

MS AND HS CORNER (6-12): MATH FACT CARD AND DICE GAMES

Games for Drill and Practice

Frequent practice is necessary to attain strong mental arithmetic skills and reflexes. Practice through games.

Drill and games should not be viewed as competitors. Drill tends to become tedious and, therefore, gradually loses its effectiveness. Games relieve the tedium because children enjoy them. Indeed, children often wish to continue to play games during their free time.

Games often reinforce skills including calculator skills, money exchange and shopping skills, logic, geometric intuition, and intuition about probability and chance (because many games involve numbers that are generated randomly.) Using games to practice number skills also greatly reduces the need for work sheets. Because the numbers in most games are generated randomly, the games can be played over and over without repeating the same problems.

Twenty-Five

submitted by Annette Perez & Dora Erickson

Deal out all the cards, an equal number to each player. The cards are left facedown in a pile in front of each player.

The person to the dealer's left goes first, and play continues clockwise.

The first person turns over a card and places it face-up in the center of the play area.

The next person turns over a card, adds it to the card already played, says the sum out loud, and places the card on top of the previously played card.

The next person turns over a card and adds the card to the sum of the first two cards.

Play continues in this way until someone has a card that when added will give a sum greater than 25. When that happens, the player must subtract rather than add.

Play continues until someone gets a sum of exactly 25.

The player who gets a sum of exactly 25 wins that round and goes first in the next round.

Name that Number

Source: <http://everydaymath.uchicago.edu>

Materials: 4 cards each of numbers 0-10 and 1 card each of numbers 11-20

Number of Players: 3 or 4

Directions: A player shuffles the deck and places five cards face-up on the playing surface. This player leaves the rest of the deck facedown and then turns over and lays down the top card from the deck. The number on this card is the number to be named.

In turn, players try to (re)name the number on the set-apart top card by adding or subtracting the numbers on two of the five face-up cards.

A successful player takes both the two face-up cards and the number-named top card. A successful player also replaces those three cards by drawing from the top of the facedown deck.

Unsuccessful players lose their turns. But they turn over and lay down the top card from the facedown deck, and the number on this card becomes the new number to be named.

Play continues until all facedown cards have been turned over. The player who has taken the most cards at the end wins.

Example: Mae's Turn:



The number to be named is 6. It may be named with $4+2$, $8-2$, or $10-4$.

Mae selects $4+2$. She takes the 4, 2, and 6 cards. She replaces the 4 and 2 cards with the top two cards from the facedown deck and then turns over and lays down the next card to replace the 6.

Mike's Turn:



The new number to be named is 16. Mike can't find two cards with which to name 16, so he loses his turn. He also turns over the next card from the facedown deck and places it on top of 16, and the number on this card becomes the new number to be named.

Play continues as before.

Game Variations

If children are finding the game difficult, increase the number of face-up cards.

Use any combinations of two or more numbers and all operations. For example, Mike could have named 16 as follows:

$10+7-1$ or $10+12-7+1$ or $8+12-10+7-1$

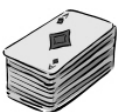
Children can experiment by using different numbers of face-up cards.

Multiplication "War"

Directions: Sort through a deck of cards and remove all the face cards. The ace stands for the number 1. Then deal out the cards between two players. Players can hold their decks or lay the piles face down on the table. Both players then turn over one card at the same time. When the two cards are down, players see who can multiply the two cards the fastest to find the product. Whoever says the correct product first wins those cards. At the end of the game, the players count their cards. The player with the most cards at the end of the game wins.

Variations of "War":

- Students can practice addition or subtraction facts instead.
- Players can each lay down 2 cards to create 2-digit addition, multiplication, and subtraction problems.
- Each player can lay 2 cards down at the same time and state the answer to their own multiplication problem. Whoever has the greater product wins.



Ninety-nine

Each player begins the game with 5 pennies (or chips). Deal out 3 cards to each player from a standard 52 card deck (if more than 4 people are playing use 2 decks and give each player just 3 pennies). The undealt cards are placed on the table to form a face-down stock.

The player to the left of the dealer starts and the turn initially passes clockwise. On each turn you play one of your three cards face-up to the centre of the table, call out the total value of the face-up pile (as per the table below), then draw the top card from the stock. When the face-up pile is empty the count is zero. For each card played add the pip value of the card played to the total value of the pile. Jacks and queens count as 10. The following cards cause special effects:

Ace - increases the value of the pile by one or eleven, at the player's choice.

Four - the value of the pile remains the same but the direction of play reverses.

Nine - counts as zero - the value of the pile remains the same and play passes to next player in turn.

Ten - increases **or** reduces the value of the pile by ten, at the player's choice.

King - the value of the pile is set to 99.

If you cannot play without taking the value of the pile over 99, you lay down your hand. The play ends, and you toss one penny into the center; players who have no pennies left drop out of the game. After each hand, the deal passes to next player to the left of the previous dealer who is still in. Hands continue till only one player has any pennies left, and that player is the winner.

When someone plays a nine or a four they repeat the value of the pile, calling out "pass to you #" or "back on you #" respectively. For example here is part of a four-player game; play is currently running clockwise. Player 1 plays a King and says "99". Player 2 plays a nine and says (looking at player 3) "pass to you 99". Player 3 plays a four and says (looking at player 2, since play order will now run counterclockwise until another four is played) "back on **you** 99". Player 2 plays a ten and says "89". Player 1 plays a eight and says "97". Player 4 plays a four, looks at player 1 and says "back on you 97" (now we're back to clockwise), and so on.

When there are only two players, there is no longer any difference between clockwise and counterclockwise play. the player to your left is also the player to your right. Therefore, **playing a four has no effect on the turn order when there are two players** - the pile value remains the same and it is the other player's turn, just as though you had played a nine.

This game should be played very rapidly. It is easy to forget to draw a replacement after you play a card. If that happens it cannot be corrected afterwards - you must get by with just two cards for the rest of the hand.

99 Variations

Some play that after a player goes over 99 and loses a coin, the pile is taken away and the other players continue to play with the cards they have in their hands, starting a new pile from zero. If the stock runs out, the played cards are shuffled to form a new stock pile, but the running total of the pile is preserved.

Some people consider that the four, which normally reverses the direction of play, should have some effect on the turn order even when there are only two players. If this is your opinion, you can agree to play the alternative rule that when there are only two players, playing a four entitles the same player to play again.

Another version has the following differences:

-The card which reverses direction without changing the value of the pile is the **8**, not the 4.

-The king has no special property - it is just worth 10 card points.

-You lose a game point when you play a card which causes the value of the pile to cross any of the three borders 33:34, 66:67 and 99:100. When the score exceeds 99 the play ends and a new hand is dealt. Therefore a total of three game points are normally lost on each hand, as the three borders are crossed, but it is possible to lose extra points by using tens to go backwards - for example if the pile is 75 and you play a ten as -10 you will lose a game point as you take the total down to 65.

Each player starts **each hand** with three game points. Whatever game points you have left at the end of the hand are added to your cumulative score. When (over several hands) anyone achieves a score of 15 game points or more, the player with the highest score wins.

Ninety-eight *by Chris Jepson*

This is a fairly simple drinking game for 2 or more players, using a standard 52 card deck.

Deal out four cards to each player and place the remainder face down to form the **stock**. The player to the dealer's left begins and play continues in clockwise order. Players play their cards on the table to form a face-up **pile** alongside the stock.

At your turn you play one of your four cards to the face up pile, call out the new value of the pile, and then draw the top card from the face down stock to replace the card you played.

At the start of the game there are no cards in the pile and its value is zero. Played cards affect the value of the pile as follows:

ace to nine	..	increase the value of the pile by the pip count of the card
ten	...	reduce the value by ten
jack, queen	..	the value stays the same
king	..	the value is set to 98

The aim is to avoid taking the value above 98. The first person who makes the value of the pile **more than 98** loses, and has to take a drink.

Example. The first player plays an 8 and says 8; the next player plays a 6 and says 14; the next player plays a king and says 98; the next player plays a jack and says 98; the next player plays a ten and says 88; the next player plays a 7 and says 95; the next player's four cards are 4, 5, 6, 9 - this player must lose.

The Game of Pig

Math concepts: This game for two or more players gives students practice with mental addition and experience with thinking strategically.

The object: to be the first to score 100 points or more.

How to play: Players take turns rolling two dice and following these rules:

1. On a turn, a player may roll the dice as many times as he or she wants, mentally keeping a running total of the sums that come up. When the player stops rolling, he or she records the total and adds it to the scores from previous rounds.
2. But, if a 1 comes up on one of the dice before the player decides to stop rolling, the player scores 0 for that round and it's the next player's turn.
3. Even worse, if a 1 comes up on both dice, not only does the turn end, but the player's entire accumulated total returns to 0.

After students have had the chance to play the game for several days, have a class discussion about the strategies they used. You may want to list their ideas and have them test different strategies against each other to try and determine the best way to play.

One Hundred

by Nicholas Cheung

One normal deck of 52 cards is used for 3 to 6 players. If there are 7 or more players 2 decks are used. Each player begins with three chips and the object of the game is to be the last player to have chips left.

Three cards are dealt to each player, one at a time, and the remaining cards are placed face-down on the table to form a stock. The cards put down by the players will form a face-up pile beside the stock. At the start of the game there are no face-up cards and the value of the (empty) pile is zero. The player to the left of dealer begins and the initial direction of play is clockwise. At your turn you put down one card face-up on the pile, say the new value of the pile, and draw the top card of the stock to replace the card you played.

Most of the pip card are worth their face value, which is added to the value of the pile. Queens other than hearts are worth ten. So for example the first player might play a nine, saying "9" and the next player might put a six on it saying "15", and so on.

Certain cards have special effects as follows:

Black Aces	The player can set the pile value to any number from 0 to 100.
Two of Spades	Doubles the previous value (for example if the previous player made the pile 36, adding the ♠2 will make the new value 72)
Fours	The pile value is unchanged but the direction of play is reversed.
Red Fives	Deduct 5 from the previous pile value (i.e. red fives are worth -5).
Tens	Set the pile value to 100.
Jacks	Deduct 10 from the previous pile value (i.e. jacks are worth -10).
Queen of Hearts	Set the pile value to zero.
Kings	The pile value is unchanged (i.e. kings are worth zero).

The aim of the game is not to be the player who takes the value of the pile over 100. If you are unable to play a card keeps the value to 100 or less, you lose one chip. A player who has lost all three chips is out of the game. The last player who has any chips left is the winner.

Example: if the player before you makes the pile value 100, the only cards you can play are black aces, fours, red fives, tens, jacks, the ♥Q and the kings.

Noddy *by Justin du Coeur*

Dealer deals 3 cards to each player, then turns up the topmost card of the deck, which can be used by both players. The Knave Noddy is the Knave of the suit turned up; if it is the card turned up, the Dealer scores 2 immediately.

Scoring Both players score all the combinations they can make from their three cards plus the up card. (Note that this happens before play, rather than after as in modern Cribbage.) Scoring combinations are:

- Pair -- 2 points
- Pair Royal (three of a kind) -- 6 points
- Double Pair Royal (four of a kind) -- 12 points
- Fifteen -- 2 points
- Twenty-Five -- 2 points (apparently a regional variation)
- Sequence of Three -- 2 points
- Sequence of Four -- 4 points
- Sequence of Five or more -- 1 point each (only possible in play)
- Flush of Three -- 3 points
- Flush of Four -- 4 points
- Flush of Five or more -- 1 point each (only possible in play)
- Knave Noddy (other than as the card turned up) -- 1 point

Note that you score these combinations without showing your cards, although I believe you declare what combinations you have. Willughby is silent on what happens if you make a mistake.

Eldest scores first; however, if Knave Noddy is turned up after the deal, Dealer scores that before any other scoring.

Play Play is similar to modern Cribbage. Eldest leads the first card, followed by one from the Dealer, etc. Any time the top cards of the pile form some kind of scoring combination, the player of the last card scores it.

All scoring combinations above count. Additionally, if a player makes exactly 31, they score 2 points. If they score below 31, and their oppo-



Two-Dice Sums

The object: to remove all the counters in the fewest rolls possible.

How to play: Two or more players can play. Each player needs 11 counters, a game strip that lists the numbers from 2 to 12 spaced far enough apart so the counters can fit on top of each number, and a recording sheet.

1. Each player arranges 11 counters on the game strip and records the arrangement.
2. Once the counters are arranged, players take turns rolling the dice.
3. For each roll, all players can remove one counter if it is on the sum rolled. Players keep track of the number of rolls of the dice it takes to clear their game board.

After students have had the chance to play the game for several days or so, have a class discussion about the different ways they arranged the counters and the number of rolls it took. Have them write about the arrangements that are best for removing the counters in the fewest number of rolls. For an extension, try Which Number Wins?

Early Cribbage

by Justin du Coeur

Reconstruction details are the same as Noddy (see other side), and the following description is based on the description of Noddy. Cribbage was apparently a variant of Noddy, designed to make the game a little more interesting. However, it was still simpler than the modern game, which did not appear until the 19th century.

Only the differences between Noddy and Cribbage will be described below.

Deal Before the first deal, the non-dealer immediately scores 3 points, because the Dealer gets the first crib, which is a significant advantage.

Instead of dealing 4 to each player, deal 5 instead. Each player selects 2 cards, which are put into a common "crib", which counts for the dealer. Note that this leaves you with three cards plus the card turned up, as in Noddy.

Scoring After scoring his own hand, the Dealer scores for the crib, counting in the turned-up card. Yes, that means that the crib is effectively five cards, which is a major advantage.

Winning The game is played to 61, instead of 31 for Noddy or 121 for modern Cribbage.

If you get 61 before your opponent reaches 45, it is called a "lurch", and counts for a double stake.

Four-Player Noddy or Cribbage

This is played quite similarly to basic Noddy or Cribbage, with a few tweaks. Players are partnered, two and two; partners may not sit next to each other. Partners score as if they were a single player; Willughby does not specify the order of scoring, but I assume one goes around, starting with Eldest.

If you are playing four-player cribbage, deal only four cards to each player; each places one card in the crib.

Crazy Eights

By Szu Kay Wong

Crazy Eights is a game for two or more players, in which the object is to get rid of the cards in your hand onto a discard pile by matching the number or suit of the previous discard. The basic game of Crazy Eights uses a standard 52 card pack, or two such packs shuffled together if there are a lot of players. The dealer deals (singly) five cards to each player (seven each if there are only two players). The undealt stock is placed face down on the table, and the top card of the stock is turned face up and placed beside the stock to start the discard pile.

Starting with the player to dealer's left, and continuing clockwise, each player in turn must either play a legal card face up on top of the discard pile, or draw a card from the undealt stock.

The following plays are legal:

- if the top card of the discard pile is not an eight, you may play any card which matches the rank or suit of the previous card (for example if the top card was the king of hearts you could play any king or any heart);
- an eight may be played on any card, and the player of the eight must nominate a suit, which must be played next;
- if an eight is on top of the pile, you may play any card of the suit nominated by the person who played the eight.

The first player who gets rid of all their cards wins, and the other players score penalty points according to the cards they have left in their hands - 50 for an eight, 10 for a picture, and spot cards at face value (one point for an ace, two for a two and so on).

Variations Crazy Eights is one of the easiest games to elaborate by adding variations, and is rarely played in its basic form. There are variations in the number of cards dealt, the rules about drawing cards and the scoring system. Usually, special meanings are given to particular cards; when played these cards affect the sequence of play, or have other effects.

Drawing Cards In the normal game, you may always use your turn **to draw a card. However, some people play that you may only draw if you are unable to play - if you can play you must.**

Some allow the drawn card to be played immediately if it is a legal play.

Some allow more than one card to be drawn - either up to a fixed number of cards, after which if you still cannot (or will not) play the turn passes to the next player. Others require you to continue drawing until you can play.

Last Card There may be a rule that you must alert the **other players when you have just one card left. If you fail to do so you must draw cards (usually two) from the stock as a penalty.**

Cards requiring special actions

Change suit Traditionally an eight can be played at any time and the player can nominate any suit. Some play that you can only play an eight that matches (either the same suit or another eight). Some play that you can play an eight at any time but cannot nominate another suit - the next player must match the suit of the eight you played or play another eight. Szu Kay Wong suggests that you can play an eight at any time, but can only nominate a different suit if the eight matches the rank or suit of the previous card. Some players use jacks or aces rather than eights as the cards which have the power to change suit.

Skip Some play that when a queen (or some other designated rank) is played, the next player in rotation misses a turn, and the turn passes to the following player.

Reverse direction Some play that when an ace (or some other designated rank) is played, the direction of play reverses, becoming anticlockwise if it had been clockwise, or vice versa.

Draw cards Some play that when a two is played the next player must either draw two cards or play another two. If several consecutive twos have been played the next player must either play another two or draw two cards for each two in the sequence.

How Long?

How Many?

source:
<http://teacher.scholastic.com>

How to play: students need Cuisenaire Rods, one die, and a grid sheet for each (Make a 10cm x 10cm grid. Also leave space for students to record how many of their squares are covered and uncovered.) The rules are:

1. On his or her turn, a player rolls the die twice to determine which Cuisenaire Rods to take. The first roll tells "how long" a rod to use. The second roll tells "how many" rods to take.
2. Players arrange their rods into a rectangle, place it on their grid, and trace it. They write the multiplication sentence inside.
3. The game is over when one player can't place a rectangle because there's no room on the grid. Then players figure out how many of their squares are covered and how many are uncovered and check each other's answers.

After students have had experience playing the game, talk with them about strategies for placing rectangles and figuring out their final scores.



Fact-O!

by Gary Hopkins

Students can play the game with a partner or in small groups with up to five players.

Students roll the three dice to determine who will play the game first. The person who rolls the highest total goes first.

The first player rolls the three dice. He or she uses the numbers rolled to create a mathematical problem that employs at least two operations (addition and subtraction, addition and multiplication, or subtraction and multiplication). For example, if the player rolls a 2, a 5, and a 6, she or he could use those numbers to create a mathematical equation such as $2 \times 5 + 6 = 16$ or $5 \times 6 - 2 = 28$. In those cases, the student would write the mathematical equation and the answer, then put an X on the answer (16 or 28) on the Fact-O Game Card below.

Fact-O Game Card

The first player passes the dice to the next player in the group; play moves in a clockwise direction.

As the game progresses, students check one another's math. If the first player writes an incorrect equation, then passes the dice, any of the other players can call out the error. (Note: An answer is not wrong until the player ends his or her turn by passing the dice to the next person.) The player who made the error must erase the X on his or her game sheet and forfeit the next turn; the player who was first to call out the error is allowed to put an X on his or her game card if that number is open. If a player calls out an error that later proves to be correct, the player who mistakenly called out the error loses his or her next turn.

Play resumes. The next player in the circle rolls the dice. (If the next player is a player who properly called out an error in the previous roll of the dice, then that player still gets his or her regular turn in rotation.)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	44	45	48	50	54	55
60	64	66	72	75	80	90	96
100	108	120	125	144	150	180	216

When the first player gets a second turn, she or he should roll the dice and try to create a mathematical problem with an answer that appears on the game sheet adjacent to the answer on which she drew an X in the first round. For example, if the player put an X on the number 16 in the first round, he or she should try to create an equation that has an answer of 7, 8, 15, 23, or 24. (Those are the numbers adjacent to the number 16 on the game sheet.) If the player is able to X a number adjacent to 16, he or she earns a point. If the player is unable to mark a square adjacent to 16, she or he is free to create an equation with any other answer and to X the square that includes that answer, but no point is earned. Points accumulate as the game continues.

When a player rolls the dice but is not able to create a mathematical problem that enables her or him to X a number that has not yet been X'd on the game sheet, the player marks no X and passes the dice to the next player.

If a player is unable to X any numbered box on the game sheet for three consecutive turns, that player is eliminated from play.

Score is kept throughout the game. When time is called, the person with the most points earned is declared the winner of the game. (Remember: The person with the most X'd squares might not be the winner because the winner is determined by points earned for X'ing the most *adjacent* squares on the game sheet.)