Review Lessons 10.1 – 10.3 Worksheet

Name: KEY

For the given configuration, determine how many different license plates are possible if (a) digits and letters can be repeated, and (b) digits and letters cannot be repeated.

1.) 2 letters followed by 3 digits

a.) $\frac{26}{L} \cdot \frac{26}{L} \cdot \frac{10}{\#} \cdot \frac{10}{\#} \cdot \frac{10}{\#}$

$= \boxed{676{,}000 \text{ plates}}$

b.) $\frac{26}{L} \cdot \frac{25}{L} \cdot \frac{10}{\#} \cdot \frac{9}{\#} \cdot \frac{8}{\#}$

$= \boxed{468{,}000 \text{ plates}}$

2.) 3 digits followed by 3 letters

a.) $\frac{10}{\#} \cdot \frac{10}{\#} \cdot \frac{10}{\#} \cdot \frac{26}{L} \cdot \frac{26}{L} \cdot \frac{26}{L}$

$= \boxed{17{,}576{,}000 \text{ plates}}$

b.) $\frac{10}{\#} \cdot \frac{9}{\#} \cdot \frac{8}{\#} \cdot \frac{26}{L} \cdot \frac{25}{L} \cdot \frac{24}{L}$

$= \boxed{11{,}232{,}000 \text{ plates}}$

Find the number of distinguishable permutations of the letters in the word.

3.) AWAY

$\frac{4!}{2!}$

$= \boxed{12 \text{ permutations}}$

4.) LETTER

$\frac{6!}{2!\,2!}$

$= \boxed{180 \text{ permutations}}$

5.) TENNESSEE

$\frac{9!}{4!\,2!\,2!}$

$= \boxed{3780 \text{ permutations}}$

Find the number of possible 5-card hands that contain the cards specified. The cards are taken from a standard 52-card deck.

6.) 3 aces and 2 kings

${}_4C_3 \cdot {}_4C_2$

$= \boxed{24 \text{ hands}}$

7.) 5 clubs

${}_{13}C_5$

$= \boxed{1{,}287 \text{ hands}}$

8.) at least 3 jacks

POSSIBILITIES:
3 Jacks, 2 other cards
OR 4 Jacks, 1 other card

${}_4C_3 \cdot {}_{48}C_2 + {}_4C_4 \cdot {}_{48}C_1$

$4512 + 48$

$= \boxed{4{,}560 \text{ hands}}$

9.) at most 2 queens

POSSIBILITIES:
0 Queens, 5 other cards
OR 1 Queen, 4 other cards
OR 2 Queens, 3 other cards

${}_4C_0 \cdot {}_{48}C_5 + {}_4C_1 \cdot {}_{48}C_4 + {}_4C_2 \cdot {}_{48}C_3$

$1{,}712{,}304 + 778{,}320 + 103{,}776$

$= \boxed{2{,}594{,}400 \text{ hands}}$

Use the binomial theorem to write the binomial expansion.

10.) $(2x - 3)^6$

$1(2x)^6(-3)^0 + 6(2x)^5(-3)^1 + 15(2x)^4(-3)^2 + 20(2x)^3(-3)^3 + 15(2x)^2(-3)^4 + 6(2x)^1(-3)^5 + 1(2x)^0(-3)^6$

$\boxed{64x^6 - 576x^5 + 2160x^4 - 4320x^3 + 4860x^2 - 2916x + 729}$

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11.) $(3x + y)^4$

$1(3x)^4(y)^0 + 4(3x)^3(y)^1 + 6(3x)^2(y)^2 + 4(3x)^1(y)^3 + 1(3x)^0(y)^4$

$\boxed{81x^4 + 108x^3y + 54x^2y^2 + 12xy^3 + y^4}$

A card is randomly drawn from a standard deck of 52 cards. Find the probability of drawing the given card. Express your probabilities as simplified fractions.

12.) The queen of hearts

$\boxed{\frac{1}{52}}$

13.) An ace

$\frac{4}{52} = \boxed{\frac{1}{13}}$

14.) A diamond

$\frac{13}{52} = \boxed{\frac{1}{4}}$

15.) A red card

$\frac{26}{52} = \boxed{\frac{1}{2}}$

16.) A card other than a 10

$\frac{48}{52} = \boxed{\frac{12}{13}}$

17.) The 6 of clubs

$\boxed{\frac{1}{52}}$

You randomly select a marble from a bag. The bag contains 8 black, 13 red, 7 white, and 12 blue marbles. Find the indicated odds.

18.) In favor of choosing blue

12 : 28

$\boxed{3:7}$

19.) In favor of choosing black or white

15 : 25 $\quad 8+7=15$

$\boxed{3:5}$

20.) Against choosing red

$\boxed{27:13}$

21.) Against choosing red or white

20 : 20 $\quad 13+7=20$

$\boxed{1:1}$

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22.) Five representatives from a senior class of 280 students are to be chosen for the student council. In how many ways can students be chosen to represent the senior class on the student council? (order does NOT matter)

$_{280}C_5 =$ **13,836,130,056 ways**

23.) Your school newspaper has an editor-in-chief and an assistant editor-in-chief. The staff of the newspaper has 12 students. In how many ways can students be chosen for these two positions? (order matters!)

$_{12}P_2$ OR $12 \cdot 11 =$ **132 ways**

24.) A pizza parlor runs a special where you can buy a large pizza with 1 cheese, 1 vegetable, and 2 meats for $12. You have a choice of 5 cheeses, 10 vegetables, and 6 meats. How many different variations of the pizza special are possible? (order does NOT matter)

$_5C_1 \cdot {}_{10}C_1 \cdot {}_6C_2 =$ **750 variations**
(CH, VEG, MEAT)

25.) A baseball manager is determining the batting order for the team. The team has nine members, but the manager definitely wants the pitcher to bat last. How many different batting orders are possible? (order matters!)

$8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot 1$ (pitcher)

$=$ **40,320 batting orders**

26.) A television news director has 8 news stories to present of the evening news.

a.) How many different ways can the stories be presented?

$8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$ OR $8!$

$=$ **40,320 ways**

b.) If only 3 of the stories will be presented, how many possible ways can a lead story, a second story, and a closing story be presented? (order matters!)

$_8P_3$ OR $8 \cdot 7 \cdot 6$

$=$ **336 ways**

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