Name: Key Hour_____ **Probability With and Without Replacement & Independent or Dependent**

Independent Events: $P(A \text{ and } B) = P(A) \cdot P(B)$

Dependent Events: $P(A \text{ and } B) = P(A) \cdot P(B \mid A)$

You have a jar of gumballs: 4 red, 9 green, 8 blue, 6 yellow, and 3 white. One gumball is drawn randomly. Find the following Probabilities and write as a reduced fraction and as a percent. 30 total

1. P(white)

$\frac{3}{30} = \frac{1}{10} = .1 = 10\%$

2. P(green)

$\frac{9}{30} = \frac{3}{10} = .3 = 30\%$

3. P(blue or yellow)

$\frac{8+6}{30} = \frac{14}{30} = \frac{7}{15}$

$= .47 \approx 47\%$

4. P($\overline{Red}$) P(not red)

$\frac{26}{30} = \frac{13}{15} \approx .87 = 87\%$

You roll a 6 sided die one time. Find the following probabilities. Write as a reduced fraction and as a percent.

5. P(7) $= 0$

6. P(1 or 2)

$\frac{2}{6} = \frac{1}{3} = .33 \approx 33\%$

7. P(odd number) 1,3,5

$= \frac{3}{6} = \frac{1}{2} = .5 = 50\%$

8. P($\bar{6}$) 12345 P(not 6)

$= \frac{5}{6} \approx .83 = 83\%$

In your math class there are the following white board markers at the board: 2 green, 2 blue, 2 red, 1 purple, and 1 black. One student randomly chooses a marker and then replaces it. The second student then chooses a marker. What is the probability of the students randomly choosing the colors listed below? Write as a percent 10 total

9. P(green, blue)

$\frac{2}{8} \cdot \frac{2}{8} = 6.25\%$

10. P(red, purple)

$\frac{2}{8} \cdot \frac{1}{8} = 3.125\%$

11. P(black, black)

$\frac{1}{8} \cdot \frac{1}{8} = 1.56\%$

12. P(purple, green)

$\frac{1}{10} \cdot \frac{2}{10} = 3.125\%$

In your sock drawer you have 10 pairs of white socks, 4 pairs of black, and 2 pairs of brown. You randomly choose a pair of socks each day. Sometimes you don't replace them because they are dirty. You choose another pair of socks the next day. Find the probability of the following situations. Write the probability as a reduced fraction.

13. P(white, white) with replacement

$\frac{10}{16} \cdot \frac{10}{16} = \frac{25}{64}$

14. P(white, black) without replacement

$\frac{10}{16} \cdot \frac{4}{15} = \frac{1}{6}$

15. P(black, brown) without replacement

$\frac{4}{16} \cdot \frac{2}{15} = \frac{1}{30}$

16. P(brown, brown) without replacement

$\frac{2}{16} \cdot \frac{1}{15} = \frac{1}{120}$

17. P(white, white, white) with replacement

$\frac{10}{16} \cdot \frac{10}{16} \cdot \frac{10}{16} = \frac{125}{512}$

18. P(white, black, brown) with replacement

$\frac{10}{16} \cdot \frac{4}{16} \cdot \frac{2}{16} = \frac{5}{256}$

19. P(black, white, white) without replacement

$\frac{4}{16} \cdot \frac{10}{15} \cdot \frac{9}{14} = \frac{3}{28}$

20. P(brown, brown, brown) with replacement

$\frac{2}{16} \cdot \frac{2}{16} \cdot \frac{2}{16} = \frac{1}{512}$

Determine if the following events are dependent or independent. Then calculate the probability of each.

21. Selecting a glazed donut from an assortment of ~~twelve~~ 16 donuts, 4 glazed, 4 with sprinkles, 4 maple bars, and 4 cake donuts. Then eating it, and then selecting a maple bar from the same box.

$P(\text{glazed, maple}) = \frac{4}{16} \cdot \frac{4}{15} = 6.7\%$ Dep

22. Given a bag of marbles with 2 red, 3 green and 2 blue. What is the probability of choosing a red marble keeping it, then choosing another red marble?

$P(\text{red, red}) = \frac{2}{7} \cdot \frac{1}{6} \approx 4.76\%$ Dep

23. Rolling a 3 on a dice and then drawing a red card from a deck of cards.

$P(3, \text{red}) \quad \frac{1}{6} \cdot \frac{1}{2} \approx 8.3\%$ Ind

24. You are choosing two cards from a deck. The first card is a queen, if you keep that card what is the probability that the second card is a face card?

$P(\text{2nd is queen}) = \frac{11}{51} = 21.6\%$ OR $P(q, \text{face}) = \frac{4}{52} \cdot \frac{11}{51} = 1.65\%$ Dep

12 face cards

25. Flipping a coin, and getting tails both times.

$P(\text{tails, tails}) = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4} = .25 = 25\%$ Ind

Independent Events: $P(A \text{ and } B) = P(A) \cdot P(B)$

Dependent Events: $P(A \text{ and } B) = P(A) \cdot P(B \mid A)$

26. Events A and B are independent. Find the missing probability

P(A) = .73
P(B) = .38
P(A and B) = .28

$P(A \text{ and } B) = P(A)P(B)$
$\frac{.28}{.73} = \frac{.73\,P(B)}{.73}$

P(A) = .15
P(B) = .62
P(A and B) = .093

$P(A \text{ and } B) = P(A) \cdot P(B)$
$P(A \text{ and } B) = (.15)(.62)$

P(A) = .39
P(B) = .85
P(A and B) = .33

$.33 = P(A)(.85)$
$\frac{.33}{.85} = P(A)$

27. Events A and B are dependent. Find the missing probability

P(A) = .37
P(B|A) = .18
P(A and B) = $(.37)(.18) = .067$

P(A) = .93
P(B|A) = .61
P(A and B) = .57

$.57 = P(A)(.61)$
$\frac{.57}{.61} = P(A)$

P(A) = .41
P(B|A) = .85
P(A and B) = .35

$.35 = .41(P(A|B))$
$\frac{.35}{.41} = P(A|B)$

28. In a random sample of 1000 Ridgeline students, a study found that 40.7% were involved in a club and 21.8% studied 4 hours per day. When they reported their findings, the research group indicated that 41.4% of students were either involved in a club or they studied 4 hours per day. Given this information, what is the probability that a student is involved in a club and studies 4 hours per day?

29. In a random sample of 150 Ridgeline Cross Country runners, a study found that 72% of them ran five days a week and 18% of them did their core exorcises 5 days a week. When they reported their findings, the research group indicated that 79.4% of the athletes either ran or did core exorcises five days a week. Given this information, what is the probability that an athlete ran and did their core exorcises five days a week?