1. **Problem**
In a deck of strange cards, there are 680 cards. Each card has an image and a color. The amounts are shown in the table below.

	black	blue	gray	orange	red	Total
dog	17	20	31	39	50	157
kite	43	32	46	33	23	177
mop	42	36	45	40	49	212
pig	27	22	21	38	26	134
Total	129	110	143	150	148	680

(a) What is the probability a random card is red?

(b) Is a dog or a kite more likely to be orange?

(c) What is the probability a random card is a kite given it is black?

(d) What is the probability a random card is either a kite or red (or both)?

(e) What is the probability a random card is a kite?

(f) What is the probability a random card is blue given it is a dog?

(g) What is the probability a random card is both a mop and orange?

2. **Problem**
   Joe is shopping for shirts. Joe likes 18 of the shirts, but will only buy 2 of them. How many different combinations of shirts are possible?

3. **Problem**
A spinner has the probability distribution shown below.

x	$\Pr(x)$
14	0.43
19	0.27
20	0.13
25	0.17

(a) What is the probability of spinning 25? In other words, what is $\Pr(X = 25)$?

(b) What is the probability of spinning 20 or 25? In other words, what is $\Pr(X = 20 \text{ or } X = 25)$?

(c) If spinning twice, what is the probability of first spinning 20 and then spinning 25? In other words, what is $\Pr(X_1 = 20 \text{ and } X_2 = 25)$?

(d) What is the probability of spinning at least 19? In other words, what is $\Pr(X \geq 19)$?

(e) Determine the mean of the probability distribution by using $\mu = \sum x \cdot \Pr(x)$.

(f) Determine the standard deviation of the probability distribution by using $\sigma = \sqrt{\sum (x - \mu)^2 \cdot \Pr(x)}$.

4. **Problem**
   Thornton is getting dressed, and still needs to pick a scarf, a coat, and a hat. Thornton has 4 scarves, 2 coats, and 2 hats. How many different outfit combinations are possible? Please make a **tree diagram**.

5. **Problem**
Each trial has 0.35 probability of success. There will be 8 trials. We will measure the number of successes (but not worry about the exact sequence).

(a) Why is this a binomial distribution?

(b) What is the probability of getting exactly 4 successes? In other words, determine $\Pr(X = 4)$.

(c) What is the probability of getting exactly 1 successes? In other words, determine $\Pr(X = 1)$.

(d) What is the probability of getting more than 1 successes? In other words, determine $\Pr(X > 1)$.

(e) What is the probability of getting at least 1 successes? In other words, determine $\Pr(X \geq 1)$.

(f) What is the probability of getting less than 1 successes? In other words, determine $\Pr(X < 1)$.

(g) What is the probability of getting at most 1 successes? In other words, determine $\Pr(X \leq 1)$.

(h) Determine the mean number of successes.

(i) Determine the standard deviation of successes.

6. **Problem**
   An event planner hosts a different activity each day. The planner still needs to schedule activities for Monday, Tuesday, Wednesday, Thursday, and Friday. The planner has 17 different activities available to choose from. How many schedules are possible?

1. (a) $P(\text{red}) = 0.218$

   (b) $P(\text{orange given dog}) = 0.248$ and $P(\text{orange given kite}) = 0.186$, so a dog is more likely to be orange than a kite is.

   (c) $P(\text{kite given black}) = 0.333$

   (d) $P(\text{kite or red}) = 0.444$

   (e) $P(\text{kite}) = 0.26$

   (f) $P(\text{blue given dog}) = 0.127$

   (g) $P(\text{mop and orange}) = 0.0588$

2. This scenario describes a combinations problem (order does not matter). We are considering the subsets of size 2 from a set of size 18.

$$
\begin{aligned}
{}_nC_r &= \frac{n!}{(n-r)! \cdot r!} \\
n &= 18 \\
r &= 2 \\
{}_{18}C_2 &= \frac{18!}{(18-2)! \cdot 2!} \\
&= \frac{18!}{16! \cdot 2!} \\
&= \frac{18 \cdot 17}{2 \cdot 1} \\
&= \boxed{153}
\end{aligned}
$$

3. Make a table (for parts d and e).

x	$\Pr(x)$	$x \cdot \Pr(x)$	$x - \mu$	$(x-\mu)^2$	$(x-\mu)^2 \cdot \Pr(x)$
14	0.43	6.02	-4	16	6.88
19	0.27	5.13	1	1	0.27
20	0.13	2.6	2	4	0.52
25	0.17	4.25	7	49	8.33
		$\sum x \cdot \Pr(x) = 18$			$\sigma^2 = 16$
		$\mu = 18$			$\sigma = 4$

(a) 0.17

(b) 0.3

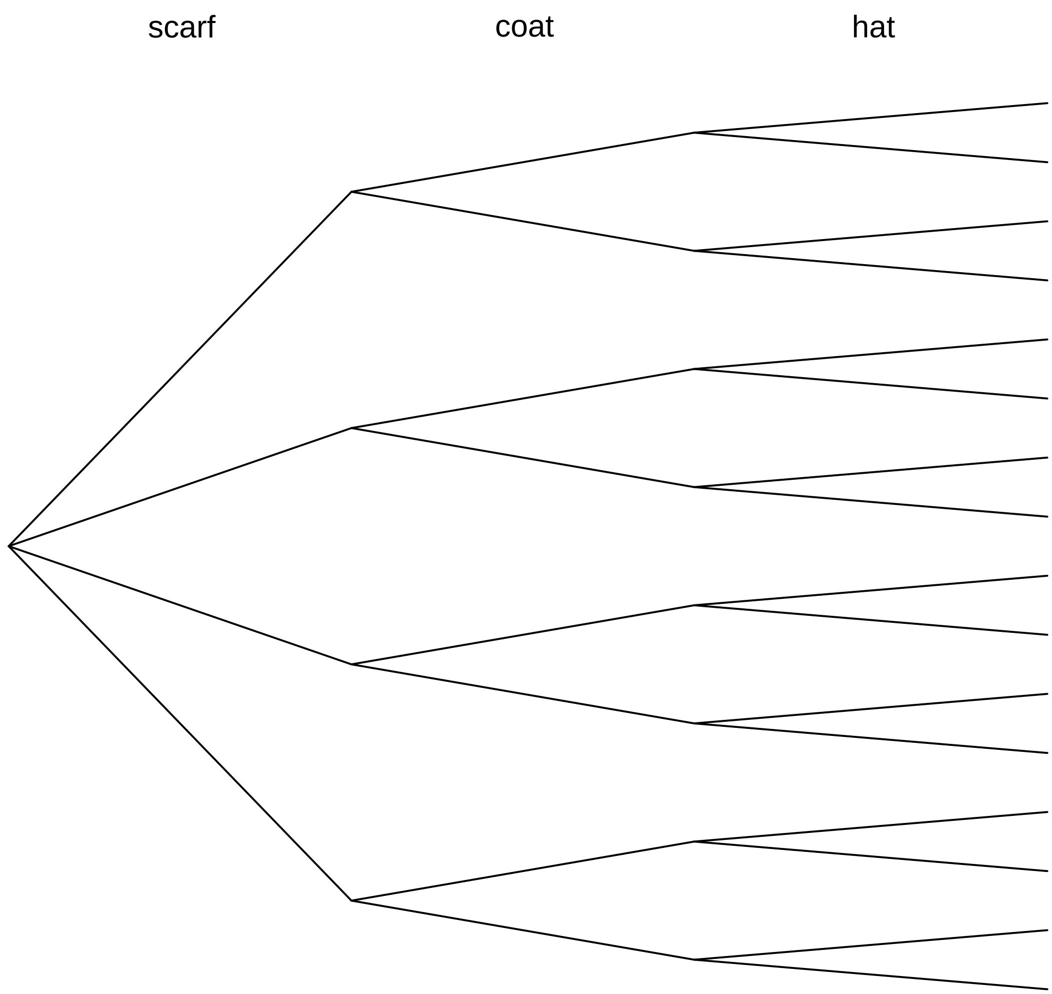
(c) 0.0221

(d) 0.57

(e) $\mu = 18$

(f) $\sigma = 4$

4. Make a tree.



Count the leaves (the nodes at the far right). In this case there are 16 leaves.

$\boxed{\text{There are 16 combinations possible.}}$

5. (a) Each trial has TWO possible outcomes (which are mutually exclusive and exhaustive). Each trial has the same probability of success. We are interested in the total number of successes in a fixed number of trials.

   (b) $\Pr(X = 4) = {}_8C_4 \cdot 0.35^4 0.65^4 = 0.1875097$

   (c) $\Pr(X = 1) = {}_8C_1 \cdot 0.35^1 0.65^7 = 0.1372624$

   (d) $\Pr(X > 1) = 0.8308731$

   (e) $\Pr(X \geq 1) = 0.9681355$

   (f) $\Pr(X < 1) = 0.0318645$

   (g) $\Pr(X \leq 1) = 0.1691269$

   (h) Because this is a binomial distribution, $\mu = np$, so $\mu = 2.8$

   (i) Because this is a binomial distribution, $\sigma = \sqrt{npq}$, so $\sigma = 1.3490738$

6. This scenario describes a permutations problem (order matters). We are considering the nonrepeating sequences of size 5 from a set of size 17.

$$_nP_r = \frac{n!}{(n-r)!}$$

$$n = 17$$

$$r = 5$$

$$_{17}P_5 = \frac{17!}{(17-5)!}$$

$$= \frac{17!}{12!}$$

$$= 17 \cdot 16 \cdot 15 \cdot 14 \cdot 13$$

$$= \boxed{742560}$$