

## **Instructions**

Thank you for participating in this study. This is an experiment in the economics of decision making. If you are careful and make good decisions, you will be able to earn a considerable amount of money, which will be paid to you in cash at the end of the experiment. At this time, please turn off your electronic devices and refrain from talking to other participants during the experiment.

In this experiment, you will act as bidders in a series of auctions. In each auction, there will be two bundles for sale with different numbers of identical items in each bundle.

### **Part 1.**

In part 1, you will participate in 10 rounds of auctions. Each auction begins with the computer randomly assigning you to a three-person group. The groups formed depend solely on chance and are independent of the groups formed in any of the other rounds. You will not know the other subjects in your group.

In each auction two bundles of identical items, A and B, are auctioned off. Bundle A has 11 identical items in it, while bundle B has 3 identical items. The number of items in each bundle will be displayed at the top-left corner of your computer screen. The bundles are indivisible, so each person will get either all 11 items in A, all 3 items in B, or nothing.

### **Value of the items for sale**

In each auction, each bidder will be assigned a *unit-value for each item* in their bundle. Unit-values will be randomly drawn from a distribution with integer values between 1 and 100. This means that any number  $\{1,2,3,\dots,99,100\}$  can be your value (numbers not including decimals). Values are in experimental currency units (ECUs) which will be converted into dollars at the rate shown at the end of the instructions. New unit-values will be randomly drawn in each auction and are independent of past draws. To begin with, your per-unit value and the values of the other 2 bidders in your group will be shown to everyone in your group. This information will be displayed at the top-right corner of your computer screen.

The following example may help to clarify what is going on. Suppose bundle A has 11 items and bundle B has 3 items, and your item value is 10. Then the total value of getting bundle A is 110 and the total value of getting bundle B is 30.

## The auction rule

After you observe the values assigned to you and the values of other bidders in your group, you will submit a *single per-unit bid* for the bundles without designating which bundle you are bidding on. These per-unit bids can be any whole number  $\{0,1,2,3,\dots,100\}$ . After all bids are submitted, the bids will be ranked from highest to lowest. The high bidder gets bundle A and pays a price equal to the per-unit bid of the second highest bidder. The second highest bidder gets bundle B and pays the per-unit bid of the lowest bidder. The lowest bidder gets nothing and pays nothing. If there are two or more bids having the same per-unit bid, the rank of these bids will be randomly determined.

The following example is how this works:

There are 3 bidders, 1, 2, and 3 with unit valuations  $V_1, V_2, V_3$ , and unit bids  $ub_1, ub_2, ub_3$ . Prices paid and payoffs are as indicated in the table below where bids have been ranked from highest to lowest:

| Bidder | Ranked Bids | Unit Valuations | Unit Prices | Bundle Earned | Payoff                        |
|--------|-------------|-----------------|-------------|---------------|-------------------------------|
| 2      | $ub_2$      | $V_2$           | $ub_1$      | A (11)        | $(V_2 - ub_1) \times 11 = xx$ |
| 1      | $ub_1$      | $V_1$           | $ub_3$      | B (3)         | $(V_1 - ub_3) \times 3 = zz$  |
| 3      | $ub_3$      | $V_3$           | -           | -             | -                             |

Bidder 2 is the highest ranked bidder with unit valuation  $V_2$ , and pays the second highest bid,  $ub_1$ , and gets Bundle A (11 units) and earns per unit profit of  $V_2$  (2's unit valuation) minus  $ub_1$  (the second highest bid), which is then multiplied by the number of units in bundle A

Bidder 1 is the second-highest ranked bidder with unit valuation  $V_1$ , and pays the third highest bid,  $ub_3$ , and gets Bundle B (3 units) and earns per unit profit of  $V_1$  (1's unit valuation) minus  $ub_3$  (the third highest bid), which is then multiplied by the number of units in bundle B.

Bidder 3 submitted the lowest bid, so he gets nothing and pays nothing.

Finally, after each round of auction you will get feedback in this table form.

## Calculator

We have provided a calculator to help with the bidding. To use it simply enter what you believe to be the likely bids of the other bidders along with what you want to bid. Then hit the *calc* button and the calculator will show the rankings of the bids and your expected earnings if the others bid the way you think they will bid.

You can use the calculator as many times as you want to try out different beliefs about what the others will bid. To do this just change the bid entries you want to change and hit the *calc* button again. You will have up to 1.5 minutes to work the calculator at the end of which the calculator will no longer work and you must submit your bid. Once you have decided what to bid, you can submit your bid in the bottom box of the calculator and hit the OK button. Of course you do not have to use all the time allotted and can enter your bid at any time. We will move on to the next auction once everyone in the room have made their bids, so don't plan to use the calculator more than you need to. (Of course you don't need to use the calculator – it's there to help in deciding what to bid.) Finally the calculator won't work if you put the same bid for more than one bidder or if you leave any of the bids blank.

### **Earnings**

To begin with, you will have a starting capital balance of 500 experimental currency units (ECUs). Any profit earned in an auction round will be added to your starting capital balances. Any losses will be subtracted from it. Your total earnings in this part of the experiment will be converted into US Dollars at the rate of 200 ECUs = \$1

## Part 2.

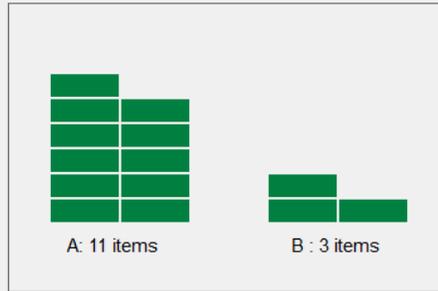
For this part of the experiment everything will stay the same as in the previous auctions but you will no longer know the per-unit values of the other bidders in your group (just your own per-unit value). Each auction will have 10 rounds where everyone's per-unit values stay the same and the bidders in your group will stay the same. You will submit bids just as before after which others' bids and assignments of that round will be announced and you will learn what **you** would have earned had the auction ended in that round. From the feedback of others' bids and allocations, you will get some idea of others' values and you can use the information in making your decision for the rest of auction rounds.

This will repeat itself – with same per-unit values and the same other bidders - for 10 rounds after which one of the rounds will be randomly selected for your earnings. These earnings will be added to your balance from the previous auctions. We will conduct an additional 8 auctions in this same way.

For these auctions the calculator will work a little differently. In the first round of each auction it will work the same as before. After that the starting values for the calculator will be same as in the previous round so that you can change any or all of the per-unit bids based on what you have used in the previous round. (Of course here too you don't have to use the calculator or adjust any or all of the value.)

Since it will take more work and more time in each of these auctions, earnings from the randomly selected round to be paid off in each auction will be equal to 200 ECUs = \$3

Round: 2



Your value                      X

Bidder 1's value                y

Bidder 2's value                Z

History of outcomes

| Round | Value | Bid | Price | Assignment | Earnings |
|-------|-------|-----|-------|------------|----------|
| 1     | V     | B   | P     | A          | E        |

Calculator

Your Value  $V_y$

Your bid

B1 bid

B2 bid

100

You

0

| Your bid | B1 bid | B2 bid | Ranking | expected earnings |
|----------|--------|--------|---------|-------------------|
| yb       | ob1    | ob2    | rk      | ee                |
| yb'      | ob1'   | ob2'   | rk'     | ee'               |
| yb''     | ob1''  | ob2''  | rk''    | ee''              |

Submit your bid

Unit value for each items = 10

|    |    |
|----|----|
| 10 |    |
| 10 | 10 |
| 10 | 10 |
| 10 | 10 |
| 10 | 10 |
| 10 | 10 |

**Bundle A : 11 items**  
**Total value = 110**

|    |    |
|----|----|
| 10 |    |
| 10 | 10 |

**Bundle B : 3 items**  
**Total value = 30**

| <b>Bidder</b> | <b>Ranked Bids</b> | <b>Unit Valuations</b> | <b>Unit Prices</b> | <b>Bundle Earned</b> | <b>Payoff</b>               |
|---------------|--------------------|------------------------|--------------------|----------------------|-----------------------------|
| 2             | ub2                | V2                     | ub1                | A (11)               | $(V2 - ub1) \times 11 = xx$ |
| 1             | ub1                | V1                     | ub3                | B (3)                | $(V1 - ub3) \times 3 = zz$  |
| 3             | ub3                | V3                     | -                  | -                    | -                           |

Bid choices and outcomes of your group in this round are summarized here, where bids have been ranked from highest to lowest.

Please press OK to Continue

| Bidder   | Bid | Value | Price | Assignment | Earnings |
|----------|-----|-------|-------|------------|----------|
| You      | Vy  | uby   | Vb1   | A (11)     | XX       |
| Bidder 1 | Vb1 | ub1   | Vb2   | B (3)      | ZZ       |
| Bidder 2 | Vb2 | ub2   | 0     | n/a        | 0        |

Your earnings from each round are summarized below

| Round | Earnings from each round | Cumulative earnings |
|-------|--------------------------|---------------------|
| 1     | XX                       | ce                  |
| 2     | XX'                      | ce'                 |

OK

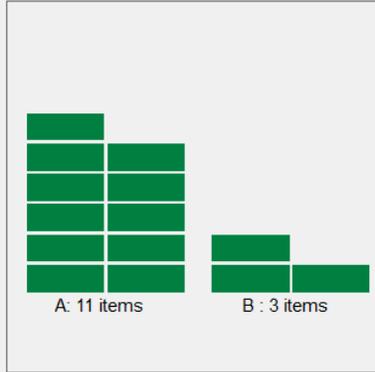
Calculator

| Your bid | B1 bid | B2 bid | Ranking | expected earnings |
|----------|--------|--------|---------|-------------------|
| yb       | ob1    | ob2    | rk      | ee                |
| yb'      | ob1'   | ob2'   | rk'     | ee'               |
| yb''     | ob1''  | ob2''  | rk''    | ee''              |

|   |                                |  |
|---|--------------------------------|--|
| <p>Your Value <math>V_y</math></p> <p>Your bid <input type="text" value="yb"/></p> <p>B1 bid <input type="text" value="ob1"/></p> <p>B2 bid <input type="text" value="ob2"/></p> <p><b>Calc</b></p> | <p>100</p> <p>You</p> <p>0</p> | <p>Submit your bid <input type="text"/></p> <p><b>OK</b></p> |
|---|--------------------------------|--|

Auction block 1 - Round 3



Your Value  $V_y$

Your bid

B1 bid

B2 bid

**Calc**

100

You

0

| Your bid | B1 bid | B2 bid | Ranking | expected earnings |
|----------|--------|--------|---------|-------------------|
| yb       | ob1    | ob2    | rk      | ee                |
| yb'      | ob1'   | ob2'   | rk'     | ee'               |
| yb''     | ob1''  | ob2''  | rk''    | ee''              |

Submit your bid

**OK**

Last Round

| Round | Your Bid | Your assignment | Your Price | Your Earnings | Bidder 1's bid | Bidder 1's Assignment | Bidder 2's Bid | Bidder 2's Assignment |
|-------|----------|-----------------|------------|---------------|----------------|-----------------------|----------------|-----------------------|
| 2     | uby      | A(11)           | ub1        | xx            | ub1            | B(3)                  | ub2            | n/a                   |

Round History

| Round | Your Bid | Your assignment | Your Price | Your Earnings | Bidder 1's bid | Bidder 1's Assignment | Bidder 2's Bid | Bidder 2's Assignment |
|-------|----------|-----------------|------------|---------------|----------------|-----------------------|----------------|-----------------------|
| 1     | uby'     | B(3)            | ub2'       | yy            | ub1'           | A(11)                 | ub2'           | n/a                   |
| 2     | uby      | A(11)           | ub1        | xx            | ub1            | B(3)                  | ub2            | n/a                   |

Bid choices and outcomes of your group in this round are summarized here, where bids have been ranked from highest to lowest.

Note, earnings are what you would be paid if this is the round randomly selected for payment.

Please press OK to Continue

| Bidder   | Bid      | Value    | Price    | Assignment | Earnings |
|----------|----------|----------|----------|------------|----------|
| You      | $V_y$    | $u_{by}$ | $V_{b1}$ | A (11)     | $xx$     |
| Bidder 1 | $V_{b1}$ |          | $V_{b2}$ | B (3)      |          |
| Bidder 2 | $V_{b2}$ |          | 0        | n/a        |          |

OK