# Problem H. Open Face Chinese Poker

## Decks of Cards

In a standard 52-card deck of playing cards, every card has *a rank* and *a suit*. The thirteen possible ranks, in order from weakest to strongest, are `2`, `3`, `4`, `5`, `6`, `7`, `8`, `9`, `10`, `Jack`, `Queen`, `King`, and `Ace`. We will abbreviate the last five of those as `T`, `J`, `Q`, `K`, and `A`. The four suits are clubs, diamonds, hearts, and spades, which we will abbreviate as `C`, `D`, `H`, `S`. A card is represented by its rank followed by its suit, so the 52 cards in the deck are:

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2C | 3C | 4C | 5C | 6C | 7C | 8C | 9C | TC | JC | QC | KC | AC |
| 2D | 3D | 4D | 5D | 6D | 7D | 8D | 9D | TD | JD | QD | KD | AD |
| 2H | 3H | 4H | 5H | 6H | 7H | 8H | 9H | TH | JH | QH | KH | AH |
| 2S | 3S | 4S | 5S | 6S | 7S | 8S | 9S | TS | JS | QS | KS | AS |

## Five Card Hands

In the game of Open Face Poker, here are the possible ***five card hands*** that can be made with five cards, in order from strongest to weakest. If a set of cards matches more than one of these, take the strongest hand. For example, `7H 8H 9H TH JH` matches the definitions of *Straight Flush*, *Flush*, *Straight*, and *High Card*, but it is considered a *Straight Flush*.

**Royal Flush**: `T`, `J`, `Q`, `K`, and `A` of the same suit. Example: `TD JD QD KD AD`.

**Straight Flush**: Five consecutive cards of the same suit. (In Straight Flush, `A` can be considered as `1` (a card weaker than `2`).) Examples: `7H 8H 9H TH JH`; `AC 2C 3C 4C 5C`.

**Four of a Kind**: Four cards of the same rank, plus any other card. Example: `8C 8D 8H 8S JD`.

**Full House**: Three cards of one rank and two cards of another rank. Example: `3C 3H 3S 5C 5D`.

**Flush**: Five cards of the same suit. Example: `4D 7D 8D QD KD`.

**Straight**: Five cards with consecutive ranks. (In Straight, `A` is a special card that can be considered as `A` (a card stronger than `K`) or 1 (a card weaker than 2).) Example: `6C 7D 8C 9H TH`.

**Three of a Kind**: Three cards of the same rank, plus any two other different cards. Example: `JC JH JS 2H KH`.

**Two Pair**: Two cards of one rank and two cards of another rank, plus any other different card. Example: `8C 8H AC AD TH`.

**Pair**: Two cards of one rank, plus any other three different cards. Example: `9H 9S 3D 4D QS`.

**High Card**: Any hand that matches none of the above. Example: `3S 5C 6C 7C TS`.

## Three Card Hands

Here are the possible three card hands that can be made with three cards, in order from strongest to weakest:

**Three of a Kind**: Three cards of the same rank. Example: `TD TH TS`.

**Pair**: Two cards of the same rank. Example: `5C 5S 8H`.

**High Card**: Any hand that matches neither of the above. Example: `JC QC KC`.

Note: a three card hand cannot make a *Straight Flush*, *Flush*, or *Straight*, even though the three cards might be of the same suit and/or consecutive.

## Comparing Hands

When comparing two hands, the hand with the stronger type wins. If they have the same type, you must use tiebreaker rules.

**Two "Royal Flush"es**: The hands tie.

**Two "Straight Flush"es**: Look only at the final card in each consecutive sequence. The hand with the card with the highest rank wins. If they have the same highest rank, they tie. Note that this means that a `23456` straight flush beats an `A2345` straight flush, since `A` is regarded as 1 here.

**Two "Four of a Kind"s**: The hand with the higher rank making up the four of a kind wins.

**Two "Full House"s**: Compare the three of a kinds within the hands. The hand with the higher rank making up the three of a kind wins.

**Two "Flush"es**: Sort each hand by rank. Compare the highest-ranking cards; if one hands highest-ranking card beats the other, that hand wins. If tie, compare the second-highest-ranking cards, and so on. If all five cards tie, the hands tie.

**Two "Straight"s**: Look only at the final card in each consecutive sequence. The hand with the card with the highest rank wins. If they have the same highest rank, they tie.

**Two "Three of a Kind"s**: The hand with the higher rank making up the three of a kind wins.

**Two "Two Pair"s**: Compare the highest-ranking pair from each hand, then the lowest-ranking pair from each hand, then the remaining cards, then declare a tie.

**Two "Pair"s**: Compare the ranks of the pairs, then the ranks of the highest remaining cards, then the ranks of the next highest remaining cards, then the ranks of the final remaining cards, then declare a tie.

When comparing a five-card "pair" hand to a three-card "pair" hand, if the pair and the highest remaining card tie, then the five-card hand wins.

**Two "High Cards"s**: Sort each hand by rank, then compare the highest-ranked card from each hand, then the next-highest-ranked, and so on.

When comparing a five-card "high card" hand to a three-card "high card" hand, if the three highest ranked cards tie, then the five-card hand wins.

## Open Face Chinese Poker

In our variant of Open Face Chinese Poker, the player is given fourteen different cards from the deck. The player must discard one card and then rearrange the remaining thirteen into one three-card *front hand*, a five-card *middle hand*, and a five-card *back hand*. The middle hand must beat or tie with the front hand, and the back hand must beat or tie with the middle hand.

For example, this would not be a legal set of hands:

Front: `7D 7S 8H`
Middle: `2H 2D 5C 5S 6H`
Back: `2C 2S 5H 5D 4D`

because the back hand does not beat or tie the middle hand.

The player earns separate scores for the front, middle, and back hands as follows. If none of the scoring options for a type of hand are matched, then the player earns 0 points for that hand. The players total score is the sum of the scores for the three hands.

## Front Hand Scoring

Pair

| 66 | 77 | 88 | 99 | TT | JJ | QQ | KK | AA |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

Three of a kind

| 222 | 333 | 444 | 555 | 666 | 777 | 888 | 999 | TTT | JJJ | QQQ | KKK | AAA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |

### Middle Hand Scoring

| Three of a Kind | Straight | Flush | Full House | Four of a Kind | Straight Flush | Royal Flush |
|---|---|---|---|---|---|---|
| 2 | 4 | 8 | 12 | 20 | 30 | 50 |

(Except for three of a kind, these values are twice the values for back hand scoring, below.)

### Back Hand Scoring

| Straight | Flush | Full House | Four of a Kind | Straight Flush | Royal Flush |
|---|---|---|---|---|---|
| 2 | 4 | 6 | 10 | 15 | 25 |

**These point values do not determine which hands beat which other hands**. They are only used to determine players' final scores.

This is a legal set of hands:

Front: `7D 7S 8H`
Middle: `2H 2D 5C 5S 4D`
Back: `2C 2S 5H 5D 6H`

and it scores 2 points for the front, 0 points for the middle, and 0 points for the back, for a total of 2 points.

This is another legal set of hands:

Front: `9C 9D 9S`
Middle: `TS JS QS KS AS`
Back: `TH JH QH KH AH`

and it scores 17 points for the front, 50 points for the middle, and 25 points for the back, for a total of 92 points.

Given a set of fourteen different cards (remember, you must discard one), what is the greatest number of points you can earn, if you choose the hands optimally? Of course, the hands must be a legal set of hands.

## Input

The first line contain an integer $T$, indicating the number of test cases. T lines follow.

Each line contains 14 space-separated descriptions of cards. Each card is represented by two characters. The first character is the rank and second character is the suit, as described in the Decks of Cards section above.

## Output

For each test case, output one line containing "`Case #x: y`", where $x$ is the test case number (starting from 1) and $y$ the maximum score you can get.

## Limits

- $1 \leq T \leq 100$.
- all cards in a case are distinct.

## Sample input and output

| Sample Input | Sample Output |
|---|---|
| 1<br>9C 9D 9S 9H TS TH JS JH QS QH KS KH AS AH | Case #1: 92 |

## Note

The hand with maximum score is the one described above, i.e:

Front: `9C 9D 9S`
Middle: `TS JS QS KS AS`
Back: `TH JH QH KH AH`

and it scores 17 points for the front, 50 points for the middle, and 25 points for the back, for a total of 92 points.