

Sealed-bid instructions with all human bidders:

This is an experiment in the economics of market decision making. Various research organizations have provided funds for conducting this research. The instructions are simple, and if you follow them carefully and make good decisions, you may earn a CONSIDERABLE AMOUNT OF MONEY which will be PAID TO YOU IN CASH at the end of the experiment.

In this experiment, we will create a market in which you will act as bidders in a sequence of auctions.

In each auction:

1. Each bidder will be assigned values for two (2) units of a commodity they wish to purchase. These values represent the value of the good to you - what we will pay you for any items purchased.
2. Each bidder bids for each of the two (2) units assigned to him/her (bids must be greater than or equal to zero).
3. Each of you will be bidding in a separate market consisting of 4 bidders - yourself along with three (3) other bidders. Each of the other 3 bidders is assigned values for two (2) units in the same way that your values were assigned. The particular values assigned to the other 3 bidders will typically be different from yours. Thus, in each auction there will be a total of 8 values and 8 bids (2 of yours and 6 by the other bidders).
4. Values for all bidders will be randomly drawn from the interval \$0.0 to \$7.50. Any value within this interval has an equally likely chance of being drawn and being assigned as a value. New values will be drawn before each auction.
5. There will be two (2) units for sale in each auction.

Assignment rules and profit calculations:

1. Bids will be ranked from highest to lowest and the two (2) highest bids will each be awarded one unit of the commodity. The price you will pay for any items earned will be described in the next page.
2. Any unit earned at a price below its value results in a positive profit; any unit earned at a price above its value results in a negative profit. Positive profits will be added to (negative profits subtracted from) the owner's capital balance. If you do not earn an item you neither earn nor lose money.

The general principle underlying the price you will pay for any items earned is to imagine that both your bids were deleted. Then see who would earn items in your place. Then the price you pay is equal to the bids that would replace yours.

This rule is much easier to understand after working out a few simple examples (all bids and prices are in dollars).

Example 1:

Bid	Value	Subj
6.67	A1	A
5.83	A2	A

5.00	B1	B
4.17	B2	B
3.33	C1	C
2.50	D1	D
1.67	C2	C
.83	D2	D

Note bids have been sorted from highest to lowest, bidder values are represented by A1(value for A of unit 1), A2 (value for A of unit 2), B1 (value for B of unit 1), etc.

The two highest bids each earn an item - in this case bidder A earns two units, units A1 and A2.

If we remove A's bids then B would earn two units in A's place with bids of 5.00 and 4.17 respectively, so these are the prices A pays for the two items earned (a total cost of 9.17).

This would yield profits for A of $(A1 + A2 - 5.00 - 4.17)$. In cases where the cost is less than the value of the items, a bidder makes positive profits. However, in case the cost is greater than the value of the items purchased, a bidder makes losses which would be subtracted from his/her capital balance and/or earnings from other auctions.

Example 2:

Bid	Value	Subj
6.67	A1	A
5.83	C1	C

5.00	B1	B
4.17	A2	A
3.33	B2	B
2.50	D1	D
1.67	C2	C
.83	D2	D

Bids are the same as in example 1, only the high bidders have changed a bit. Both A and C get one unit each, units A1 and C1.

Removing A's bids, B would get one unit, unit B1, with its bid of 5.00, so this is what A must pay for A1.

Removing C's bids would also result in B getting one unit, unit B1, in C's place so C must also pay 5.00 unit C1.

This would yield profits for A of $(A1 - 5.00)$ and for C of $(C1 - 5.00)$.

Example 3:

Bid	Value	Subj
6.67	A1	A
5.83	C1	C

5.00	A2	A
4.17	B1	B
3.33	B2	B
2.50	D1	D
1.67	C2	C
.83	D2	D

In this example both A and C get one unit each, units A1 and C1, but unlike example 2 A also has the highest rejected bid.

Removing A's bids, B would get one unit, unit B1, with its bid of 4.17, so this is what A must pay for A1.

Removing C's bids would also result in A getting its unit 2 in C's place, with its bid of 5.00, so that C must pay 5.00 for C1.

This would yield profits for A of $(A1 - 4.17)$ and for C of $(C1 - 5.00)$.

So pricing rules may be summarized as follows:

- (1) If you earn two units the price you pay for these two units will be equal to the sum of the highest and second highest rejected bid.
- (2) If you earn one unit and do *not* have the highest rejected bid, the price you pay will be equal to the highest rejected bid.
- (3) If you earn one unit and *also have* the highest rejected bid, the price you pay equal to the second highest rejected bid.

Additional Remarks:

1. In case of ties among the high bids - for example the 2nd and 3rd highest bids are the same - the computer will randomly determine which of the two bids is the third highest and earns an item.
2. You are free to bid whatever you think will bring you the most earnings. In thinking about bidding, earning an item is of no intrinsic value. Your sole objective should be to maximize your earnings.
3. You will all be given a starting capital balance of \$8.00. Any losses will be subtracted from this balance, any profits added to it. Your final balance will be paid to you in cash at the end of the experiment.
4. In each auction period there will be two markets with 4 bidders each operating at the same time. Assignments to each market are made randomly and will change randomly from one auction to the next.
5. We will conduct 2 dry runs to familiarize you with the procedures and accounting rules. This will be followed by 36 periods played for cash.

Are there any questions?

Ausubel auction with drop-out information: All human bidders

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2. Each bidder bids for each of the two (2) units assigned to him/her.
3. Each of you will be bidding in a separate market consisting of 4 bidders - yourself along with three (3) other bidders. Each of the other 3 bidders is assigned values for two (2) units in the same way that your values were assigned. The particular values assigned to the other 3 bidders will typically be different from yours. Thus, in each auction there will be a total of 8 values and 8 bids (2 of yours and 6 by the other bidders).
4. Values for all bidders will be randomly drawn from the interval \$0.0 to \$7.50. Any value within this interval has an equally likely chance of being drawn and being assigned as a value. New values will be drawn before each auction.
5. There will be two (2) units for sale in each auction.

Assignment rules and profit calculations:

Items will be allocated using the following "English clock" auction procedure:

Prices will start at \$0.00 and will increase using a "clock" counter located at the bottom of your screen. You are counted as actively bidding on an item until you have dropped out or have "clinched" an item (clinching will be explained below). Once you have dropped out of bidding for an item you can no longer bid on that item. Once you have clinched an item, it is yours and you pay the "clinching" price.

We first discuss "dropping out."

You can drop out of bidding for an item by hitting any key on your key pad. One key stroke drops you from bidding on one item (your lowest valued unit). To stop bidding on the second item hit any key again. If you want to drop out of bidding for both items at the same time (price) just hit a second key during the pause in the clock price that follows dropping out of bidding on the first item.

How does Clinching work? Clinching works just like in a football, baseball, or basketball league when a team clinches a spot in the playoffs, only that here clinching involves earning an item, and the price paid for the item, with the number of units supplied representing the number of slots open in the "playoffs."

Once you have clinched an item it is yours and the price you pay is the drop-out price which assured you of clinching the item.

Clinching is easiest to explain via some examples:

Example 1:

There are 4 bidders each with two units to bid on so that there are 8 units being bid on (in total) and there is a supply of 2 units. The clock price starts at 0 and ticks up in increments of \$0.25. Price = \$0.00 and,

Bidder	A	B	C	D	Supply = 2
# units dem.	2	2	2	2	Total Demand = 8

Suppose the clock price hits .75 and someone (say bidder D) drops out on a single unit. There are now 7 active bids and 2 units for sale so no one is assured of earning (clinching) anything yet. Thus, Price = \$0.75

Bidder	A	B	C	D	Supply = 2
# units dem	2	2	2	1	Total Demand = 7

Suppose the clock price hits 1.50 and now bidder C drops out on a single unit. There are now 6 active bids and 2 units for sale so no one is assured of clinching anything yet. P = \$1.50

Bidder	A	B	C	D	Supply = 2
# units dem.	2	2	1	1	Total Demand = 6

A third bid drops at price 2.50 - bidder D on her 2nd unit. Followed by C dropping on her 2nd unit at the price of 3.50. Still no units are clinched. P = \$3.50

Bidder	A	B	C	D	Supply = 2
# units dem.	2	2	0	0	Total Demand = 4

Now suppose the price reaches \$4.25 and B drops out on her 2nd unit.

Bidder	A	B	C	D	Supply = 2
# units dem.	2	1	0	0	Total Demand = 3

This leaves A bidding on 2 units and B bidding on 1 unit with supply of 2 units so that A is assured of earning at least 1 unit. With clinching you pay the drop-out price which assured you of clinching the item -- \$4.25 in this case. So A would clinch one unit at the price of 4.25. (Our convention is that the first unit clinched by a bidder is always the bidder's highest valued unit.) Thus, earnings for bidder A will be the value of her highest valued unit less the clinching price of \$4.25.

The situation after A has clinched her one unit at $P = \$4.25$ is.

Bidder	A	B	C	D	Supply = 1
# units dem.	1	1	0	0	Total Demand = 2

Now there is a single unit left for sale with both A and B still active on one unit each. The price continues to increase (from the \$4.25 level). Lets assume that B drops out on her 2nd unit when the price reaches \$5.00. Then A clinches the remaining unit and pays the clinching price of \$5.00 for it. Thus, earnings for A on this unit would be the value of the second unit less \$5.00. (Of course if A had dropped before B, B would have clinched the 2nd unit and paid A's drop out price.)

This would yield profits for A of: $(A1 + A2 - \$4.25 - \$5.00)$ where A1 and A2 represent the value of A's two units. In cases where the cost is less than the value of the items, a bidder makes positive profits. However, in case the cost is greater than the value of the items purchased, a bidder makes losses which would be subtracted from his/her capital balance and/or earnings from other auctions.

Note, that price clock will increase every 3 sec. Drop-out prices will be broadcast to everyone in your market as they occur, as well as clinching prices. Multiple dropouts within the 3 sec price increment will be counted as having dropped out at the same price, with the computer recording the dropout order to settle any potential ties between dropouts.

Example 2:

There are 4 bidders each with two units to bid on so that there are 8 units being bid on (in total) and there is a supply of 2 units. The clock price starts at \$0 and ticks up in increments of \$0.25.

Once again, suppose that D and C are the first to drop-out, each on a single unit, followed by D dropping out on her 2nd unit, and followed by A dropping on her first unit. There are 4 units still being bid on and supply is 2 so no one has clinched a purchase yet. The situation is now:

Bidder	A	B	C	D	Supply = 2
# units dem.	1	2	1	0	Total Demand = 4

Suppose now that B drops out on her lowest valued unit at a price of \$3.50. Now there is total demand of 3, supply of 2 and no one is assured of earning anything yet so no one has clinched a purchase yet. The situation is now:

Bidder	A	B	C	D	Supply = 2
# units dem.	1	1	1	0	Total Demand = 3

There are 3 units being bid on, 1 each by A, B and C and the price is \$3.50. The price continues to increase. Suppose that at $P = \$4.25$, B drops out of the bidding.

Bidder	A	B	C	D	Supply = 2
# units dem.	1	0	1	0	Total Demand = 2

Now there is supply of 2 units and demand for 2 units so that both A and C are each assured of earning a single unit and pay the clinching price of \$4.25 for that unit.

This would yield profits for A of $(A1 - \$4.25)$ and for C of $(C1 - \$4.25)$.

Additional Remarks:

1. You are free to bid whatever you think will bring you the most earnings. In thinking about bidding, earning an item is of no intrinsic value. Your sole objective should be to maximize your earnings.

2. You will all be given a starting capital balance of \$8.00. Any losses will be subtracted from this balance, any profits added to it. Your final balance will be paid to you in cash at the end of the experiment.

3. In each auction period there will be two markets with 4 bidders each operating at the same time. Assignments to each market are made randomly and will change randomly from one auction to the next.

4. We will conduct 2 dry runs to familiarize you with the procedures and accounting rules. This will be followed by 36 periods played for cash.

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You can drop out of bidding for an item by hitting any key on your key pad. One key stroke drops you from bidding on one item (your lowest valued unit). To stop bidding on the second item hit any key again. If you want to drop out of bidding for both items at the same time (price) just hit a second key before the price clock increases.

Items earned and the price you pay for those units will be determined by a “clinching” procedure. Clinching works just like in a football, baseball, or basketball league when a team clinches a spot in the playoffs, only that here clinching involves earning an item, and the price paid for the item, with the number of units supplied representing the number of slots open in the “playoffs.”

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Bidder	A	B	C	D	Supply = 2
# units dem	2	2	2	1	Total Demand = 7

Suppose the clock price hits 1.50 and now bidder C drops out on a single unit. There are now 6 active bids and 2 units for sale so no one is assured of clinching anything yet. P = \$1.50

Bidder	A	B	C	D	Supply = 2
# units dem.	2	2	1	1	Total Demand = 6

A third bid drops at price 2.50 - bidder D on her 2nd unit. Followed by C dropping on her 2nd unit at the price of 3.50. Still no units are clinched. P = \$3.50

Bidder	A	B	C	D	Supply = 2
# units dem.	2	2	0	0	Total Demand = 4

Now suppose the price reaches \$4.25 and B drops out on her 2nd unit.

Bidder	A	B	C	D	Supply = 2
# units dem.	2	1	0	0	Total Demand = 3

This leaves A bidding on 2 units and B bidding on 1 unit with supply of 2 units so that A is assured of earning (A has clinched) at least 1 unit. Thus, A would earn one unit - A's highest valued unit (our convention is that the first unit clinched by a bidder is always the bidder's highest valued unit) - and pay the clinching price at which A clinched that unit, \$4.25. As such the earnings for A on her highest valued unit would be the value of that unit less the clinching price of \$4.25.

Note, the computer will record all of this as the auction proceeds, but will not inform A, or anyone else, of this until the auction has ended.

The situation after A has clinched her one unit at $P = \$4.25$ is.

Bidder	A	B	C	D	Supply = 1
# units dem.	1	1	0	0	Total Demand 2

Now there is a single unit left for sale with both A and B still active on one unit each. The price continues to increase (from the \$4.25 level). Lets assume that B drops out on her 2nd unit when the price reaches \$5.00. Then A clinches the remaining unit and pays the clinching price of \$5.00 for it. Thus, earnings for A on this unit would be the value of the second unit less \$5.00. (Of course if A had dropped before B, B would have clinched the 2nd unit and paid A's drop out price.)

This would yield profits for A of: $(A1 + A2 - \$4.25 - \$5.00)$ where A1 and A2 represent the value of A's two units. In cases where the cost is less than the value of the items, a bidder makes positive profits. However, in case the cost is greater than the value of the items purchased, a bidder makes losses which would be subtracted from his/her capital balance and/or earnings form other auctions.

Note, that price clock will increase every 3 sec. Multiple dropouts within the 3 sec price increment will be counted as having dropped out at the same price, with the computer recording the dropout order to settle any potential ties between dropouts. Also note that you will not know prices paid and units earned in your market until the price clock reaches its maximum value of \$7.50. Also note that once the price clock reaches \$7.50, anyone who has not dropped out on a unit will be counted as having dropped at \$7.50.

Example 2:

There are 4 bidders each with two units to bid on so that there are 8 units being bid on (in total) and there is a supply of 2 units. The clock price starts at \$0 and ticks up in increments of \$0.25.

Once again, suppose that D and C are the first to drop-out, each on a single unit, followed by D dropping out on her 2nd unit, and followed by A dropping on her first unit. There are 4 units still being bid on and supply is 2 so no one has clinched a purchase yet. The situation is now:

Bidder	A	B	C	D	Supply = 2
# units dem.	1	2	1	0	Total Demand = 4

Suppose now that B drops out on her lowest valued unit at a price of \$3.50. Now there is total demand of 3, supply of 2 and no one is assured of earning anything yet so no one has clinched a purchase yet. The situation is now:

Bidder	A	B	C	D	Supply = 2
# units dem.	1	1	1	0	Total Demand = 3

There are 3 units being bid on, 1 each by A, B and C and the price is \$3.50. The price continues to increase. Suppose that at $P = \$4.25$, B drops out of the bidding.

Bidder	A	B	C	D	Supply = 2
# units dem.	1	0	1	0	Total Demand = 2

Now there is supply of 2 units and demand for 2 units so that both A and C are each assured of earning a single unit and pay the clinching price of \$4.25 for that unit.

This would yield profits for A of $(A1 - \$4.25)$ and for C of $(C1 - \$4.25)$.

As before, the computer will record all of this as the auction proceeds, but will not inform A, or anyone else,

of these results until the auction has ended; i.e., the price clock has reached its maximum value of \$7.50

Additional Remarks:

1. You are free to drop out of the bidding at whatever prices you think will bring you the most earnings. In thinking about bidding, earning an item is of no intrinsic value. Your sole objective should be to maximize your earnings.
2. You will all be given a starting capital balance of \$8.00. Any losses will be subtracted from this balance, any profits added to it. Your final balance will be paid to you in cash at the end of the experiment.
3. In each auction period there will be _____ markets with 4 bidders each operating at the same time. Assignments to each market are made randomly and will change randomly from one auction to the next.
4. We will conduct 2 dry runs to familiarize you with the procedures and accounting rules. This will be followed by 36 periods played for cash.

Are there any questions?

(To be read to subjects - they do not have a copy of this.)

Housekeeping details: This is a dry run. Don't do anything yet, just look at the right hand side of your computer screens. At the top of the screen next to "Bidders" we report the number of bidders in each market (4). Next is the "Supply" - the number of items for sale in each market (2). Next is "Demands" - the total number of units bid on in the market (8 = your 2 units + 6 from the other 3 bidders). Next is "balance" - your starting cash balance. Next is "auction fee" - this is the cost of participating in the auction (there is no cost - ignore this). Next is shown the upper and lower bound of the uniform distribution from which values are drawn - \$7.50 and \$0.

Next is shown the value of your first unit. Further down is the value of your second unit. The prices at which you drop out of the bidding will be reported below your valuation as the auction proceeds, next to "Your bid". However whether you have earned any units, and the earnings for those units will not be reported until after the auction has ended.

At the very bottom of the screen is shown the clock price. It is set to 0.00 right now. It will increase at increments of .25. The clock price will increase every 3 sec.

We will start the clock in a moment. Remember, in order to drop out of the bidding on a single unit hit any key (but not a number the #2 key). To drop out on both items at the same price hit the number 2 at the top of the key pad or hit a second key right after hitting the first key. Multiple dropouts within the 3 sec price increment will be counted as having dropped out at the same price, with the computer recording the dropout order to settle any potential ties between dropouts.

Note that there will be a slight delay between when you hit a key to drop out and the recording of your drop-out price on your screen. You will be recorded as dropping out at the correct price regardless of this brief delay. Hitting a second key during this delay will only insure that you drop out on your second unit which you may or may not want to do.

Are there any questions at that point?

OK I'm going to start the clock now.

(After the market is closed:)

OK, all markets have closed now.

Look just to the left of where your values were first reported. We have reported back to you the outcomes for your market: Shown above the solid line are the values of the bidders who have clinched an item. If you have clinched an item there is a * next to the item. The prices at which these units were clinched are shown next to the value of the item.

Below the solid line are shown the values for those who did not clinch an item along with the corresponding drop-out prices. These are listed with the last drop-out price first, and the first drop-out price last. Note that there are letters assigned to other bidders drop-out prices, with each letter representing one other bidder. These letters will change randomly from one auction to another so that no one can be identified across auctions.

Profits of the items you have been bidding on are shown to the right of your screens just below the value of the item. The price at which you dropped out of the bidding is reported just below the value of the item. Below this is shown the price at which you clinched the item and below this the profits earned on the item.

If you dropped out without clinching an item on the "your bid" line the computer shows the price at which you dropped out and that you earned zero profits on that item.

At the very bottom right hand side of your screen you will see total profits - the sum of the profits on your 2 units. Just below this is net profits - total profits less the auction fee. Note, the auction fee will always be

0, so this number will be the same as total profits.

Finally, your cash balance will be updated following each auction period - positive profits added to it, negative profits subtracted from it.

One final point: The auction ends in your market when the clock reaches \$7.50. At that time you will know if you have earned an item and the clinching price for that item.

Are there any questions?

You all have record sheets. You must fill these in during the dry runs so that we can check if you understand the pricing rules and the profit calculations. (The better you understand the pricing rules and profit calculations the more money you are likely to make). After the dry runs we recommend you continue to keep these records but do not require that you do so.

Please feel free to ask questions as we go along. Let us assure you, if you have a question about what's going on, you can bet that there are at least two other bidders who have the same or a similar question in mind. Please direct all of your comments to me or one of the assistants. You are not permitted to talk to each other until the experiment is over.

After 1st dry run - add the following:

Before continuing with the next dry run let me ask and answer some questions others have asked in this experiment:

1. How much money can I earn? We don't know exactly since your earnings depend in part on how you and the other three bidders in your market bid and in part on luck (the values you draw and the values others in your market draw). All we can tell you is that most of our subjects elect to return for additional experiments.
2. At what price should I drop out at? You can drop out at whatever price you like. Recall that your value is what you will get for any items earned. If we knew exactly how you should behave we would not have to run the experiment.