Answers

ANSWERS 1.1

1. $5! = 120$
2. $\dfrac{5!}{2!\cdot 2!} = 30$
3. $\dfrac{1\cdot 7!}{4!\cdot 2!} = 105$
4.
(a) $5\cdot 5\cdot 5 = 125$
(b) $5\cdot 4\cdot 3 = 60$
5. $21\cdot 21\cdot 21\cdot 9\cdot 10\cdot 10 = 8\ 334\ 900$
6.
(a) $6\cdot 7\cdot 7 = 294$
(b) $6\cdot 7\cdot 3 = 126$
(c) $6\cdot 7\cdot 2 = 84$
7.
(a) $6\cdot 6\cdot 5 = 180$
(b) $5\cdot 5\cdot 3 = 75$ (First choose the last digit.)
(c) $5\cdot 5\cdot 1 = 25$ end in 5 and $6\cdot 5\cdot 1 = 30$ end in 0 for a total of 55.
8. $(6-1)! = 120$
9. $\dfrac{(7-1)!}{2} = 360$
10. ${}_7C_4 = 35$
11. ${}_{10}C_2 = 45$ (It takes a set of 2 teams to make a game.)
12. ${}_9C_3 = 84$ (It takes a set of 3 points to form a triangle.)
13. $\dfrac{11!}{2!\cdot 7!\cdot 2!} = 1980$
14. $6(3!)(5!) = 4320$ (The girls can be together in any one of 6 different clusters. Within each cluster, they can be arranged in 3! ways. The boys can be arranged in the remaining 4 positions in 4! ways.)
15. $1(2!)(3!) = 12$ (Person A must be seated. Then B and C can be arranged about A in 2! ways. The remaining 3 people can be arranged in 3! ways.)
16. ${}_4C_3\cdot{}_4C_1 + {}_4C_4\cdot{}_4C_0 = 17$ (There could be 3 girls and 1 boy or 4 girls and 0 boys.)
17.
(a) ${}_7C_3 = 35$
(b) ${}_6C_2\cdot{}_4C_1 = 60$
(c) ${}_{10}C_3 = 120$
18.
(a) ${}_{26}C_{10} = 5\ 311\ 735$
(b) ${}_{26}C_5\cdot{}_{26}C_5 = 4\ 327\ 008\ 400$
(c) ${}_{39}C_{10} = 635\ 745\ 396$
(d) ${}_{13}C_4\cdot{}_{13}C_4\cdot{}_{13}C_2 = 39\ 875\ 550$
(e) ${}_{40}C_{10} = 847\ 660\ 528$
19. ${}_6C_3\cdot{}_3C_2\cdot 5! = 7200$
20.
(a) ${}_4C_3\cdot{}_4C_2\cdot 5! = 2880$
(b) ${}_1C_1\cdot{}_3C_2\cdot{}_4C_2\cdot\underline{4}\cdot\underline{3}\cdot\underline{2}\cdot\underline{1}\cdot\underline{1} = 432$
21. ${}_5C_1+{}_5C_2+{}_5C_3+{}_5C_4+{}_5C_5 = 31$ (You can leave a set of any 1 of 5 coins or a set of any 2 of 5 coins etc.)
22. We can make $\underline{4}\cdot\underline{3}\cdot\underline{1}\cdot\underline{2}\cdot\underline{1} = 24$ arrangements that contain no C's. We can make $1\cdot 1\cdot{}_4C_3\cdot\underline{4}\cdot\underline{3}\cdot\underline{1}\cdot\underline{2}\cdot\underline{1} = 96$ arrangements that contain a C, a B in the middle position and 3 more letters from {U,I,A,L}. We can make ${}_2C_2\cdot 1\cdot{}_4C_2\cdot\dfrac{\underline{4}\cdot\underline{3}\cdot\underline{1}\cdot\underline{2}\cdot\underline{1}}{2!} = 72$ arrangements that contain 2 C's, and a B in the middle position. Thus there is a total of 192 arrangements.
23. Certainly they were not out of numbers. With only 1 million people in the province, each person would have to be driving 8 vehicles (including children). Clearly it was a decision to indicate that a change in the license plate had been made. Everyone with digits first has the logo.
24. There are $\dfrac{12!}{3!\cdot 3!\cdot 3!\cdot 3!} = 369\ 600$ different routes. It would take $\dfrac{369\ 600}{365}$ or 1012.6 years. You would never be more than 6 blocks from your house.