Grades 3-9

Math Card Games

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Math Games and Activities with Cards

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Introduction

This book is a compilation of mathematics games and problem-solving activities for grades 3-9. These ideas are intended to be used as a supplement to any mathematics program. These activities are standards based.

The games provide concept and skill development practice as well as opportunities to develop a strategy to win. The activities provide practice on specific problem-solving strategies, such as making tables, finding patterns, generalizing and working backwards. The games and activities can be done at school or at home. Each page may be reproduced for classroom or home use.

The table of contents groups the games and activities by topic. Teacher comments and selected answers are also provided.

Why Use Cards?

Cards are:
• A useful diagnostic tool.
• Highly motivating!
• Flexible! They can be used at numerous grade levels and in many settings.
• Inexpensive and readily available.
• A powerful springboard to new topics based on pupil experience.
• Helpful as an aid to reinforce concepts.
• Effective as a tool to provide skill maintenance.
• A familiar, tactile, visual, yet mysterious and magical way to provide variety!

When And Where To Use Cards:
• Individually!
• One on one!
• In small groups!
• As an entire class!
• As an activity station!
• Friday afternoon!
• Special days and events!
• Day before a holiday!
• As a "sponge" or "filler"!
• As homework!
• As a class starter!
• Whenever the objective warrants!

Management Tips for Using Card Games:
• Make sure the game fits your objectives.
• Explain the rules before play using a transparency or "Texas" deck.
• Establish ground rules before play begins.
• Keep the group size at four or fewer players.
• Match students of comparable ability in competitive games.
• Use the games sparingly.

Your Number's Up

Materials

One deck of playing cards. Aces = 1, Jokers= 0; face cards and Tens are removed. Paper and pencil to keep score.

Rules and Play

1. *Your Number's Up* is a place-value card game for one to four players/teams. Players choose the type of game board and a high or low goal. The object is to build the largest or smallest number.

2. The dealer shuffles and places the cards face down in a pack. Players then decide if it will be a high or low score that wins the game, and then the number of places allowed in the game (1- 5).

3. Players take turns drawing a card from the pack and selecting a spot for that number on their place-value mat. Players must select a different place on each turn. Cards that are drawn are set aside in a discard pile; they are not returned to the pack. When all the places are filled, the winner is declared. An example of a game with a high-score goal, involving 4-digit numbers and three players, is shown below.

Goal High or Low (circle one) score wins

Players Names Places

	1000	100	10	1	
Randy	6	6	4	2	
Mary	7	7	0	3	
Taro	7	4	4	2	

Mary wins the round

Variations

- Allow players to select the number of decimal places (0-4) in a game.

- When all the places are filled, have players round their number to the nearest 10, 100, 1000, 10000, tenth, hundredth, etc., to determine the winner of the game.

Your Number's Up

Goal: High or Low (circle one) score wins

Players Names Places

Goal: High or Low (circle one) score wins

Players Names Places

Goal: High or Low (circle one) score wins

Players Names Places

Secrets of The Great Pyramid

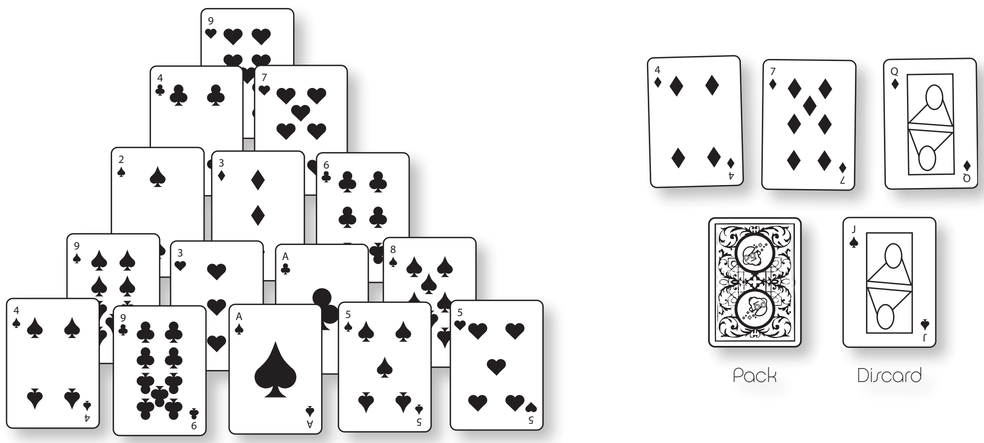
Materials

One deck of playing cards. Jokers are removed. Aces = 1, Jacks = 11, Queens = 12, Kings = 13, all other cards face value.

Rules and Play

1. The game *Secrets of the Great Pyramid* is for one player/team using on deck of cards.

2. Deal 15 cards face up in a pyramid as shown below. Then deal three cards for use in attempting to remove cards from the pyramid (4, 7, 12). Place the remaining cards face down on the playing surface.



3. The object of the game is to remove all 15 cards from the pyramid by combining the value of two or three cards from the pack. You can add, subtract, multiply, or divide. Play begins by attempting to remove cards from the bottom row of the pyramid. In the example above, we could remove the 5 of Spades or the 5 of Hearts because they are both "free" and 12 – 7 =5. We could also have removed the 4 of Spades, 9 of Clubs or the Ace of Spades by using all three cards: 7 – (12+4)= 4; 12- 7 +4= 9; 12- (7+4)= 1. Players must decide which move to make, using either two or three cards.

4. Any unused card is returned to the pack and can be used later. If you cannot form a sentence that will remove a card, then place these cards in the discard pile and deal a new set of three.

5. Continue play until the pyramid is cleared or the pack is depleted. Record the results of each game on the graph on the next page. Each player is allowed only one pass through the pack.

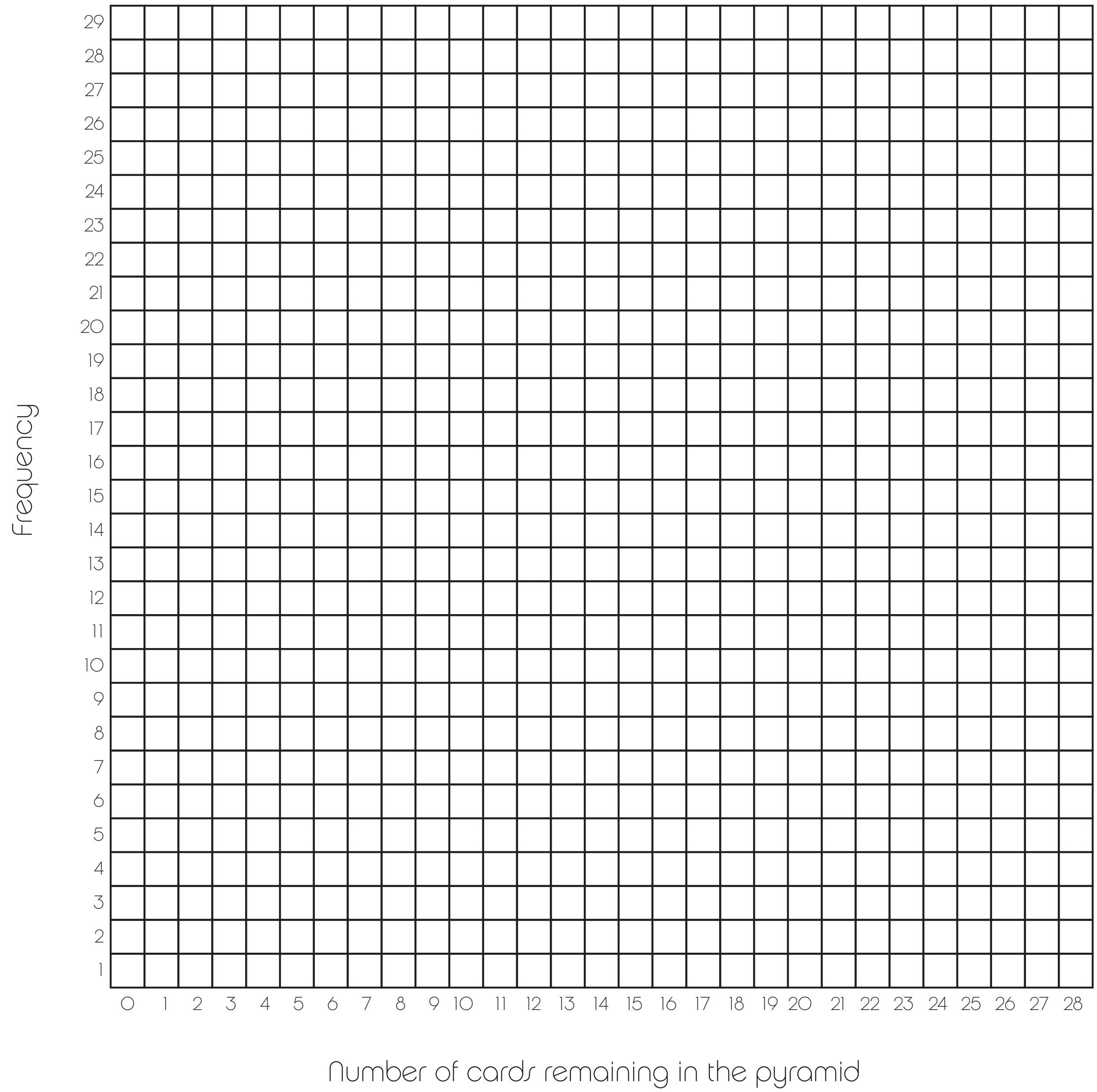
Variations

- Place 21 or 28 cards in the pyramid. Restrict removal to sums to 13 using one or two cards.

- Remove the Kings. Then place 21 or 28 cards in the pyramid. Change the removal rule to make sums of 12 using one or two cards.

- Remove the face cards. Then place 21 or 28 cards in the pyramid. Change the removal rule to make sums of 10 using one or two cards.

Secrets of The Great Pyramid



Find It

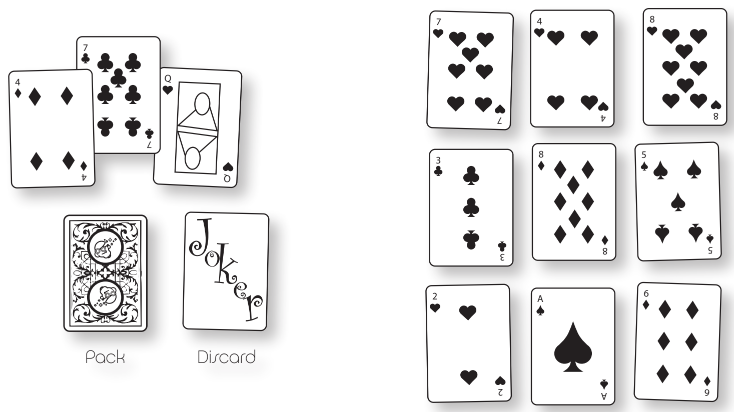
Materials

One deck of playing cards, pencil, graph paper.

Rules and Play

1. This is a card game for one player or team. Aces = 1, Jacks = 11, Queens = 12, Kings = 13; other cards are face value.

2. Deal nine cards face up in any array as shown below. Then deal three cards for use in attempting to remove cards from the array. Place the remaining cards face down in a pack on the playing surface.



3. The object of the game is to remove all of the cards from the array by combining the values of two or three cards in a set of three random cards. Any combination of addition, subtraction, multiplication or division may be used.

4. Using two or three of the random cards, you must form a math sentence whose answer is equal to the value of one of the cards in the array. If the answer is equal to one of the cards, then the "answer card" and the cards used are removed and placed in the discard pile. You must use two or three cards. Any unused cards are returned to the deck and reused later. If you see that you cannot form a sentence that will remove a card, discard the three cards and deal a new set. Notice that in the example shown, several correct answers are possible: 7-4 =3 will remove the 3; 12 – 7 = 5 will remove the 5; and 7 - (12 ÷ 4) = 4 removes the 4.

5. Players may pass on any round, but the three random cards must be placed in the discard pile. Play continues until the array is cleared or the pack is depleted.

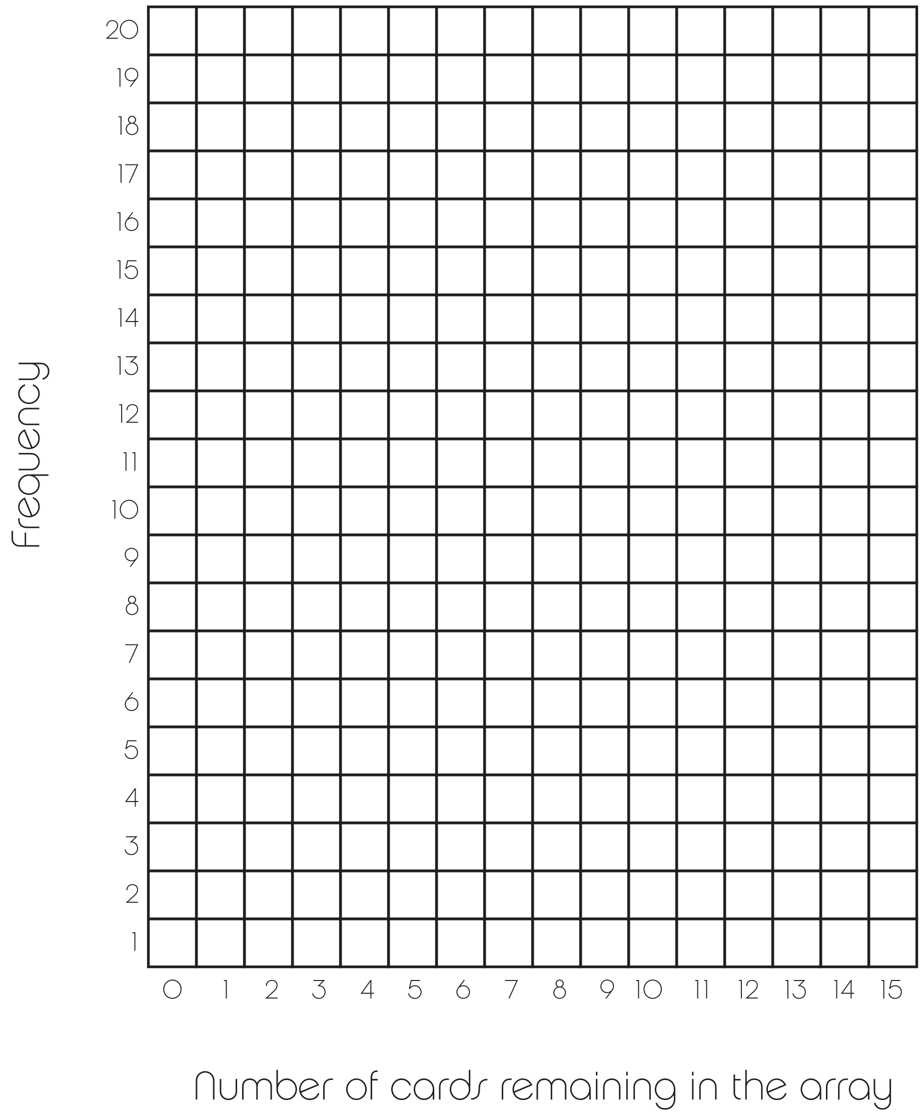
6. Only one pass through the deck is allowed for each game. At the end of the game, count the number of cards remaining in the array and record the result on a graph.

Variations

- For additional challenge, place 16 cards in the original array.

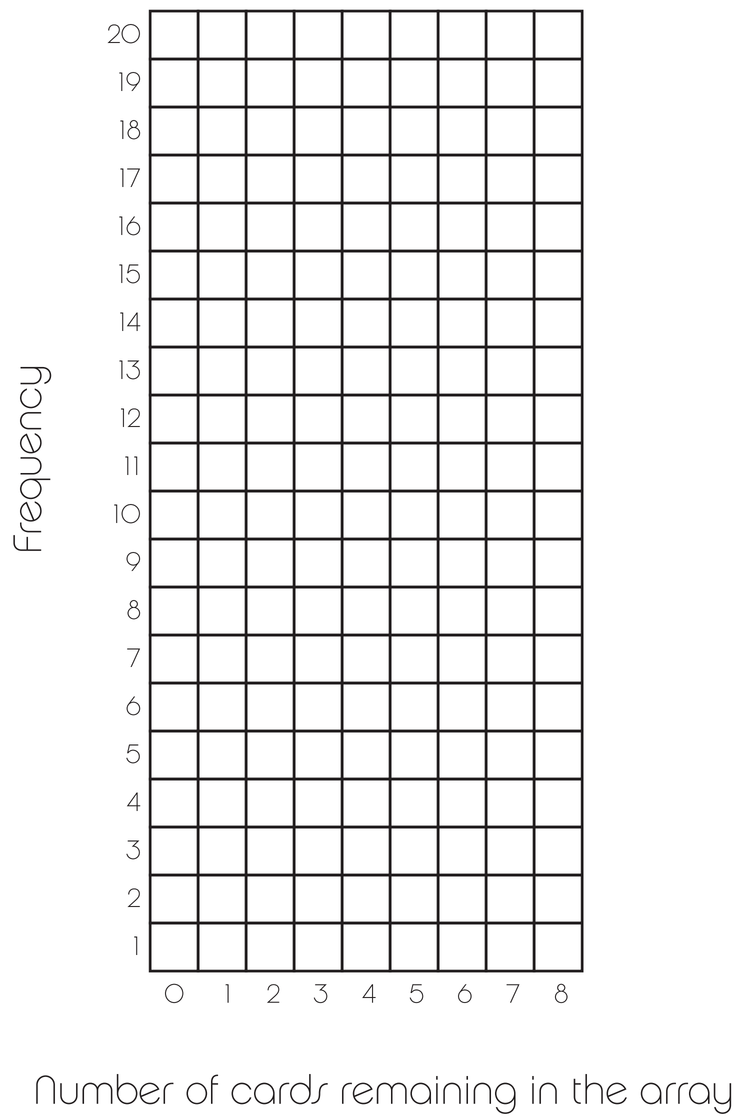
- Play a competitive version of the game. The player/team with the smallest number of cards remaining in the array at the conclusion of play wins that round. The first player to win three rounds wins the game.

Find It



Frequency
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Number of cards remaining in the array

Find It


Frequency
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0 1 2 3 4 5 6 7 8
Number of cards remaining in the array

Lightning

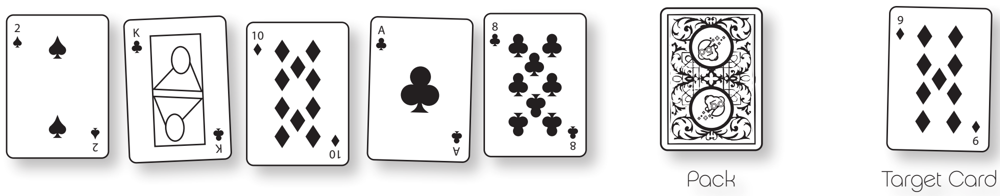
Materials

One deck of playing cards.

Rules and Play

1. This game is for two to four players. Aces represent 1. Face cards may either be removed, used as Tens, or used as 11, 12 and 13, depending on the skill level of the players.

2. The dealer places five cards face up on the table. When all players are ready, the dealer then turns another card face up. This card is called the target card. Each player then tries to use addition, subtraction, multiplication and division to combine all five cards in such a way that the result is equal to the numerical value of the target card (see example below). Each of the five cards must be used once and only once.



3. When a player thinks (s)he has an answer (s)he says, "Lightning! " and explains his/her solution. If (s)he is correct, (s)he gets the six cards. If (s)he is incorrect, (s)he must give back five cards to the pack. Cards that are given back are placed at the bottom of the pack. If a solution is incorrect, others then have a chance to solve the problem using the same cards. Players who do not have any cards to give back are eliminated from the game.

4. A maximum of 3 minutes are allowed to solve each hand. An egg timer may be useful as a timing device.

5. The object of the game is to collect the most cards. Play ends when the pack is depleted or when time is called. The player with the most cards wins.

Variations

- Adjust rules so that players may use two, three, four, or all five cards to solve the problem. Scoring can then be adjusted as follows:

  If you use two cards you get 3 points (2 cards + target card)
  If you use three cards you get 4 points (3 cards + target card)
  If you use four cards you get 5 points (4 cards + target card)
  If you use five cards you get 6 points (5 cards + target card)

- For players who like an additional challenge, deal only four cards and a target card face up on the table. Players then try to combine the four cards so that the result is equal to the target card. Any legal math maneuver is allowed to solve the problem (that is, +, -, ÷, x, exponents, place value, etc). Replenish the vacated spaces after each round of play.

- Remove the face cards and tens. Allow two digit numbers as a goal by placing two cards in the target area.

Scan For Compatible Sums

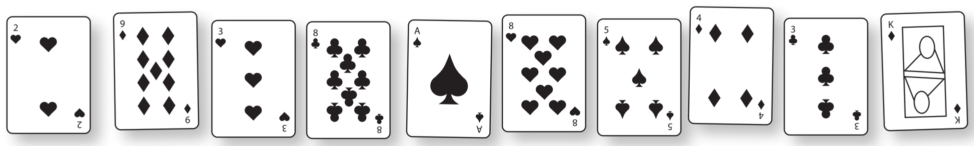
Materials

One deck of playing cards.

Rules and Play

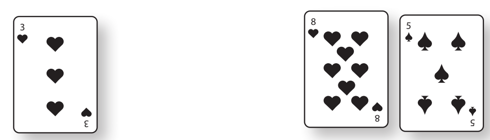
1. This is card game for one to three players (Jokers = 0, Aces = 1, Jacks = 11, Queens = 12, Kings = 13).

2. Shuffle the cards and lay out 10 cards face up as shown below.



3. The object of the game is to collect the most cards. Cards are collected by combining groups 1, 2, 3,…10, cards in such a way that the sum of each group is a multiple of 10 (that is, 10, 20, 30, 40, etc).

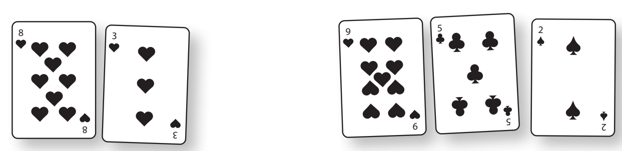
4. Players alternate turns. Up to 10 cards may be taken on each play. In the example above, 2 and 8 could be removed because 2 + 8 =10. In a similar fashion, we could remove the 9 and Ace because 9 + 1 =10; or the King, 4 and 3 because 13 + 4 + 3 =20. This would leave the collection to the right. (We could also remove all seven of the these cards in one fell swoop with a total of 40!).



   It is important to note that cards can combine and be removed from any position in the line and that more than one combination may be possible. In the example above, 8, 5, 4, and 3 could have been removed because 8 + 5 + 4 + 3 = 20.

5. If a player clears all 10 cards from the layout, (s)he gets another turn with 10 more cards. When no more compatible sums can be removed from the line, that player's turn ends and the empty slots in the line restocked. Players may NOT change their mind after a group of cards is removed.

6. Play continues until the deck is depleted. Note that on the last round only a small number of cards may be available for replenishment. When this occurs, proceed as usual, but with a smaller number of cards in the line. Example: Suppose two cards were left over from the previous round of play, 8 and 3, and only three cards remained in the pack to be used for replenishment, 9, 5, and 2.



   In this case, the last player may take 8 and 2 or 5, 3, and because the sums equal 10. Then the game ends. Any unused cards on the last play are discarded.

7. The winner is the player who collects the most cards.

Variation

- Assign all face cards the value of 10.

Ten-Twenty-Thirty

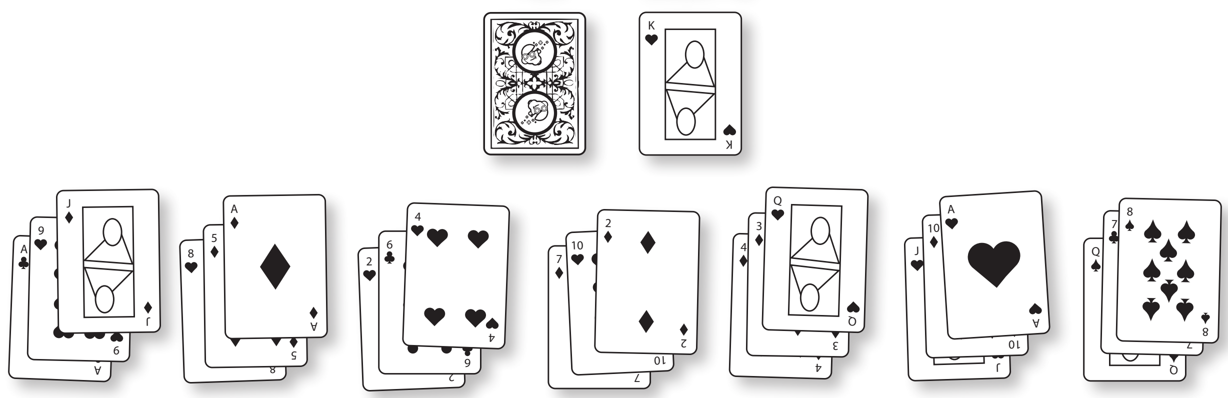
Materials

One deck of playing cards.

Rules and Play

1. The game *Ten-Twenty-Thirty* is for one player using one deck of cards. Aces = 1; face cards = 10.

2. The game begins by dealing seven piles of three cards face up as shown in the example below.



3. The object of the game is to remove all the cards from each pile. Groups of three cards may be removed from the same pile only if the sum is 10, 20, or 30.

4. In the example above we could remove Pile 1—Ace of Clubs, Nine of Hearts, and Jack of Diamonds—because the sum is 20. Note that if a pile is depleted it is not restored on subsequent plays.

5. Once all sets of cards within each pile that total 10, 20 or 30 have been removed, each non- vacant pile is dealt another card. Then another attempt is made to remove sets of three cards whose sum is 10, 20, or 30. This procedure of replenishing and then attempting to remove sets of three cards continues until all piles are empty (in this case the game is won) or the pack is depleted.

6. The game ends when there are no more cards in the pack and when no cards can be removed from a pile. (In this case, the game is lost!)

7. Each player is allowed only one pass through the deck.

Variations

- Remove sets of three cards whose sum is 9, 19, 29, or 8, 18, 28, etc.

- Remove sets of two cards whose product is 10, 20, 30, 40, …, 100.

Double Trouble

Materials

One deck of playing cards.

Rules and Play

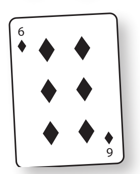
1. *Double Trouble* is a card game for two to four players/teams.

2. The dealer removes all of the face cards and Tens from the deck. Aces = 1, Jokers = 0.

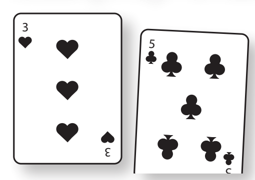
3. The dealer places the cards face down in one, two, three, four or five piles, depending upon the maturity of the players and the difficulty level desired. There should be an equal number of cards in each pile.

4. Play begins by having the dealer turn over the top card in each pile. Samples involving one- and two-digit games are shown below.

Doubling 1-Digit Numbers



Doubling 2-Digit Numbers



5. The first player/team who can correctly double the number shown on the card(s) wins the set of cards. If a tie results, the top card(s) are set aside from each pile and either buried or become a part of the winnings in the next round.

6. Play continues until the piles are depleted. The player/team with the most cards wins the game.

Triple Play

Materials

One deck of playing cards.

Rules and Play

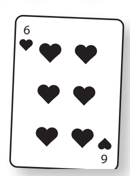
1. *Triple Play* is a card game for two to four players/teams.

2. The dealer removes all of the face cards and Tens from the deck. Aces = 1, Jokers= 0.

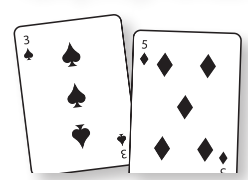
3. The dealer places the cards face down in one, two, three, four or five piles, depending up on the maturity of the players and the difficulty level desired. There should be an equal number of cards in each pile.

4. Play begins by having the dealer turn over the top card in each pile. Samples involving one- and two- digit games are shown below.

Tripling 1-Digit Numbers



Tripling 2-Digit Numbers



5. The first player/team who can correctly triple the number shown on the card(s) wins the set of cards. If a tie results, the top card(s) are set aside from each pile and either buried or become a part of winnings in the next round.

6. Play continues until the piles are depleted. The player/team with the most cards wins the game.

Half As Much

Materials

One deck of playing cards.

Rules and Play

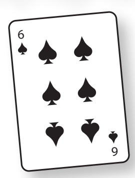
1. *Half as Much* is a card game for two to four players/teams.

2. The dealer removes all face cards, Tens and the odd-numbered cards from the pack. Aces = 1, so remove them; Jokers = 0.

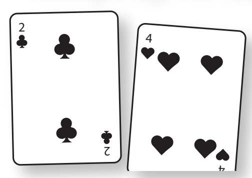
3. The dealer places the cards face down in one, two, three, four, or five piles, depending upon the maturity of the players and the difficulty level desired. There should be an equal number of cards in each pile.

4. Play begins by having the dealer turn over the top card in each pile. Samples involving one- and two-digit games are shown below.

Halving 1-Digit Numbers



Halving 2-Digit Numbers



5. The first player/team who can correctly halve the number shown on the card(s) wins the set of cards. If a tie results, the top card(s) are set aside from each pile and either buried or become a part of the winnings in the next round.

6. Play continues until the piles are depleted. The player/team with the most cards wins the game.

Variation

- To provide practice involving halving where the result can be a decimal, do not remove the odd-numbered cards from the pack.

Noticing 8s and 9s

Materials

One deck of playing cards (remove Tens and face cards; Aces =1, Jokers= 0). One game board for each player. One score sheet for each player.

Rules and Play

1. This game is for two to four players or teams. The object of the game is to score the most points by making and solving math problems with large answers.

2. Players or a teacher select a board for use in each game. Each player must have a game board and a score sheet. All players must have the same game board. Players cut for deal. High card starts. Play rotates clockwise.

3. Each player, in turn, draws the number of cards required to fill the number of spaces on the game board. As each card is drawn it must be placed on the game board. Cards may not be moved once they are placed. Cards are placed on each board to form the largest possible answer.

4. After the cards are placed on a game board, players must calculate the answer to their problem. If the answer is correct, a player may record the answer as his/her score. If (s)he is incorrect, (s)he must record a score of zero for that round. Players are encouraged to calculate each answer in their heads without paper/pencil or calculator within a two-minute time limit.

5. Record the answer for each player for each round.

6. The game ends when there are no cards remaining in the pack or at the end of four rounds, whichever comes first. The player with the largest total is the winner.

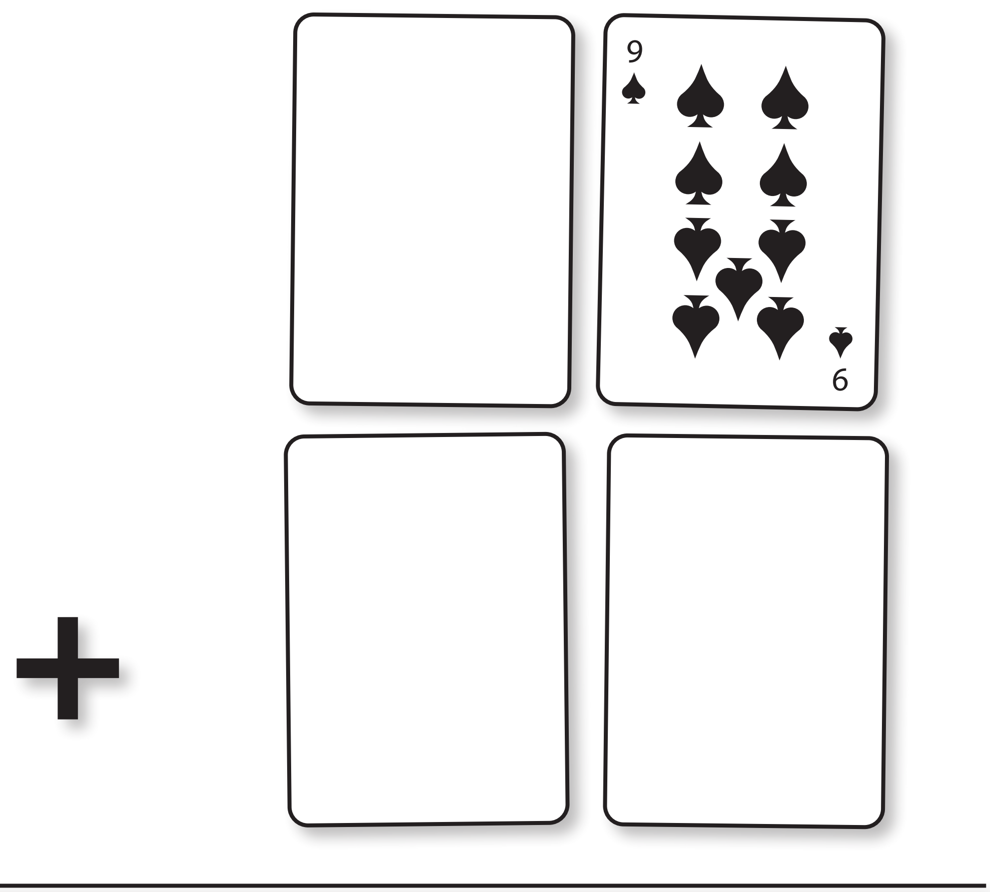
Noticing 8s and 9s

Addition of Whole Numbers

2-digit + 2-digit game board.

Remember:

- Remove face cards
- Remove tens
- Aces = 1
- Jokers = 0



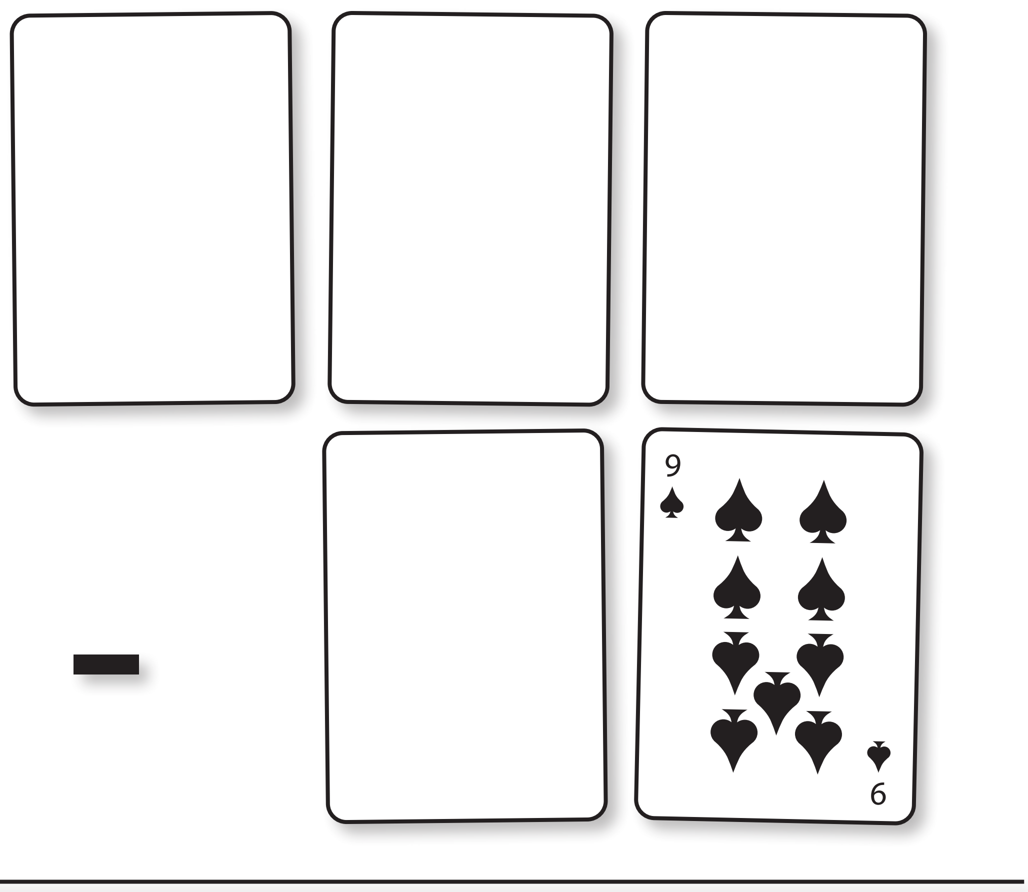
Noticing 8s and 9s

Subtraction of Whole Numbers

3-digit - 2-digit game board.

Remember:

- Remove face cards
- Remove tens
- Aces = 1
- Jokers = 0



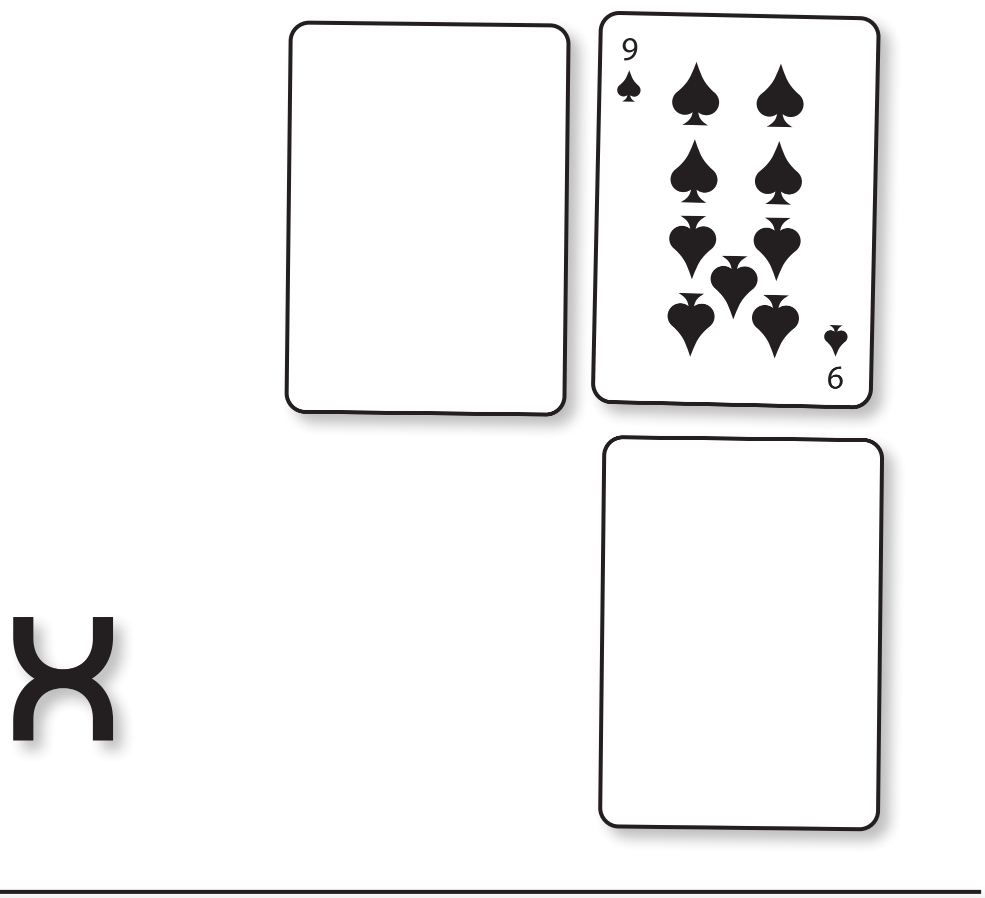
Noticing 8s and 9s

Multiplication of Whole Numbers

2-digit x 1-digit game board.

Remember:

- Remove face cards
- Remove tens
- Aces = 1
- Jokers = 0



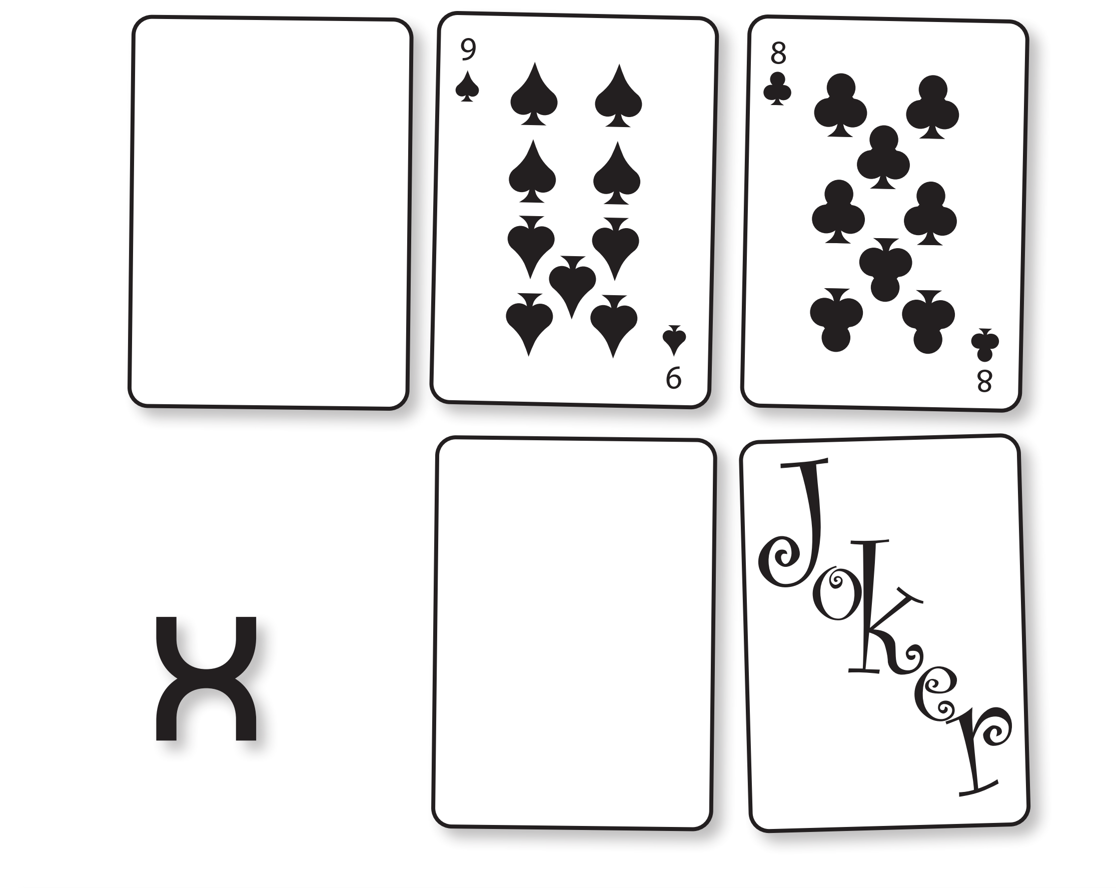
Noticing 8s and 9s

Multiplication of Whole Numbers

3-digit x 2-digit game board.

Remember:

- Remove face cards
- Remove tens
- Aces = 1
- Jokers = 0

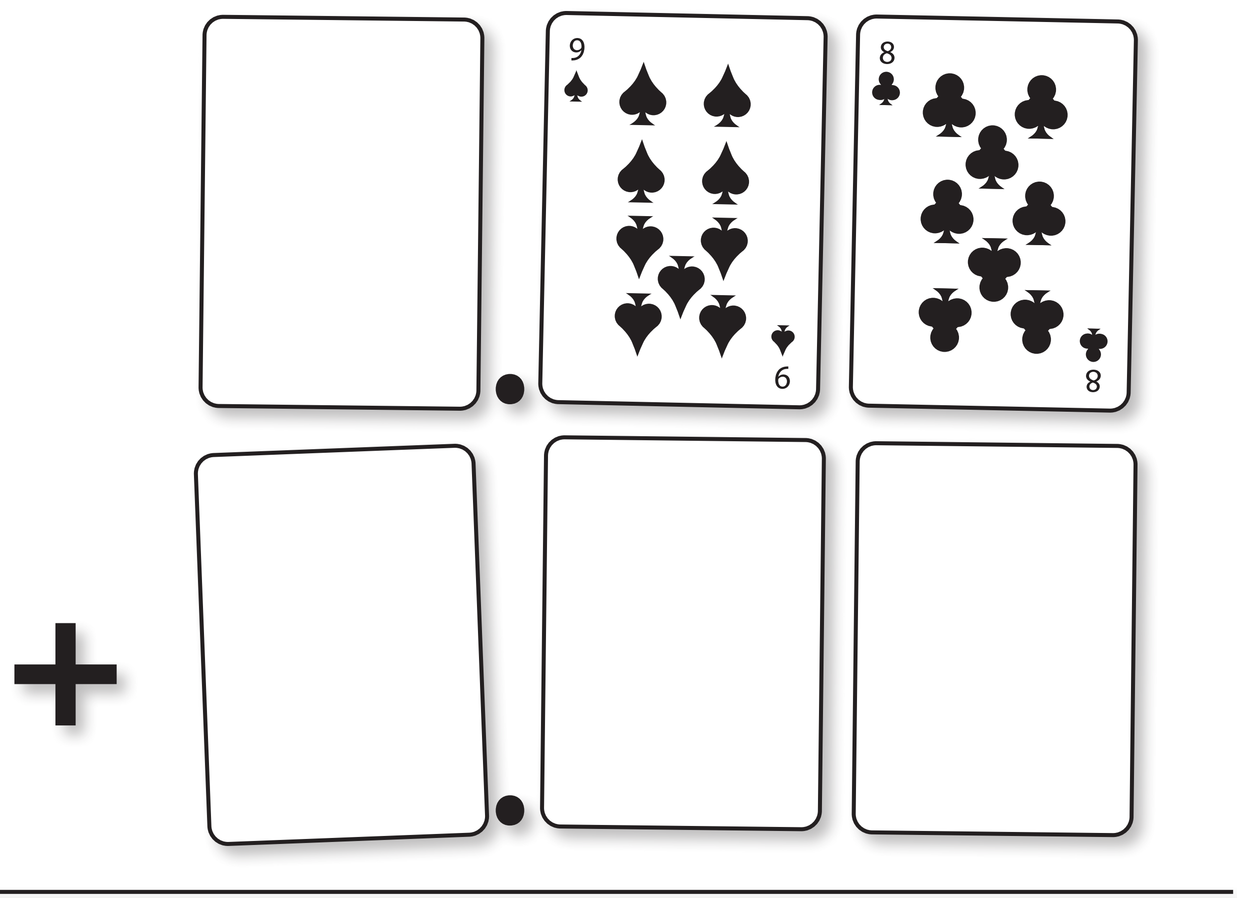


Noticing 8s and 9s

Addition of Decimals

Remember:

- Remove face cards
- Remove tens
- Aces = 1
- Jokers = 0

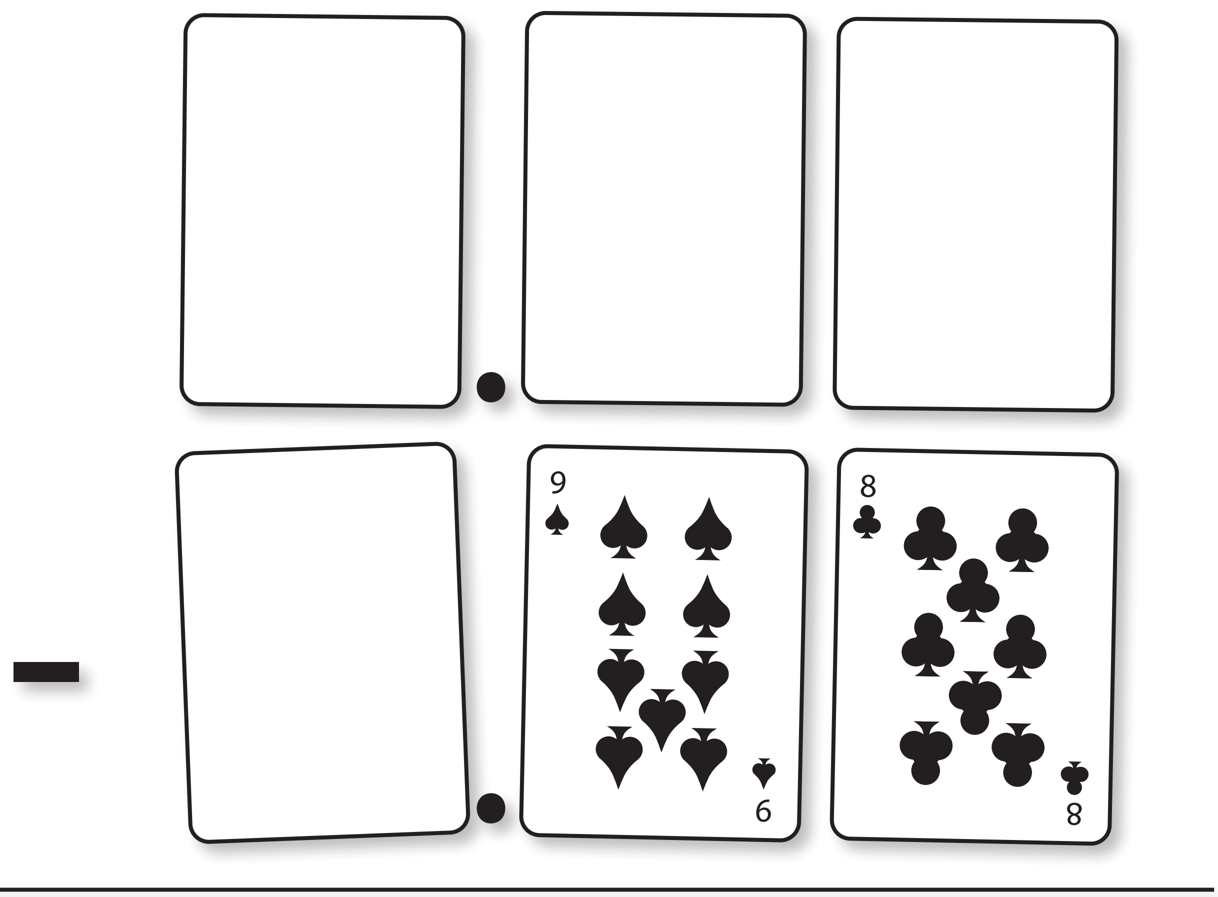


Noticing 8s and 9s

Subtraction of Decimals

Remember:

- Remove face cards
- Remove tens
- Aces = 1
- Jokers = 0



Minimize

Materials

One deck of playing cards (remove Tens and face cards; Aces =1, Jokers= 0). One game board for each player. One score sheet for each player.

Rules and Play

1. This game is for two to four players using one deck of cards. In this game Aces = 1, Jokers= 0. The object of the game is to score the fewest points by making math problems with small answers.

2. Players or a teacher select a board for use in each game. Each player must have a game board and a score sheet. All players must have the same game board. Players cut for deal. Low card starts. Play rotates clockwise.

3. Each player in turn draws the number of cards required to fill the number of spaces on the game board. Cards are placed on each board to form the smallest possible answer. As each card is drawn, it must be placed on the game board. Cards may not be removed once they are placed. (Check with your teacher to see if calculators are allowed.)

4. After the cards are placed on a game board, players must calculate the answer to their problem. If the answer is correct, a player may record the answer as his/her score. If (s)he is incorrect, (s)he must record a score of zero for that round. Players are encouraged to calculate each answer in their heads without paper/pencil or calculator within a two – minute time limit.

5. Record the answer for each player for each round.

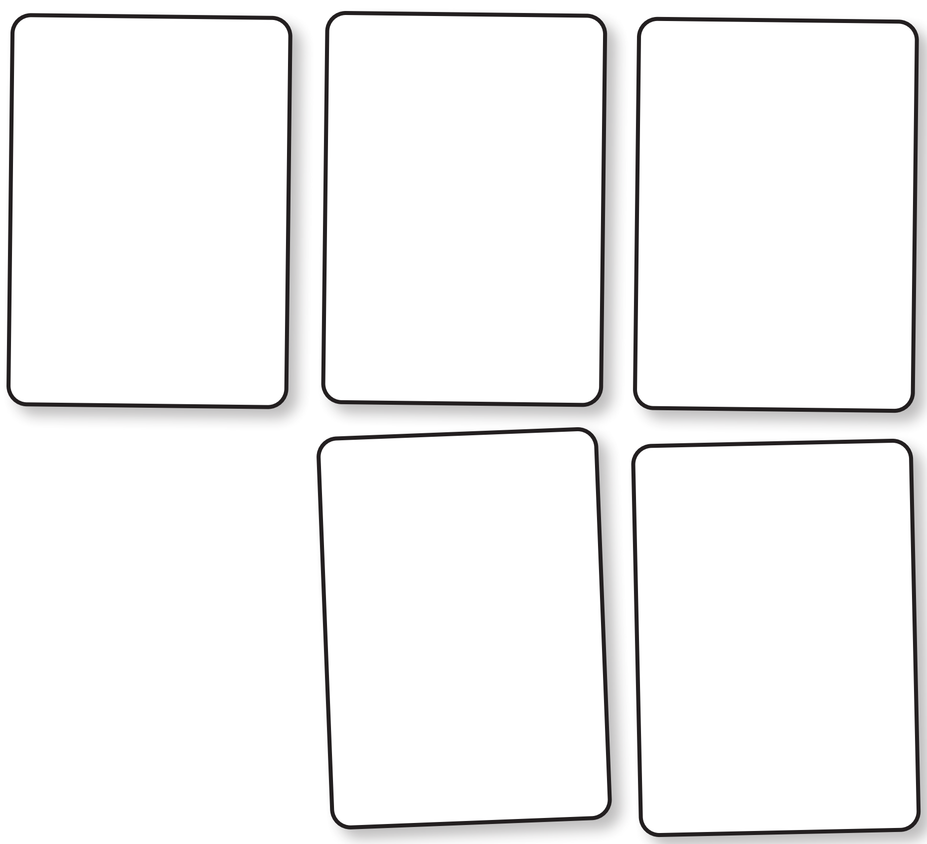
6. The game ends when there are no cards remaining in the pack or at the end of four rounds, whichever comes first. The player with the smallest total is the winner.

Minimize

Addition, Subtraction, Multiplication

Remember:

- Remove face cards
- Remove tens
- Aces = 1
- Jokers = 0
- Provide your own operation symbol

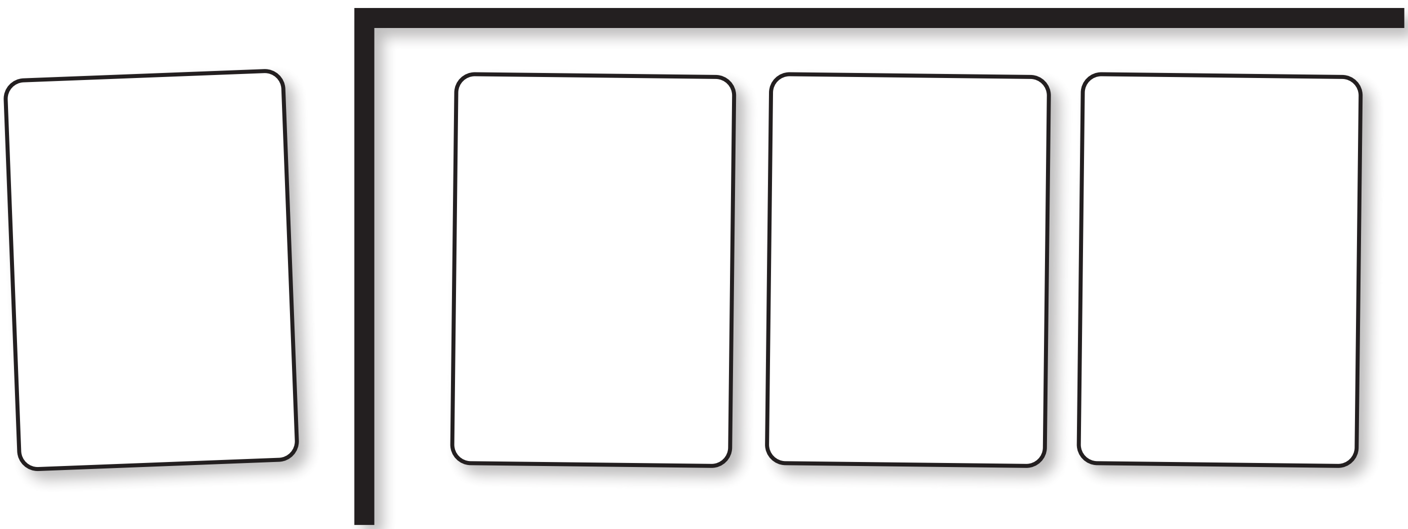


Minimize

Division

Remember:

- Remove face cards
- Remove tens
- Aces = 1
- Jokers = 0
- Provide your own operation symbol



Record Sheet

Noticing 8's and 9's and Minimize

Name: ______________________________

Round	Score
1	
2	
3	
4	
Total	

Noticing 8's and 9's and Minimize

Name: ______________________________

Round	Score
1	
2	
3	
4	
Total	

Noticing 8's and 9's and Minimize

Name: ______________________________

Round	Score
1	
2	
3	
4	
Total	

Noticing 8's and 9's and Minimize

Name: ______________________________

Round	Score
1	
2	
3	
4	
Total	

Be A Factor

Materials

One deck of playing cards (remove Tens and face cards; Aces =1, Jokers= 0). One game board for each player. One score sheet for each player.

Rules and Play

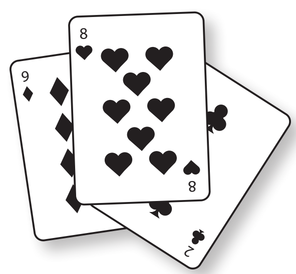
1. *Be a Factor* is a game for two to four players.

2. The object of the game is to collect the most cards. Cards are collected by playing a card that is a factor of 24 in the discard pile.

3. The dealer shuffles the cards and distributes three cards to each of the players.

4. The game begins by having one of the players draw a card. (S)he must then decide which card to discard from his/her hand. When a card is placed on the discard pile, the player must declare whether or not it is a factor of 24. If the card is a factor of 24, that player wins all the cards in the discard pile and another turn. If a player answers incorrectly and is challenged by an opponent, (s)he must pay back one card to the pack. If the discard is not a factor of 24, play passes to the next player. Players take turns in clockwise order.

5. It is important to note that players must explain why the card they play is a factor of 24 before they are allowed to remove cards from the discard pile. For example, if a player played an 8 on the discard pile, (s)he would need to say, "8 is a factor of 24 because 8 x 3= 24".



6. Play rotates clockwise until the pack is depleted or time is called.

7. The winner of the game is the player with the most cards.

Variations

- Allow players to remove sets of cards from the discard pile if the play is a factor of some number other than 24. For example, use 12, 18, etc.

- For advanced play, allow factors of combinations of numbers, such as 9 or 15, 24 or 9, etc.

Prime Time

Materials

One deck of cards (Aces = 1, Jacks = 11, Queens = 12, Kings = 13).

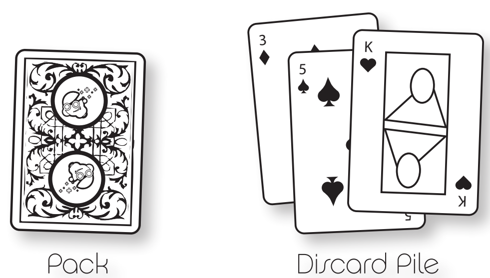
Rules and Play

1. *Prime Time* is a game for two to three players.

2. Deal five cards to each player.

3. The object of the game is to discard all cards in a hand, or have the fewest cards remaining in a hand, after one pass through the deck.

4. Play begins when a player must discard a prime or draw cards from the pack until (s)he can discard a prime. Only one card may be discarded on each turn.



5. Play continues until the pack is depleted, time expires, or a designated number of rounds are completed. The winning player is the player with the fewest cards remaining in his/her hand. The winner of each round receives 1 point for each card in his/her opponent's hand(s), in excess of winning hand.

6. The player with the highest score at the end of the game wins.

Variation

- Adjust the scoring so that the winner of each round receives the total number of points that represent the difference of each pair of hands.

Slap Happy

Materials

One deck of cards (Aces = 1, Jacks = 11, Queens = 12, Kings = 13).

Rules and Play

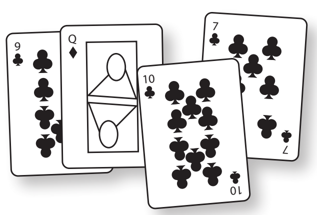
1. *Slap Happy* is a game for two to four players.

2. The object of the game is to collect the most cards.

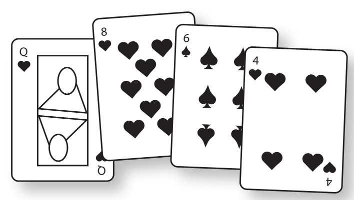
3. The dealer shuffles the cards and distributes all cards, one at a time, face down, to the players. All players must keep their cards face down in a pack.

4. The game begins by having each of the players simultaneously turn over one card from the top of their pack and place it face up in the center of the playing area. Each player must move his/her card from the top of the pack in an outward motion, this will give each player a fair chance of seeing all of the cards being played.

5. When a prime is played, the first player to slap the stack takes the prime and all cards below it. If none of the cards played are prime, players leave the exposed cards at the center of the table and continue turning over cards from their pack until a prime is drawn. The winner of each round must shuffle his/her cards before play is resumed. Two examples of a game in progress are shown below.



Stack may be slapped:
7 is a prime number!



Stack may not be slapped:
no numbers are prime!

6. On some occasions more than one player will pounce on a stack. When this occurs, the player whose hand is directly on top of the prime card wins the pile

7. Play continues until one player has all the cards or until time is called. The winner of the game is the player with the most cards.

Variations

- Consider having younger players slap the 5, 10, Jack, etc.

- Allow slapping the stack if the card is a factor or multiple of some number. For example, multiples of 2, 3, 4, etc.; factors of 9, 12, 15, 18, 24, etc.

- For advanced play, allow slapping if the card is a factor or multiple of two numbers. For example, 9 or 5, 9 or 6, etc.

Prediction

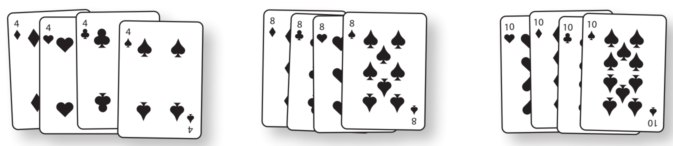
Materials

One deck of cards (Aces = 1, Jacks = 11, Queens = 12, Kings = 13). Paper and pencil to keep score and make predictions.

Rules and Play

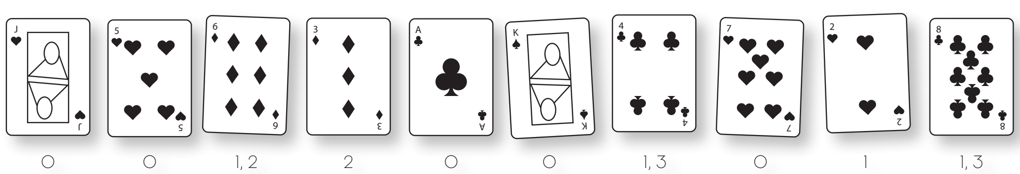
1. *Prediction* is a game for two to four players. The object of the game is to get the highest score by accumulating the most points.

2. The game begins by having the dealer secretly remove three sets of four cards from the pack. Each set of four cards must be of the same rank. The sets removed are not shown to the other players until scoring takes place.



3. The dealer shuffles the remaining cards and distributes 10 cards to each player.

4. Each player then turns their cards face up and finds the score for their hand based on the scheme shown below. Note that the same card can be used to score points in several categories. (For example, 8 is even and divisible by 4.) An example of how to score a hand is provided below.



Type of Card	Number of Points
Even Number	1
Divisible by 3	2
Divisible by 4	3
Divisible by 10	5

5. The dealer records each player's score for the round. After regular scoring has been done, bonus points are assigned based on who can predict the cards that were removed from the deck. If there are more than two players, this should be done by secret ballot. Bonus points are awarded as follows: 1 bonus point for 1 set correct, 2 bonus points for 2 sets correct, 3 bonus points for 3 sets correct.

6. The dealer changes at the end of each round. The game ends when each player has had a chance to deal. Scores are then totaled. The player/ team with the highest score wins.

Variations

- Change the number of secret sets of cards that are removed by the dealer.
- Add more scoring categories to the divisibility list. For example, include divisibility by 5.
- Adjust the scoring scheme. For example, use 10, 20, 30, 50 or 100, 200, 300, 500, or 1000, 2000, 3000, 5000, depending upon the unit being studied. Decimals or fractions might also be considered. Bonus points can be adjusted in a similar fashion, or they might even be powers of 10, such as 1, 10, and 100.

Prediction

Scoring Category:	Number of Points:
Even Number	1
Divisible by 3	2
Divisible by 4	3
Divisible by 10	5
Bonus	1-3

Players Names	Round 1	Round 2	Round 3	Round 4	Total

Scoring Category:	Number of Points:
Even Number	1
Divisible by 3	2
Divisible by 4	3
Divisible by 10	5
Bonus	1-3

Players Names	Round 1	Round 2	Round 3	Round 4	Total

Simplest Form

Materials

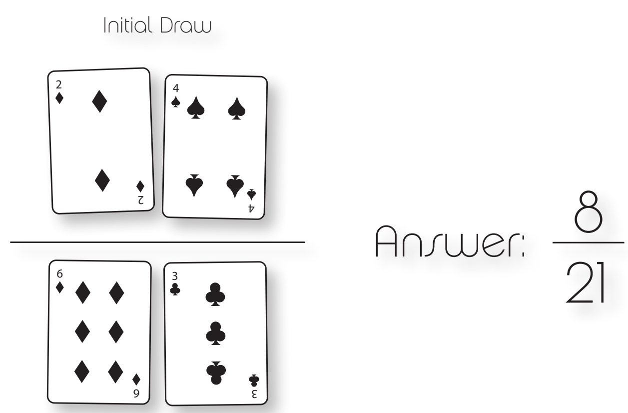
One deck of playing cards. Aces = 1; Jokers and face cards are removed.

Rules and Play

1. *Simplest Form* is a fraction card game for two players/teams.

2. The dealer shuffles and distributes the cards one at a time to the players. Players position their cards face down in a pack and sit side by side.

3. Play begins by having the players simultaneously turn over two cards and place them on a game board. Each player places one card in the empty space for the numerator and one card in the empty space for the denominator. An example is shown below.



4. The first player/team who can correctly simplify the fraction shown by the cards wins the set of cards. If a tie results, the cards are either buried or are set aside and become a part of the winnings in the next round.

5. Play continues until one player/team has accumulated all of the cards or time is called. The player/team with the most cards wins the game.

Variation

- Have players sit opposite their opponent. Each player draws two cards and places them in order in the spaces on their side of the board. Each player then simplifies the fraction as seen from his/her side of the board. Note that the answers will usually be different, because one player's numerator will be the other's denominator. If you play this variation, rename the game *Look At It My Way!*

Capture That Fraction

Materials

One deck of playing cards (Aces= 1, Jokers= 0, Jacks = 11, Queens = 12, Kings = 13). Calculator.

Rules and Play

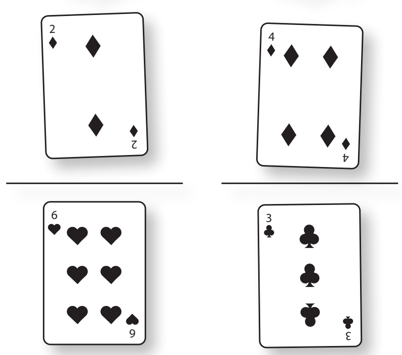
1. *Capture That Fraction* is a game for two to four players/teams.

2. The dealer shuffles and distributes the cards one at a time to the players. Players position their cards face down and sit side by side.

3. Play begins by having the players simultaneously turn over two cards and place them on a game board. Each player places one card in the empty space for the numerator and one card in the empty space for the denominator. An example is shown below.

Initial Draw

Player 1 Player 2



$\frac{4}{3}$ isgreater than $\frac{2}{6}$ so Player 2 wins the cards

4. The player/team who has the largest fraction shown by the cards wins the set of cards. If a tie results, the cards are either buried or are set aside and become a part of the winnings in the next round.

5. Play continues until one player/team has accumulated all of the cards or time is called. The player/team with the most cards wins the game.

Variations

- Impose a rule that requires placing the smaller card in the numerator and the larger in the denominator.

- Change the rules so that the smaller fraction wins.

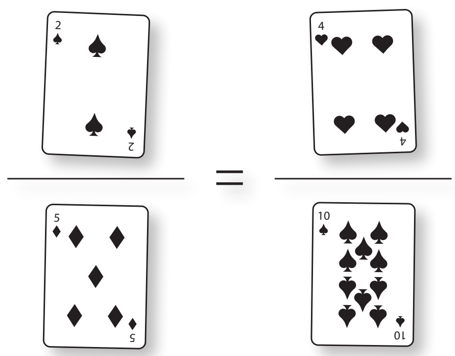
Proportion Rummy

Materials

One deck of playing cards (Aces= 1, Jokers= 0, Jacks = 11, Queens = 12, Kings = 13).

Rules and Play

1. *Proportion Rummy* is a game for two to four players or teams. The object of the game is to win points by making card sentences that form a proportion.



2. Play begins by dealing four cards to each player. Playing in turn, players draw from the pack or discard pile. Each player tries to collect a set of four cards that form a proportion.

3. Players continue to draw and discard until one player has a set of four cards that form a proportion. When a player has a proportion, (s)he must say "Proportion!" and explain his/her answer. If the answer is correct (s)he receives 1 point.

4. At the end of each round the cards are shuffled and redealt. Play continues until one of the players/teams accumulates 10 points.

Variation

- Adjust the scoring rules and the amount required to win. For example: Score 1 point for each card used to make a proportion. This would result in a score of 4 instead of 1 on each round. Require 40 points to win. Sum the values of the four cards used to form a proportion for each score. Require 100 points to win. Sum the values of the card(s) in opponents' hands for each score. Require 200 points to win.

Percent Flash

Materials

One deck of playing cards for each group. One calculator for each player.

Rules and Play

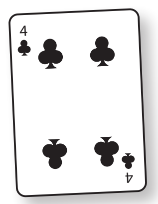
1. The game *Percent Flash* is for two to four players. Aces = 1, Jacks = 11, Queens = 12, Kings = 13.

2. The object of the game is to get the highest score by accumulating the most cards.

3. The dealer shuffles the cards and places the pack face down at the center of the playing area.

4. Play begins with the dealer turning over one card from the top of the pack. Players then try to find 15% of that number.

5. The first player that can give a correct answer takes the card. If a tie results, or if an error is made, the card is buried. An example: A four was drawn. A player said "15% of 4 is .6" and won the card.



6. The percent used to solve the problem on each round remains constant throughout the game.

7. Play continues until the pack is depleted or until time is called. The player with the most cards wins.

Variation

- Randomly determine the percent used on each round, or in each game from a set of mental math choices- 1%, 10%, 5%, etc.

- Allow the winner of each round to determine the percent used for the next round.

- Remove the Tens and face cards from the deck and play using 2, 3, or 4- digit numbers.

- Distribute the cards to the players. All players must keep the cards face down in a pack. Players simultaneously turn over one card from their pack and place it in the center of the playing area. The first player that can find the sum of the cards and then give an answer that is 15% of that number takes all the cards.

Line 'Em Up

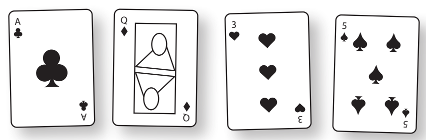
Materials

One deck of playing cards (Aces = 1, Jacks = 11, Queens = 12, Kings = 13, Jokers= 0); watch or clock that measures seconds.

Rules and Play

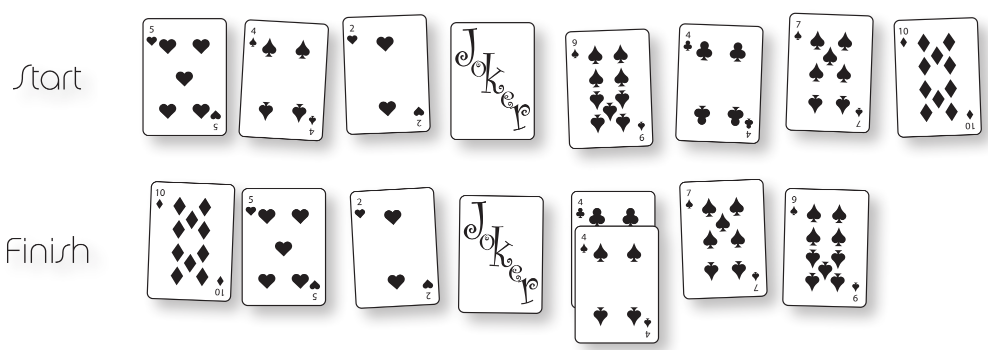
1. *Line 'Em Up* is a number-arranging game for two to four players/teams. The object of the game is to win the most points by being the fastest player to arrange cards in order from smallest to largest.

2. Distribute the cards equally to all players. Each player should receive a maximum number of 13 cards. Players must keep their cards face down in a pack. Each red card represents a negative integer and each black card represents a positive integer. Four cards and their integral values are shown below.



+1 -12 -3 +5

3. At the signal "go," players take turns flipping over their cards and arranging them in a line, in order, from smallest to left to largest on the right. The player/team to complete the task correctly, with the lowest time, wins a point. The first player/team to get three points wins the game. If a player completes the task with the fastest time, but is incorrect, his/her opponent gets 30 seconds to complete the task correctly. If all players are incorrect, no points are scored. Cards are placed in a discard pile at the end of each round. The example below shows how a round with eight cards starts and ends.



Variations

- Have players/teams arrange the cards from largest on the top to smallest on the bottom, or largest on the left and smallest on the right.

- For younger students, play the game using whole numbers.

- For beginning work with integers, remove the face cards and use a small set of cards. For a more challenging game, use 13 cards.

- Establish a class champion, or a Hall of Fame, by using a stopwatch.

Build and Take

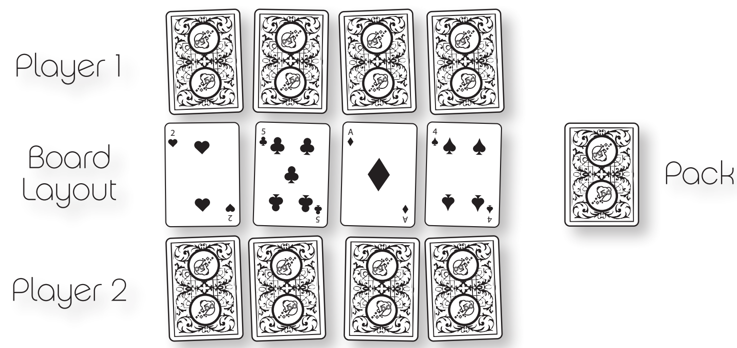
Materials

One deck of cards for each group.

Rules and Play

1. *Build and Take* is an addition and subtraction of integers game for 2-4 players. The black cards represent positive integers and the red cards represent negative integers. The object of this game is to collect the most cards.

3. The dealer supplies each player with 4 cards. Four cards are also dealt face up on the table and the remaining cards are placed face down in a pack. Note: Aces= + /-1, Kings, Queens, Jacks= +/-13, +/-12, +/-11 and all other cards are face value, respectively.



4. Players take turns attempting to form sums or differences whose answer is zero. Each player attempts to remove one or more cards from the table by combining cards in his/her hand with one or more cards on the table in such a way that the answer is zero. In the example above, if player 1 had a five of Diamonds and a two of Clubs then (s)he could remove the three of Diamonds from the board because -5 + +2 = -3. It is important to note that combinations of cards from a hand or the table can be used.

5. Two (2) minutes are allowed for each player to complete his/her turn.

6. After each player completes a turn, the table and that player's hand are replenished. In the unlikely event that no play is possible then that board is buried, the board is replenished and play passes to the next player.

7. Play continues until one pass through the pack is completed. The player who takes the last trick also wins the remaining cards on the table and in other players' hands.

8. The game ends when the pack is depleted, when time is called, or when no play is possible by all people in the game. The player with the most cards wins.

Variations

- Change the scoring rules. A. On each round award 2 points for the most cards and 2 points for Aces or one-eyed face cards. The first player to accumulate 50 points wins the game. B. Stop the game after one pass through the deck and then have each player total his/her entire collection. The winner is the player with the largest total.

- To make the game easier, remove the face cards.

- To make the game more challenging change the rules so that if a Jack is used you must multiply by 2; if a Queen is used you must multiply by 4; and if a King is used you must multiply by 10.

Integer Flash

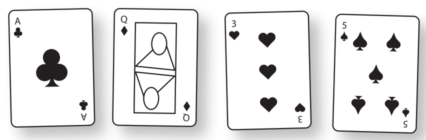
Materials

One deck of playing cards (Aces = 1, Jokers = 0). Use of a calculator is optional.

Rules and Play

1. *Integer Flash* is a game for two to four players/teams. The object of the game is to win the most cards by being the fastest player to solve integer computation problems.

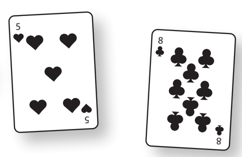
2. Distribute the cards equally to all players. Players must keep their cards face down in a pack. Each red card represents a negative integer and each black card represents a positive integer. Four cards and their integral values are shown below.



+1 -12 -3 +5

3. Play begins with the players simultaneously turning over a card. The first player to give a combination involving additions, subtraction, multiplication, or division takes the set. It is recommended that one operation be used for an entire game. In the example below, two players are playing a multiplication game.

Card turned by Player 2



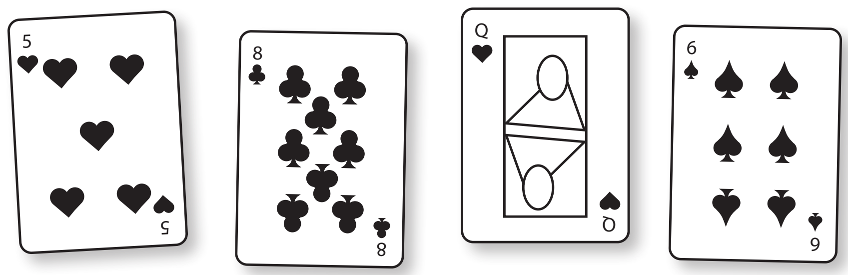
Card turned by Player 1

The first player to give a correct answer wins the cards. (-5 x 8 = -40 or 8 x -5 = -40). If a tie results, the cards are withdrawn, buried and then reused later.

4. Play continues until time is called or until one player wins all the cards. The player with the most cards at the end of play is the winner.

Lucky 13 Challenge

The numbers from 1 to 13 can be formed using the four cards below (Queen = 12). You may use addition, subtraction, multiplication, division, place value, exponents, square roots, factorials, or even decimal points. The first two problems have been done for you. See how many you can find. Record your results below.



1 (8 - 5) - (12 / 6) = 1

2 (12 - 6) / (8 - 5) = 2

3 ____________________

4 ____________________

5 ____________________

6 ____________________

7 ____________________

8 ____________________

9 ____________________

10 ____________________

11 ____________________

12 ____________________

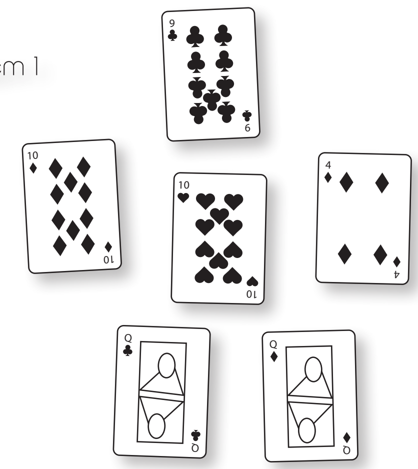
13 ____________________

Possible or Impossible?

Five-Card Problems

Use the five cards around the outside of the pattern to try to get the target card in the middle. You may use addition, subtraction, multiplication, or division. Then decide if the problem is possible or impossible and explain your answer. The first problem has been done for you. (Aces = 1, Jacks = 11, Queens = 12, Kings = 13)

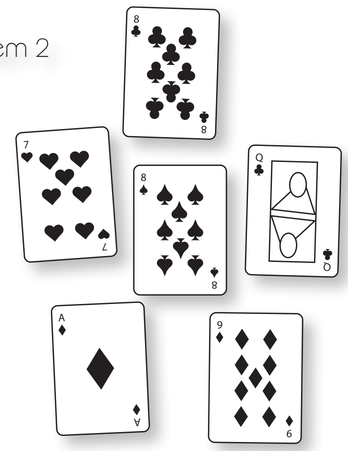
Problem 1



Prediction: Possible Impossible

Sample Answer: $10 + ((12 - 12) \times 9 \times 4) = 10$

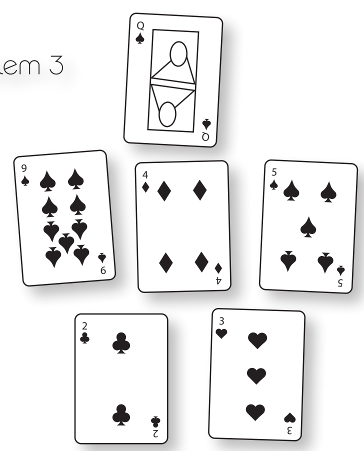
Problem 2



Prediction: Possible Impossible

Sample Answer:

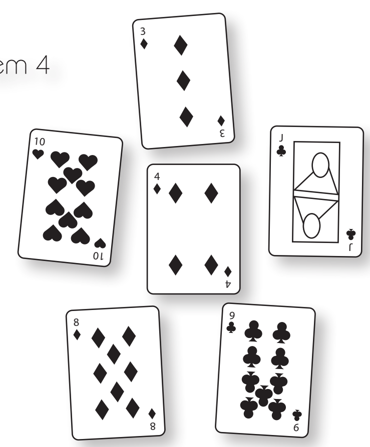
Problem 3



Prediction: Possible Impossible

Sample Answer:

Problem 4



Prediction: Possible Impossible

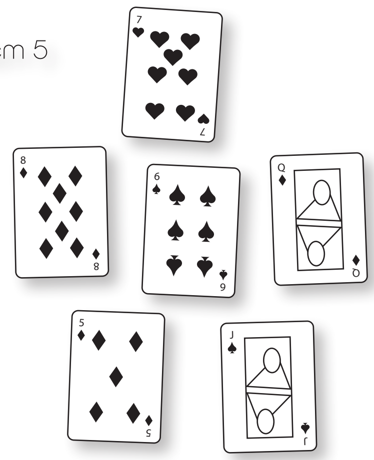
Sample Answer:

Possible or Impossible?

Five-Card Problems

Use the five cards around the outside of the pattern to try to get the target card in the middle. You may use addition, subtraction, multiplication, or division. Then decide if the problem is possible or impossible and explain your answer. The first problem has been done for you (Aces = 1, Jacks = 11, Queens = 12, Kings = 13).

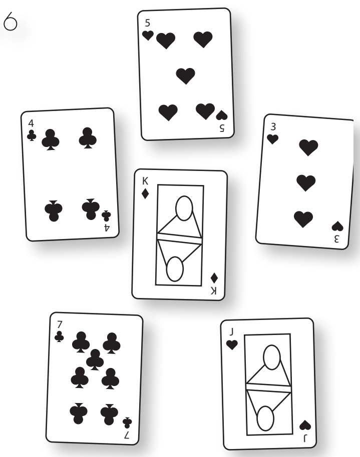
Problem 5



Prediction: Possible Impossible

Sample Answer:

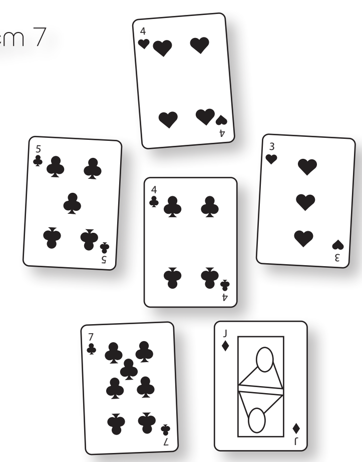
Problem 6



Prediction: Possible Impossible

Sample Answer:

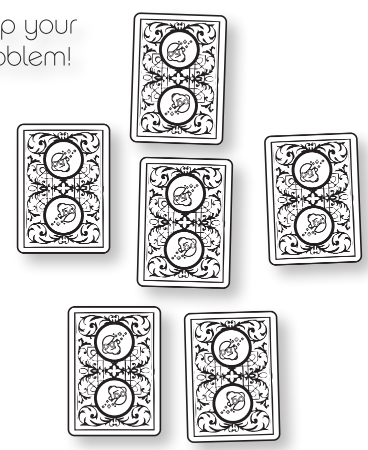
Problem 7



Prediction: Possible Impossible

Sample Answer:

Make up your own problem!



Prediction: Possible Impossible

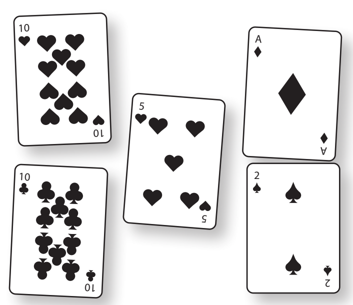
Sample Answer:

Possible or Impossible?

Four-Card Problems

Use the four cards around the outside of the pattern to try to get the target card in the middle. You may use any legal math maneuver, including addition, subtraction, multiplication, or division, place values, exponents, etc. Then decide if the problem is possible or impossible and explain your answer. The first problem has been done for you (Aces = 1, Jacks = 11, Queens = 12, Kings = 13).

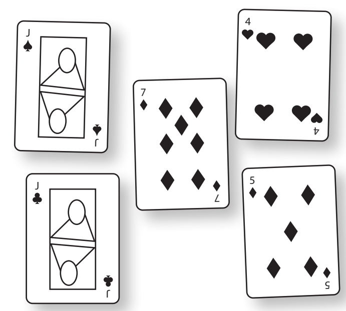
Problem 1



Prediction: Possible Impossible

Sample Answer: (10 x 1) - (10 / 2) = 5

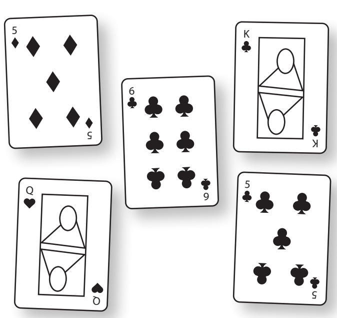
Problem 2



Prediction: Possible Impossible

Sample Answer:

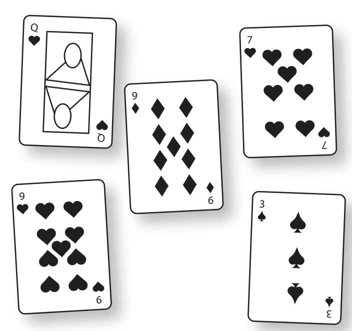
Problem 3



Prediction: Possible Impossible

Sample Answer:

Problem 4



Prediction: Possible Impossible

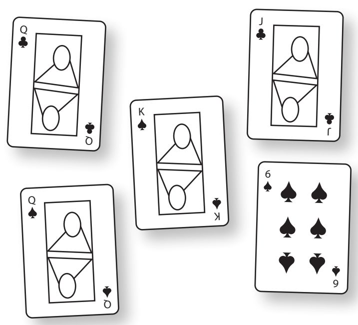
Sample Answer:

Possible or Impossible?

Four-Card Problems

Use the four cards around the outside of the pattern to try to get the target card in the middle. You may use any legal math maneuver, including addition, subtraction, multiplication, or division, place values, exponents, etc. Then decide if the problem is possible or impossible and explain your answer. The first problem has been done for you (Aces = 1, Jacks = 11, Queens = 12, Kings = 13).

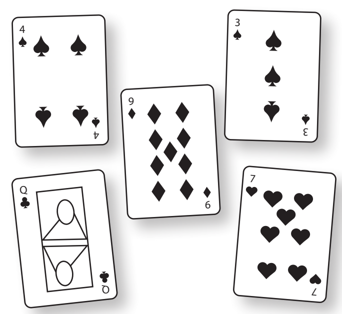
Problem 5



Prediction: Possible Impossible

Sample Answer:

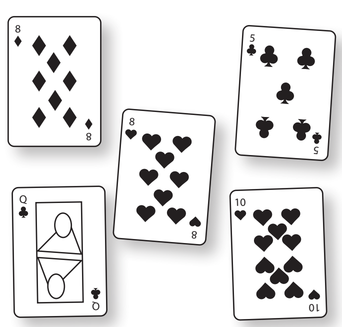
Problem 6



Prediction: Possible Impossible

Sample Answer:

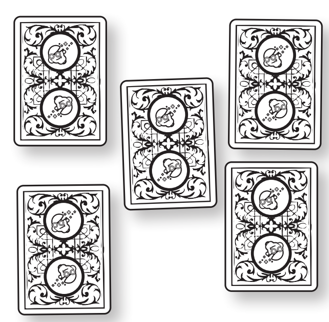
Problem 7



Prediction: Possible Impossible

Sample Answer:

Problem 8



Prediction: Possible Impossible

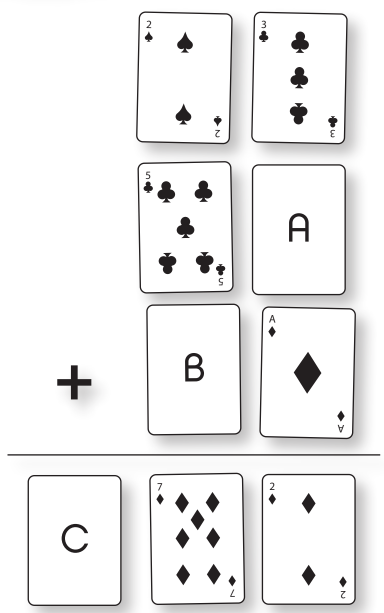
Sample Answer:

Hidden Card Problems

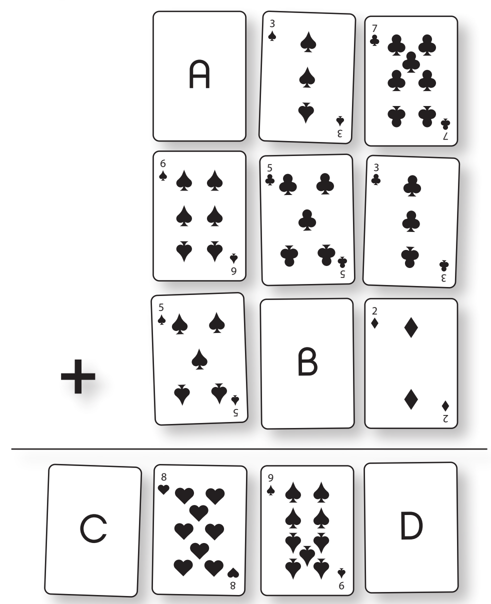
Addition of Whole Numbers

Use your cards to find the missing digits for the following problems. After you have found the answer, have your teacher check your work (Aces = 1, Jokers = 0; remove tens and face cards).

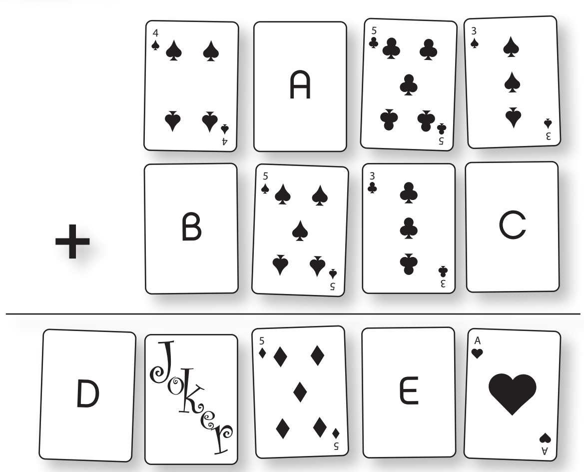
Problem 1



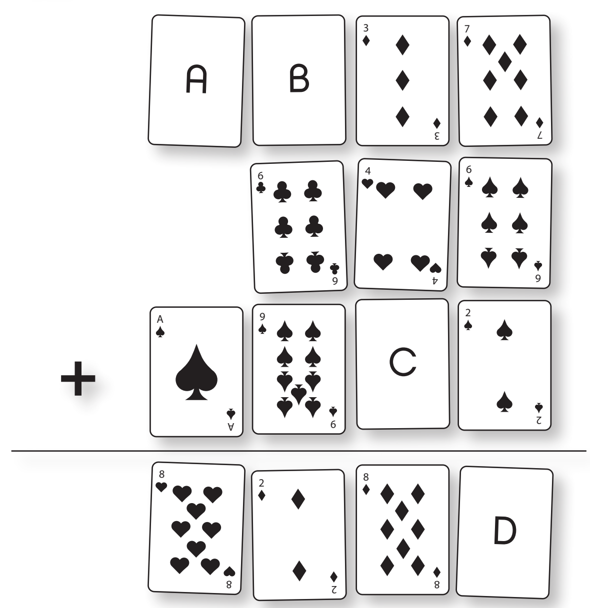
Problem 2



Problem 3



Problem 4

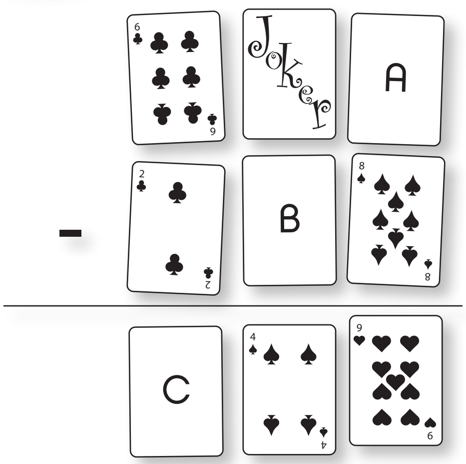


Hidden Card Problems

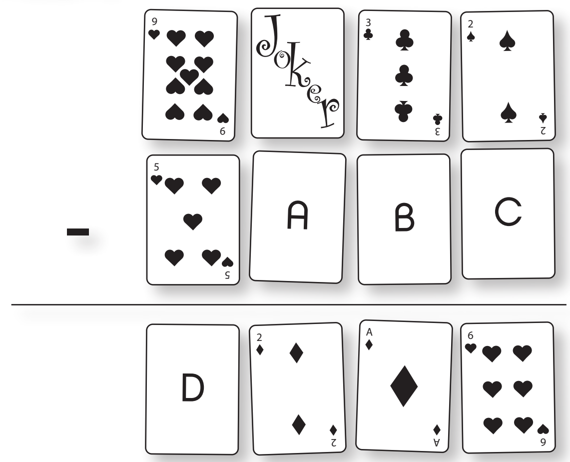
Subtraction of Whole Numbers

Use your cards to find the missing digits for the following problems. After you have found the answer, have your teacher check your work (Aces = 1, Jokers = 0; remove tens and face cards).

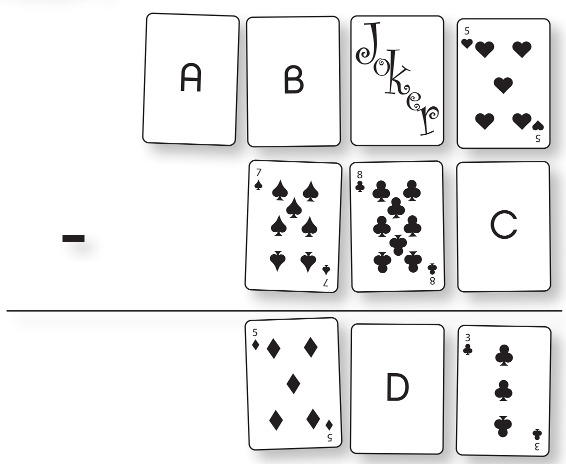
Problem 1



Problem 2



Problem 3

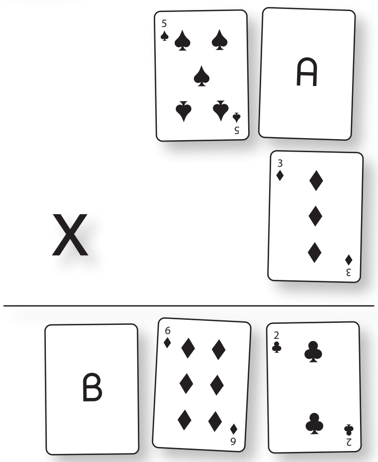


Hidden Card Problems

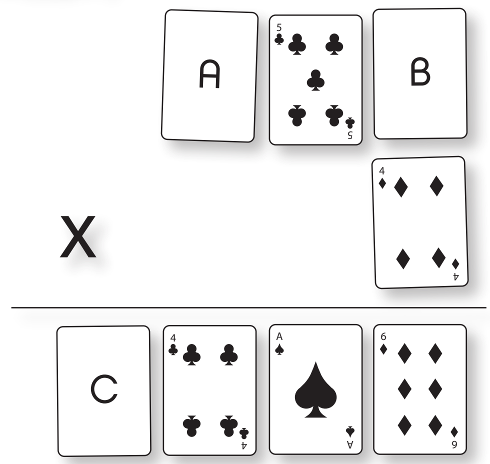
Products of Whole Numbers

Use your cards to find the missing digits for the following problems. After you have found the answer, have your teacher check your work (Aces = 1, Jokers = 0; remove tens and face cards).

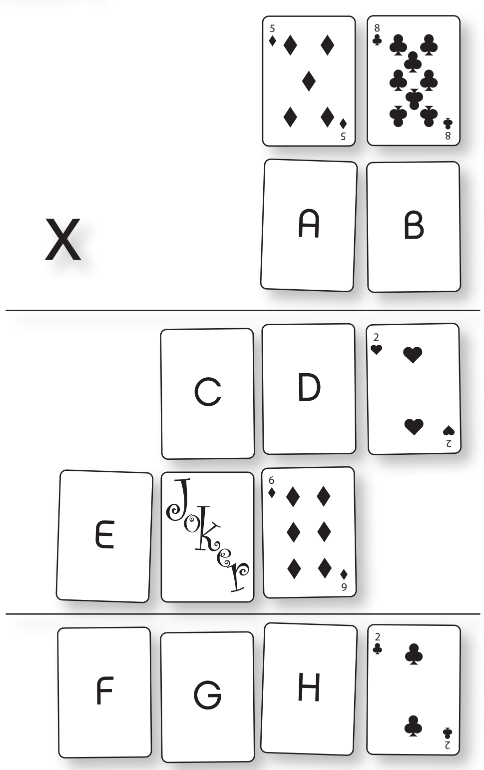
Problem 1



Problem 2

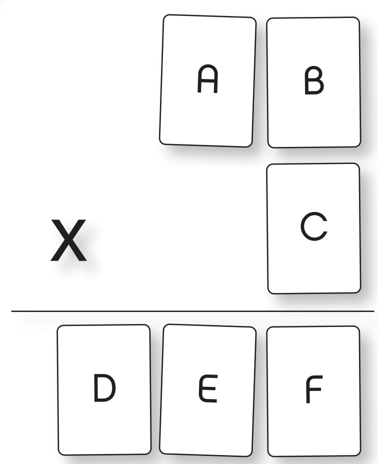


Problem 3



Problem 4

Use the cards Ace through 6 of a single suit. Place the cards on the board so that a correct multiplication problem is created.

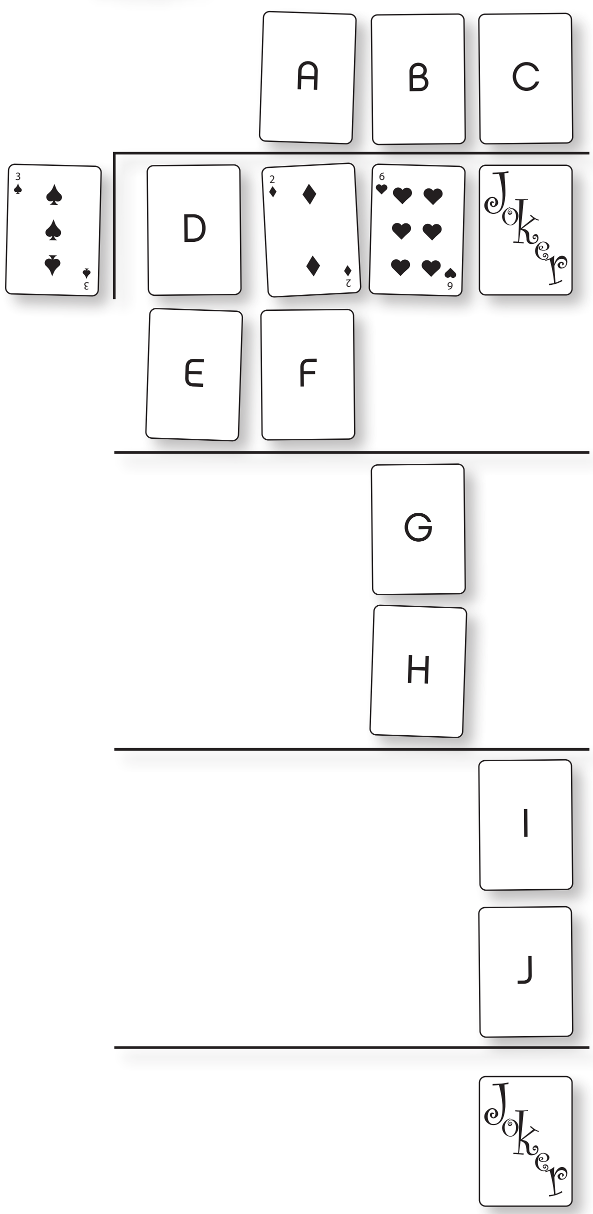


Hidden Card Problems

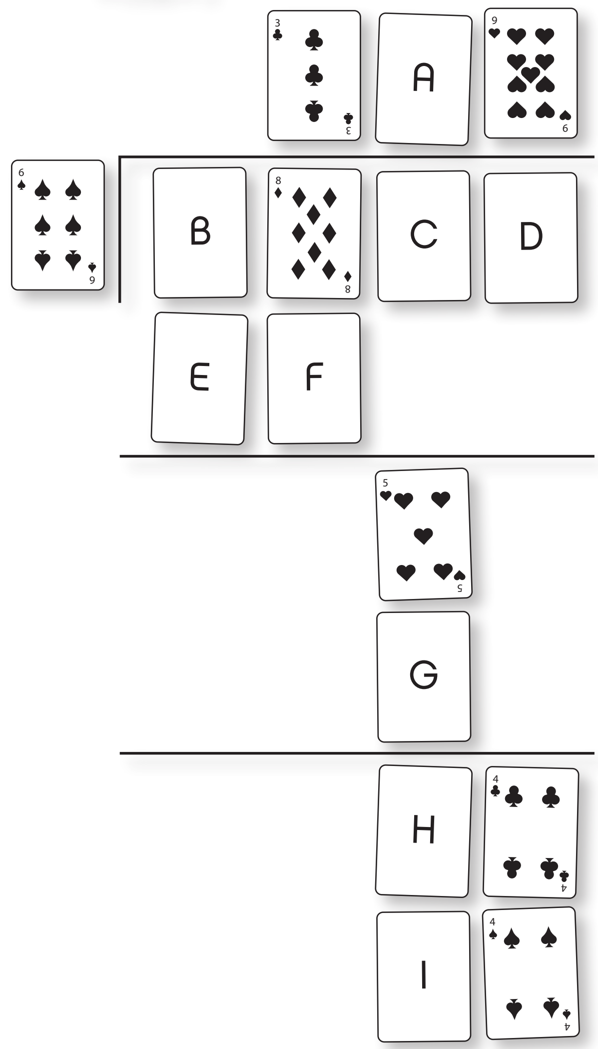
Division of Whole Numbers

Use your cards to find the missing digits for the following problems. After you have found the answer, have your teacher check your work (Aces = 1, Jokers = 0; remove tens and face cards).

Problem 1



Problem 2



Hidden Card Problems

Making up your own problem

Write down a problem involving addition, subtraction, multiplication, or division of whole numbers. Next, draw rectangles around some of the numbers. Then replace the numbers inside the rectangles with question marks (see example). Give your problem to a friend to see if it is possible to solve.

Example:

Step 1

$$\begin{array}{rrr} & 2 & 6 \\ + & 9 & 7 \\ \hline 1 & 2 & 3 \end{array}$$

Step 2

$$\begin{array}{rrr} & 2 & \boxed{6} \\ + & \boxed{9} & 7 \\ \hline \boxed{1} & 2 & 3 \end{array}$$

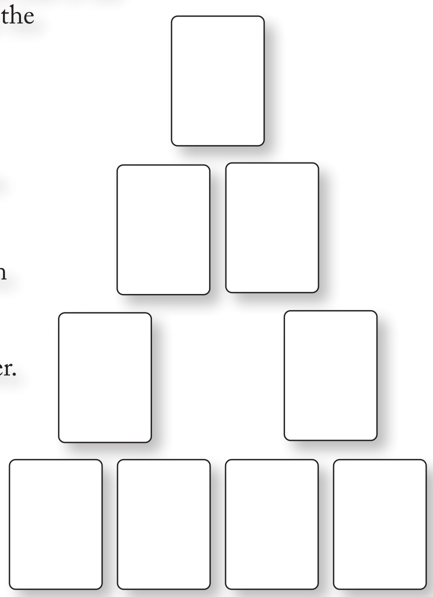
Step 3

$$\begin{array}{rrr} & 2 & \boxed{?} \\ + & \boxed{?} & 7 \\ \hline \boxed{?} & 2 & 3 \end{array}$$

Card Puzzles

Magic Triangle

Use the cards Ace through Nine of any suit. Arrange the cards so that the sum of any side is the same. Then answer the questions below.



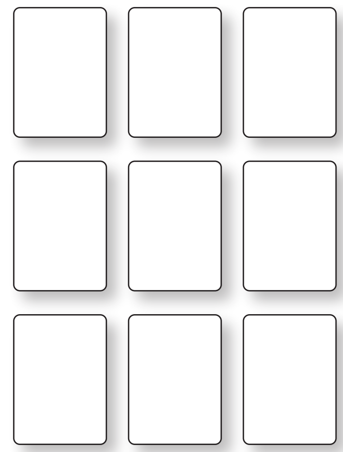
Questions

1. What is the sum of each side?

2. Can this problem be done in more than one way? Explain your answer.

Magic Sums

Use the cards Ace through Nine of any suit. Arrange the cards so that the sum of any side is the same. Then answer the questions below.

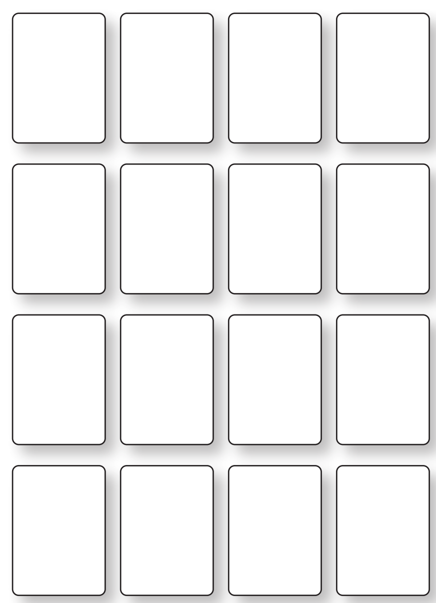


Questions

1. What is the sum of each row, column, or diagonal?

2. Can this problem be done in more than one way? Explain your answer.

Sum More Magic Cards



Use the cards Ace though Four of each suit. Arrange the 16 cards so that:
The sum of each row, column, or diagonal is the same.

All numbers and suits in each row, column, and diagonal are different.
Record your answer. Then answer the questions below.

Questions:

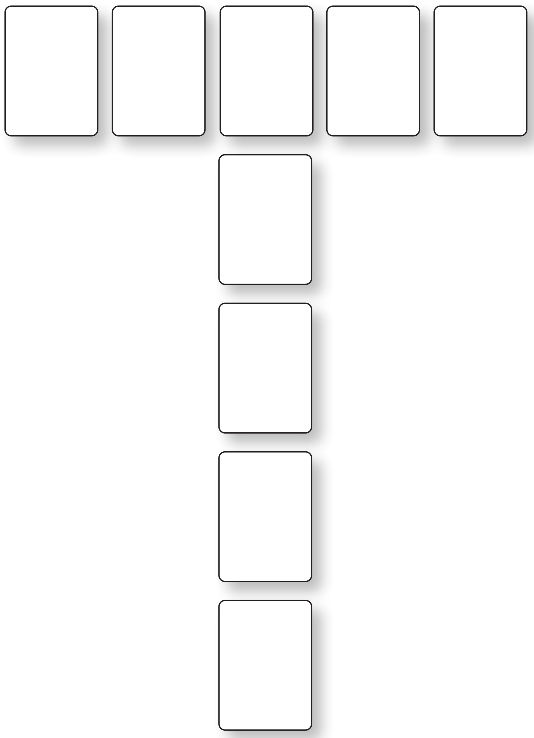
1. What is the magic sum?

2. Is your arrangement of cards the same or different than other solutions?

Card Puzzles

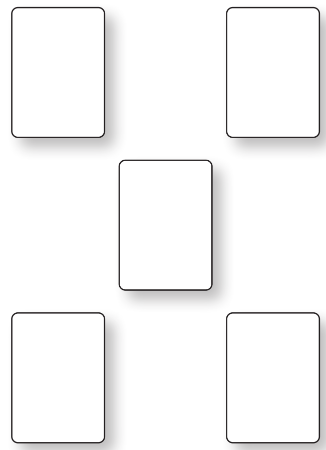
T Card

Use the cards Ace through Nine of any suit. Place the cards on the T so that the sum of the horizontal part and the vertical part is 23.



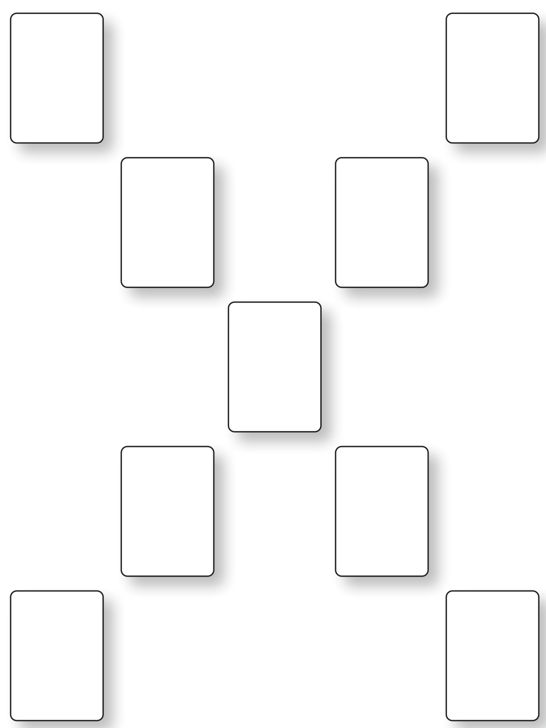
X Card

Use the cards Two though Six of any suit. Place the cards in a pattern so that the product of each diagonal is the same. Record your answer.



Another X Card

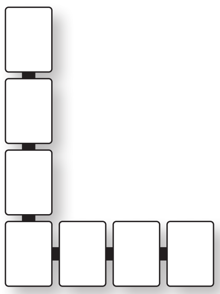
Use the cards Ace through Nine of any suit. Place the cards so that the sum of each diagonal is 27. Record your answer.



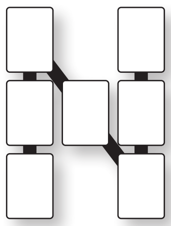
Card Puzzles

Letter Card Problems

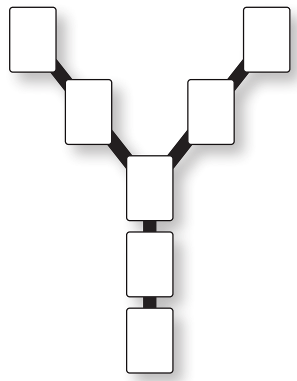
Several letters of the alphabet that can be formed with cards are shown below. Select one of these letters. Then use the cards Ace through Seven to solve the puzzle (Ace = 1). In each puzzle, the sum of each row, column, and diagonal must be the same. Record your answer and the magic sum.



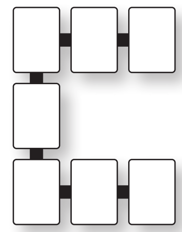
Magic Sum:



Magic Sum:

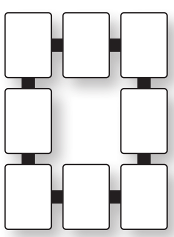


Magic Sum:



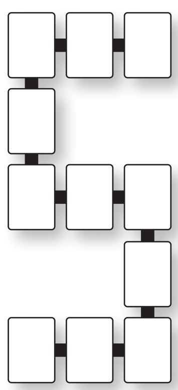
Magic Sum:

Use the cards Ace through Eight (Ace = 1) to solve this puzzle.



Magic Sum:

Use the cards Ace through Jack (Jack = 11) to solve this puzzle.



Magic Sum:

Make up your own letter card puzzle!

Card Puzzles

Two-Card Logic

Imagine you have two unknown cards
as shown below.

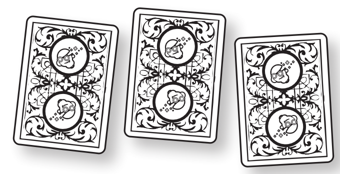
Use these clues to find the cards.

Both cards are black.
The difference of the two cards is 5.
The sum of the two cards is 21.
The spade is the larger card.

What are the cards? (Remember Aces = 1)

Three-Card Logic

Suppose that you have three unknown cards
as shown below.



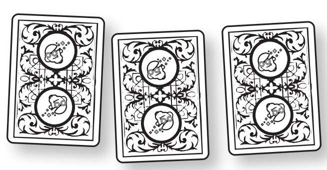
Use these clues to find the cards.

All three cards are less than or equal to 9.
No card is seven.
The sum of two cards is 15.
The sum of two cards is 17.

What are the cards?

Another Three-Card Logic

Imagine you have three unknown cards positioned
as shown below.



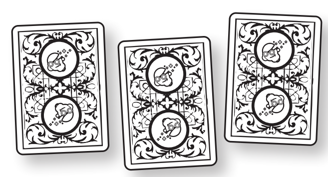
Use these clues to identify the positions, values
and suits of the cards.

A Queen is to the right of a King.
A Queen is to the left of a Queen.
A Spade is to the left of a Heart.
A Spade is to the right of a Spade.

What are the cards?

The Last Three-Card Logic

Three cards are on a table as shown below.



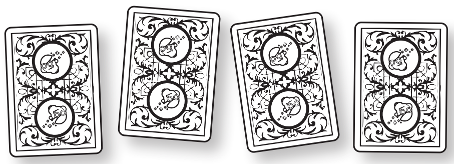
Each card was placed on the table according
to the following rules:

Each card is a one-digit whole number.
The spelling of the value of each card begins with a vowel.
No card is a Heart.
The cards are arranged in alphabetical order by suit.
If you factor the number value of each card,
you obtain a list of four numbers.

Card Puzzles

Four-Card Logic

Imagine you have four unknown cards
as shown below.



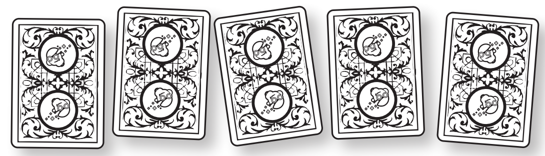
Use these clues to find the cards.

All of the cards are Spades.
The cards form a number that is between
8000 and 10000.
No two digits are the same.
If you subtract, the ones digit will be 1.
The tens digit is 2 more than the ones digit.
If you triple the hundreds digit, the answer
is the thousands digit.

What are the cards?

Five-Card Logic

Imagine you have five unknown cards
as shown below.



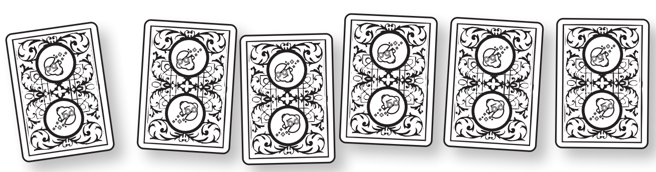
Use these clues to help you identify the cards.

All of the cards are Hearts.
No two cards are the same.
The sum of the five cards is 21.
The cards form a number that is between
12,000 and 13,000.
The hundreds digit is two times the thousands digit.
If you subtract 5, the ones digit would be 1.

What are the cards?

Six-Card Logic

Imagine you have six unknown cards as shown below.



Use these clues to find the cards.

All of the cards are clubs.
The cards form a number that is between 700,000 and 750,000.
The hundreds digits is 3.
The sum of the tens and ones digit is 17.
The tens digit is even.
If 35,000 is subtracted, the thousands and ten thousands digits would be 1.

What are the cards?

Stacking the Deck for Problem Solving

Many card tricks have a mathematical explanation. See how many of these card tricks you can perform and explain. Record the starting sequence for each trick.

1. Take one suit of cards from an ordinary deck. Arrange the cards in such a way that the pattern of appearance by alternately turning up a card and then placing the next card on the bottom of the pack is 1 (Ace), 2, …., 12 (Queen), 13 (King).

2. Arrange one suit of cards so that when cards are alternately turned up and put on the bottom of the pack, the order starts with King, then proceeds down to Queen, Jack, etc. and finishes with Ace.

3. Use only the odd- or even-numbered cards of one suit. Arrange the cards so that the pattern of appearance by alternately turning up a card and then placing the next one of the bottom of the pack is 1 (Ace), 3, 5, 7, 9, 11 (Jack), 13 (King), or 2, 4, 6, 8, 10, 12 (Queen).

4. Use only one suit of cards. Arrange the cards so that the pattern of appearance by alternately turning up a card and then placing the next two cards on the bottom of the pack is 1 (Ace), 2, 3, 4, 5,…, 13 (King).

5. Make up your own stacking the deck card trick. Your trick might feature alternately turning up a card or cards and then placing the next card or cards on the bottom of the pack.

Stacking the Deck for Problem Solving

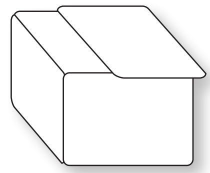
Record Sheet

Name: ______________________________ Date: ______________________________

Number of Cards	Starting Sequence

Cards and Garages

It is difficult, but possible, to build garages with cards. Here is an example.



This is a one-car garage. Six cards were used to build the garage. Use this example and a deck of cards to help you complete the exercises.

Exercises

1. Build a two-car garage using eleven cards. Make a sketch of your creation.

2. Build a three-car garage. How many cards are needed?

3. Complete the table. Then record any patterns you notice.

Number of Garages	1	2	3	4	5
Number of Cards Used	6	11			

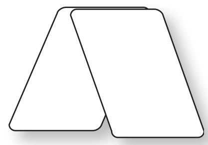
4. A school record for building a multiple car garage using cards is 25. If the minimum number of cards were used in construction, how many cards were needed?

5. Suppose you wanted to break the school record described in Exercise 4. How many cards would you need? How many card decks would you need?

6. What is the general rule for the number of cards needed to build a multiple car garage?

Cards and A-Frame Houses

It is difficult but possible to build A-frame houses with cards. An example is shown below. This house is one story high. Two cards were used to build the house. Use this example and a deck of cards to help you complete the exercise.



Exercises

1. Build a two-story A-frame house using seven cards.

   Make a sketch of your creation.
   What techniques were useful in building your house?

2. Build a three-story A-frame house. Make a sketch of your creation. How many cards are needed?

3. Complete the table. Then record any patterns you notice.

Number of Stories	1	2	3	4	5	6	7
Number of Cards Used	2	7					

4. Patricia said she didn't have the time or patience to build a 10-story A-frame house, but she could draw a picture of what it would look like to determine the number of cards needed for the construction. Explain why she is correct and if there is another way to solve this problem.

5. The world record for building an A-frame house using cards is 61 stories! If the minimum number of cards were used in construction, how many cards were needed to build the structure?

6. Suppose you wanted to break the world record described in exercise 4. How many cards would you need?

7. What is the general rule for the number of cards needed to build an A-frame house S stories high?

8. Tom and Yia made up a card game. Here are the rules:

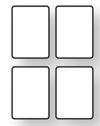
   The object of the game is to build an A-frame house using cards within a 2-minute time limit.
   The player/team with the most cards standing at the end of the time limit wins the round.
   The first player/team to win 3 rounds wins the game.

Try playing the game. Do you like it? Explain your answer. How do you think the game can be improved?

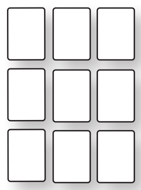
Cards, Rectangles, and Holes

How many rectangles are there in each figure? The first two problems have been done for you.
What patterns do you notice?

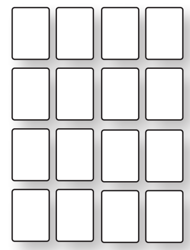
1 Rectangle



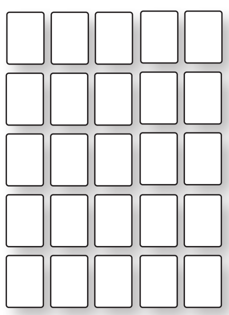
4 Rectangles



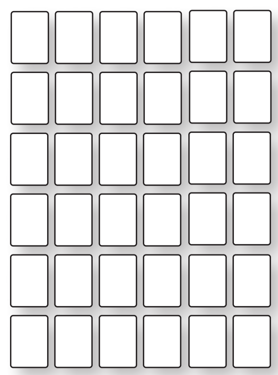
___ Rectangles



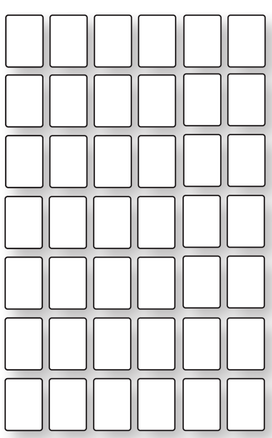
___ Rectangles



___ Rectangles



___ Rectangles



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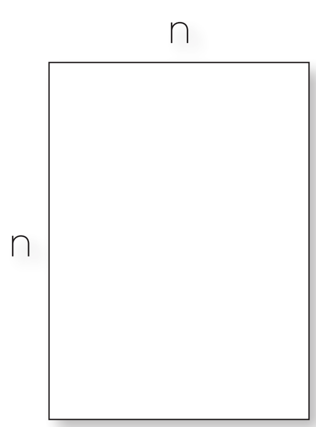
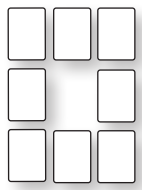


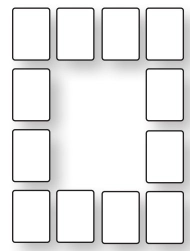
___ Rectangles

Cards and Rectangles

How many cards are needed to build each figure? The first problem has been done for you.
What patterns do you notice?



8 Rectangles



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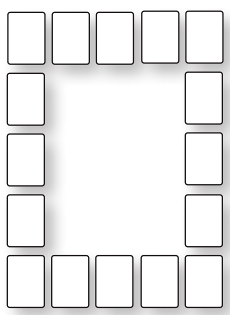

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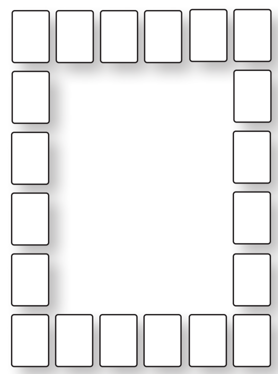

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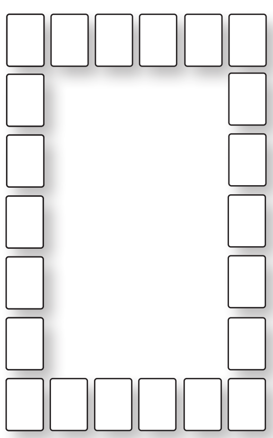

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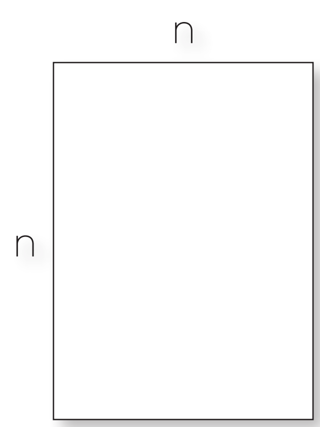


___ Rectangles

Selected Answers and Comments

Page 4: Your Number's Up!

This game provides practice with place value of whole numbers or decimals, and making decisions.

Page 6: Secrets of the Great Pyramid

This is a game for practicing basic facts, but it is also an excellent springboard to many other topics, for example: graphing, statistics (mean, median, mode, range, and standard deviation), fractions, decimals, percent, and probability.

Page 8: Find It!

Find It! Provides timed practice making mathematical sentences using only the numbers 1 through 13 and any combination of addition, subtraction, multiplication, or division. Like Pyramid, this is a game for practicing basic facts, but it is also an excellent springboard to many other topics, for example: graphing, statistics (mean, median, mode, range, and standard deviation), fractions, decimals, percent, and probability.

Page 11: Lightning

This game is a powerful tool for diagnosis, practicing combinations of basic facts, using parenthesis, order of operations, developing strategies, and improving communication skills. For example, given the cards 2, 3, 4, 11, 13 and a target of 13, an experienced player will attempt to use the identity elements for addition and multiplication to get the answer. Since 0 + 13 = 13 and 1 x 13 = 13, (s)he will usually immediately say "(4 x 2 + 3) – 11 = 0 and 0 + 13 = 13." Many teachers, students, and parents find this game so engaging that they place unsolved hands on the bulletin board or refrigerator! Many people also report high student interest when they pose Lighting work problems for review and their success with class, grade level, building, and district-wide tournaments.

Page 12: Scan for Compatible Sums

This game provides practice with the strategy of finding "tidy" or "nice" sums. A time limit on each turn will force players to make quick decisions.

Page 13: Ten-Twenty-Thirty

This is another mental math game designed to provide practice with the strategy of finding compatible sums. This game is usually played by one player/team, but it can be player by two players/teams. In a two-player game, the player with the fewest cards at the end of play wins the game. Many teachers have students play this game before they use Scan for Compatible Sums.

Pages 14-16: Double Trouble, Triple Play, and Half as Much

This set of games provides students with practice halving, doubling, and tripling whole numbers and decimals. Primary students may have difficulty if the Joker (0) is in the far left place, for example, Joker, 9, 2. Also note that the question of whether or not the dealer is allowed to play needs to be considered. Many teachers recommend having the dealer play with 2 players. With 3 or 4 players, the dealer serves as a judge, but does not play. The winner becomes the dealer for the next game.

Page 17: Noticing 8s and 9s

The purpose of this game is to provide students with practice using a mental math strategy called compensation. For example, to compute 2998 x 3, we first multiply 3000 x 3 and then adjust. Since 3000 x 3 is 9000, and 9000 is too big, we subtract 3 x 2 to obtain 8994.

Using a timer will force players to make quick decisions in this game. Times can be subtracted from each answer to obtain a score for a round. An example for a multiplication of whole numbers game is shown below.

Name	Round	Problem Time	Score
Chris	1	2998 x 3 = 8994	15 8979

The above example also illustrates how the game can be modified. Similar game boards can be created for 3-digit x 2-digit multiplication problems and addition, subtraction, or multiplication of decimal problems.

Many teachers report that students' motivation increases when they post the winning scores on a bulletin board labeled Maximize Game Hall/Wall of Fame.

Selected Answers and Comments

Page 24: Minimize

Game boards for Minimize should be created to suit the objectives of the class. Many teachers find the generic 3-digit by 2-digit format is effective. Duplicate sets of game boards for each group and then have students provide operation symbols and decimal points as desired. When playing division Minimize, a decision will need to be made regarding how to handle answers involving non-zero remainders, for example, 162/9 = 18. However, 241/7 = 34 r3 or 34, or 34.428571 or 34.43. If you wish to emphasize mental arithmetic, have players drop the remainder. If you wish to emphasize paper and pencil or calculator use, have students record results in the form desired.

Division games may also provoke a lively discussion of division by zero. This is the proverbial teachable moment when it occurs during a game. Be sure to explain why division by zero is undefined and what to do if a problem such as 285/0 is created.

Using a timer will force players to make quick decisions. Times can be subtracted from each answer to obtain a score for a round. An example for a division of whole numbers game is shown below.

Name	Round	Problem TIme	Score
Chris	1	162/9 = 18	15 3

Many teachers report that students' motivation increases when they post the winning scores on a bulletin board labeled Minimize Game Hall/Wall of Fame.

Page 28: Be a Factor

This game provides finding factors of the numbers from 1-13 and formulating a strategy to win.

Page 29: Prime Time

This game provides practice identifying prime numbers and formulating a strategy to win. It may be difficult for small hands to hold all the cards in this game. Also note that the number 1 (Ace) is neither prime nor composite since it has only one factor. The scoring variation that is suggested can be difficult for students. Each player must find the total of all the cards remaining in his/her hand. Then, the winner subtracts his/her total from each of the other players. For example, suppose the winner in a two-player game had the cards Ace, Two, Four, Eight and his opponent had a Six, Five, Three, Nine, and Ace. The winner's score would be 24 – 15 = 9. Note that in this variation it is possible for the winner of a hand to receive zero points. Once students are familiar with the game they may also enjoy a variation where any player who can match the card on the discard pile receives another turn. In this variation players may discard any card or their extra turn and continue to play as long as they can match.

Page 30: Slap Happy

This objective of this game is to provide practice identifying prime numbers. Additional variations include slapping if the sum or difference of the players' cards is prime; if the sum of the cards is even; if the sum of the cards is more than 15; if the difference of the cards is odd; if the product of the cards is odd; if the product of the cards is more than 90l if the quotient of the cards has a remainder of zero; if the G.C.F. is 1; if the fraction formed by the cards is an improper fraction; if the fraction formed by the cards is equivalent to one-half; if the decimal name from the fraction formed by the cards is less than or equal to .25; if the value of one card is 50 percent of another; if the card has point symmetry; if the card has line symmetry.

Pages 31-32: Prediction

This game provides an opportunity to practice finding factors of a number and use logical thinking skills. Be sure to provide time for students to discuss their strategies from winning. Two examples from a seventh grade class are provided below.

"Use elimination to figure out the missing cards."

"Hold back Eights, Nines, Tens, and Queens so that your opponent can't get lots of points."

Page 33: Simplest Form

This game provides renaming fractions practice.

Selected Answers and Comments

Page 34: Capture That Fraction

This game provides comparing fractions practice.

Page 35: Proportion Rummy

This game provides solving proportion practice.

Page 36: Percent Flash

Percent Flash provides mental math practice on finding a percent of a number.

Note that as the number of players increases, the game difficulty increases. Also note, a useful management technique is to have a specific slot for each player to place his/her card. For example, in a game involving 4-digit whole numbers, Player 1 could place a card in the ones place, Player 2 could place a card in the tens place, etc. For a 3-Player game involving mixed decimals, Player 1 could place a card in the ones place, Player 2 could place a card in the tenths place, and Player 3 could place a card in the hundredths place.

Another variation is to provide students with real-world practice finding 1%-13% of a number by collecting examples from newspapers, flyers, and restaurant checks. Present pictures and prices on 3x5 cards or the overhead projector. Place the deck of cards face down before each group. Players take turns drawing a card and then finding the tax, tip, or both on each item. For beginning players the same item should be used for one complete pass through the deck. If a player answers correctly, (s)he keeps the card. The player with the most cards at the end of the game wins. Some students will need help recognizing how uncommon percents can be related to percents that they know how to work with. For example, if the bill is $9.00 and the card drawn is a Jack, the player must find 11% of $9. Suggest that they think of 11% as 10% plus 1%. Working it through, we get: 10% of $9 is $0.90; 1% of $9 is $0.09; so 11% of $9 is $0.99.

Another popular variation is to give students an item and the price and then use the card drawn as a percent off or discount. Require players to state the amount saved and the discount price.

Using a time limit on each turn will force players to make quick decisions in this game.

Page 37: Line 'Em Up

This game provides timed practice recognizing and arranging a set of integers from smallest to largest.

Page 38: Build and Take

This game provides practice in addition and subtraction of integers.

Page 39: Integer Flash

Integer Flash provides practice adding, subtracting, multiplying, or dividing integers. This is a game of skill. To avoid conflict, opponents should be compatible and have comparable computational skills. Beginners may experience more success if they play several games where they only determine whether the answer to a single operation problem will be positive or negative. A useful prerequisite is Comparing Integers Flash. In this variation, the largest value wins each round. If a tie results, each player places three cards face down and turns up the fourth card. The player whose fourth card has the largest numerical value wins the war. If another tie occurs, the procedure is repeated.

Players who enjoy an additional challenge can find the sum or difference of the two cards that are drawn and then square the result to obtain a final answer.

Page 40: Lucky 13 Challenge

This material is useful as a follow up to the Find It and Pyramid games. Sample solutions are shown.

3. $(12 - 6) - (8 - 5) = 3$
4. $(12 - 8) \times (6 - 5) = 4$
5. $(12 \div 6) + (8 - 5) = 5$
6. $(12 \div 6) \times (8 - 5) = 6$
7. $(6 - (12 - 8)) + 5 = 7$
8. $8 \times (12 - (6 + 5)) = 8$
9. $(12 - 6) + (8 - 5) = 9$
10. $(12 \div (8 - 5)) + 6 = 10$
11. $(12 \div 6 \times 8) - 5 = 11$
12. $(12 \times 5) - (6 \times 8) = 12$
13. $5^{(8-6)} - 12 = 13$

Selected Answers and Comments

Pages 41-42: Possible or Impossible

This material is useful as a follow up to the Lightning game. Sample solutions are shown.
2. Possible. (9 – 7) x ((12 – 8) x 1) = 8
3. Possible (12 ÷ 3) x ((5 x 2) – 9) = 4
4. Possible. 3 + ((11 – 10) x (9 – 8)) = 4
5. Possible. 5 + ((12 – 11) x (8 – 7)) = 6
6. Possible. ((5 x 4) – (11 + 3)) + 7 = 13
7. Possible. ((11 – 3) ÷ 4) x (7 – 5) = 4

Pages 43-44: More Possible or Impossible

This material is useful as a follow up to the Lightning game. Sample solutions are shown.
2. Possible. 11 – ((11 + 5) ÷ 4) = 7
3. Possible. (12 + 13 + 5) ÷ 5 = 6
4. Possible. 7 + (12 ÷ (9 – 3)) = 9
5. Possible. √((12 + 12) ÷ 6) + 11 = 13
6. Possible. ((12 ÷ 3) x 4) – 7 = 9
7. Possible. (12 – 8) x (10 ÷ 5) = 8

Page 45: Hidden Card Addition

1. A=8	2. A=7	3. A=0	4. A=5
B=9	B=0	B=6	B=7
C=1	C=1	C=8	C=0
	D=2	D=1	D=5
		E=9	

Page 46: Hidden Card Subtraction

1. A=7	2. A=8	3. A=1
B=5	B=1	B=3
C=3	C=6	C=2
	D=3	D=2

Page 47: Hidden Card Multiplication

1. A=4	2. A=3	3. A=7	4. A=5
B=1	B=4	B=4	B=4
	C=1	C=2	C=3
		D=3	D=1
	or	E=4	E=6
		F=4	F=2
	A=8	G=2	
	B=4	H=9	
	C=3		
		or	
		A=7	
		B=9	
		C=5	
		D=2	
		E=4	
		F=4	
		G=5	
		H=8	

Page 48: Hidden Card Division

1. A=4	2. A=0
B=2	B=1
C=0	C=5
D=1	D=4
E=1	E=1
F=2	F=8
G=6	G=0
H=6	H=5
I=0	I=5
J=0	

Page 50: Magic Sums

1. Magic Triangle Puzzle

1
9 6
5 7
2 8 4 3

Questions
1. 17
2. Yes. Use reversals and symmetry. Some students may enjoy solving a simpler version of this problem by using the cards Ace through Six of nay suit and then placing

Selected Answers and Comments

the cards in a triangle with 3 cards on each side so that the sum of each side is 10.

2. Magic Squares

8	1	6
3	5	7
4	9	2

Questions

1. 15
2. Yes.
3. Sum More Magic

4 Spades	3 Hearts	2 Diamonds	A Clubs
A Diamonds	2 Clubs	3 Spades	4 Hearts
3 Clubs	4 Diamonds	A Hearts	2 Spades
2 Hearts	A Spades	4 Clubs	3 Diamonds

Questions

1. 10

Page 51: T and X Card Puzzles

1. The sum of each part is 23.

3 4 1 7 8
2
5
6
9

2. The sum of each diagonal is 27.

5 6
4 3
9
8 2
1 7

3. The product of each diagonal is 60.

3 6
5
2 4

Other symmetric solutions are possible.

Page 52: Letter Card Problems

1.

3
2
7
4 5 1 6 (sum: 12)
(sum: 16)

3 6
2 4 1
7 5

3 6
5 2
4
7
1
(sum: 12)

5 6 1
4
3 2 7
(sum: 12)

2.

6 5 1
4 8
2 7 3
(sum: 12)

3 5 10
4
11 6 1
8
2 7 9
(sum: 18)

Page 53: 2 and 3 Card Logic Puzzles

1. Kind of Spades and Eight of Spades or King of Spades and Eight of Clubs.
2. Six, Eight and Nine of any suit.
3. King of Spades, Queen of Spades, Queen of Hearts.
4. Eight of Clubs, Eight of Diamonds, Eight of Spades.

Page 54: 4, 5, and 6 Card Logic Puzzles

1. Nine, Three, Six, and Four of Spades.
2. One, Two, Four, Eight, and Six of Hearts.
3. Seven, Four, Six, Three, Eight, and Nine of Clubs.

Selected Answers and Comments

Pages 55-56: Stacking the Deck for Problem Solving

1	1												
2	1	2											
3	1	3	2										
4	1	3	2	4									
5	1	5	2	4	3								
6	1	4	2	6	3	5							
7	1	6	2	5	3	7	4						
8	1	5	2	7	3	6	4	8					
9	1	9	2	6	3	8	4	7	5				
10	1	6	2	10	3	7	4	9	5	8			
11	1	9	2	7	3	11	4	8	5	10	6		
12	1	7	2	10	3	8	4	12	5	9	6	11	
13	1	12	2	8	3	11	4	9	5	13	6	10	7

Page 57: Cards and Garages

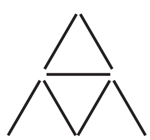
2. 16.
3.

Number of Garages	1	2	3	4	5
Number of Cards Used	6	11	16	21	26

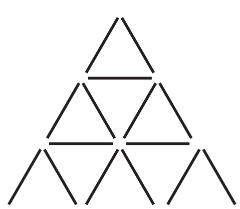
4. 126.
5. 131. If we assume 52 cards in a deck, the answer is 3.
6. $C = 6 + (G - 1)5$, where C = number of cards needed and G = number of garages.

Page 58: Cards and A-Frame House

1a.



1b. Answers will vary.
2. 15



3.

Number of Stories	1	2	3	4	5	6	7
Number of Cards Used	2	7	15	26	40	57	77

4. Pictures can save time. Yes. Extend the table in Exercise 3.
5. 5612.
6. 62 stories require 5797 cards.
7. $C = S(S+1) + (S(S-1)) \div 2$ where S = number of stories and C = number of cards needed.

Page 59: Cards and Rectangle Patterns

2. 4.
3. 9.
4. 16.
5. 25.
6. 36.
7. 49.
8. n^2

Many students will find it easier to generalize if the data for this problem is presented in a table.

Number of Cards/Side:	Number of Cards in Square:
3	9
4	16
5	25
6	36
7	49
8	64
9	81
10	100
100	10,000
n	n^2

A challenging extension of this problem is to answer the same questions, but investigate the total number of rectangles in each arrangement instead of the number of small rectangles. For example, problem 2 has 9 rectangles (4 small, 4 medium, and 1 large). Have students record their results in a table.

Number of Cards/Side	1	2	3	etc.
Total No. of Rectangles	1	9	36	

Page 60: Cards, Rectangles, and Holes Patterns

2. 12.
3. 16.
4. 20.
5. 24.
6. $4n - 4$

Selected Answers and Comments

Many students will find it easier to generalize if the data for this problem is presented in a table.

Number of Cards/Side	Number of Cards in the Square
3	8
4	12
5	16
6	20
7	24
8	28
9	32
10	36
100	396
n	4n – 4