S.CP.B.9: Permutations 1

1 A four-digit serial number is to be created from the digits 0 through 9. How many of these serial numbers can be created if 0 can *not* be the first digit, no digit may be repeated, and the last digit must be 5?
1) 448 2) 504 3) 2,240 4) 2,520

2 How many different four-letter arrangements can be made from the letters in the word "CHAIRS," if the same letter may be used only once?
1) 360 2) 420 3) 720 4) 840

3 How many different six-letter arrangements can be made using the letters of the word "TATTOO"?
1) 60 2) 90 3) 120 4) 720

4 How many different 11-letter arrangements are possible using the letters in the word "ARRANGEMENT"?
1) 2,494,800 2) 4,989,600 3) 19,958,400
4) 39,916,800

5 What is the total number of different nine-letter arrangements that can be formed using the letters in the word "TENNESSEE"?
1) 3,780 2) 15,120 3) 45,360 4) 362,880

6 How many distinct ways can the eleven letters in the word "TALLAHASSEE" be arranged?
1) 831,600 2) 1,663,200 3) 3,326,400
4) 5,702,400

7 The Mathematics Club will select a president, a vice president, and a treasurer for the club. If there are 15 members in the club, how many different selections of a president, a vice president, and a treasurer are possible if each club member can be selected to only one position?
1) 42 2) 455 3) 2730 4) 3375

8 John is going to line up his four golf trophies on a shelf in his bedroom. How many different possible arrangements can he make?
1) 24 2) 16 3) 10 4) 4

9 How many different three-letter arrangements can be formed using the letters in the word *ABSOLUTE* if each letter is used only once?
1) 56 2) 112 3) 168 4) 336

10 How many different four-letter arrangements are possible with the letters G, A, R, D, E, N if each letter may be used only once?
1) 15 2) 24 3) 360 4) 720

11 How many different ways can five books be arranged on a shelf?
1) 5 2) 15 3) 25 4) 120

12 There are 18 students in a class. Each day, the teacher randomly selects three students to assist in a game: a leader, a recorder, and a timekeeper. In how many possible ways can the jobs be assigned?
1) 306 2) 816 3) 4896 4) 5832

13 How many different seven-letter arrangements of the letters in the word *HEXAGON* can be made if each letter is used only once?
1) 28 2) 49 3) 720 4) 5040

14 How many different 6-letter arrangements can be formed using the letters in the word "ABSENT," if each letter is used only once?
1) 6 2) 36 3) 720 4) 46,656

15 How many different 4-letter arrangements can be formed using the letters of the word "JUMP," if each letter is used only once?
1) 24 2) 16 3) 12 4) 4

16 How many different five-digit numbers can be formed from the digits 1, 2, 3, 4, and 5 if each digit is used only once?
1) 120 2) 60 3) 24 4) 20

17 A locker combination system uses three digits from 0 to 9. How many different three-digit combinations with no digit repeated are possible?
1) 30 2) 504 3) 720 4) 1,000

18 How many different two-letter arrangements can be formed using the letters in the word "BROWN"?
1) 10 2) 12 3) 20 4) 25

19 Julia has four different flags that she wants to hang on the wall of her room. How many different ways can the flags be arranged in a row?
1) 1 2) 10 3) 16 4) 24

20 What is the total number of different four-letter arrangements that can be formed from the letters in the word "VERTICAL," if each letter is used only once in an arrangement?
1) 8 2) 1,680 3) 6,720 4) 40,320

21 What is the total number of different seven-letter arrangements that can be formed using the letters in the word "MILLION"?
1) 30 2) 210 3) 1,260 4) 2,520

22 Which value is equivalent to ${}_3P_3$?
1) 1 2) 9 3) 3! 4) 27

23 Which formula can be used to determine the total number of different eight-letter arrangements that can be formed using the letters in the word *DEADLINE*?
1) 8! 2) $\frac{8!}{4!}$ 3) $\frac{8!}{2!+2!}$ 4) $\frac{8!}{2!\cdot 2!}$

24 Which expression represents the total number of different 11-letter arrangements that can be made using the letters in the word "MATHEMATICS"?
1) $\frac{11!}{3!}$ 2) $\frac{11!}{2!+2!+2!}$ 3) $\frac{11!}{8!}$ 4) $\frac{11!}{2!\cdot 2!\cdot 2!}$

25 The number of possible different 12-letter arrangements of the letters in the word "TRIGONOMETRY" is represented by
1) $\frac{12!}{3!}$ 2) $\frac{12!}{6!}$ 3) $\frac{{}_{12}P_{12}}{8}$ 4) $\frac{{}_{12}P_{12}}{6!}$

26 Which expression represents the number of different 8-letter arrangements that can be made from the letters of the word "SAVANNAH" if each letter is used only once?
1) $\frac{8!}{5!}$ 2) $\frac{8!}{3!2!}$ 3) ${}_8P_5$ 4) 8!

27 The bowling team at Lincoln High School must choose a president, vice president, and secretary. If the team has 10 members, which expression could be used to determine the number of ways the officers could be chosen?
1) ${}_3\mathrm{P}_{10}$ 2) ${}_7\mathrm{P}_3$ 3) ${}_{10}\mathrm{P}_3$ 4) ${}_{10}\mathrm{P}_7$

28 Erica cannot remember the correct order of the four digits in her ID number. She does remember that the ID number contains the digits 1, 2, 5, and 9. What is the probability that the first three digits of Erica's ID numbers will all be odd numbers?
1) $\frac{1}{4}$ 2) $\frac{1}{3}$ 3) $\frac{1}{2}$ 4) $\frac{3}{4}$

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Answer Section

1 ANS: 1
$8 \times 8 \times 7 \times 1 = 448$. The first digit cannot be 0 or 5. The second digit cannot be 5 or the same as the first digit. The third digit cannot be 5 or the same as the first or second digit.

REF: 011125a2

2 ANS: 1
${}_6P_4 = 360$

REF: 011723a2

3 ANS: 1
$\frac{{}_6P_6}{3!2!} = \frac{720}{12} = 60$

REF: 011324a2

4 ANS: 1
$\frac{{}_{11}P_{11}}{2!2!2!2!} = \frac{39,916,800}{16} = 2,494,800$

REF: 011518a2

5 ANS: 1
$\frac{{}_9P_9}{4! \cdot 2! \cdot 2!} = \frac{362,880}{96} = 3,780$

REF: 061511a2

6 ANS: 1
$\frac{{}_{11}P_{11}}{3!2!2!2!} = \frac{39,916,800}{48} = 831,600$

REF: 081512a2

7 ANS: 3
${}_{15}P_3 = 2730$

REF: 061607a2

8 ANS: 1
${}_4P_4 = 4 \times 3 \times 2 \times 1 = 24$

REF: 080816ia

9 ANS: 4
${}_8P_3 = 336$

REF: 061026ia

10 ANS: 3
${}_6P_4 = 360$

REF: 081028ia
11 ANS: 4
${}_5P_5 = 5 \times 4 \times 3 \times 2 \times 1 = 120$

REF: 061109ia
12 ANS: 3
${}_{18}P_3 = 4896$

REF: 061328ia
13 ANS: 4
${}_7P_1 = 5040$

REF: 011527ia
14 ANS: 3
${}_6P_6 = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$

REF: 089917a
15 ANS: 1
${}_4P_4 = 4 \times 3 \times 2 \times 1 = 24$

REF: 010013a
16 ANS: 1
${}_5P_5 = 5 \times 4 \times 3 \times 2 \times 1 = 120$

REF: 060016a
17 ANS: 3
${}_{10}P_3 = 10 \times 9 \times 8 = 720$

REF: 010114a
18 ANS: 3
${}_5P_2 = 20$

REF: 010925a
19 ANS: 4
${}_4P_4 = 4 \times 3 \times 2 \times 1 = 24$

REF: 080616a
20 ANS: 2
${}_8P_4 = 1680$

REF: 060723a

21 ANS: 3

$$\frac{{}_7P_7}{2!\cdot 2!} = \frac{5040}{4} = 1260$$

REF: 010829a

22 ANS: 3 REF: 010713a

23 ANS: 4 REF: fall0925a2

24 ANS: 4 REF: 011409a2

25 ANS: 3

$2!\cdot 2!\cdot 2! = 8$

REF: 061425a2

26 ANS: 2

Make an adjustment to reflect that "A" appears three times and "N" appears twice by dividing by 3! and 2!.

REF: 080727a

27 ANS: 3 REF: 060808ia

28 ANS: 1

$$\frac{3!}{4!} = \frac{6}{24} = \frac{1}{4}$$

REF: spring9820a