

# Lesson 4 Solutions

$$\textcircled{1} \quad \frac{4}{\text{Cons.}} \frac{5}{\text{}} \frac{4}{\text{}} \frac{3}{\text{}} \frac{2}{\text{}} \frac{1}{\text{}} \frac{3}{\text{Vowel.}}$$

$$= 1440 \text{ ways}$$

$$\textcircled{\text{OR}} \quad 4P_1 \times 5P_5 \times 3P_1$$

$$= 4 \times 120 \times 3$$

$$= 1440 \text{ ways}$$

$$\textcircled{2} \quad \frac{7}{W} \cdot \frac{8}{\text{}} \cdot \frac{7}{\text{}} \cdot \frac{6}{\text{}} \cdot \frac{5}{\text{}} \cdot \frac{4}{\text{}} \cdot \frac{3}{\text{}} \cdot \frac{2}{\text{}} \cdot \frac{1}{\text{}} \cdot \frac{6}{W}$$

$$= 1,693,440$$

$$\textcircled{\text{OR}} \quad 7P_1 \times 8P_8 \times 6P_1$$

$$= 7 \times 40320 \times 6$$

$$= 1,693,440$$

$$\textcircled{3} \quad 9! \cdot 4! = 8,709,120$$

arrange ↑ group plus 8 ppl.  
arranging ↑ the 4 ppl in a group

$$\textcircled{4} \quad \frac{3}{P} \frac{13}{\text{}} \frac{12}{\text{}} \frac{11}{\text{}} \frac{10}{\text{}} \frac{9}{\text{}} \frac{8}{\text{}} \frac{7}{\text{}} \frac{6}{\text{}} \frac{5}{\text{}} \frac{4}{\text{}} \frac{3}{\text{}} \frac{2}{\text{}} \frac{1}{\text{}}$$

$$= 1.868 \times 10^{10}$$

$$\textcircled{\text{OR}} \quad 3P_1 \times 13P_{13}$$

$$= 3 \times 6227020,800$$

$$= 1.868 \times 10^{10}$$

3 teachers, 2 parents, 5 children

$$\textcircled{5} \quad \text{a) } 10! = 3,628,800$$

$$\text{b) } 3! \cdot 3! \cdot 2! \cdot 5! = 8640$$

arr ↑ 3 groups  
arr ↑ teachers  
arr. ↑ parents  
arr children

c) parents together

$$\begin{array}{c}
 \nearrow \text{arr.} \\
 9! \cdot 2! = 725,760 \text{ ways} \\
 \nwarrow \text{arr.} \\
 \text{1 group of} \\
 \text{parents} \\
 \text{plus} \\
 \text{8 other} \\
 \text{PPl.}
 \end{array}$$

d)  $6! \cdot 5! = 86,400$  ways

e) 1

b)

a)  $\underline{69} \underline{69} \underline{69} \underline{69} \underline{69} \underline{69} \underline{69} \underline{69} = 69^8 = 5.138 \times 10^{14}$

c)

a)  $\underline{26} \underline{69} \underline{69} \underline{69} \underline{69} \underline{69} \underline{69} \underline{69} \underline{7} = 69^6 \times 26 \times 7 = 1.964 \times 10^{13}$

lower case      spec. character

7) a)  $\underline{26} \underline{26} \underline{26} \underline{10} \underline{10} \underline{10} = 26^3 \cdot 10^3 = 17,576,000$

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b)  $\underline{24} \underline{26} \underline{26} \underline{9} \underline{10} \underline{10} = 14,601,600$

not C or X      not Ø

8) CASE 1: start w/ A  $\rightarrow \frac{1}{A} \cdot \frac{24}{\text{Vowel}} \cdot \frac{4}{\text{Vowel}} = 96$

CASE 2: start w/ B  $\rightarrow \frac{1}{B} \cdot \frac{24}{\text{Vowel}} \cdot \frac{5}{\text{Vowel}} = 120$

CASE 3: start w/ C  $\rightarrow \frac{1}{C} \cdot \frac{24}{\text{Vowel}} \cdot \frac{5}{\text{Vowel}} = 120$

total  
 $= 96 + 120 + 120$   
 $= 336$  ways.

$$(9) a) \underline{8} \cdot \underline{7} \cdot \underline{6} \cdot \underline{5} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1}$$

$$= 8!$$

$$= 40,320 \text{ ways}$$

(b) Vowels together

MAGNETIC

$$6! 3!$$

$$= 4320 \text{ ways}$$

(10)

CASE 1:

$$\text{Start w/ Red} \quad \underline{1} \quad \underline{6} \quad \underline{5} \quad \underline{4} \quad \underline{3} \quad \underline{2} \quad \underline{1} \quad \underline{2} = 1440$$

Red Pink or Blue

CASE 2

$$\text{Start w/ Green} \quad \underline{1} \quad \underline{6} \quad \underline{5} \quad \underline{4} \quad \underline{3} \quad \underline{2} \quad \underline{1} \quad \underline{2} = 1440$$

Green Pink or Blue

CASE 3:

$$\text{Start w/ Blue} \quad \underline{1} \quad \underline{6} \quad \underline{5} \quad \underline{4} \quad \underline{3} \quad \underline{2} \quad \underline{1} \quad \underline{1} = 720$$

Blue Pink or Blue

$$\text{Total} = 3600.$$

$$(11) \text{ All possibilities} = 7! = 5040$$

$$2 \text{ friends sit together} = 6! 2! = 1440$$

$$2 \text{ friends apart} = 5040 - 1440 = 3600 \text{ ways}$$

$$(12) \text{ CASE 1: } \underline{1} \quad \underline{4} \quad \underline{3} \quad \underline{2} \quad \underline{1} \quad \underline{1} = 24$$

Start w/ A    A vowel

$$\text{CASE 2: } \underline{1} \quad \underline{4} \quad \underline{3} \quad \underline{2} \quad \underline{1} \quad \underline{2} = 48$$

Start w/ L    L vowel

$$\text{Case 3} \quad \underline{1} \quad \underline{4} \quad \underline{3} \quad \underline{2} \quad \underline{1} \quad \underline{2} = 48$$

Start w/ N    N vowel

$$\text{Total} = 120$$

13) CASE 1:  $\underline{6} \underline{5} \underline{4} \underline{3} = 360$   
 4 letter password

CASE 2  $\underline{6} \underline{5} \underline{4} \underline{3} \underline{2} = 720$   
 5 letter password

} total 1080

14) a)  $12! = 479,001,600$   
 b)  $10! \cdot 3! = 21,772,800$

15)

must start w/ 6, 7, 8, 9

must end w/ 1, 3, 5, 7, 9

CASES 1:  $\underline{1} \underline{7} \underline{6} \underline{5} \underline{5} = 1050$   
 Start w/ 6  $\underline{6}$  end w/ 1, 3, 5, 7, 9

CASE 2:  $\underline{1} \underline{7} \underline{6} \underline{5} \underline{4} = 840$   
 Start w/ 7  $\underline{7}$  end w/ 1, 3, 5, 7, 9

CASE 3:  $\underline{1} \underline{7} \underline{6} \underline{5} \underline{5} = 1050$   
 Start w/ 8  $\underline{8}$  end w/ 1, 3, 5, 7, 9

CASE 4:  $\underline{1} \underline{7} \underline{6} \underline{5} \underline{4} = 840$   
 Start w/ 9  $\underline{9}$  end w/ 1, 3, 5, 7, 9

} total 3780