Name *Answer Key*

Probability {Bonus} Practice: For those of you who just love a good time:)
Please select at least 10 of these problems that are interesting to you. Feel free to do more as needed!

1. If you randomly draw a card from a standard deck, what is the probability that you pull out a card that is less than 5 and a spade?

$P(<5 \text{ and spade}) = P(<5) \cdot P(\text{spade})$

$= \frac{16}{52} \cdot \frac{13}{52} = \frac{208}{2704} = \frac{4}{52} = \frac{2}{26} = \frac{1}{13} = 7\%$

2. If you randomly draw a card from a standard deck, what is the probability that you pull out a card that is a heart or a face card?

$P(\heartsuit \text{ or face}) = P(\heartsuit) + P(\text{face}) - P(\heartsuit \text{ and face})$

$= \frac{13}{52} + \frac{12}{52} - \frac{3}{52} = \frac{22}{52} = \frac{11}{26} \approx 42.3\%$

3. If you roll two dice, what is the probability that you get a sum of 6 or a sum of 7?

$P(6 \text{ or } 7) = P(6) + P(7)$

$= \frac{5}{36} + \frac{6}{36} = \frac{11}{36} = 30.6\%$

6	7
15	34
51	43
24	52
42	25
33	16
	61

4. If you roll two dice, what is the probability that you get a perfect square sum or a sum of 8?

Perfect □ = 1, 4, 9, 16 ...

$P(4 \text{ or } 9 \text{ or } 8) = P(4) + P(9) + P(8)$

$= \frac{3}{36} + \frac{4}{36} + \frac{5}{36} = \frac{12}{36} = \frac{1}{3} \approx 33.3\%$

4	9	8
13	36	26
31	63	62
22	54	35
	45	53
		44

5. If you roll two dice, what is probability that you get an even sum that is less than 10?

2, 4, 6, 8

$P(2, 4, 6, 8) = P(2) + P(4) + P(6) + P(8)$

$\frac{1}{36} + \frac{3}{36} + \frac{5}{36} + \frac{5}{36} = \frac{15}{36} = 42\%$

6. Two unmarked bags contain the letters MATH and ANIMAL. If you randomly select a bag and randomly pull out a letter, what is the probability that you pull an A?

MATH | ANIMAL

$\frac{1}{2} \cdot \frac{1}{4} + \frac{1}{2} \cdot \frac{2}{6}$

$\frac{1}{8} + \frac{2}{12} = \frac{7}{24} = 29.2\%$

14. A bag contains 10 green tiles, 4 yellow tiles, and 6 blue tiles. You draw one tile, you DO NOT replace it in the bag, and then you draw a second tile. What is the chance that the second tile you draw is yellow?

draw yellow and draw yellow OR draw "yellow" and draw yellow

$$\frac{4}{20}\cdot\frac{3}{19}+\frac{16}{20}\cdot\frac{4}{19}$$

$$\frac{12}{380}+\frac{64}{380}=\frac{76}{380}=20\%$$

For 15 through 18, use the following information: A jar contains 8 red balls, 4 purple balls, and 2 white balls. If you pull out two balls, one at a time,
what is the probability that you pull out:

15. Two purple balls? $P(\text{Purple} \cup \text{Purple}) = P(\text{Purple})\cdot P(\text{Purple}\mid\text{Purple})$

$$=\frac{4}{14}\cdot\frac{3}{13}=\frac{12}{182}=6.6\%$$

16. A red ball, then a white ball?

$$P(R\cup W)=\frac{8}{14}\cdot\frac{2}{13}=\frac{16}{182}=8.8\%$$

17. A red and white ball in either order?

$$P(R\cup W\cap W\cup R)=\frac{16}{182}+\left(\frac{2}{14}\cdot\frac{8}{13}\right)=\frac{32}{182}=17.6\%$$

18. Exactly one red ball?

$$P(\text{red}\cup\text{nred})=\frac{8}{14}\cdot\frac{6}{13}=\frac{48}{182}$$

$$P(\text{nred}\cup\text{red})=\frac{6}{14}\cdot\frac{8}{13}=\frac{48}{182}$$

$$=\frac{96}{182}=52.7\%$$

A few extra problems on probability:

19. Chipotle claims on its' cups that you can make over 60,000 flavor combinations for your burrito. They offer 16 different ingredients (including all four salads and two types of beans). Show how this claim is either true or false.

20. When forensic scientists test DNA, either for crime scenes or for paternity tests, they test 13 different alleles of a person's DNA. Assume that each allele has a 1/6 chance of occurring in any given person. Show that testing 13 alleles eliminates down to one suspect.