

1. An animal acting agency has 5 dogs, 7 cats, and 2 birds waiting to audition. How many ways can these 14 animals be arranged in a line if:

(a) it does not matter which order the animals stand in.

$$14! = 87,178,291,200$$

(b) the dogs are at the front of the line, the cats are in the middle, and the birds are at the back.

$$5! * 7! * 2! = 1209600$$

2. Evaluate $\frac{12!}{9!}$

$$\frac{12!}{9!} = 12 * 11 * 10 = 1320$$

3. Consider the set $\{x \in \mathbb{Z} : 5 \mid x \text{ and } x \mid 60\}$.

(a) Write out the set by listing its elements between curly braces.

$$\{-5, 5, -10, 10, -15, 15, -20, 20, -30, 30, -60, 60\}$$

(b) Find the cardinality of the set.

$$12$$

4. For each of the following, write TRUE or FALSE (**not** T or F), as appropriate.

(a) $\frac{1}{2} \in \mathbb{Z}$

FALSE

(b) $\{2, 3\} \in 2^{\{1,2,3,4\}}$

TRUE

(c) $\{2, 3\} \subseteq 2^{\{1,2,3,4\}}$

FALSE

1. An animal acting agency has 5 dogs, 8 cats, and 3 birds waiting to audition. How many ways can these 16 animals be arranged in a line if:

(a) it does not matter which order the animals stand in.

$$16! = 20,922,789,888,000$$

(b) the dogs are at the front of the line, the cats are in the middle, and the birds are at the back.

$$5! * 8! * 3! = 29,030,400$$

2. Evaluate $\frac{12!}{9!}$

$$\frac{12!}{9!} = 12 * 11 * 10 = 1320$$

3. Consider the set $\{x \in \mathbb{Z} : 5 \mid x \text{ and } x \mid 80\}$.

(a) Write out the set by listing its elements between curly braces.

$$\{-5, 5, -10, 10, -20, 20, -30, 30, -40, 40\}$$

(b) Find the cardinality of the set.

$$10$$

4. For each of the following, write TRUE or FALSE (**not** T or F), as appropriate.

(a) $\frac{1}{2} \in \mathbb{Z}$

FALSE

(b) $\{2, 3\} \subseteq 2^{\{1,2,3,4\}}$

FALSE

(c) $\{2, 3\} \in 2^{\{1,2,3,4\}}$

TRUE