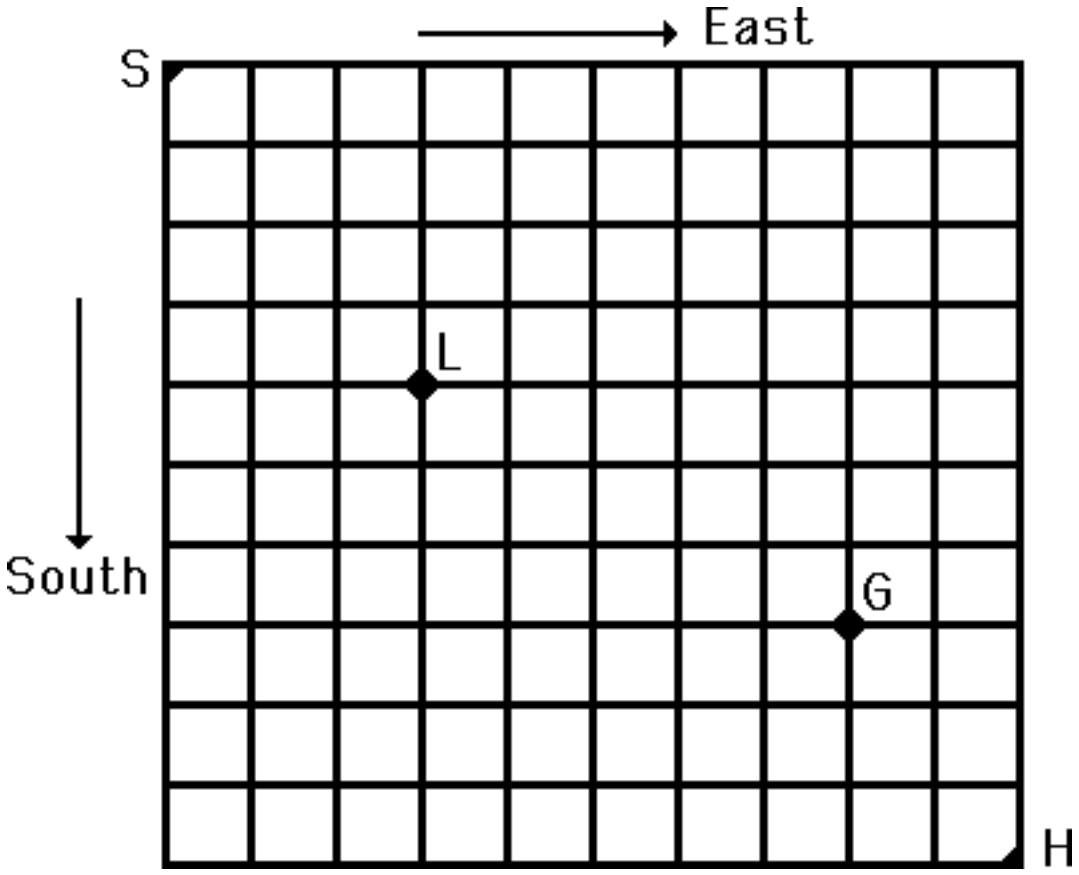
a. 84 b. 126 c. 36 d. 9 e. 18

12. A truck driver has to deliver milk to 10 stores in 3 towns. There are 3 stores in one town, 2 in another and 5 in the third. The driver wants to make all of the stops in one town before going on to another. In how many different ways can the driver plan the route?

a. 3! 2! 5! 3 b. 3! 2! 5! c. 3! 2! 5! 3!

d. $(3! + 2! + 5!) \cdot 3$ e. $(10 \cdot 9 \cdot 8)(7 \cdot 6) \cdot 5!$

13.



Mark is walking from his school at S to his home at H. He must stop at the Library at L and the Grocery at G. Assume he only walks south and east. How many different routes can he choose in walking home?

a. $\binom{7}{3} + \binom{8}{3} + \binom{5}{3}$

b. $\binom{7}{3}\binom{8}{3}\binom{5}{3}$

c. $\binom{20}{10}$

d. $\binom{7}{3}\binom{7}{4} + \binom{8}{3}\binom{8}{5} + \binom{5}{3}\binom{5}{2}$

e. $P(7,3) \cdot P(8,3) \cdot P(5,3)$

14. Eight students take an exam. Assume that at least one student passes the exam but not all of the students pass the exam. How many different possibilities are there for the set of students who pass the exam?

a. 253 b. 255 c. 256 d. 254 e. 6

15. Nine students are divided up for physical education. Three will play tennis, three will sail and three will do weight training. How many divisions are possible?

a. $\frac{9!}{(3!)^3}$ b. $\frac{9!}{(3!)^3\ 3!}$ c. $\frac{9!}{3!}$ d. $\frac{9!}{(3!)^4}$ e. $\frac{(9!)}{(3^3)!}$

16. Two dice are tossed. The event A is that the sum is odd. The event B is that at least one of the numbers is even. The event C is that both numbers are the same. Which of the following pairs are mutually exclusive events?

a. B and C b. A and B c. A and C

d. all pairs of events. e. no pairs of events.

17. Three cards are drawn (without replacement) from a standard deck of 52 cards and the order of the selection is recorded. How large is the sample space?

a. $\frac{52!}{3!}$ b. $52 \cdot 51 \cdot 50$ c. 52^3 d. $52 \cdot 3$ e. $\binom{52}{3}$

18. If the probability is $\frac{4}{13}$ that a shipment of laboratory supplies will arrive on time, what are the odds that it will not arrive on time?

a. 9:4 b. 13:4 c. 13:17 d. 4:13 e. 9:13

19. A pair of dice is tossed. What is the probability of **not** getting 9, 10 or doubles?

a. $\frac{13}{36}$ b. $\frac{12}{36}$ c. $\frac{10}{36}$ d. $\frac{24}{36}$ e. $\frac{23}{36}$

20. Ten sets of triplets attend a reunion. They choose a committee of 4 to plan the activities. No more than one person can come from each set of triplets. How many committees are possible?

a. C(30,4) 3! b. C(30,4) c. C(10,4) · 3

d. 4^{10}

e. $C(10,4) \cdot 3^4$