

Making The Most of Maths Gear

Card Capers



Dr Paul Swan 

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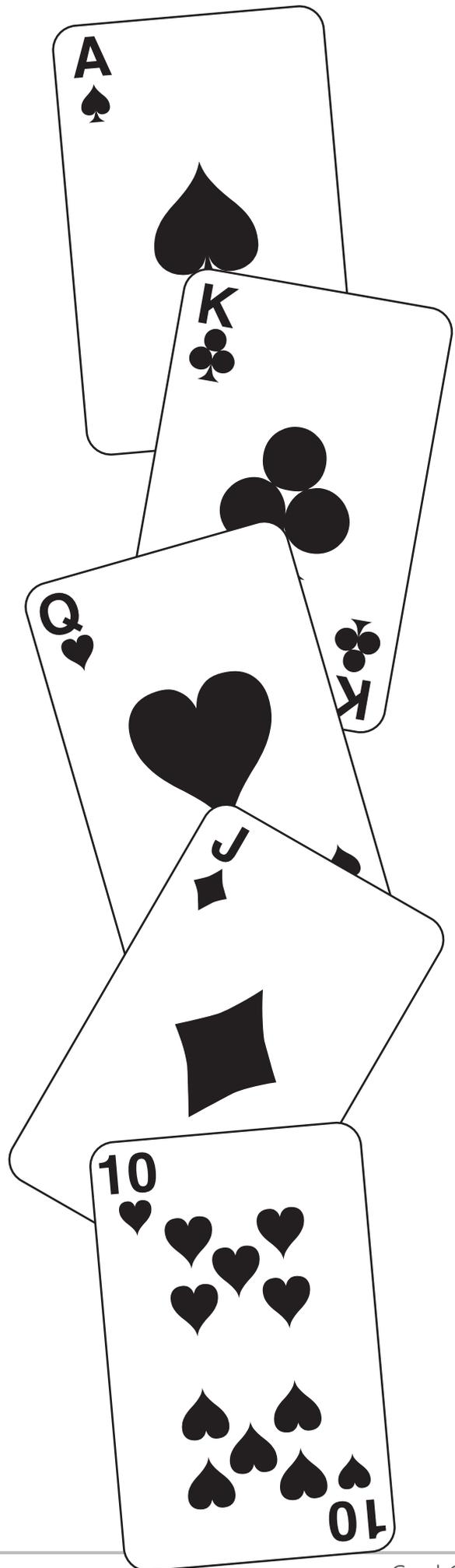
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Concepts



Games	Australian Curriculum Link	Mathematics concept
Symmetrical Cards	Yr 5:ACMMG114	Recognising line symmetry and rotational symmetry.
Spotted Cards	Yr 4:ACMNA075 Yr 4:ACMNA076	Calculating the total numbers of symbols in a deck of 52 cards.
Cut and Predict	Yr 3:ACMSP067 Yr 5:ACMSP116	Investigating the probability of certain outcomes (colours, suits) appearing when cutting a deck of cards.
Magic Cards	Yr 2:ACMNA030	Investigating the commutative property of addition by adding numbers 1-9 in rows of 3 and comparing the totals.
Boxed Cards Card Puzzle	Yr 2:ACMNA030 Yr 3:ACMNA054	Arranging cards of value 1-10 to generate equivalent sums (each side of a rectangle has the same sum). Arranging playing cards in an array such that the sums of rows, columns and diagonals are even.
Classifying Cards	Yr 2:ACMSP049 Yr 3:ACMSP069	Classifying playing cards according to different and shared attributes using Venn diagrams and grids.
Card Layout	Yr 2:ACMNA030 Yr 3:ACMNA055	Investigating how many different sums using 2 numbers are possible from a total of 4 numbers.
Card Conundrum	Problem Solving and Reasoning	Investigating how to arrange cards in an array to comply with certain rules regarding card appearances in rows and columns.
The Cards of Hanoi Shuffle the Cards Deck Detective	Problem Solving and Reasoning	Rearranging playing cards whilst complying with placement rules regarding relative size of numbers. Using multiple clues regarding suit, number, colour and position to determine the arrangement of three hidden cards.
Beat That Card Bingo Fish Up and Down Snap +/- 1	Yr F:ACMNA002 Yr F:ACMNA289 Yr 1:ACMNA013	Judging the relative magnitude of two numbers (which is bigger). Reading and matching numerals 1-9. Arranging four numbers in ascending order. Matching numbers which differ by one or two in value.
Counting Cards Make 10 Make 10 Again Thirty One 99 or Bust On Target Card Nim	Yr 2:ACMNA030 Yr 3:ACMNA055	Adding strings of single-digit numbers in order to reach a given total.
Flipper	Yr 2:ACMNA030 Yr 3:ACMNA055	Adding strings of single-digit numbers.
I-Spy	Yr 2:ACMNA030 Yr 3:ACMNA054 Yr 3:ACMNA055	Adding two single-digit numbers, and identifying pairs of numbers which add to a given total.
Place Value Pack	Yr 3:ACMNA053	Allocating digits to places in order to produce the number with the highest value.
Multiple Madness Card Count	Yr 3:ACMNA055 Yr 3:ACMNA056 Yr 4:ACMNA074 Yr 4:ACMNA075	Adding a string of single-digit numbers. Identifying when the running total is a multiple of a given single-digit number.
Practice Pack Fast Facts	Yr 3:ACMNA055 Yr 3:ACMNA056 Yr 4:ACMNA075	Multiplying two single-digit numbers. Adding two single-digit numbers.
Getting Closer	Yr 2:ACMNA028 Yr 2:ACMNA030 Yr 3:ACMNA055	Allocating places to digits in order to generate two, two-digit numbers whose sum is closest to a target number.
Hit the Deck	Yr 4:ACMNA076 Yr 5:ACMNA100	Multiply three one-digit numbers. Reinforces commutative property of multiplication (numbers can be multiplied in any order). Add three one-digit numbers.
HiLo Make My Number Secret Pairs Card Calculations	Yr 4:ACMNA075 Yr 3:ACMNA055 Yr 3:ACMNA056	Multiplying two single-digit numbers. Adding two-digit and single-digit numbers. Comparing the size of the results. Use any combination of the four operations on three single-digit numbers in order to reach a given total. Identify two single-digit numbers which generate a given product. Operating upon strings of numbers using addition and subtraction in order to reach the highest single-digit total. Adding strings of single-digit numbers.
Calculate-a-Digit	Yr 3:ACMNA053	Using place value knowledge to transform a given four-digit number into another in which one digit differs, by using addition or subtraction.

Problems and Puzzles to solve using cards

Teacher notes

The problems and puzzles in this section of the book will give students the opportunity of engaging in problem solving which, involves using mathematical thinking processes and skills. It is important that students develop mathematical thinking skills and learn how to apply them.

What is a problem?

Simply put, a problem is a situation where there is no obvious method of solution. There is no basic routine to follow in order to solve the problem. Students need to think about it.

Students may be guided through the problem solving process. Polya (1990) suggested a four step process for solving problems that has been slightly modified to suit the needs of students.

- **Understanding the problem or puzzle**
Provide the opportunity to discuss the problem and possible problem solving strategies
- **Devise a plan**
Choose a strategy or strategies suited to the task. Encourage students to explore these. The task may need to be broken down into manageable steps. Students may have solved a similar problem and can draw on this knowledge.
- **Carry out the plan**
Apply the strategies and logical reasoning skills suited to the problem and test alternative approaches.
- **Look back**
Students need to check their work and explain and justify their thinking about how the problem was solved.

The problems and puzzles encourage students to:

- Take risks and try a range of strategies.
- Explore different possibilities and realise that there is often more than one solution to a problem.
- Think about and talk about their learning.
- Actively look for patterns in the numbers.
- Use appropriate mental computation strategies.

Playing cards are ideal for these tasks as the cards may be easily manipulated to explore possible solutions without the need for recording on paper. Students can be given these tasks to do at home as playing cards are readily available.

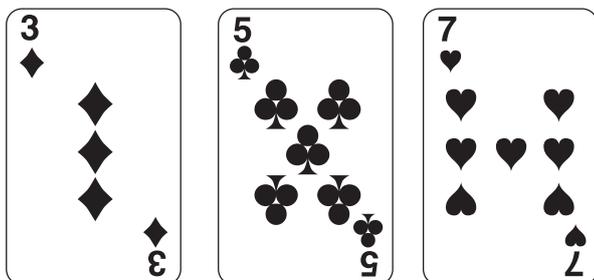
Note: Answers to the problems and puzzles may be found at the back of the book.
Polya, G. (1990) *How to Solve it*. London: Penguin

Symmetrical Cards

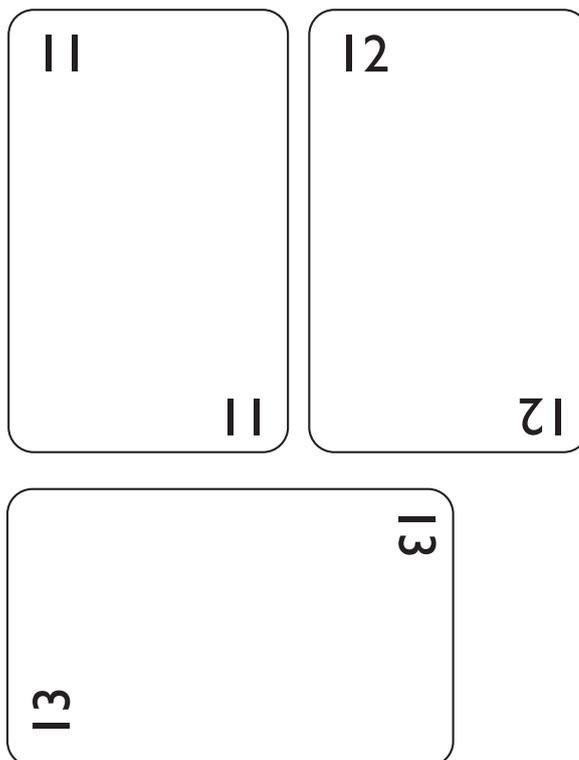
- Look at the symbols on the numbered cards in a standard deck

i.e.    

- Notice how they are arranged in a symmetrical pattern.
- Which cards have line symmetry?
- Which cards have rotational symmetry?
- Which cards have both rotational and line symmetry?



- Design some playing cards to represent 11, 12 and 13.

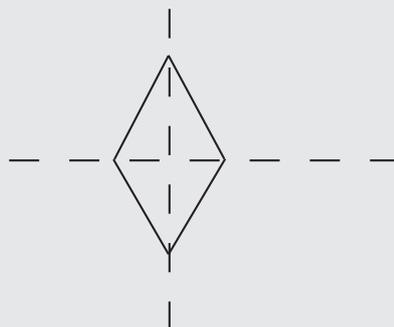


Teacher Notes

A figure, in this case a card, has line symmetry if the card may be folded along a line so that each half is a mirror image of the other half. Miras and mirrors are useful tools for helping students determine whether a figure has line symmetry. Some figures will have more than one line of symmetry.

Rotational symmetry is when a figure appears to maintain its original orientation when rotated about a fixed point.

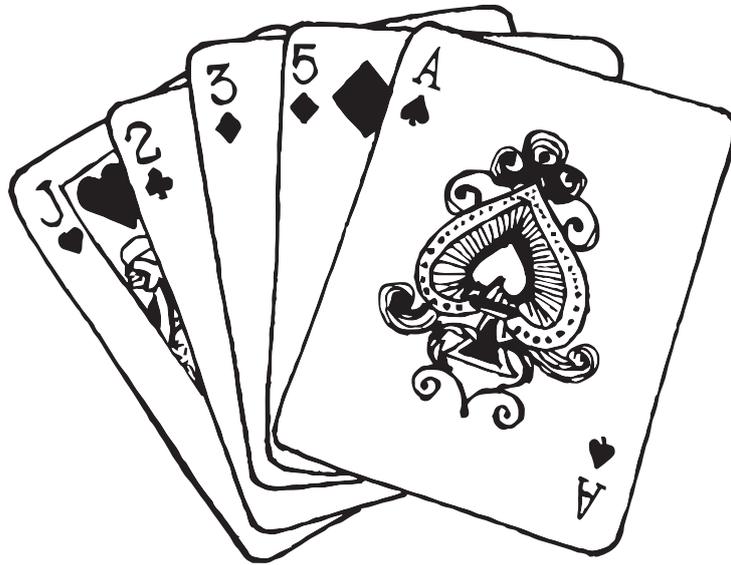
Encourage students to use appropriate mathematical language when describing symmetrical patterns eg line symmetry, reflection, mirror image, rotational symmetry.



Spotted Cards

- How many spots

i.e. ♠ ♣ ♦ ♥ symbols
are there on a deck of cards?

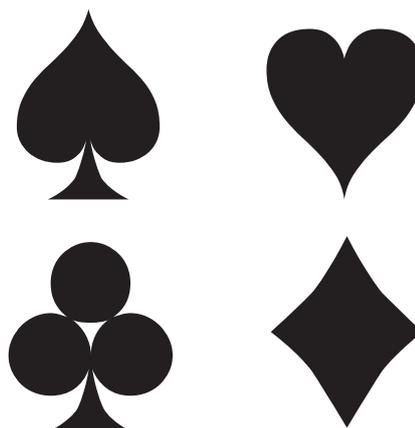


Teacher Notes

Students may need assistance to break down the task into more manageable steps. Discuss possible solution strategies that suit the task and ways to systematically record the spots in the entire deck. Allow students to work as a team to solve the problem. For example, they might determine the number of spots on the cards that make up a single suit of cards and multiply by four to determine the total number of spots.

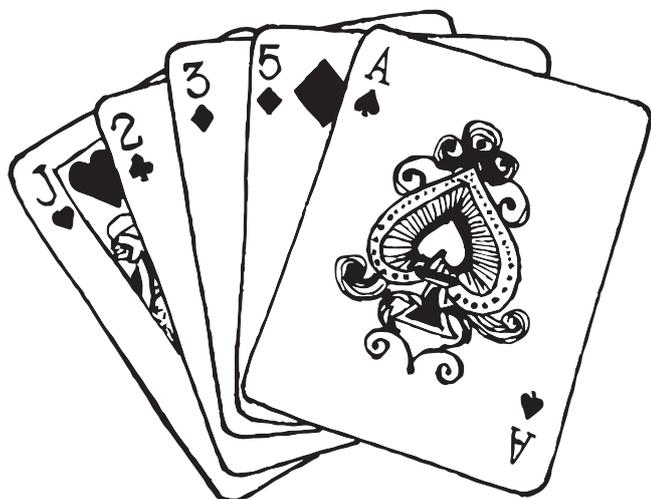
Cut and Predict

- Remove the Jokers and shuffle a pack of playing cards. Cut the deck and record the colour of the card.
- Try this twenty times.
- Write about what you notice.
- If you were to try this fifty, one hundred or two hundred times, how many red cards would you expect to turn up?
- Repeat the experiment, but this time, note which suit appears.
- Predict the number of hearts that you would expect to get from forty, sixty or one hundred cuts from the deck.



Variations

- Consider cutting for picture cards.



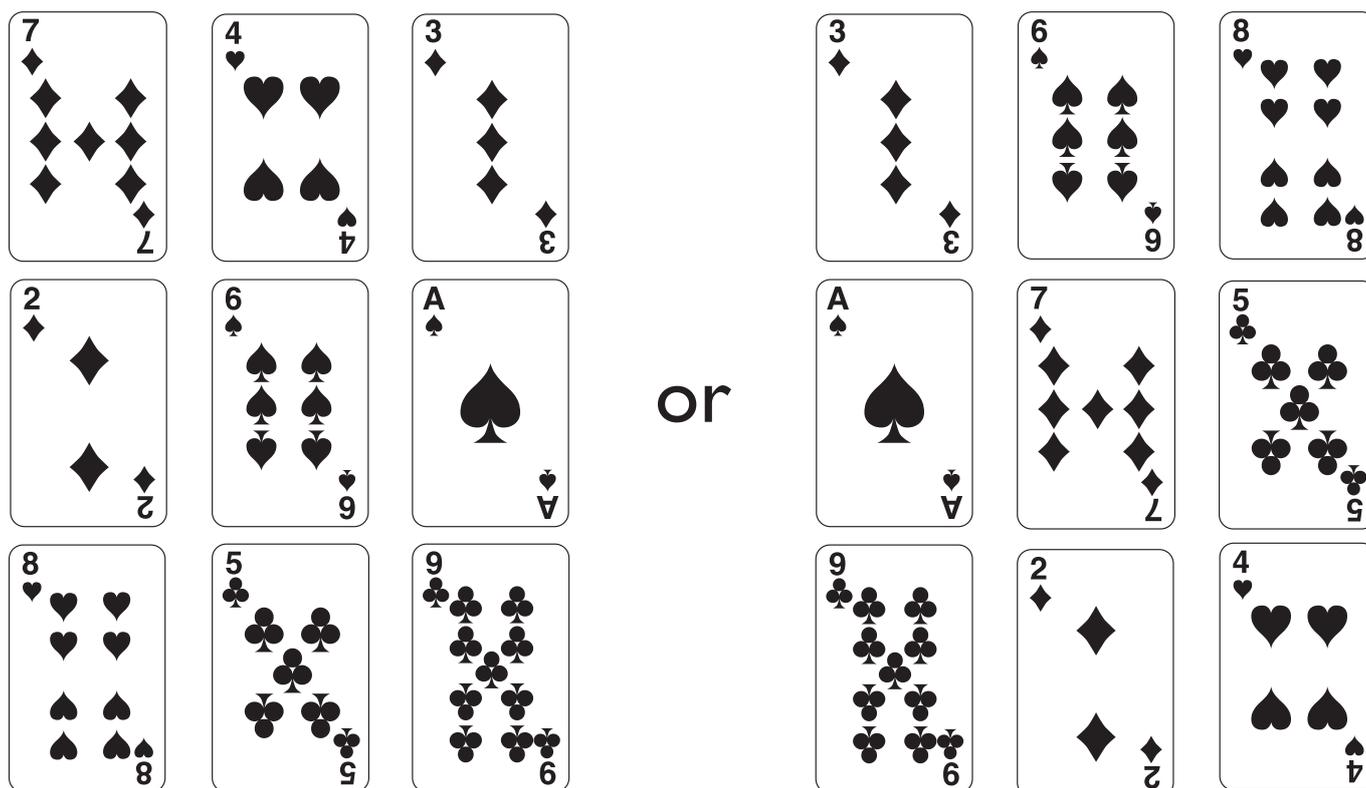
Teacher Notes

Students may need guidance to plan, collect, organise and record data in order to make predictions. Data can be used to identify what is more, less or equally likely to occur and justify predictions that are made. Data may be recorded in tables, for example, colour of card. Students will then be able to refer to the numerical information in the table when making probability statements. Students need to be made aware that the sample sizes may affect the validity of the findings. Encourage the students to use the language of chance when explaining prediction. For example, a student might say that the chance of two events happening is equally likely or 50/50.

Magic Cards

- Separate an Ace (Ace = one), 2, 3, 4, 5, 6, 7, 8 and 9 from a deck of cards.
- Place the cards in a 3 x 3 grid on the table.

e.g.

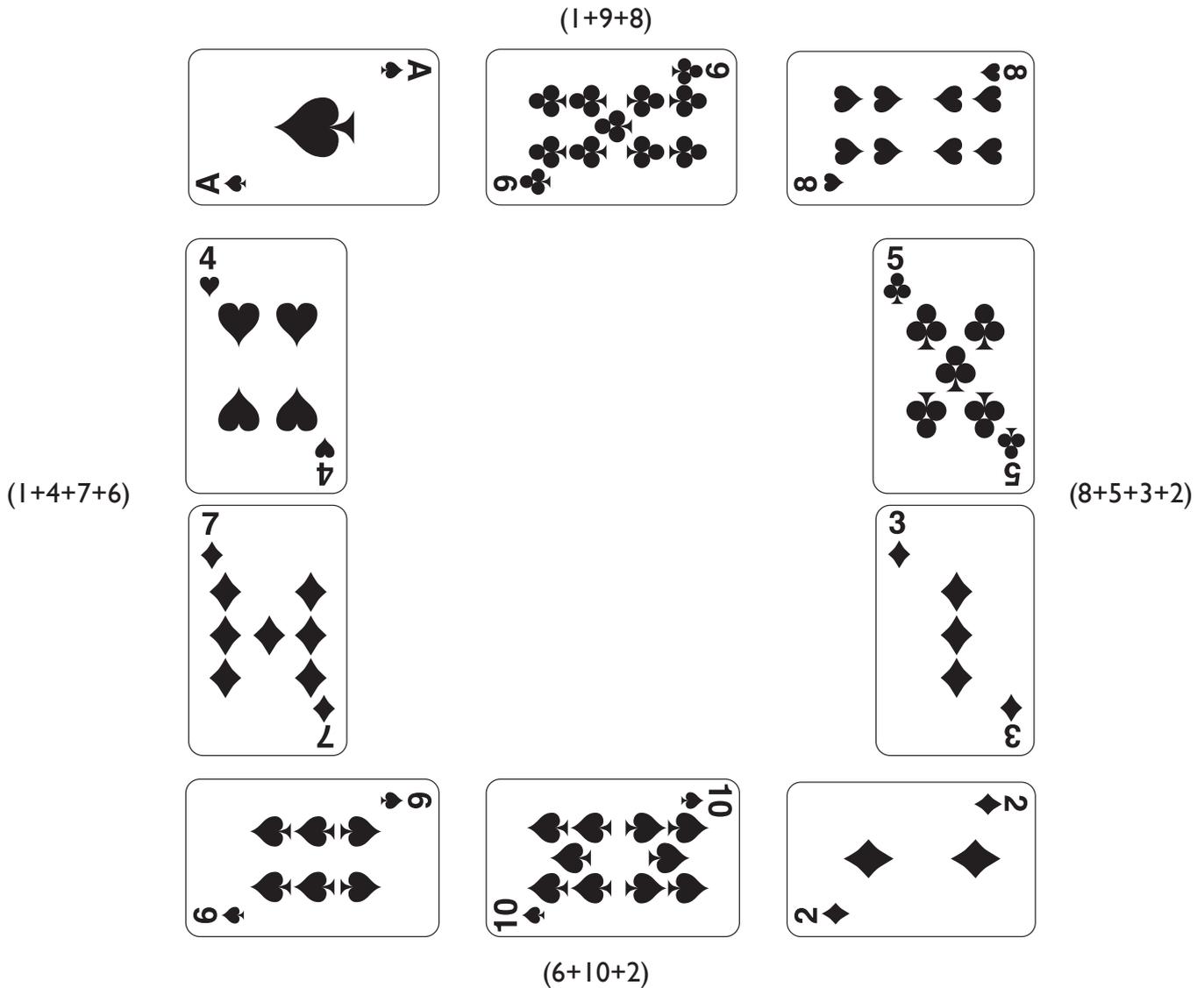


or

- Find the total of the first row, $7 + 4 + 3 = 14$
Find the total of the second row, $2 + 6 + A = 9$
Find the total of the third row, $8 + 5 + 9 = 22$
- Add these three totals.
- Collect the nine cards, shuffle them and place them on the table in a different arrangement. Add the totals.
- Repeat once more. What do you notice? Why do you think this happens?

Boxed Cards

- Remove ten cards (Ace to 10) from a deck of cards and form a box.



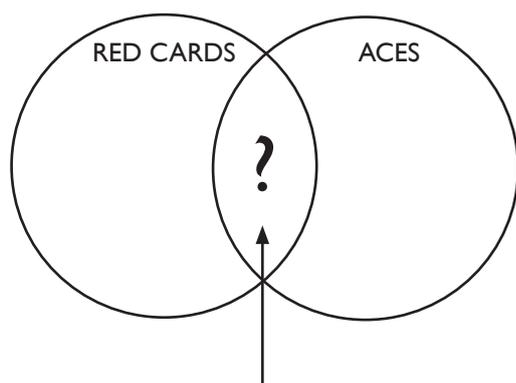
- Add up the numbers shown on the cards that form the sides of the box.
- Try to find another arrangement that produces a sum of eighteen on each side of the box. When adding the values on each side of the box, count three cards on the top and bottom and four cards down each side.

Classifying Cards

Teacher Notes

Cards may be classified or sorted into various groups. For example, children in the early years can sort and classify cards according to suit, colour, or whether the cards are even or odd. Young children might also place the cards in order according to the number of symbols shown on the card. Later they can use the numerals. Allow children the opportunity to share how they have sorted the cards.

- Venn diagrams can be used to help organise the sorting process. Cards are grouped according to particular attributes.



Which cards are both red and aces?



- How many cards end up in each location?
- Try sorting the cards according to the following criteria shown on page 12.
- Carroll diagrams (named after Lewis Carroll, the author of Alice in Wonderland), or Venn diagrams may be used to help organise the sorting process. For example, cards may be sorted according to the following criteria.

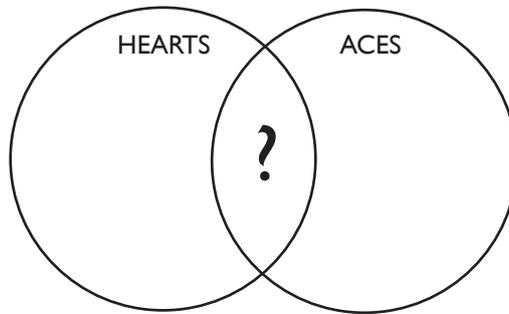
	Odd Number	Even Number	Picture Card
RED			
BLACK			

Classifying Cards

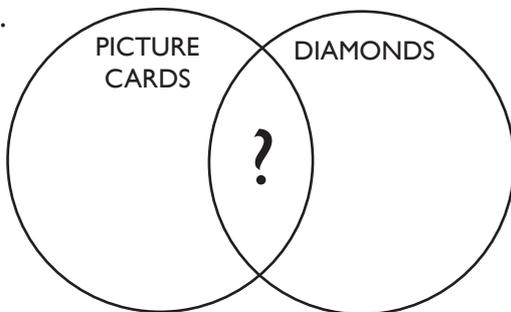


Classify the cards according to the following criteria.

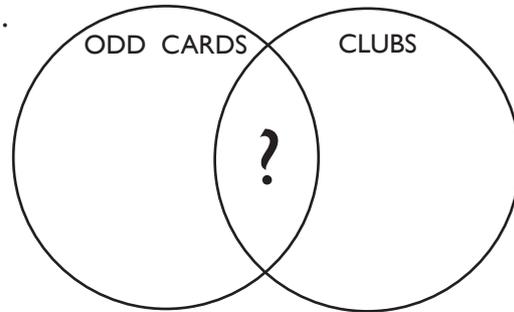
1.



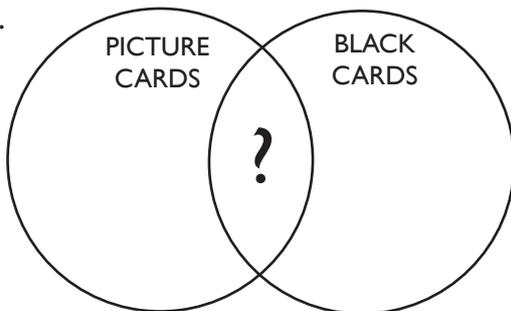
2.



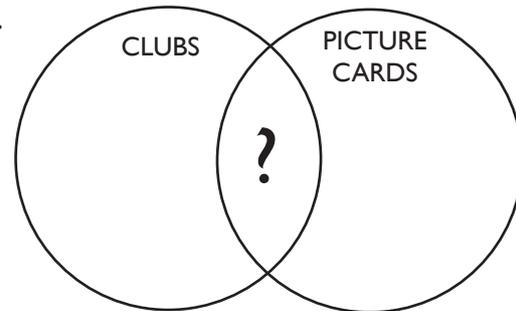
3.



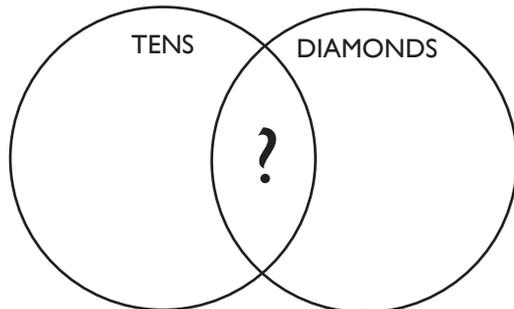
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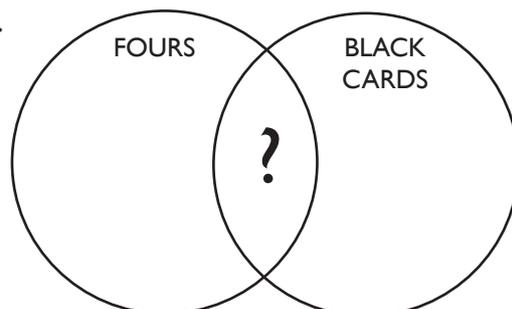
5.



6.

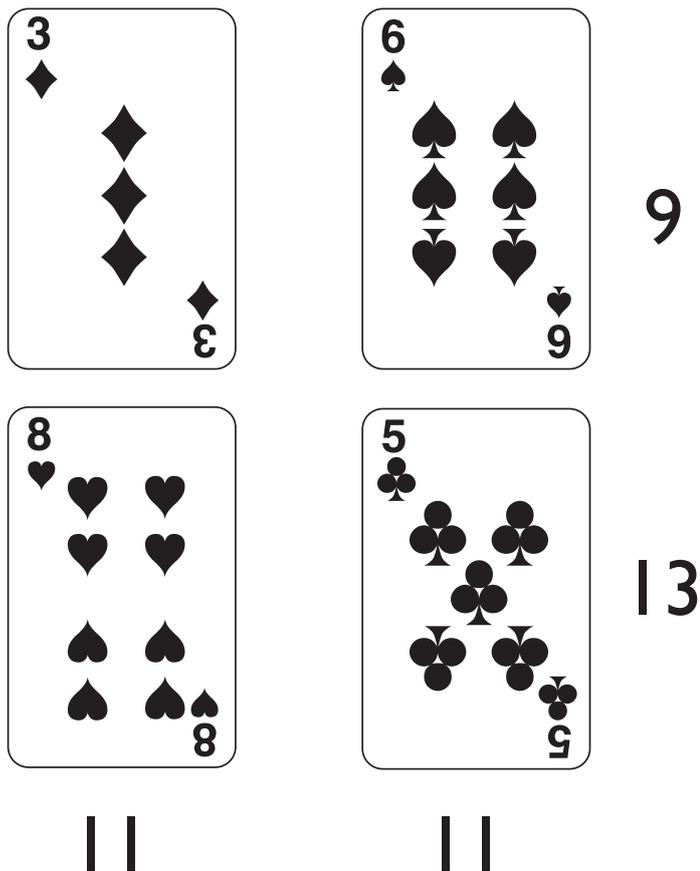


7.



Card Layout

- Arrange four numbered cards in a 2 x 2 array.
- Find the total for each row and column.



Totals: 9, 13, 11, 11

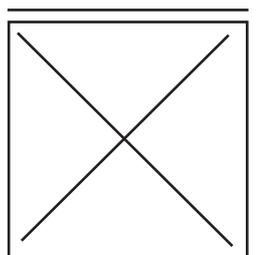
- Try to rearrange the cards so that different totals are produced.
- How many different totals are possible?
- How will you know when you have found them all?
- Try starting with a 2 x 3 array.

Card Conundrum

- Remove all of the Aces and picture cards from a deck of cards and form a 4×4 array in which each row and each column contains one Ace, King, Queen and Jack.

- Try again, but this time form a 4×4 array in which each row, column and *diagonal* contains one Ace, King, Queen and Jack.
- Form a 4×4 array in which no two cards of the same value or the same suit appear in the one row, column or diagonal.

Remember to check both diagonals.



This is really hard.
My brain hurts!



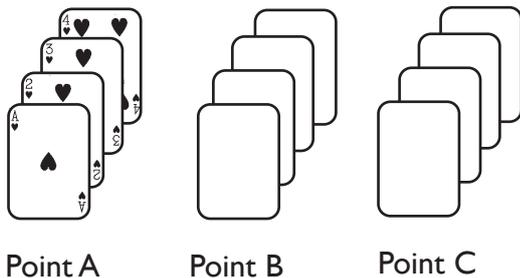
The Cards of Hanoi

In the famous “Tower of Hanoi” puzzle, discs are transferred from one peg to another according to the rules that:

- only one disc may be moved at a time
- a larger disc cannot be placed on top of a smaller disc.

A similar puzzle may be produced using playing cards.

- Separate an Ace, a 2, a 3 and a 4 from a deck of cards.
- The object of the puzzle is to move the four cards from point A to point C.



Caution: With five or six cards this puzzle becomes very difficult and takes a long time to complete.



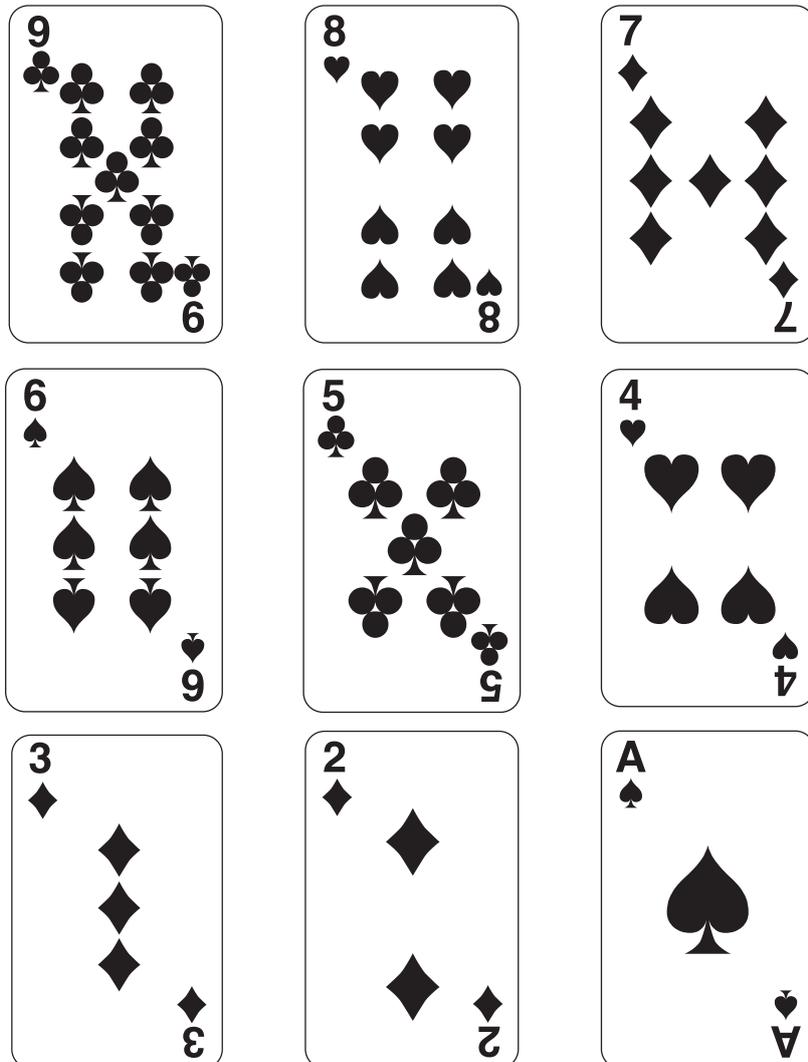
Use the following rules:

- A larger valued card cannot be placed on top of a lesser valued card, e.g. a three cannot be placed on top of a two or an ace.
- Only one card may be moved at a time. Note that cards may be moved directly from point A to point C.
- If you find the puzzle hard then remove the four. If you find it easy to solve then try adding a five and a six.

Shuffle The Cards

- Remove nine cards (Ace to 9) from a deck.
- Shuffle the nine cards and lay them out, face up, in a 3 x 3 array.
- Try to move the cards so they are in descending order from nine to one, as shown below.
- You may only move a single card at a time. A card may only be moved on top of another one if it is of a higher value.

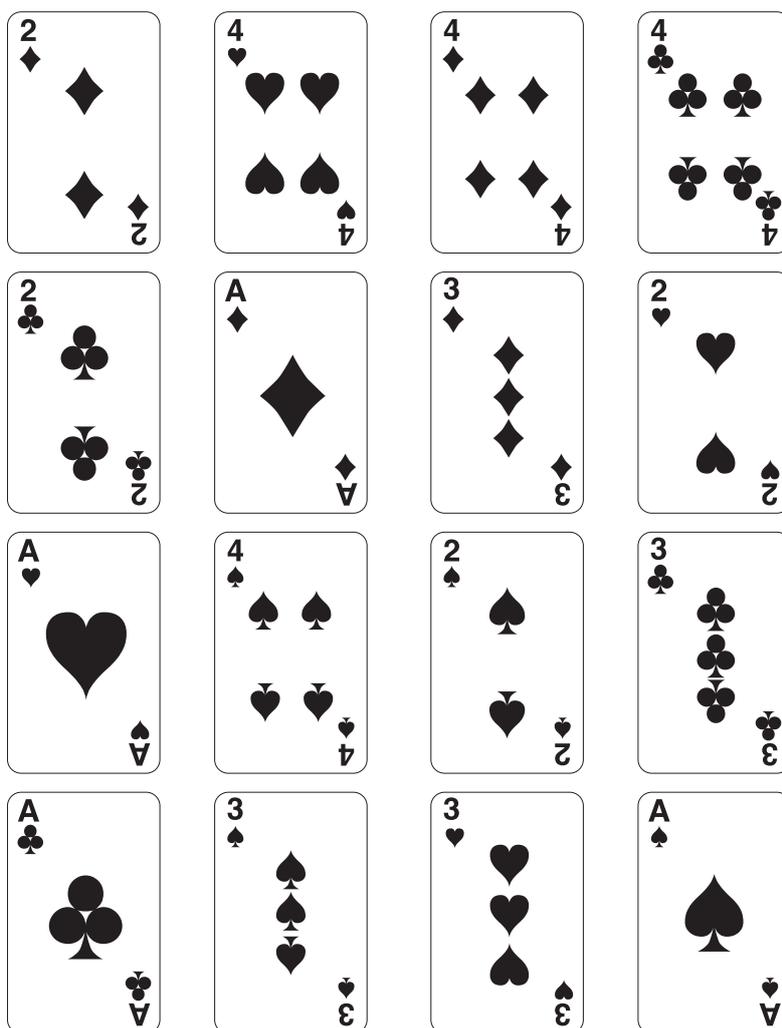
E.g.



Card Puzzle

A puzzle for individuals or small groups using sixteen cards (Four Aces, four 2s, four 3s, four 4s).

- Try to arrange the sixteen cards into a 4 x 4 array so that the sum of every row, column and diagonal is even.



Variation

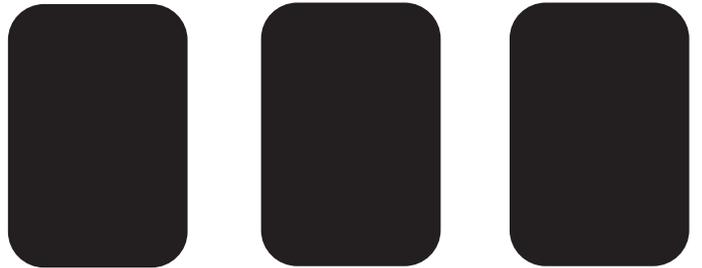
- Play the blind version where the deck of sixteen cards is placed face down and one card is placed on the array at a time. A second card is then turned over and placed in the array and so on. Note that once cards are placed they cannot be moved or removed.

Deck Detective

A puzzle for individuals or small groups using three cards.

Use the following clues to work out which cards are turned over and the position of the cards.

- Two of the cards are hearts.
- Two of the cards are Aces.
- One of the cards is black.
- One of the cards is a picture card.
- The two Aces are separated by the female picture card.
- One Ace is not a spade.
- The Ace of hearts is on the far left of the set of three cards.



Try this one

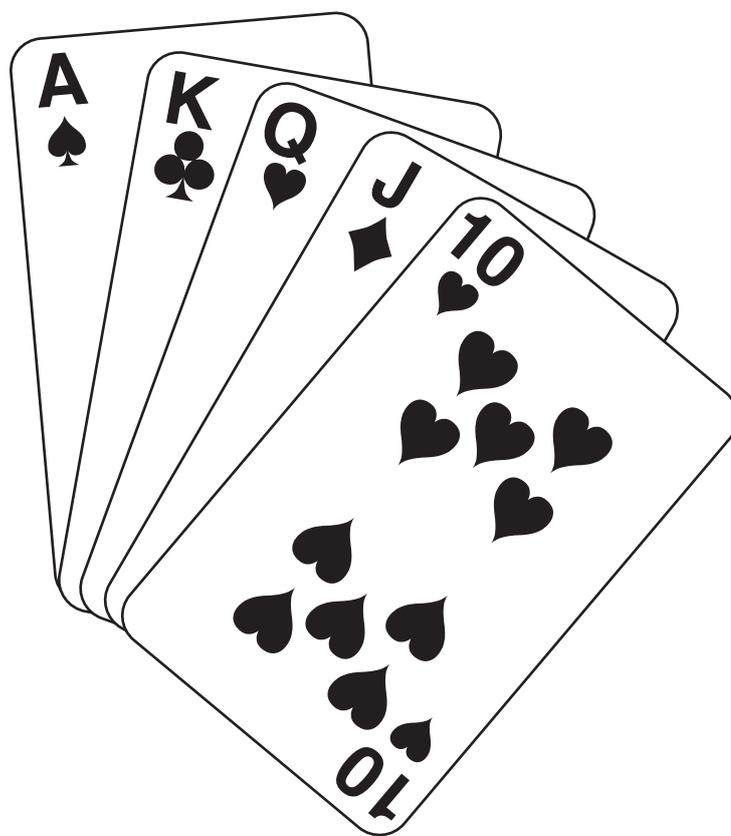
- There are two black cards and one red card.
- None are picture cards.
- The three cards are consecutive.
- The red card is not a heart.
- Two of the cards are clubs.
- The smallest card is an eight.
- The largest card is red.
- The cards have been placed in descending order from left to right.



Teacher notes

Students could write their own sets of clues for others to solve. Suggest that they start with the answer and work backwards.

Card Games



Teacher notes

Students may need to be introduced to card playing conventions in order to play the games.

- Dealing to the left in a clockwise rotation.
- Dealing to yourself last.
- Shuffling cards.

Beat That

Purpose

- Recognise numerals 2 – 10.
- Instantly recognise the total spots on the cards.
- Compare numbers to identify the largest.

Materials

- Deck of cards (with the picture cards removed.)
- Ace = 1

Organisation

A game for two players.

Aim

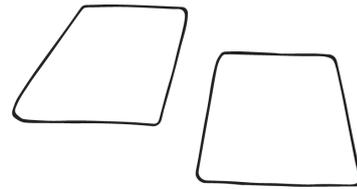
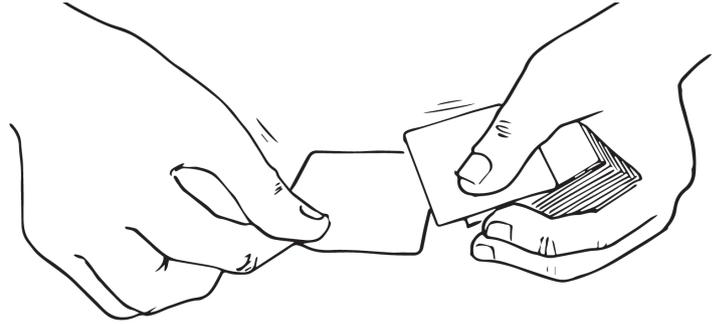
To be the first to recognise matching numbers.

Rules

- Deal all of the cards in the deck to the two players face down. (The same as for Snap).
- Simultaneously, each player turns over their top card.
- The player with the bigger number takes the two cards on the table.
- If two cards of the same value appear, the cards are left on the table to jackpot to the next turn, when the winner would pick up four cards.
- The winner is the player with the most cards after a set period of time or the player who ends up with all the cards.

Variation

- The player with the smallest number takes the two cards.
- Turn two cards over at a time and add the values to see who has the largest combination. The person with the largest combination picks up all four cards on the table.



Card Bingo

Purpose

- Order numbers in ascending or descending order.
- Compare numbers 1 – 13.
- Instantly recognise the total spots on the cards.

Materials

- Two decks of cards.
(Separate the picture cards from both decks.)
- Ace = 1

Organisation

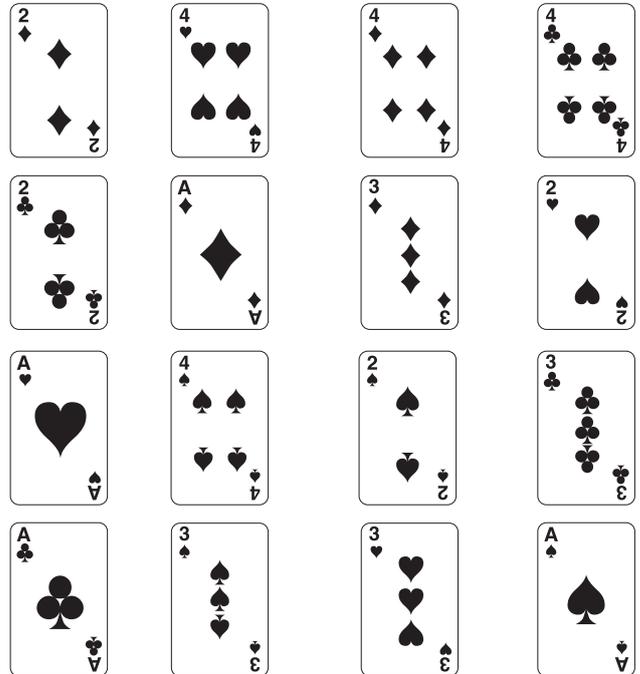
A game for small groups or the whole class.

Aim

To be the first to turn over four cards in a line.

Rules

- Each player makes a 4 x 4 array of cards face up.
- One player takes on the role of caller, flips a card over from the top of the unused deck and calls out the name of the card, eg 7 (It doesn't matter if the card is the 7 of hearts, clubs etc.)
- If the card that is called out matches one in the player's array, the player may then turn that card over.
- The first player to turn a set of four cards over in a line, either horizontally, vertically or diagonally is the winner.



Up and Down

Purpose

- Order numbers in ascending or descending order
- Compare numbers 1 – 13
- Instantly recognise the total spots on the cards

Materials

- Deck of cards.
(Aces = one, Jacks = eleven, Queens = twelve, Kings = thirteen)

Organisation

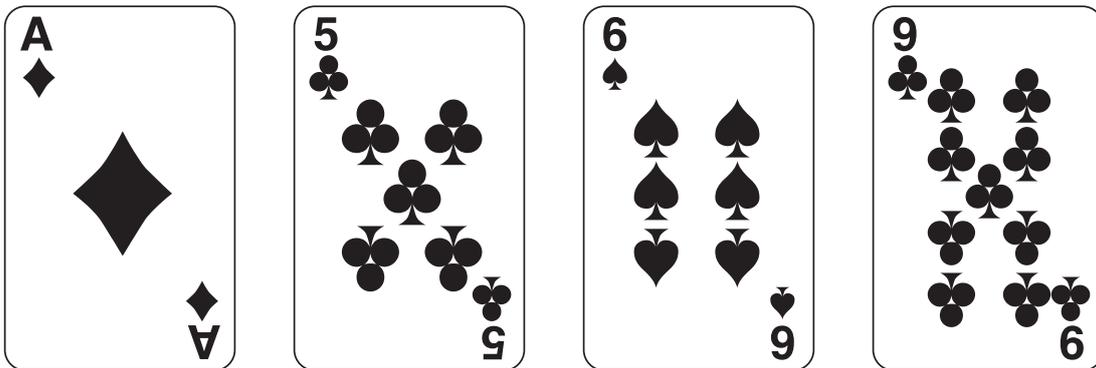
A game for 2 – 4 players.

Aim

To arrange the cards in order.

Rules

- Each player is dealt four cards face up.
The remaining cards are placed in a pack in the centre of the table.
- The aim of the game is to be the first player to arrange the cards in either ascending or descending order. This does not have to be in consecutive order, ie 4,5,6,7. It could be 2, 5, 6 and 9. Cards cannot be rearranged – only exchanged.
- Starting with the player to the dealer's left each player may exchange one of his/her cards for one from the top of the pack or one from the discard pile. The card which is exchanged is placed into a discard pile.
- The first player to arrange his/her cards in order is the winner of that round. The winner receives a point. The first player to accumulate five points is the winner of the game.



Fish

Purpose

- Read and say numbers 2 – 10.
- Recognise collections of numbers in familiar arrangements.

Materials

- Deck of playing cards.
(Picture cards may be removed to allow students to focus purely on numbers.)

Organisation

A game for pairs or small groups.

Aim

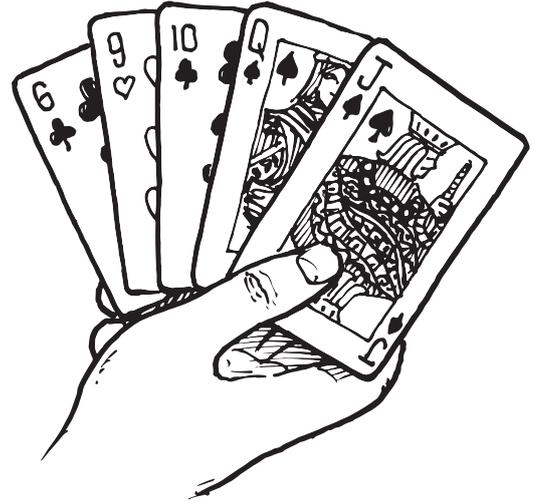
The winner is the player with no cards or the least cards after a set amount of time.

Rules

- One player deals five cards to each of the players and leaves the deck face down in the middle of the table.
- The player to the left of the dealer begins by asking the next player if he/she has a particular card in his/her hand, e.g. a 4. Note that before asking for a card, the player must have the matching card in his/her hand.
- The player asked must give the card to the player who asks for it if he/she holds it. If the player who is asked does not have the required card then he/she tells the player making the request to “go fish”, which means that player must pick up a card from the deck.
- If a match is made then the pair of cards must be laid down for all to see. The player does not pick up any more cards and is given another turn. Every time a match is made, the player who made the request for a card is given another turn.
- The aim of the game is to match all of your cards so that none are left in your hand.

Variation

- Play Fish +/- 1



Snap +/- 1

Purpose

- Identify numbers before and after counting numbers 1–10.

Materials

- Deck of cards (picture cards removed).
- Ace may equal one or eleven.

Organisation

A game for two players.

Aim

To win cards by slapping the card pile where there is a difference of one.

Rules

- The game is played along similar lines to 'snap'.
- One player deals all of the cards face down to the other players.
- Each player turns over their top card. Instead of

slapping the pile of cards when the values on the two cards match, the pile of cards should be slapped when the values differ by one. For example, if a 7 is placed on the pile and then an 8 is discarded on top, a player may slap the pile and pick up all the cards.

If an 8 was on the pile and a 7 was discarded, then the pile of cards could also be slapped.

- The winner is the player with the most cards after a set period of time or the player who ends up with all of the cards.

Variations

- Play the standard game of snap to develop number recognition.
- Play Snap +/- 2.
i.e. snap when the values differ by two.



Counting Cards

Purpose

- Add on from a starting number other than zero.
- Mentally add a series of numbers using an efficient strategy.
- Use language associated with addition: join, and, add, sum.

Materials

- Deck of cards (picture cards removed).

Aim

To add numbers to a specific total.

Organisation

A game for pairs or small groups.

Rules

- Prior to starting the game, a target number should be chosen (e.g. 15).
- Each player is dealt 5 cards.
- Four cards are dealt face up and the remaining deck placed in the middle.

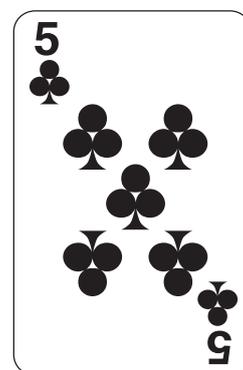
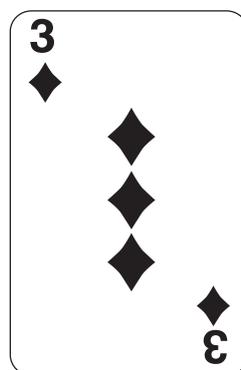
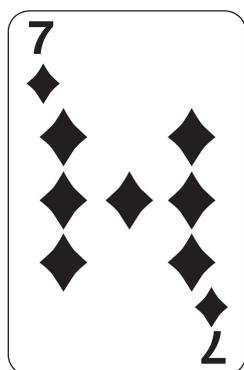
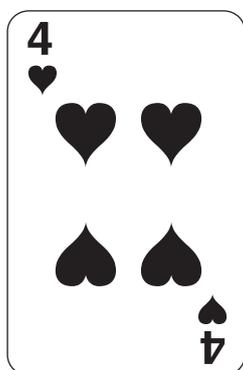
- Players take turns to place one of their cards on one of the four cards that is face up and add the values to try to reach the target number.

Depending on the size of the target number, players may place more than one card on a single pile. Cards may only be laid down if the exact total can be produced. A player's turn is over after he/she produces the target number or chooses a card from the deck.

- Players choose a card from the deck if they cannot lay down a card or cards.
- Players reaching the target get to keep the cards in a separate pile. The values of these cards are added at the end of the game to determine a winner.
- Once a pile is removed, a card is turned over from the deck to replace it.

Variations

- Change the target number.
- Set a target to be reached by multiplication rather than addition.



Make 10

Purpose

- Identify two or more cards that total to ten.
- Rearrange numbers to make them easier to add.
- Recall basic addition facts to ten.

Materials

- Deck of playing cards (picture cards removed).

Organisation

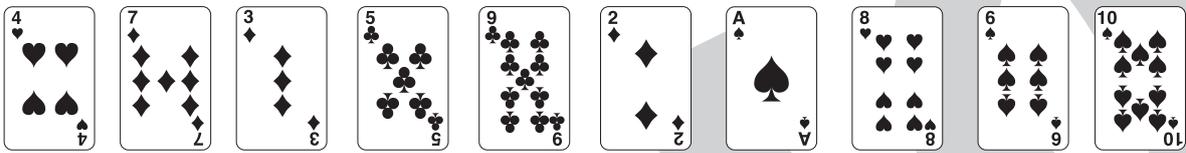
A game for pairs or small groups.

Aim

To make combinations that add to 10.

Rules

- One player deals out ten cards in a row.



- The first player then looks across the row of cards for a combination of cards (any number of cards is fine) that adds to make ten e.g. $6 + 4$, $7 + A + 2$.
- Only one combination may be removed. The aim of the game is to collect as many cards as possible, so combinations that require more cards are favoured.
- Once a combination of cards has been removed the cards are replaced by the dealer with new ones from the pack.
- Play continues until there are no more cards or until players can no longer make up combinations that add to ten. Players then count their cards to determine the winner.

Variation

- Choose a different target number eg. twelve.

Make 10 Again

Purpose

- Identify two or more cards that total to ten.
- Rearrange numbers to make them easier to add.
- Recall basic addition facts to ten.

Materials

- Deck of playing cards (10s and picture cards removed).
- Ace = one.

Organisation

A game for one or two players.

Aim

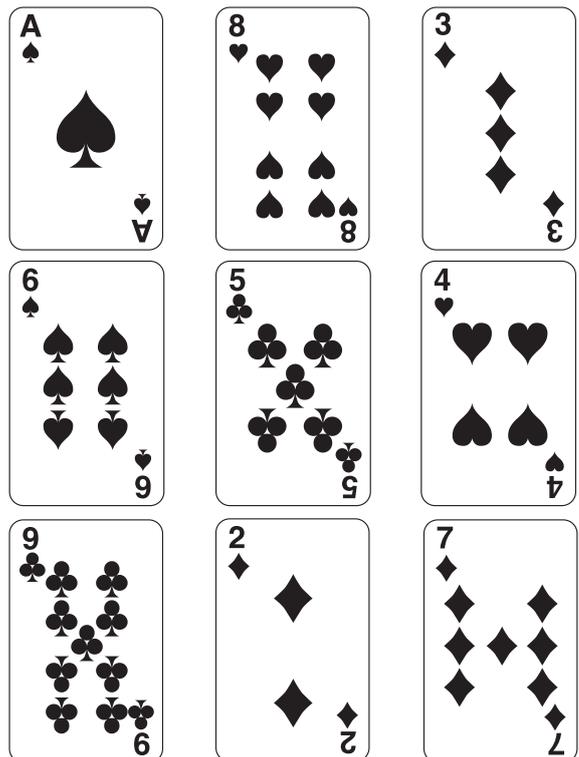
To make combinations that add to 10.

Rules

- One player deals all 36 cards, face up in a 3 x 3 array. There should be four cards in each pile.
- Players take turns to pick up any number of cards, which when added make 10. As cards are taken from the pile, a new card is revealed underneath.
- Play continues until all of the cards have been used or until no more combinations that add to ten can be made.
- The winner is the player with most cards at the end of the game.

Variation

- Choose a different target number eg twelve.



Flipper

Purpose

- Mentally add a series of numbers using appropriate strategies.
- Rearrange numbers so that compatible numbers (eg 7 and 3, 6 and 4) are placed together.

Materials

- Deck of cards (picture cards removed)
- Ace = 1

Organisation

A game for the whole class.

Aim

To correctly add a series of single digit numbers using different strategies and beat previous best times.

Rules

- Each student shuffles his/her deck and lays it face down on the desk.
- The teacher calls out “go” and then the students flip over one card at a time, keeping a running total.
- After thirty seconds, one minute or two minutes, depending on the ability of the class, the teacher says “stop”.

- The players then record the total they reached and the number of cards flipped in order to reach the total.
- Flipped cards are then handed to the closest player who checks they add to the stated total. Encourage children to rearrange cards so certain compatible numbers are placed together. eg 7 and 3, 2 and 3 and 5. Compatible numbers are easier to add.
- Children can build up a chart similar to the one above to monitor their own performance.
- Allow children the opportunity to share the mental strategies used to keep a cumulative total. eg bridging to 10, near doubles.

Variation

- Remove the 7, 8, 9 and 10s for younger players.

DATE	TIME	CARDS	TOTAL	CHECKED
4/7	30 sec	8	37	√

I Spy

Purpose

- Identify cards that add to a given total.
- Use language associated with addition. eg combine, and, join, sum, total.
- Understand the terms horizontal and vertical.
- Allow students the opportunity of exploring all possible number combinations that add to a given total, eg $6, 5 + 1, 4 + 2, 3 + 3, 2 + 4, 1 + 5$.

Materials

- Deck of cards (picture cards removed).

Organisation

A game for two players.

Aim

To win as many cards as possible.

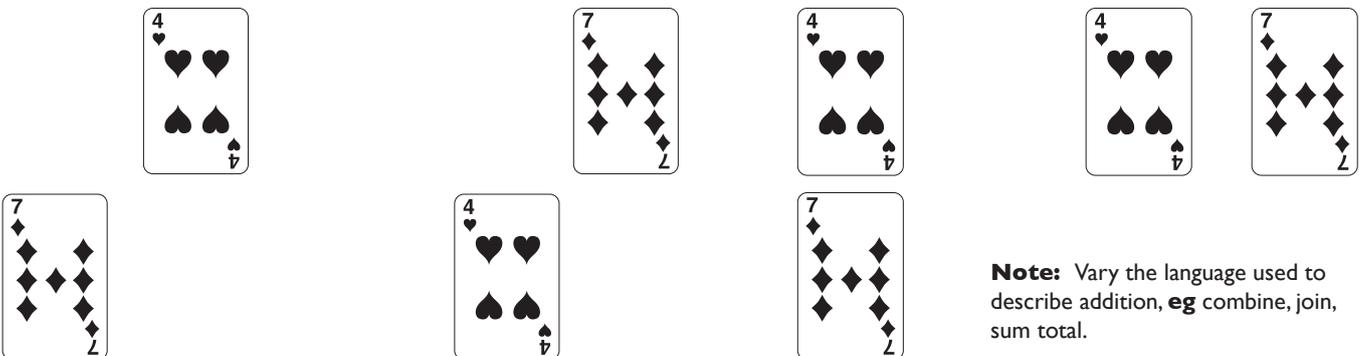
Rules

- The forty cards are dealt face up in a 10×4 or 8×5 array.
- One player challenges the other player to find two cards next to each other that add to make a particular number by saying **“I spy with my little eye two cards which add to make _____”**

- The other player then looks for two cards that are next to each other either horizontally or vertically that add to make the number and then picks this pair of cards up and any other pair next to each other that add to make the stated number.
- If the second player misses any pairs that add to the chosen number, then the first player may claim them.
- Players swap roles and continue until the table is cleared.
- The winner is the player with the most cards at the end of the game.
- As large gaps appear, the size of the array may be reduced to help fill the gaps.

Variations

- Allow students to add three cards together.
- Allow students to use pairs of cards that are diagonally opposite each other.
- Change operations: i.e. Use subtraction or multiplication.



Note: Vary the language used to describe addition, **eg** combine, join, sum total.

Thirty One

Purpose

- Use appropriate mental strategies to add and subtract numbers to reach a total.

Materials

- Deck of cards (the ace counts for eleven, picture cards are worth ten).

Organisation

A game for 2-4 players.

Aim

To make a total of thirty-one or a total greater than the other players.

Rules

- Each player is dealt three cards. One card is placed face up in the centre of the table (this forms the discard pile) and the remainder of the deck is placed next to it.
- The player to the left of the dealer starts by either drawing a card from the deck or from the discard pile and then discarding one from his/her hand.
- Play continues in this fashion until a player can make thirty one, exactly, by adding the values of the cards in his/her hand

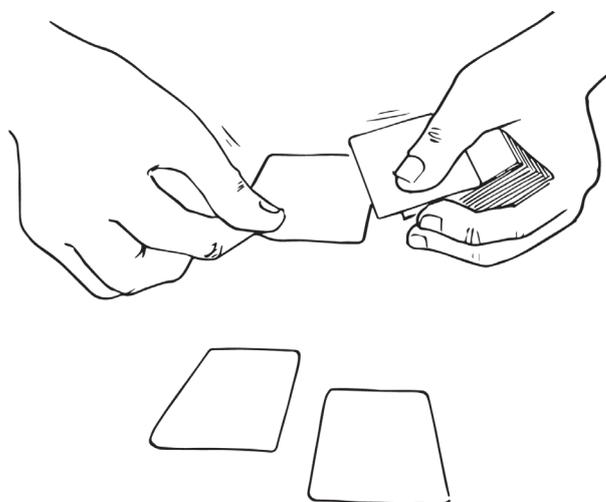
OR

until one player knocks the table. By knocking the table the player indicates he/she is happy with his/her total. The other players have one more turn and then all hands are exposed, totalled and compared.

- The winner of the round is the player with the highest total.
- Players keep a cumulative record of their totals. The first player to reach one hundred wins the entire game.

Variations

- Discard before picking up.
- Remove cards with lower values.



Place Value Pack

Purpose

- Read and say whole numbers into the thousands.
- Compare and order numbers into the thousands.
- Identify the value of the digits in each place on the place value board.

Materials

You will need a deck of cards with the 10s and picture cards removed.

Organisation

A game for pairs or the whole class.

Aim

To create the largest number.

Rules

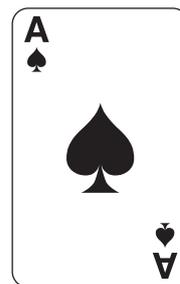
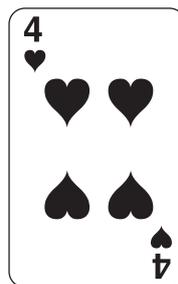
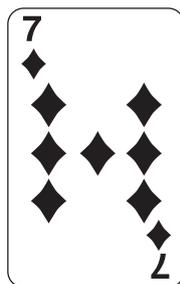
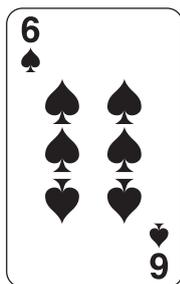
- The deck is shuffled and left face down on the table.
- Players take turns to pick a card from the top of the deck and turn it over.
- The player must then place his/her card in front of them in either the ones, tens, hundreds or thousands place, and tell other players the value of the card. A Place Value board will help. The card must be placed before another is drawn from the deck.

- Continue until there is a card in each section of the board.
- The winner is the player who produces the largest number. For example 6 741 was produced using a 6, 7, 4 and ace. 7 641 was the best number that might have been formed. Players need to read their numbers aloud. Players can place their numbers in either ascending or descending order.
- Overall winner is the first player to make the largest number 5 times.

Variations

- Make larger/smaller numbers. Include decimals.
- Use a scoring system where the person with the lowest amount scores zero while all the other players score the difference between their number and the lowest number.

Thousands	Hundreds	Tens	Ones



Multiple Madness

Purpose

- Identify multiples of counting numbers.
- Use appropriate mental strategies to add numbers to keep a running total.

Materials

- Deck of cards (picture cards removed)

Organisation

A game for 2 – 4 players.

Aim

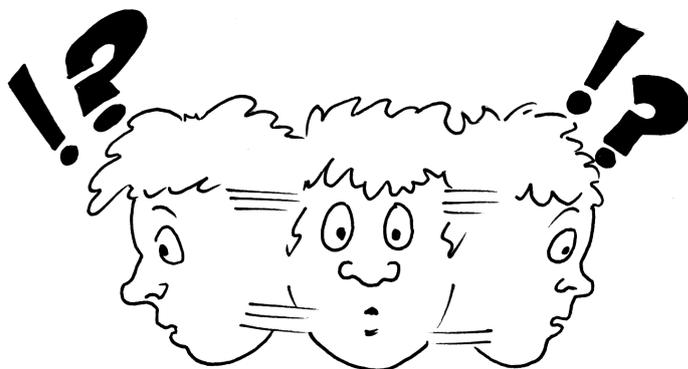
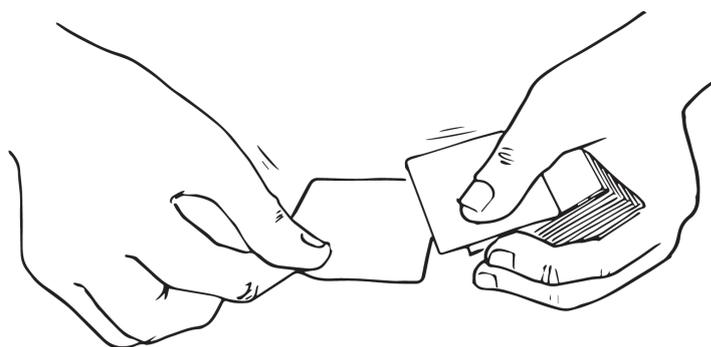
To collect the most cards.

Rules

- All the cards are dealt.
- Players must not look at their cards.
- The dealer chooses a number from one to ten e.g. three. This becomes the multiple for that round.
- The players then take turns to flip over their top card and place it on a pile in the middle.
- Players must keep a mental running total of the cards (i.e. the values of the cards) added to the pile.
- When the total is a multiple of the chosen number – say three – then the first player to call out ‘three three three’ collects the cards.
- Other players may challenge whether the result is really divisible by a that number. A calculator may be used to settle disputes. If the player calling out “three three three” was wrong then he/she must place two of his/her cards in the centre and play continues until the multiple comes up.
- The winner is the person with the most cards in his/her hand after a set time or the only player with cards left in his/her hand.

Variations

- Use different multiples, e.g. 5, 6.
- Use pairs of multiples, e.g. 2 and 3 or 2 or 3.
Note: it is easier to find multiples of 2 or 3 rather than both together.



Teacher notes

A multiple of a given counting number is any number into which it will divide without a remainder, eg the multiples of 4 are 0, 4, 8, 12, 16, ...

Practice Pack

Purpose

- Recall basic multiplication facts.
- Use known multiplication facts to work out unknown table facts.

Materials

- Deck of playing cards (picture cards removed).
- Split the deck into 2 packs.
Pack (1) - 3 sets of cards. Ace to 10.
Pack (2) - 1 set of cards. Ace to 10.
- Ace = one.

Organisation

A game for one to three players.

Aim

To recall multiplication facts and win the most cards.

Rules

- The player(s) place the two packs (one containing thirty cards and one containing ten cards) side by side.
- One card from the ten card pack is flipped over. The value shown on the card indicates the table to be practised for the round.
- Cards are then flipped over from the pack of thirty and the product of the two cards is calculated.
- Players keep the cards for the table fact they correctly answer.
- Play continues until the pack of thirty is exhausted.
- The pack of thirty is then shuffled and placed face down on the table.
- Another card is flipped over from the pack of ten to set the table to be practised for the second round.

Variation

- Add the values on the card instead of multiplying them.
- Give each player a set of ten cards instead of using one pile of thirty.



Teacher notes

Students need to understand and use the language associated with multiplication such as product, multiple, factors, divisible.

Allow those students who are less confident with table facts to use a table fact grid as support.

Getting Closer

Purpose

- Use appropriate strategies to add and subtract two-digit numbers.
- Use place value to write and compare numbers.

Materials

- Deck of cards (picture cards removed).

Organisation

A game for 2 – 4 players.

Aim

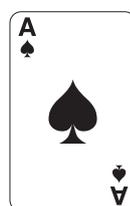
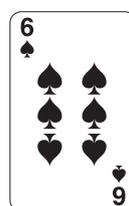
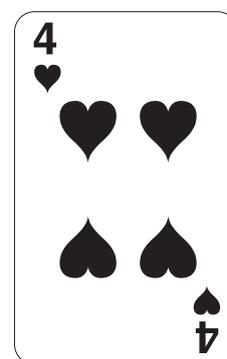
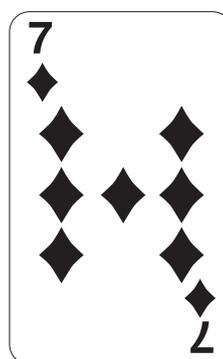
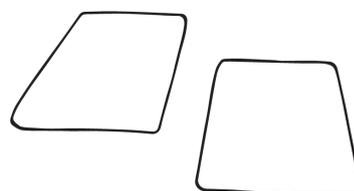
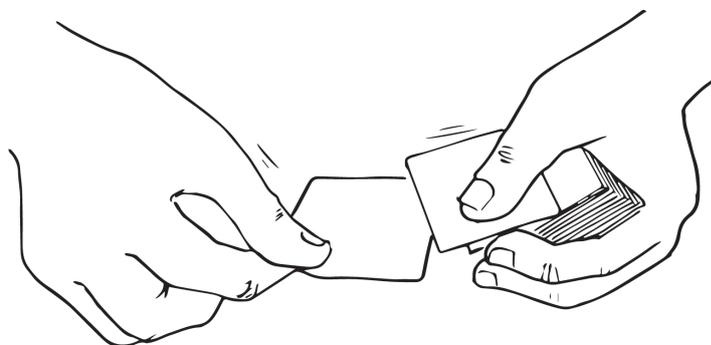
To create two, two-digit numbers to reach a target number.

Rules

- Deal four cards to each player.
- Turn up two cards from the deck. The first represents the tens and the second, the units. This becomes the target number.
- The players now turn over their cards and try to form two, two-digit numbers that when added or subtracted will be as close to the target number as possible.
- Players score by finding the difference between their total and the target number.
- Play continues for several rounds. The winner is the player with the smallest total.

Variation

- Players should try to produce a total as far away from the target as possible.



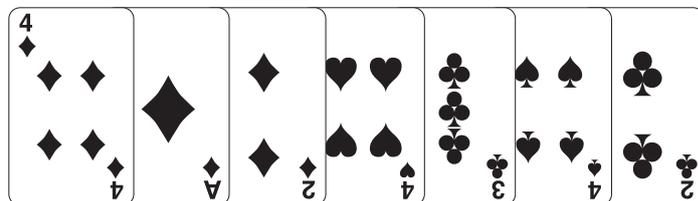
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99 or Bust

Purpose

- Use appropriate strategies to mentally add and subtract a series of numbers.
- Apply strategies and tactics to increase your chances of winning.
- Recognise that some games have an element of chance.



e.g. $(4 + 1 + 2 + 4 + 3 + 4 + 2 = 20)$

Materials

You will require a deck of cards.

Organisation

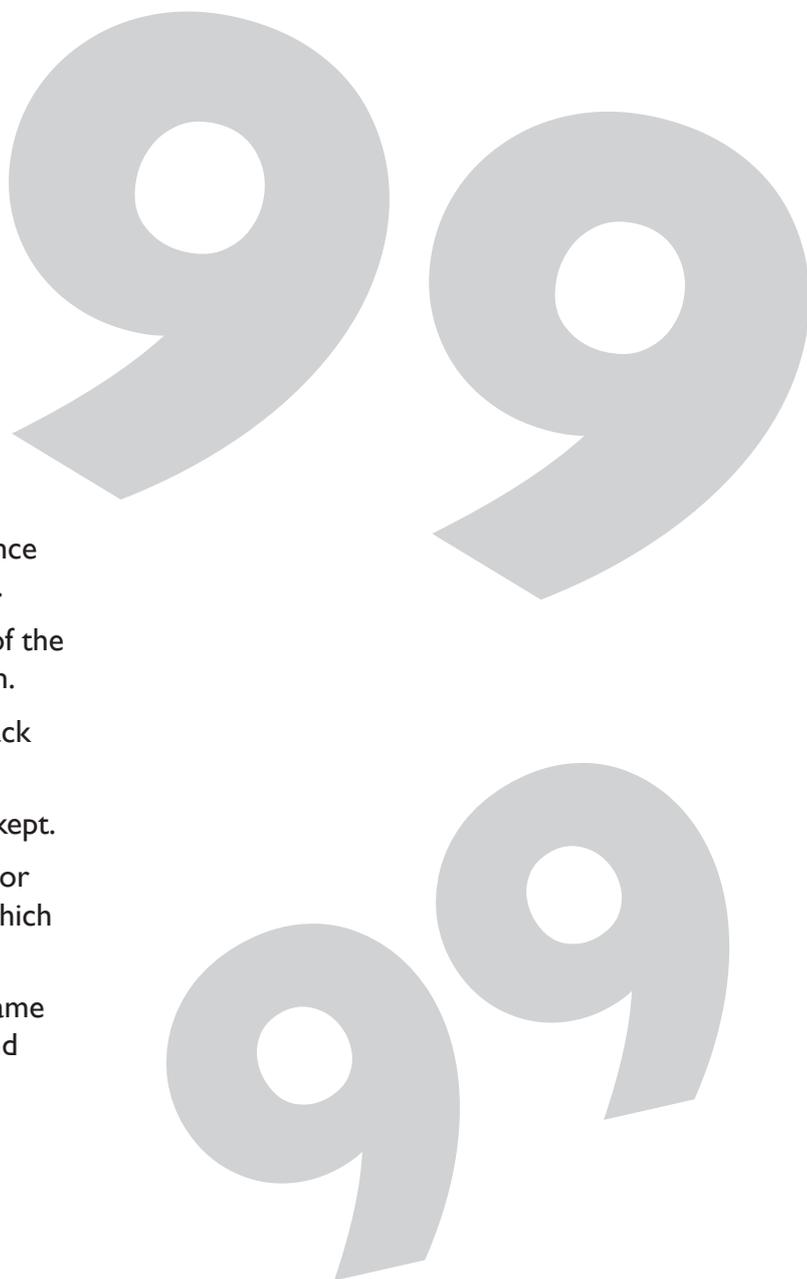
A game for 2 – 4 players.

Aim

To reach 99 or force an opponent to go over 99.

Rules

- Aces = one, Picture cards = minus ten (i.e. subtract 10 from the total), other cards are counted according to their face value.
- Each player is dealt three cards and the balance of the pack is placed face down on the table.
- Play commences with the player to the left of the dealer and continues in a clockwise direction.
- In turn each player draws a card from the pack and then discards one from his/her hand.
- A running total of the cards on the table is kept.
- The aim of the game is to reach ninety-nine or force an opposing player to discard a card which makes the total higher than ninety-nine.
- As the total gets closer to ninety-nine the game becomes very exciting and various tactics and strategies come into play.



Hit The Deck

Purpose

- Use appropriate mental strategies to multiply numbers beyond the basic facts.

Materials

- Deck of cards.
- Ace = one
- Picture cards = ten.

Organisation

A game for 2 – 4 players.

Aim

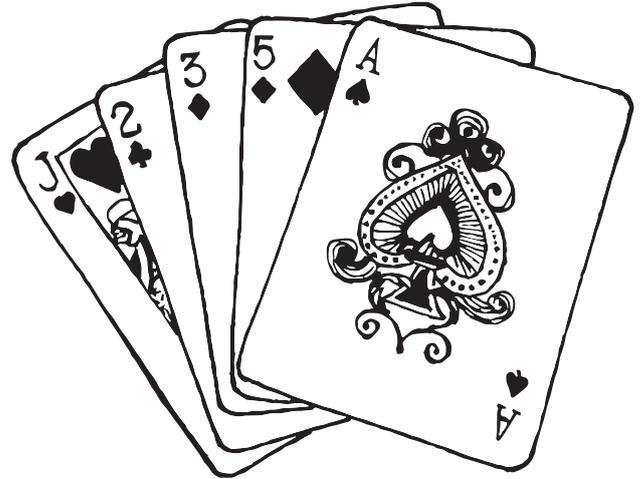
To be the first to multiply three single-digit numbers.

Rules

- One player draws three cards from the deck and lays them face up on the table.
- The first player to call the product of the three cards is awarded that number of points.
- No points are awarded for an incorrect answer.
- If three cards of the same suit or three cards of the same value turn up, then the first player to call out “HIT THE DECK” and correctly multiply the three numbers receives **double** points.

Variations

- Draw two, four or five cards.
- Use addition instead of multiplication.



Teacher notes

Allow players to rearrange the order of the cards turned over to make the calculation easier.

On Target

Purpose

- Use appropriate strategies to mentally add a series of numbers.
- Apply strategies and tactics that can increase your chance of winning.

Materials

- Deck of cards (picture cards removed).
- Ace = one.

Organisation

A game for small groups.

Aim

To be the player with the smallest total.

Rules

- The dealer chooses a two digit target number and then deals five cards to each player. Play begins with the first player to the left of the dealer and continues in a clockwise direction. In turn, each player lays one card from his/her hand face up on the table.
- A running total of the cards is kept until no player can lay down a card without exceeding the target number.
- Once the game has concluded, the players add the values of the remaining cards in their hands to find their scores.
- The winner is the player with the least score after three rounds.

Variations

- Use different target numbers.
- Remove larger cards and reduce target number for younger children.
- Remove the odd or even numbered cards from the pack.

Sample game

A target of **52** was chosen and the four players played the following cards:

Player 1	Player 2	Player 3	Player 4
9	9	10	8
6	5	Ace	2
Ace	Can't go	Ace	-

52

Cards Remaining in Hand

				Score
Player 1	4	3		7
Player 2	4	3	2	9
Player 3	9	7		16
Player 4	8	6	5	19

To work out the score for that round simply total the value of the cards left in the player's hand.

Therefore Player 1 is the winner for that round. The winner of the game is the player with the least score after three rounds.

Fast Facts

Purpose

- Recall basic multiplication facts.
- Use known multiplication facts to work out unknown table facts.

Materials

- Deck of playing cards (picture cards removed).
- Aces = one.

Organisation

A game for two players.

Aim

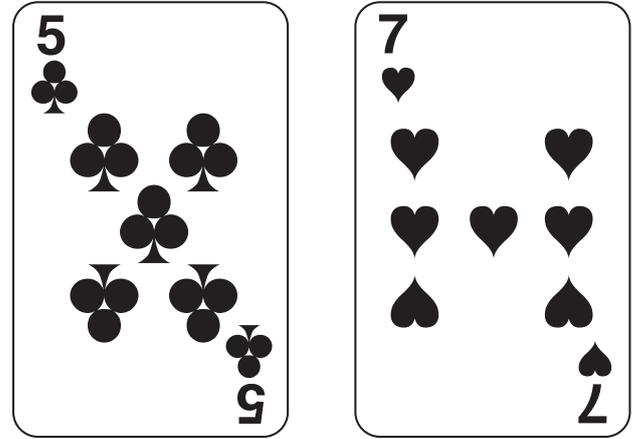
To win the most cards.

Rules

- Deal out half of the cards to each player.
- Both players lay out a card face up. The first to call the product picks up the two cards.
- Ties are settled by leaving the cards on the table. The winner of the next call picks up all of the cards on the table.
- The winner is the player with the most cards once all of the cards have been used.

Variations

- Use addition or subtraction.
- Remove cards which are beyond the students' ability e.g. 7, 8, 9.



x	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Teacher notes

Provide players with a tables grid so the products called out may be checked.

HiLo

Purpose

- Recall basic multiplication facts.
- Use known multiplication facts to work out unknown table facts.
- Mentally keep a running total.
- Compare whole numbers.

Materials

- Deck of cards (picture cards removed).

Aim

To achieve the highest score.

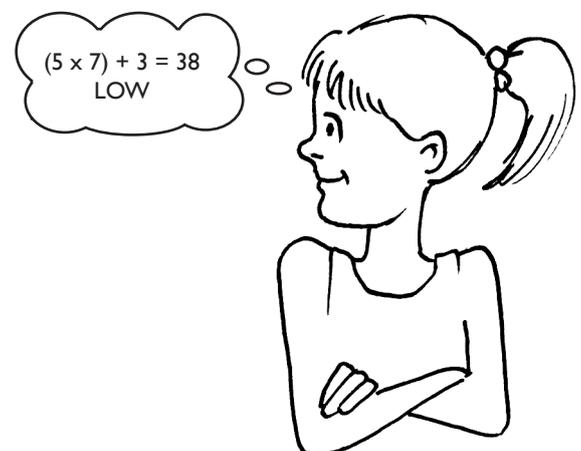
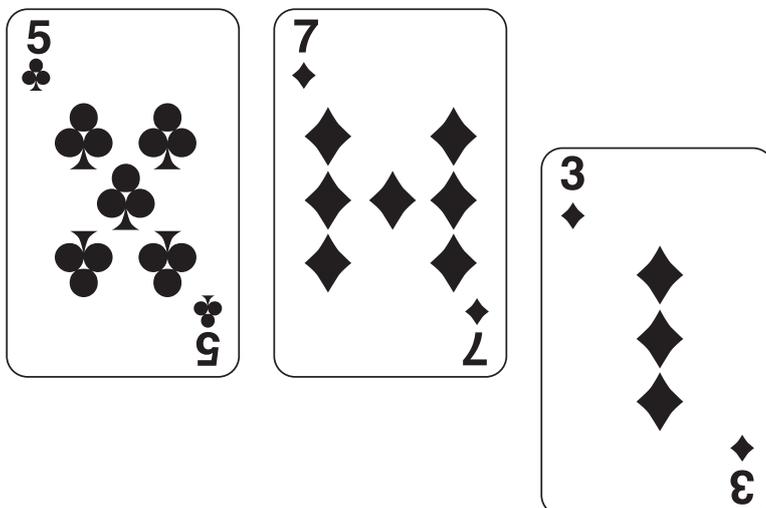
Organisation

A game for a small group.

Rules

- One player deals out two cards face down and one card face up to each player. (The face up card is the addition card.)
- The dealer then states either **High** or **Low** and turns over his/her cards. These cards are multiplied and the number on the third card is added to the product.

e.g.



- The other players now turn over their cards and work out their totals. If a player scores less than the dealer, when the call is **Low** then he/she earns a point. If the call was **High** and the player scored less than the dealer then he/she does not score.
- The winner is the player with the highest score after ten rounds.

Variation

- Remove some of the higher value cards (eg. 7, 8, 9) to make the game simpler.

Make My Number

Purpose

- Select appropriate operations to reach a target number.
- Use the **order of operations** when calculating.
- Use appropriate mental strategies for the four operations.

Materials

- Deck of playing cards.
Note: The picture cards all have a value of ten.
- Ace = one or eleven.

Aim

To make a target number using three numbers and different operations.

Organisation

A game for pairs or small groups.

Rules

- The dealer chooses a two-digit target number and deals three cards to each player. The player to the left of the dealer tries to make the target number using his/her three cards and any of the four mathematical operations (addition, subtraction, multiplication or division). If the player cannot make the number, one card is discarded from the hand and another one drawn. Play continues in a clockwise direction.
- The winner is the player who is able to make the target number with his/her three cards.

Sample game: Target number 32

Player 1 J 3 4 $10 \times 3 + 4 = 34$
Player 2 9 8 4 $9 \times 4 - 8 = 28$
Player 3 Q 8 4 $10 \times 4 - 8 = 32$ (Win)

Students could be asked to record the number sentences created for each target number.

Variations

- The size of the target number and/or the operations used can be altered depending on the age of the players.
- Deal out more than three cards. This game provides an ideal context in which to discuss “rule of order”.



Teacher notes

When completing a calculation that involves several different operations the convention is to follow a particular order:

Brackets, Indices, Multiplication and Division (in the order they appear), Addition and Subtraction (in the order in which they appear).

The acronym BIMDAS may assist students to remember the order of operations.

Card Count

Purpose

- Identify multiples of ten.
- Use appropriate mental strategies to add numbers to make a multiple of ten.

Materials

- Pack of playing cards (picture cards removed).

Organisation

A game for two players.

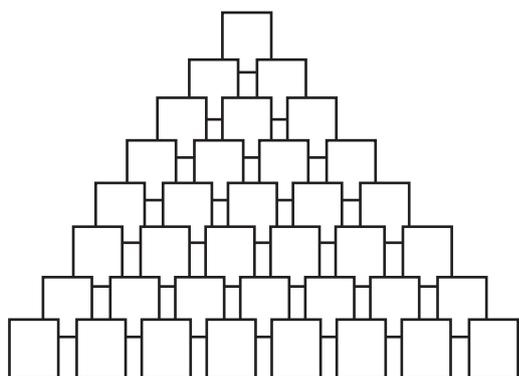
Aim

To create the largest total.

Rules

- The players arrange thirty-six cards face up to form a pyramid (as shown) with eight horizontal rows, each one overlapping the one above it.
- The rest of the pack (four cards) is placed on the table face down. This is called the leftovers pile.
- A player begins by removing, from the bottom row, up to five cards, which when totalled form a multiple of ten. These cards are set aside for scoring at the end of the game. Player number two may then remove any uncovered cards to form a multiple of ten.
- A card may not be removed if it is covered by another card.

- Should a player be unable to find uncovered cards to total a multiple of ten, the top card in the leftovers pile is turned over. The card from the leftovers pile may be used in combination with any uncovered cards to form a multiple of ten.
- If this card cannot be used in this way the next card is also turned; this and other uncovered cards may now be combined to form a multiple of ten.
- This process is repeated, if necessary, until all four cards in the leftover pile have been used.
- The game ends when all of the cards in the pyramid have been used, or when no combinations of up to five cards will give a multiple of ten.
- The winner is the player with the larger total when the cards are added up.



Teacher notes

A multiple of a given counting number is any number into which it will divide without a remainder. The multiples of 10 are 0, 10, 20, 30, 40 ...

Card Nim

Purpose

- Use appropriate mental strategies to add numbers to keep a running total.
- Apply strategies and tactics that increase the chances of winning.

Materials

- Separate the four aces (Aces = one), four 2s, four 3s and four 4s from a deck of cards.

Aim

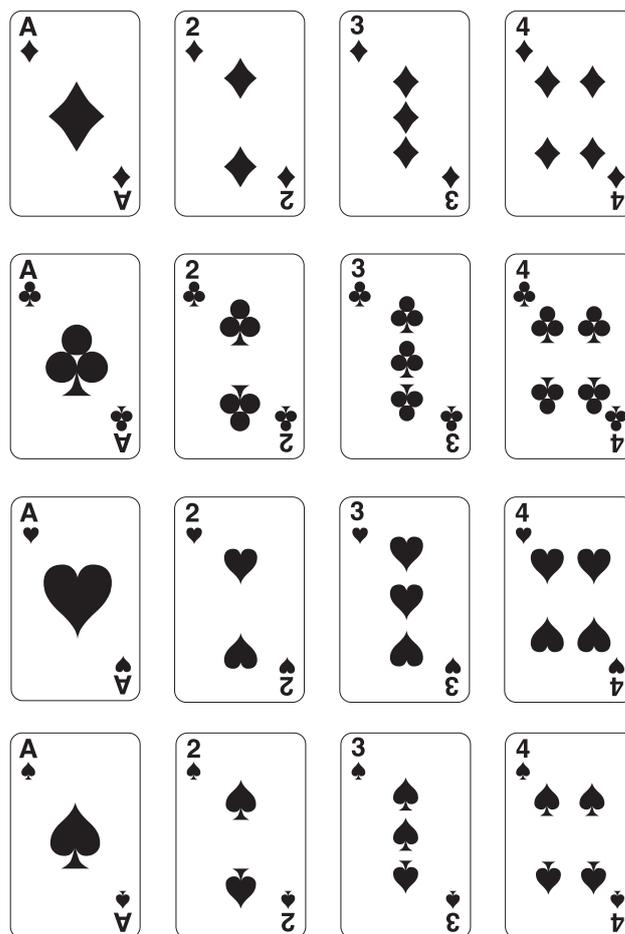
To apply a strategy to win the game.

Organisation

A game for pairs.

Rules

- The dealer lays the cards out in the following manner shown to the right.
- In turn, each player selects a card from the array of sixteen cards and turns it over. Once it has been turned over it may not be reused. The value is noted and a combined running total is kept. The player who makes the total equal to twenty one is the winner.
- Any player going over twenty one busts and loses the game.



Teacher notes

In order for students to discover useful strategies and tactics to win the game, they will need to keep a record of the running total for each game. Encourage students to share any useful strategies they have and try out suggested strategies.

Secret Pairs

Purpose

- Recall basic multiplication facts.
- Identify pairs of numbers that produce a given product.

Materials

- Set of ten playing cards of any suit from ace to 10.
- Ace = one.

Organisation

A game for pairs.

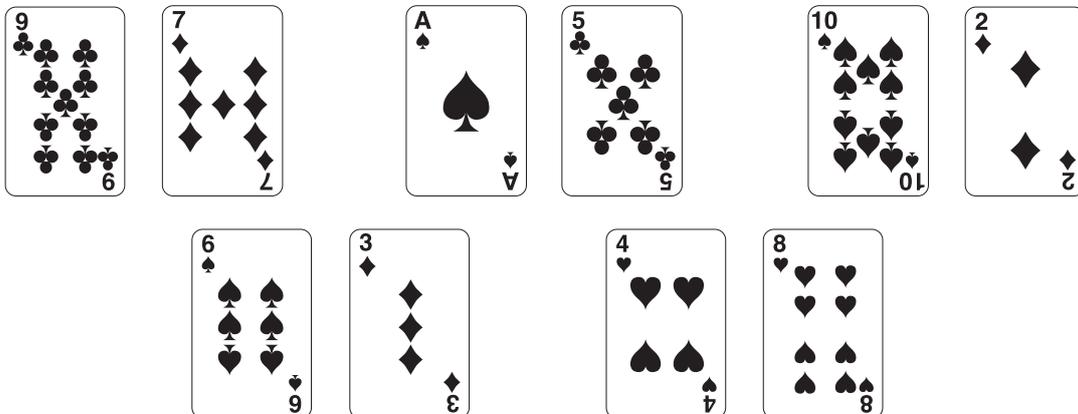
Aim

To use multiplication facts to correctly guess the secret pair of numbers.

Rules

- Each player is dealt ten cards.
- Each player arranges their ten cards in five pairs but keeps these pairs secret from the other player.
- He or she writes the product of each pair on the recording sheet.
- The second player must then try to guess which pairs produce the given product.
- Players then swap roles.
- The winner is the player who correctly guesses the most pairs.

10 cards arranged in 5 pairs.



Pair 1

$$\boxed{9} \times \boxed{7} = \boxed{63}$$

Teacher notes

Students may not be familiar with the mathematical term 'product'. It is the result of multiplying two or more numbers together. For example the product of 4 and 5 is 20, $4 \times 5 = 20$.

Secret Pairs



Pair 1 × =

Pair 2 × =

Pair 3 × =

Pair 4 × =

Pair 5 × =

Calculate A Digit

Purpose

- Use place value to read whole numbers into the thousands.
- Represent whole numbers on a calculator.
- Partition (split or break up) whole numbers according to place value. For example, $6937 = 6000 + 900 + 30 + 7$.

Materials

- A calculator.
- Deck of cards (tens and picture cards removed).

Organisation

A game for one or two players or whole class.

Aim

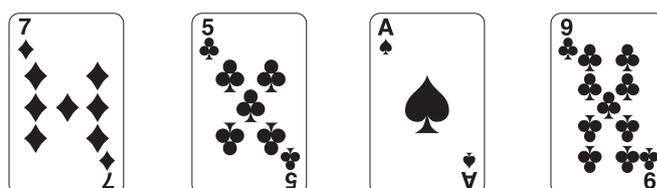
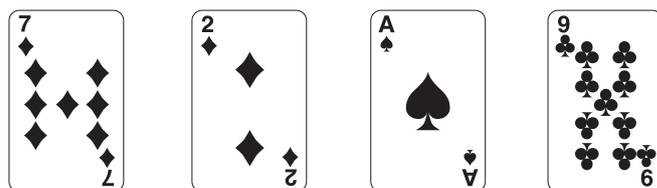
Identify the total that needs to be added or subtracted to a number to alter its value.

Rules

- Deal the cards face down into four piles. Each pile represents a particular value i.e. thousands, hundreds, tens or units.
- Flip the top card over from each pile and enter the number onto the calculator e.g. 7219.
- One player flips another card over and the second player must change the number on the display of the calculator using addition or subtraction.
- Play continues for five card flips and then players swap roles. Alternatively, play can continue until the player with the calculator makes a mistake.

Variations

- Use five or six piles of cards to represent larger numbers. Use decimals.
- Flip more than one card at a time.



The player would need to add 300 to 7219 to turn it into 7519.

Card Calculations

Purpose

- Select appropriate operations to reach a target number.
- Use the order of operations when calculating a total.
- Use appropriate mental strategies for all operations.

Materials

- Deck of cards (10s and picture cards removed).

Organisation

A game for a small group.

Aim

To produce the largest number.

Rules

- Each player is dealt four cards face up.
- Each player then tries to make a number sentence which gives a single digit answer.
- The answer becomes the score for that player.

e.g. $7 + 3 + 2 - 6 = 6$ 6 points
 $6 + 7 - 3 - 2 = 8$ 8 points
 $36 - 27 = 9$ 9 points

The best combination of numbers is the one that produces the largest number and hence the largest score.

- The winner is the player with the largest score after five rounds.

Variations

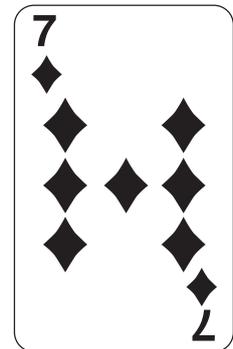
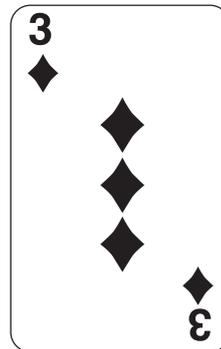
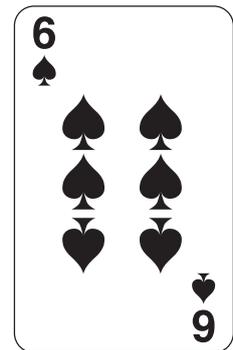
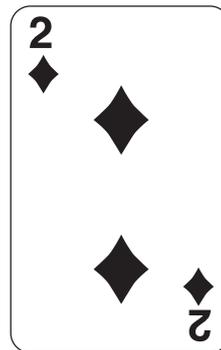
- Aim to produce the lowest score.
- Deal out more/less cards.

Teacher notes

When completing a calculation that involves several different operations, the convention is to follow a particular order:

Brackets, Indices, Multiplication and Division (in the order they appear), Addition and Subtraction (in the order in which they appear).

The acronym BIMDAS may assist students to remember the order of operations.



Answers

Symmetrical Cards. p. 5

All of them. 3, 5, 9. 3, 5, 9

Spotted Cards. p. 6

If we consider a single suit:

Each picture card has 4 spots ($3 \times 4 = 12$)

Every number card has one spot directly under each number ($2 \times 10 = 20$)

Each card has the same number of spots as its face value.

($1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55$)

Therefore there are 87 spots in one suit. There are 4 suits, therefore there are 4×87 or 348 spots on an entire deck.

Cut and Predict. p. 7

About half would be red. 25, 50, 100. 10, 15, 25.

Magic Cards. p. 8.

They always total to 45.

Boxed Cards. p. 9

One solution:

6	10	2
7		3
1		8
4	9	5

Classifying Cards. p. 10, 11

There are 26 red cards, 2 red aces and 4 aces.

There are ten odd numbered red cards, ten even numbered red cards and six red picture cards. There are ten odd numbered black cards, ten even numbered black cards and six black picture cards.

- | | | |
|-----------------------------|------------------------|-------------------------------|
| 1. Ace of Hearts. | 2. J, Q, K of Diamonds | 3. Ace, 3, 5, 7 & 9 of Clubs. |
| 4. J, Q, K of Spades | 5. J, Q, K of Clubs | 6. 10 of Diamonds |
| 7. 4 of Spades, 4 of Clubs. | | |

Card Conundrum. p. 12

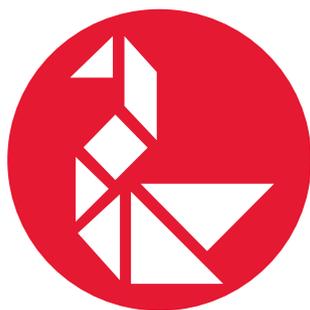
1)	K	Q	J	A	2)	K	J	A	Q	3)	A(h)	K(c)	Q(d)	J(s)
	Q	K	A	J		A	Q	K	J		Q(s)	J(d)	A(c)	K(h)
	J	A	K	Q		Q	A	J	K		J(c)	Q(h)	K(s)	A(d)
	A	J	Q	K		J	K	Q	A		K(d)	A(s)	J(h)	Q(c)

Card Puzzle. p. 15

There are several solutions.

Deck Detective. p. 16

1. Ace of Hearts, Queen of Hearts, Ace of Spades.
2. 10 of Diamonds, 9 of Clubs, 8 of Clubs.



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