Sums. The're Math Magic

3 – Sum Card Tricks

Please go through each slide stopping until you have understood the concept described

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It's Just A Card Trick

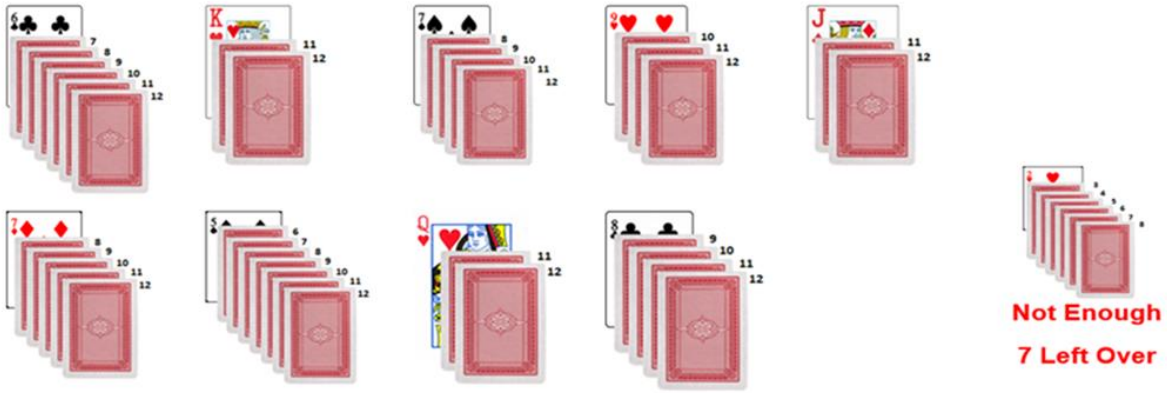
Please deal out the cards like this:

Put the first card face up. Then count from that card number up to 12 putting cards face down.

Please count picture cards, Jacks, Queens and Kings, as ten and aces as one.

Do this until you cannot complete the count and put the last face-up card and the others together on one side. Count these.

For example:



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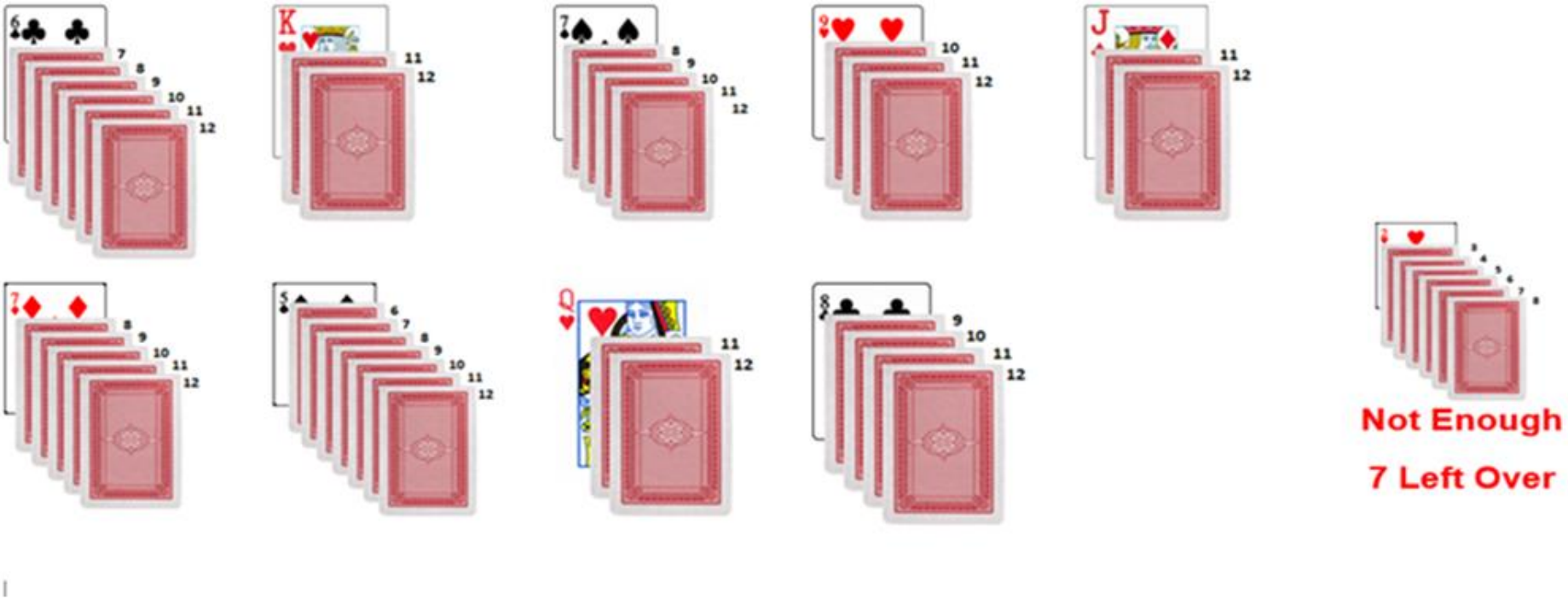

Total = 72

Do not include the 2 in the left over pile

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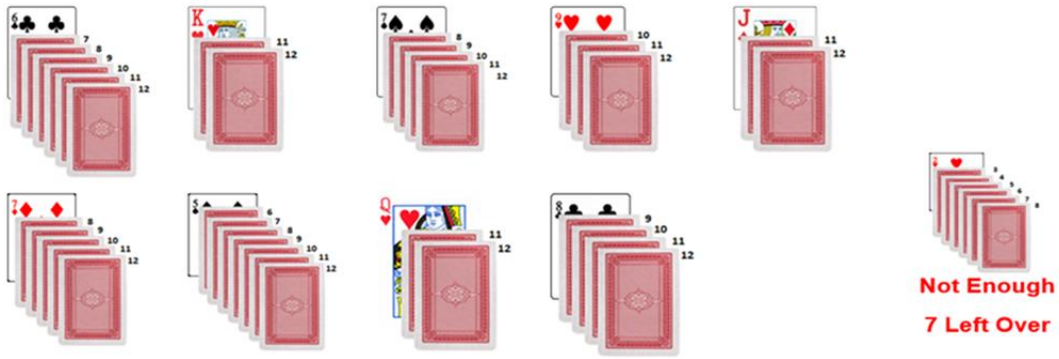

Total = 72

Now cover up the cards you can see. You can still calculate the total!

All you can now see is that there are 9 piles of cards and 7 left over

The formula is Sum of the Face-Up Cards =

[(No of Piles – 4) x 13] + (No Left Over)

In this case [(9-4) x 13] + 7 = (5 x 13) + 7 = 65 + 7 = 72

Try it out yourself and then amaze your friends.

But your teacher will ask you to prove it !!! **Can you prove the formula?**

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Now we need to work out the formula for the number of cards left over.

We will use L to be Left Over. We can write this as L = Left Over

Start with the first pile on its own where the value of the card is C_1.

Left Over = L = $52-(13-C_1) = 52-(13-C_1) = 52-13 + C_1$

In the example, C_1 is 6 so L = 52-(13-6) = 52-13+6 = 45

Let us call the total number of piles of cards (without the left-over pile) = P and the face up card in pile P as C_p.

For P piles of cards the formula is:

Left-Over = L = $52 -(13-C_1) - -(13-C_2) \ldots\ldots -(13-C_p)$

We can write this as L = 52 – (n x 13) +$\sum(C_p)$

Notice we have $\sum(C_p)$ = The Sum Of All The Face Up Cards in the equation and this is the answer we are looking for.

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Therefore (the sign for "therefore" is ∴)

∴ L = 52 – (P x 13) + $\sum(C_p)$

Now subtract 52 – (P x 13) from both sides of the equation.

∴ L - 52 + (P x 13) = $\sum(C_p)$

But 52 = 4 x 13

∴ $\sum$(Cp) = L + (13 x (P-4)

Sum of the Face-Up Cards = [(No of Piles – 4) x 13] + (No Left Over)

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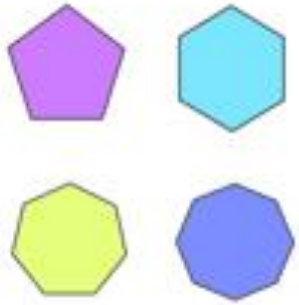
What do you call an empty parrot cage?

A Polly Gone



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Always 33

Divide the pack into two sets of 26 but put the Ace of Spades as the seventh card in pack 2. Give pack 1 to your friend.

Ask them to select nine cards at random.

Ask two other friends to discard three of the chosen cards and put them onto the top of their pack.

Ask them to add up the value of the remaining three cards – tell them that picture cards count as ten and Aces as one. This is Total A.

Ask them to put into each face up cards another card face down, counting up to 10

e.g. If the face up is a 6 then add 7,8,9 and 10 so there are 5 cards in the pile.

Ask them to count the number of cards on the three piles – both face-up and face-down. This is Total B

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Always 33

Add Total A to Total B – it should be 33 – if not get them to check that they have done their activity properly.

Ask them to pick up all their 26 cards and put them together.

Now put their 26 cards on top of your 26 cards.

Say "You came up with a total of …. from a set of cards taken totally at random" (It will be 33)

"I have memorised all my half of the cards and the 33rd. card is the Ace of Spades.

Then amaze them because you are correct.

Great fun – but now you must prove it.

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Always 33

Total A is the sum of the cards $C_1 + C_2 + C_3$. This is Total A

Each pile has the number of cards up to and including ten.

If the card was a 6 then you counted 7,8,9,10 meaning that there would be 5 cards in the pile.

Which number plus or minus 6 equals 5 – answer 11

So the first pile has $11-C_1$ cards.

In total there are $11- C_1 + 11 – C_2 + 11 – C_3$. This is Total B

So Total A plus Total B = $C_1 + C_2 + C_3$. + $11- C_1 + 11 – C_2 + 11 – C_3 = 11 + 11 + 11 = 33$

This is algebra!

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QED:

Which in Latin is Quad Erat Demonstrandom = That which was to be demonstrated

Or in simple English = Quite Easily Done

Can you devise some more tricks like these?

Have fun and amaze your friends and parents.

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Please go to the next lesson.

Sum Card Tricks 2