## X-Squared Open Solution Card Games

The X-Squared card deck is a revolutionary tool for mathematical learning and entertainment. Many types of card games are possible. This document describes and illustrates games that we refer to as "Open Solution." In this family of games, all 24 of the Solution cards in the X-Squared deck are set on the playing surface and available in creating equations throughout play. These cards are shown in Figure 1.

**Figure 1. X-Squared Solution Cards**

The Open Solution games can be played with 3, 4, 5 or 6 Integer cards. It can be played by drawing cards from the Integer deck or using specific cards that are dealt to the players. Each game type is explained.

In each of these games players accumulate Solution cards during the round until all of the 24 Solution cards are exhausted. At the end of the round the players add up the face values of each of the Solution cards they have obtained. The player with the highest total at the end of the round wins the round.

**Open Solution – 3 Card Draw (2 to 4 Players)**

Refer to Figure 2. Each player is dealt three Integer cards. Players attempt to use their Integer cards and Operator cards to create an equation equal to one of the 24 Solution cards. A player may choose to use the three cards they were dealt or may exchange one of their cards with either the card face up or the top card on the deck. The player attempts to create an equation using all 3 Integer cards and 2 Operator cards (the exponent and parentheses are always optional) equal to any of the available Solution cards. Note that there are two exponent cards, one operates on an integer and the other on an expression.

The objective is to score as many points as possible, so the higher value Solution cards are worth more. Therefore, a player attempts to identify the highest value Solution card for which they can generate a conforming equation with the cards they have available. If a player cannot create an equation with their three cards, they lose their turn and the next player takes a turn attempting to create an equation.

For this game illustration we will assume that there are two players.

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# Dealer Turns Over Integer Card

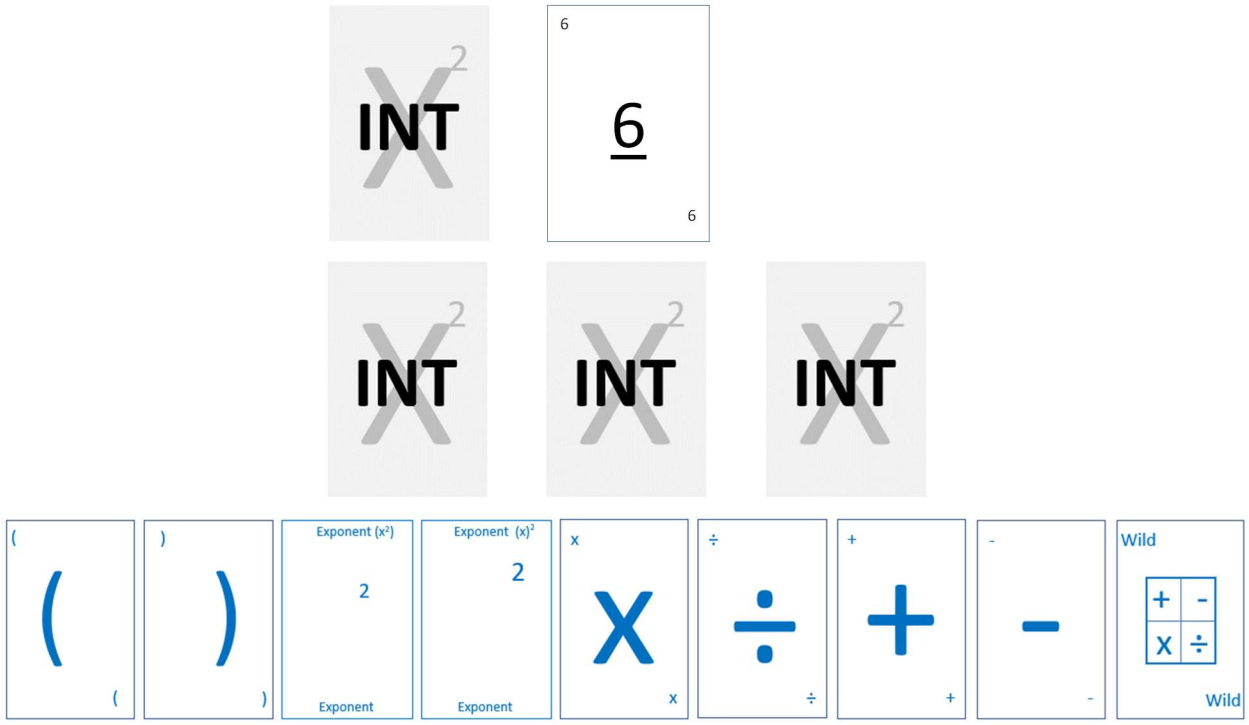


**Figure 2. Open Solution 3-Card Draw Game Setup**

Assume that Player 1 is dealt the three cards shown in Figure 3. The player attempts to use those 3 cards to create an equation for one of the 24 Solution cards. The player has the option to trade one of the three cards for a card from the deck and then attempt to create an equation.

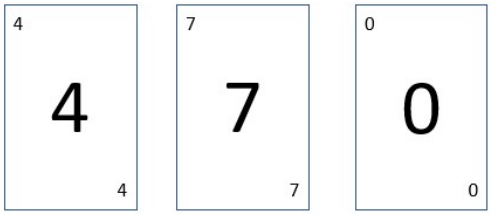


**Figure 3. Player 1 Integer Cards**

Player 1 can use his cards to create the equation shown in Figure 4. When doing this the player gets to keep the 45 Solution card. Player 1 then discards the three Integer cards and selects 3 new ones.

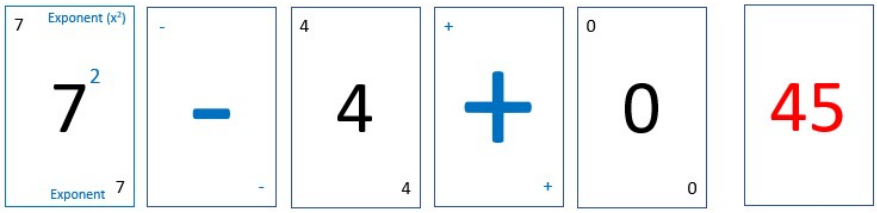


**Figure 4. Player 1 Equation Round 1**

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After the first player selects the 45 Solution card the available cards are as shown in Figure 5.

**Figure 5. Solution Cards with 45 Solution Removed**

Assume that Player 2 is dealt the three cards shown in Figure 6. The player attempts to use those 3 cards to create an equation for one of the 23 remaining Solution cards. The player has the option to trade one of the three cards for a card from the deck and then attempt to create an equation.

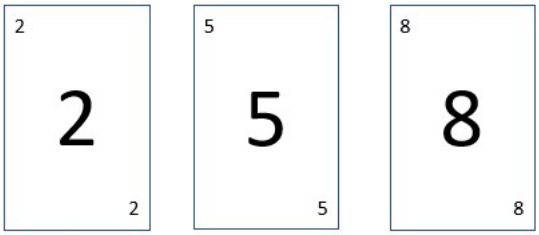


**Figure 6. Player 2 Integer Cards**

Player 2 can use his cards to create the equation shown in Figure 7. When doing this the player gets to keep the 95 Solution card. Player 2 then discards the three integer cards and selects 3 new ones.

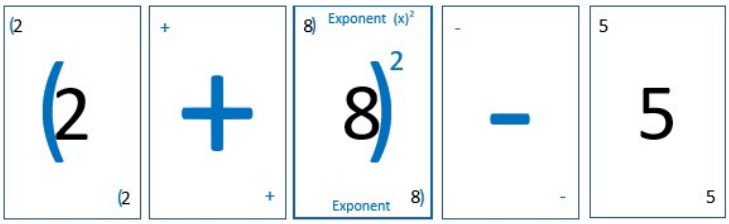


**Figure 7. Player 2 Equation Round 1**

Play continues in this manner, with each player taking turns creating equations, until all of the Solution cards are used up. Players sum the total values of their cards and the player with the most is the winner. When the deck of Integer cards is consumed they are shuffled and set back on the playing surface.

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**Open Solution – 4 Card Draw (2 to 4 Players)**

Refer to Figure 8. Each player is dealt four Integer cards. Players attempt to use their Integer cards and Operator cards to create an equation equal one of the 24 Solution cards. A player may choose to use the four cards they were dealt or may exchange one of their cards with either the card face up or the top card on the deck. The player attempts to create an equation using all 4 Integer cards and 3 Operator cards (the exponent and parentheses are always optional) equal to any of the available Solution cards.

The objective is to score as many points as possible, so the higher value Solution cards are worth more. Therefore, a player attempts to identify the highest value Solution card for which they can generate a conforming equation with the cards they have available. If a player cannot create an equation with their four cards, they lose their turn and the next player takes a turn attempting to create an equation.

For this game illustration we will assume that there are two players.

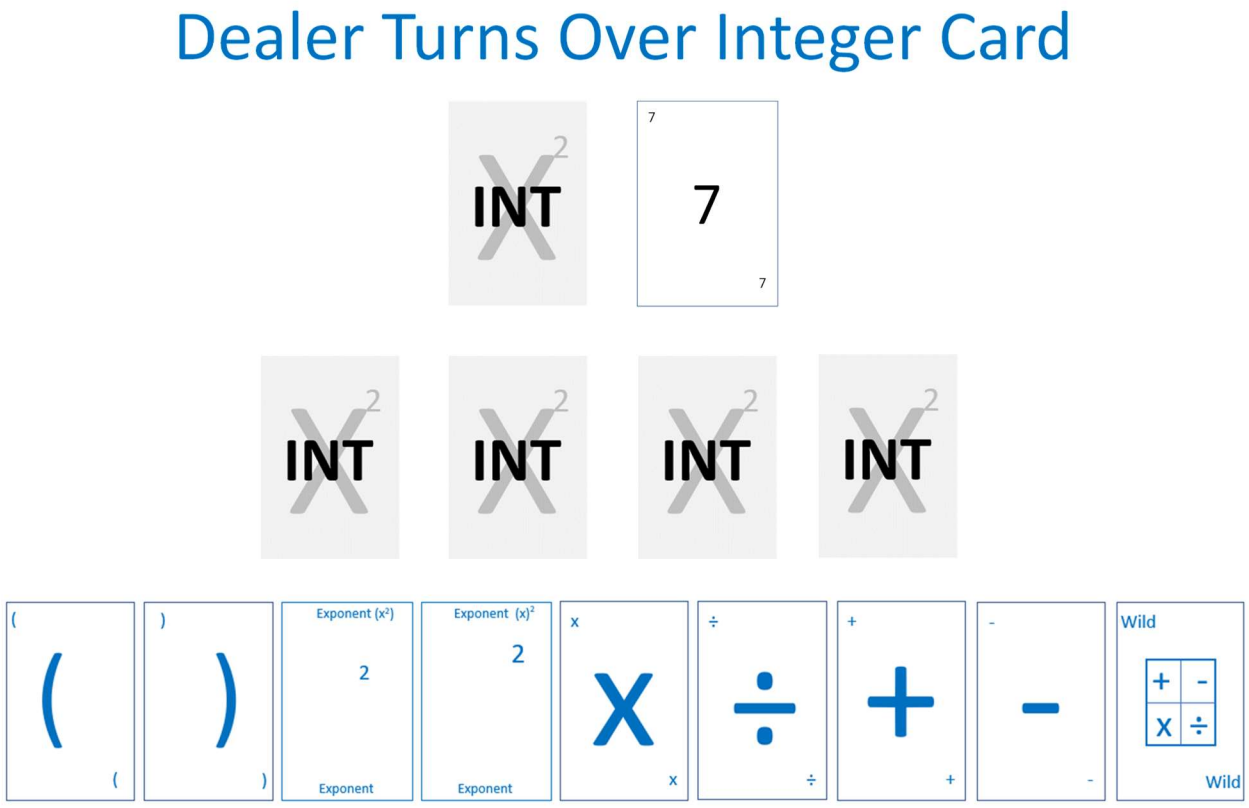


**Figure 8. Open Solution 4-Card Draw Game Setup**

Assume that Player 1 is dealt the four cards shown in Figure 9. The player attempts to use those 4 cards to create an equation for one of the 24 Solution cards. The player has the option to trade one of the four cards for a card from the deck and then attempt to create an equation.

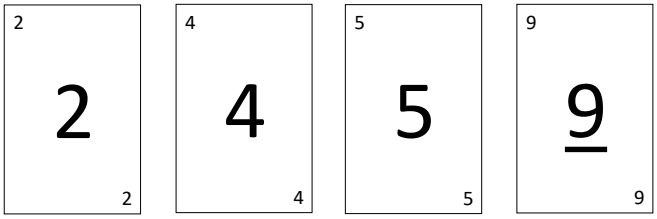


**Figure 9. Player 1 Integer Cards**

Player 1 can use his cards to create the equation shown in Figure 10. When doing this the player gets to keep the 95 Solution card. Player 1 then discards the four Integer cards and selects 4 new ones.

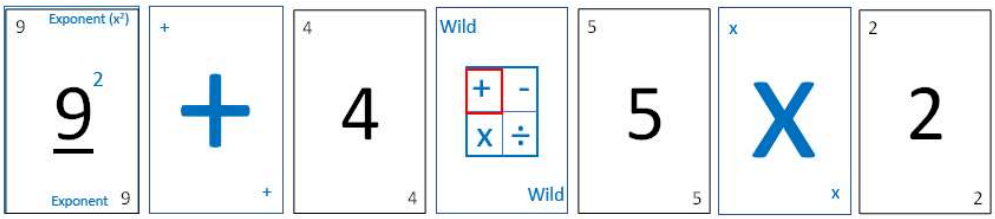


**Figure 10. Player 1 Equation Round 1**

Assume that Player 2 is dealt the four cards shown in Figure 11. The player attempts to use those 4 cards to create an equation for one of the remaining 23 solution cards. The player has the option to trade one of the four cards for a card from the deck and then attempt to create an equation.

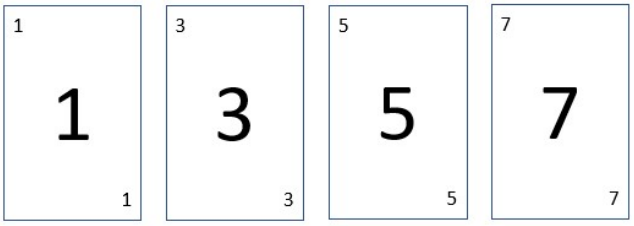


**Figure 11. Player 1 Integer Cards**

Player 2 can use his cards to create the equation shown in Figure 12. When doing this the player gets to keep the 99 Solution card. Player 1 then discards the four Integer cards and selects 4 new ones.

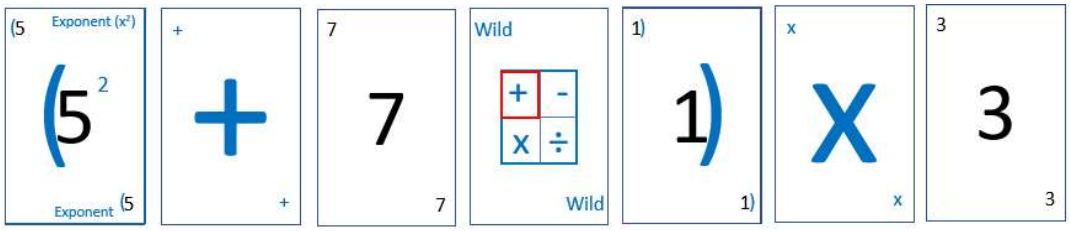


**Figure 12. Player 2 Equation Round 2**

Play continues in this manner, with each player taking turns creating equations, until all of the Solution cards are used up. Players sum the total values of their cards and the player with the most is the winner. When the deck of Integer cards is consumed they are shuffled and set back on the playing surface.

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**Open Solution – 5 Card Challenge (2 Players)**

Refer to Figure 13. Each player is dealt five Integer cards. In the challenge games players get two sets of Parentheses (inside and outside), and they are allowed to use up to 2 Exponent cards. In Figure 13 there are 3 exponent cards: one operates on an integer, another operates on inside parentheses and the third operates on outside parentheses. Players may use 2 of the 3 available Exponent cards.

Players attempt to use their Integer cards and Operator cards to create an equation equal one of the 24 Solution cards. The player attempts to create an equation using all 5 Integer cards and 4 Operator cards (the exponent and parentheses are always optional) equal to any of the available Solution cards.

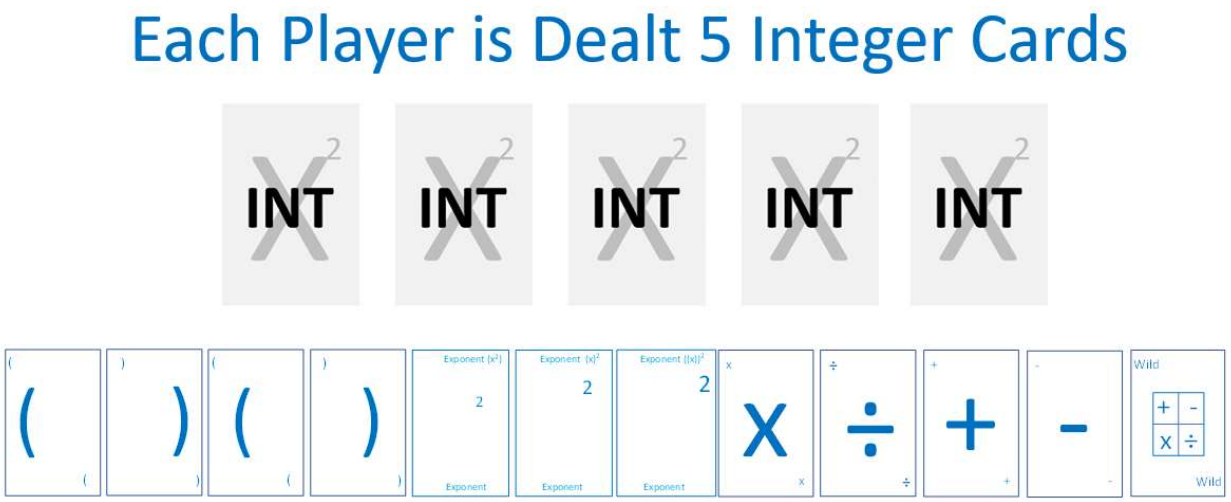


**Figure 13. Open Solution 5-Card Challenge Game Setup**

Assume that Player 1 is dealt the five cards shown in Figure 14. The player attempts to use those 5 cards to create an equation for one of the 24 Solution cards.

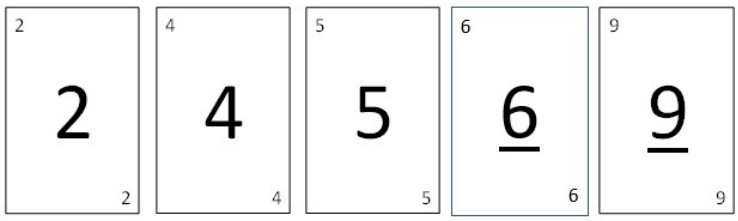


**Figure 14. Player 1 Integer Cards**

Player 1 can use his cards to create the equation shown in Figure 15. When doing this the player gets to keep the 99 Solution card. Player 1 then discards the five Integer cards and selects 5 new ones.

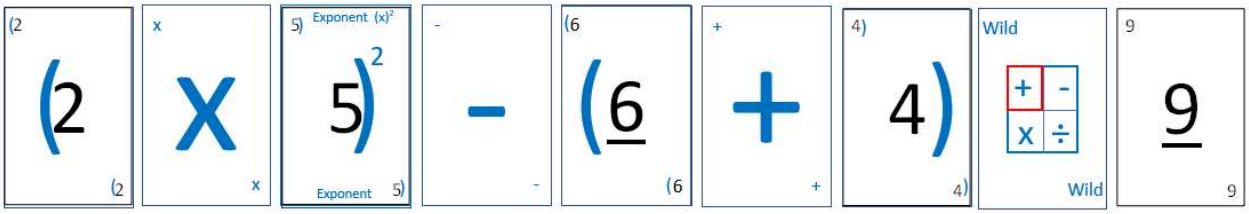


**Figure 15. Player 1 Equation Round 1**

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Assume that Player 2 is dealt the five cards shown in Figure 16. The player attempts to use those 5 cards to create an equation for one of the remaining 23 Solution cards.

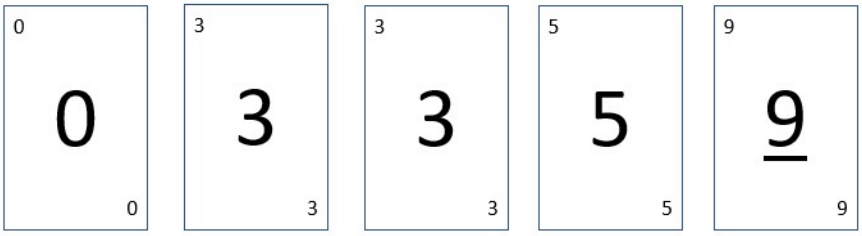


**Figure 16. Player 2 Integer Cards**

Player 2 can use his cards to create the equation shown in Figure 17. When doing this the player gets to keep the 95 Solution card. Player 2 then discards the five Integer cards and selects 5 new ones.

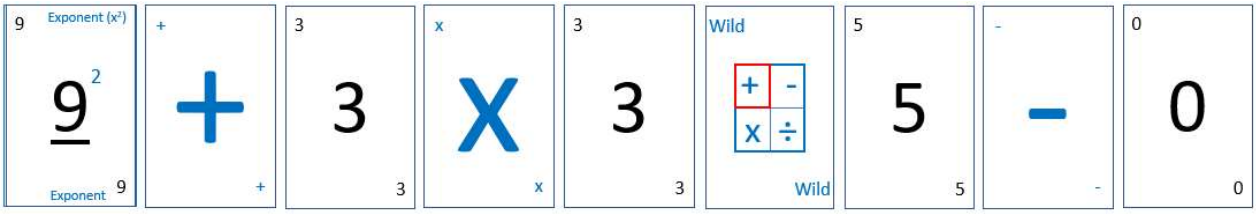


**Figure 17. Player 2 Equation Round 2**

After player 2 takes his turn the Solution cards remaining are as shown in Figure 18.

**Figure 18. Solution Cards with 95 and 99 Solution Removed**

Play continues in this manner, with each player taking turns creating equations, until all of the Solution cards are used up. Players sum the total values of their cards and the player with the most is the winner. When the deck of Integer cards is consumed they are shuffled and set back on the playing surface.

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**Open Solution – 6 Card Challenge (2 Players)**

Refer to Figure 19. Each player is dealt five Integer cards. In the challenge games players get two sets of parentheses (inside and outside), and they are allowed to use up to 2 Exponent cards.

Players attempt to use their Integer cards and Operator cards to create an equation equal one of the 24 Solution cards. The player attempts to create an equation using all 6 Integer cards and all 5 Operator cards (the exponent and parentheses are always optional) equal to any of the available Solution cards.

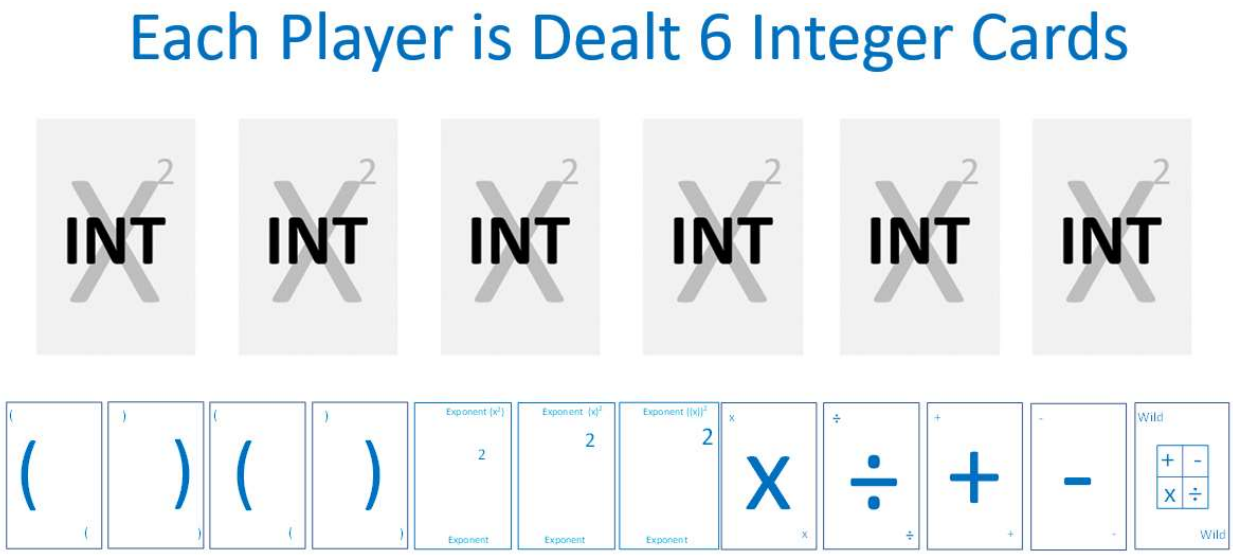


**Figure 19. Open Solution 5-Card Challenge Game Setup**

Assume that Player 1 is dealt the six cards shown in Figure 20. The player attempts to use those 6 cards to create an equation for one of the 24 Solution cards.

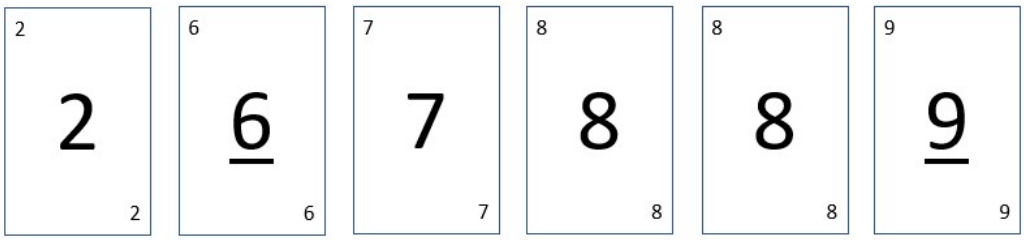


**Figure 20. Player 1 Integer Cards**

Player 1 can use his cards to create the equation shown in Figure 21. When doing this the player gets to keep the 90 Solution card. Player 1 then discards the six Integer cards and selects 6 new ones.

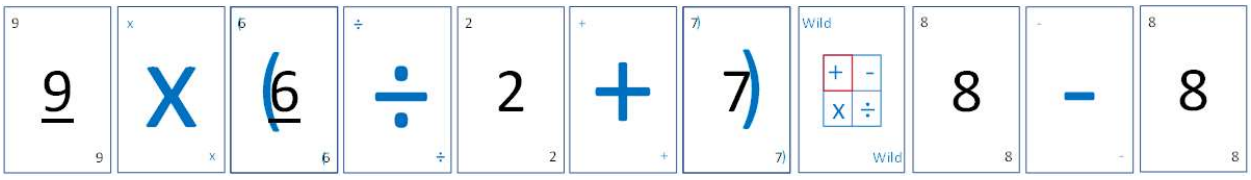


**Figure 21. Player 1 Equation Round 1**

Assume that Player 2 is dealt the six cards shown in Figure 22. The player attempts to use those 6 cards to create an equation for one of the remaining 23 Solution cards.

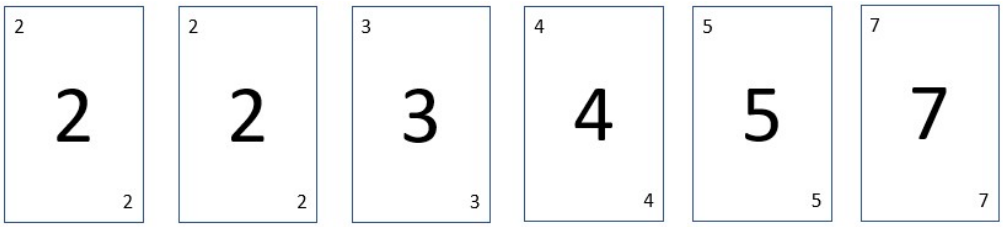


**Figure 22. Player 1 Integer Cards**

Player 2 can use his cards to create the equation shown in Figure 23. When doing this the player gets to keep the 70 Solution card. Player 2 then discards the six integer cards and selects 6 new ones.

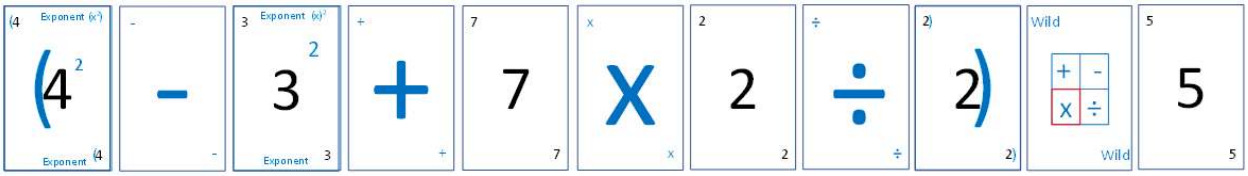


**Figure 23. Player 2 Equation Round 2**

After player 2 takes his turn the Solution cards remaining are as shown in Figure 24.

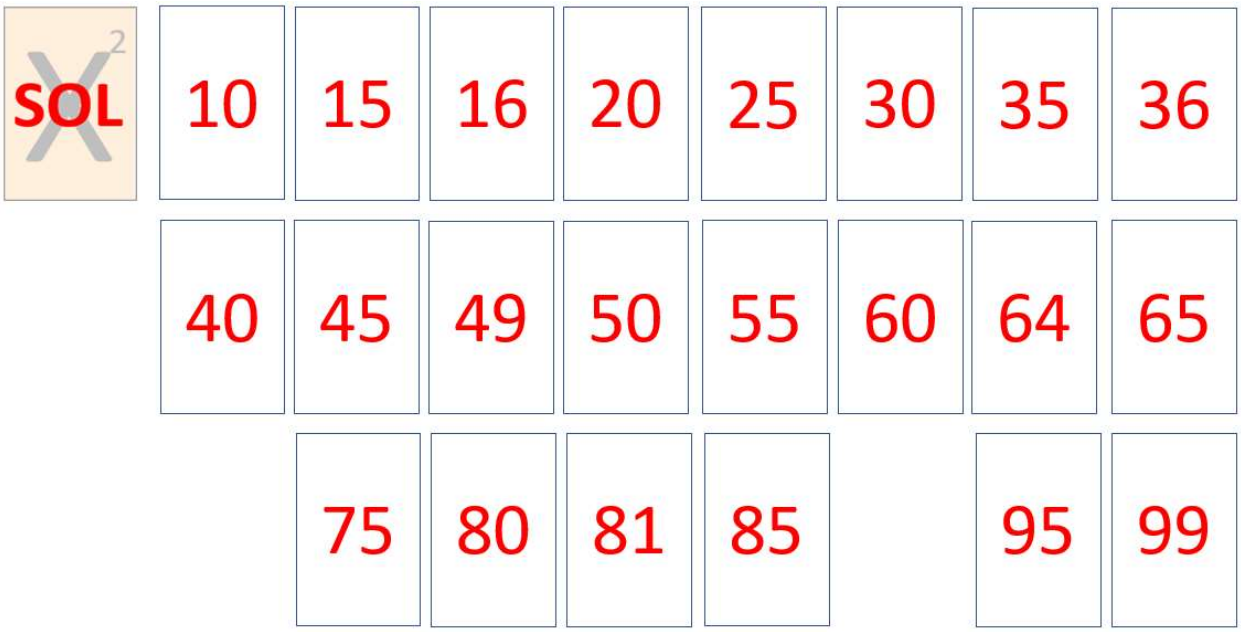


**Figure 24. Solution Cards with 70 and 90 Solutions Removed**

Play continues in this manner, with each player taking turns creating equations, until all of the Solution cards are used up. Players sum the total values of their cards and the player with the most is the winner. When the deck of Integer cards is consumed they are shuffled and set back on the playing surface.

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