

# Krypto Rules

The game of Krypto is played with a deck of 52 cards: three each of the numbers 1 to 10, two each of the numbers 11 to 17, and one each of the numbers 18 to 25.

Sets of Krypto cards — including Primary Krypto (only numbers from 1 to 10) and the Fraction Supplement — can be purchased from MPH Games, Inc., P.O. Box 1125, Fairfield, CT 06432. They can also be ordered from Amazon and other online retailers.

## Playing the Game

In the center of the table, deal five playing cards, number side up. Then turn over a sixth card which is the Target Card. Each player will add, subtract, multiply, or divide using each of the numbers on the five playing cards. Fractions, decimals, negative numbers, roots, and exponents are not permitted. Each card must be used once and only once to obtain a final solution equal to the number on the Target Card.

### Example 1

Playing Cards: **2, 1, 2, 2, 3**                      Target Card: *20*

$$\begin{aligned}2 + 1 &= 3 \\3 \times 3 &= 9 \\9 \times 2 &= 18 \\18 + 2 &= 20\end{aligned}$$

Notice that the numbers on all five playing cards were used once and only once to equal the target number.

### Example 2

Playing Cards: **1, 3, 7, 1, 8**                      Target Card: *1*

$$\begin{aligned}3 - 1 &= 2 \\2 + 7 &= 9 \\9 \div 1 &= 9 \\9 - 8 &= 1\end{aligned}$$

### Example 3

Playing Cards: **24, 22, 23, 20, 21**                      Target Card: *1*

$$\begin{aligned}22 + 24 &= 46 \\46 \div 23 &= 2 \\2 + 20 &= 22 \\22 - 21 &= 1\end{aligned}$$

# Krypto Strategies

There are many strategies that are helpful when playing Krypto. Several are given below, but you should try to find others.

## Zero Strategy

When the number on the target card is equal to a number on a playing card, obtain a zero as one of the steps in the solution. Then, you can use the zero property of multiplication or the identity property of addition.

### Examples of Zero Strategy

Playing Cards: **8, 10, 4, 8, 21**      Target Card: *21*

$$\begin{aligned}8 - 8 &= 0 \\0 \times 10 &= 0 \\0 \times 4 &= 0 \\0 + 21 &= 21\end{aligned}$$

Even if the target number is not the same as one of the playing cards, zero can still be useful:

Playing Cards: **5, 2, 7, 21, 3**      Target: *6*

$$\begin{aligned}7 \times 3 &= 21 \\21 - 21 &= 0 \\0 + 2 &= 2 \\2 \times 3 &= 6\end{aligned}$$

## One Strategy

Obtaining a one can also be helpful. Then, you can use the identity property of multiplication.

### Example of One Strategy

Playing Cards: **6, 9, 5, 18, 3**      Target Card: *14*

$$\begin{aligned}18 \div 3 &= 6 \\6 \div 6 &= 1 \\1 \times 9 &= 9 \\9 + 5 &= 14\end{aligned}$$

## Addition and Subtraction Strategy

Generally, it's easier to add and subtract than it is to multiply and divide. Therefore, looking for a solution that involves only addition and subtraction may allow you to find an answer more quickly.

Sometimes, it's not possible to find a solution that uses only addition and subtraction. Use this simple test:

1. Find the sum of all five values from the playing cards.
2. Compare the sum to the target number.
3. If one of them is odd and the other is even, then there is no solution that involves only addition and subtraction. But, if both are odd or both are even, there is a very good chance that a solution using only addition and subtraction exists.

### Example of Addition and Subtraction Strategy

Playing Cards: **23, 5, 7, 9, 4**                      Target Number: *13*

- Sum of playing cards:  $23 + 5 + 7 + 9 + 4 = 48$  (even)
- Target number = 13 (odd)

The sum is even, and the target number is odd. Therefore, no solution exists that uses only addition and subtraction. Don't waste your time looking for one.

Playing Cards: **23, 5, 7, 9, 4**                      Target Number: *16*

- Sum of playing cards:  $23 + 5 + 7 + 9 + 4 = 48$  (even)
- Target number = 16 (even)

Both the sum and the target number are even, so it's likely that a solution involving only addition and subtraction exists. In fact, here is one such solution:

$$23 + 5 = 28$$

$$28 + 4 = 32$$

$$32 - 9 = 23$$

$$23 - 7 = 16$$

## Modification for Beginners

Use only the cards numbered 1 to 10. The game of Primary Krypto actually contains cards with those values only. As skill levels increase, add the numbers 11 to 25.

## Unsolvable Hands

It is possible to be dealt a hand without a solution.

For example, a hand with playing cards 1, 2, 3, 1, 2 and a target card of 23 cannot be solved. (You can get close, with  $(1 + 2 + 1) \times 2 \times 3 = 24$ , but it's not possible to get 23.)

However, an unsolvable hand is *very* rare. There are over 3,000,000 possible sets of five playing cards, and approximately 1,000 do not have a solution. Consequently, the chance of being dealt a hand without a solution is about 1 in 3,000. Because there are so few unsolvable hands, if you don't find a solution quickly, keep trying!