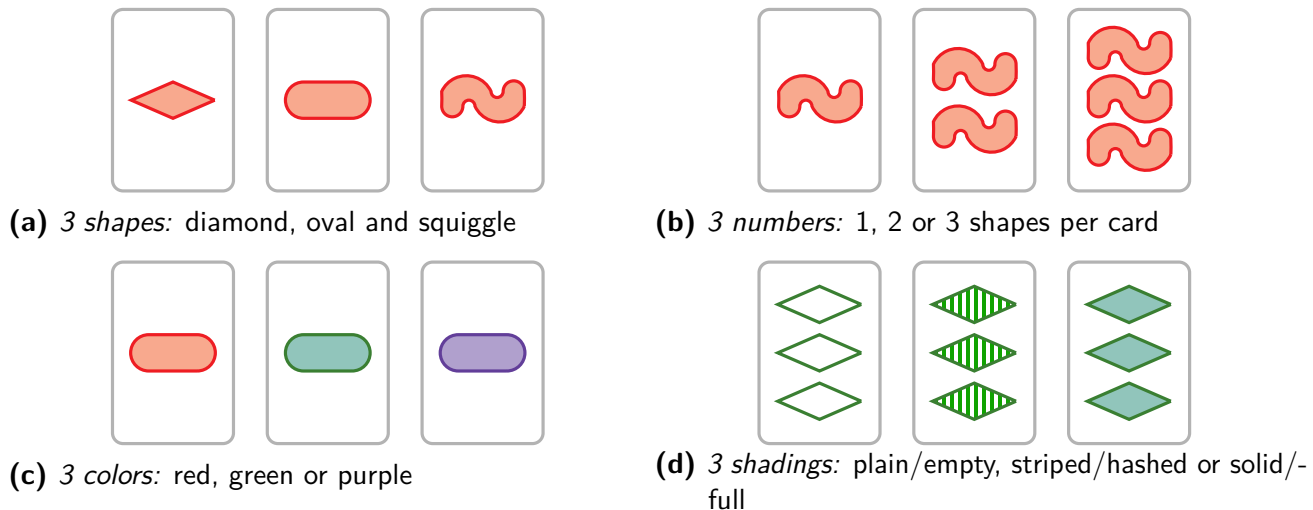


## 4.6 Game of SET

Set is a multi-player game played with a special deck of cards. Each card is uniquely determined by four features : number, color, shape and shading which can vary as follow:

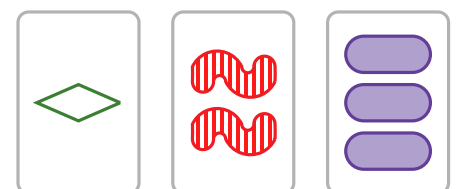
**Figure 4.2:** All four features off a card of SET



**Definition 4.1 — A SET.** is a collection of 3 cards such that for each feature, either all the cards in the trio share the same value for that feature, or else no two have the same value for it.

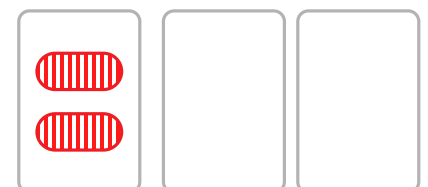
### ■ Example 4.1

- “one plain green diamond”
- “two striped red squiggles”
- and “three solid purple ovals” form a set.

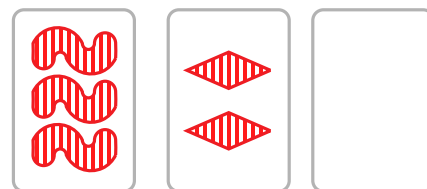


### Exercise 1

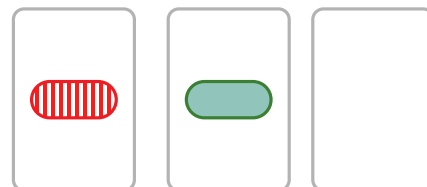
1. Complete to form a SET with the same shape, the same color, the same number of symbols and all different shading.
2. Complete to form a SET with different shapes, different colors, and different numbers of symbols and the same shading.



3. Find a card to form a SET. Explain why it is a SET in a simple sentence.



4. Find a card to form a SET. Explain why it is a SET in a simple sentence.



### Exercise 2 — 🕒 How to play.

Listen and fill the blanks <https://youtu.be/NzXDfSFQ1c0> (2'30")

#### Instructions

To play, we start with a shuffled deck and the dealer deals 12 cards face up on the table. Your goal, as a player, is to find a SET. Once you find one, you call it out, collect the SET (assuming that it is a legitimate one), and the dealer deals 3 more cards. The object of the game is to collect the most SETs. One point is given for each SET. Highest score wins.

A player must call SET before picking up the cards. There are no turns, first player to call SET has few seconds to pick his cards. If the SET is incorrect, he/she loses one point.

Daily Set challenge <https://www.setgame.com/set/puzzle>

#### Vocabulary

1. **to deplete, depleted, depleted**

The lake was depleted of water. ....

2. **to resume, resumed, resumed** .....

3. **to stripe, striped, striped**

Zebras have unique striped pattern. ....

4. **to strip, stripped, stripped**

The tank was stripped down piece by piece .....

The general was stripped of his rank. ....

### Exercise 3 — analyze the game.

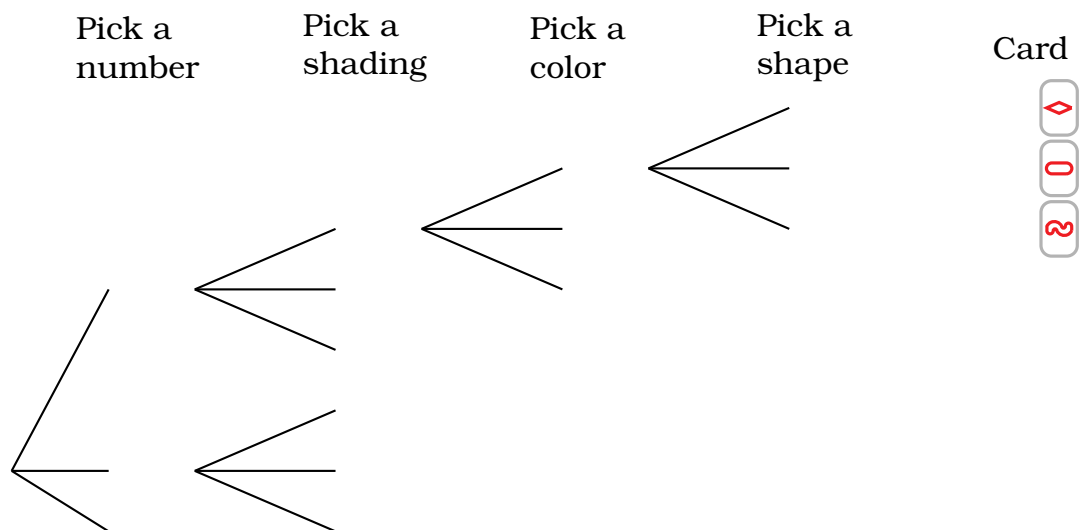
1. How many different cards in a SET deck? *You can use the text below to explain yourself*

To make a card we .....characteristics (to pick/picking/picked).

Each characteristic has .....

We can draw a .....to count all .....

There are a total of .....



2. Show that for every two cards there is a unique third card that will make a set

*(you can use the blanks to organise your thoughts)*

(different from/same/similar/similarly). Take the characteristic \_\_\_\_\_.

Either the first two cards have the same \_\_\_\_\_, and the third card must have \_\_\_\_\_. Either the first two cards have \_\_\_\_\_, and then the third card must have \_\_\_\_\_ and there is \_\_\_\_\_ possibility for that. \_\_\_\_\_ for the other three characteristics.





To make such a card, we have to pick among \_\_\_\_\_ possible choices for number, \_\_\_\_\_ possible choices for shape, \_\_\_\_\_ possible choices for shading, and \_\_\_\_\_ possible choices for color. There are \_\_\_\_\_ possible cards.

To make a card sharing only a same color, we have to pick among \_\_\_\_\_ possible choices for number, \_\_\_\_\_ possible choices for shape and \_\_\_\_\_ possible choices for shading. This makes a \_\_\_\_\_ possible cards. Similarly, we have \_\_\_\_\_ cards sharing only a same number, as well as \_\_\_\_\_ cards sharing only a same shape, and \_\_\_\_\_ cards sharing only a same shading.

To pick a card sharing same color, number and shape but different shading, we have to pick among \_\_\_\_\_ possible choices.

10<sup>th</sup> Grade







**Answers****1. How many different cards in a SET deck?**

Since there are three possible values for each of the four characteristics, there are a total of  $3^4 = 81$  cards in a Set deck.

**2. Show that for every two cards there is a unique third card that will make a set.**

Take the characteristic NUMBER. If the first two cards have the same number, then the third card must have that same number. If the first two cards have different numbers, then the third card must have a number different from the first two and there is only one possibility for that. Similarly for the other three characteristics.

**3. If you draw three cards at random, what is the probability that they form a SET?**

Since any two cards uniquely determine a Set, if you draw two cards, then exactly one of the remaining 79 cards will join with the first two cards to make a Set. The probability of drawing it is  $1/79$ .

**4. How many different SETS are there?**

There are 81 choices for the first card, 80 choices for the second card, and one choice for the third card. Since the order of cards in a Set don't matter, we should divide by  $3! = 6$ . Thus there are  $81 \times 80 / 6 = 1080$  different Sets.

**5. After playing a few rounds of Set, you will notice that there are different kinds of SETS. What are they? Which kinds do you think are the most and least common? Which seem to be the trickiest to spot?**

There are actually four different kinds of Sets. They can be classified according to how many characteristics the cards share: zero, one, two, or three. The three-alike Sets are easiest to spot. An example of a three-alike Set is “one plain red squiggle,” “two plain red squiggles,” and “three plain red squiggles.” The none-alike or all-different Sets are the most challenging to find. An example of an all-different Set is “one plain red oval,” “two striped green squiggles,” “three solid purple diamonds.”

**6. Figure out the percentage of three-alike Sets, two-alike Sets, one-alike Sets, and all-different Sets.** If your calculation is correct you should have found that out of the 1080 total possible Sets the number of three-alike Sets is 108, or 10%, the number of two-alike Sets is 324, or 30%, the number of one-alike Sets is 432, or 40%, and the number of all-different Sets is 216 or 20%.