

## INTRODUCTION

Today you are participating in a decision-making experiment where you have the opportunity to earn money and bonus points towards your total grade in the microeconomics course.

You will receive your payout once the experiment has concluded and all payouts have been calculated.

The experiment has three components that determine the payout:

- After the instructions, you will take a 4-question test to assess your understanding of the algorithm used for the prize distribution in the main part of the experiment. Each correct answer will earn you 1 point which is worth monetary payment.
- Monetary payouts for the main prize drawing part of the experiment: each prize is worth a certain amount of money. You will participate in two versions of this part and may therefore receive two payouts.
- Monetary payout for the bombing experiment in the end.

Your earnings in the prize draw experiment depend on your own decisions, the decisions of the other participants, and a random component.

Your earnings in the bombing experiment depend on your decisions and a random component.

## **INSTRUCTIONS: PRIZE DRAWING**

Today, you are competing for one of three cash prizes:

**Prize A:** 600 rubles

**Prize B:** 400 rubles

**Prize C:** 200 rubles

Your competitors are 23 other people in addition to yourself (**24 people in total**). They can be first-year students from any academic group, not just your own.

A total of **6 prizes of each type** will be drawn in your group of 24 people: 6 Prizes A, 6 Prizes B, and 6 Prizes C.

The prize sizes and rules are the same for all 24 participants in your group.

The experiment involves several **steps**.

**Step 1:** Each participant, including you, submits a ranked ordered list of prizes in order of priority.

As first priority, you indicate the prize for which you would like to compete first.

As second priority, you indicate the prize you would like to compete for second if you do not receive the first-priority prize.

As third priority, you indicate the prize you would like to compete for third if you do not receive your first- or second-priority prizes.

*Note: Some versions of the experiment may not include the option to specify a third priority prize.*

You will be provided with a piece of paper to write down your list of prize priorities after the instructions and the test.

**Step 2:** All participants in the group are randomly ranked from 1 to 24. The participant with the lower ranking number has priority in receiving a prize. For instance, if participants with numbers 9 and 10 both want prize A, but there is only one prize A available, the participant with number 9 will be awarded it. Think of this process as forming a queue for the prizes.

**Step 3:** The prizes are distributed among the group members using the following algorithm:

- For each prize, the applications from participants who listed it as their first priority are considered first. These participants are ranked according to the numbers assigned to them in the second step. The 6 participants with the lowest numbers (or less than 6 if there are fewer than 6 participants competing for a given prize) are conditionally and provisionally awarded the prize. The remaining participants with higher numbers are rejected, and their applications are then redirected to be considered for the prizes indicated as their second priority.

- For 'rejected' entrants, their applications for the prizes indicated as their second priority are then considered. These applications are evaluated together with those already conditionally and provisionally accepted. All participants whose entries were received in the current stage or were conditionally accepted in the previous stage are then ordered by their numbers again. The first 6 participants with the lowest numbers

(or less than 6 if there are fewer than 6 participants competing for a given prize) are conditionally and provisionally awarded the prize. The remaining participants with higher numbers are rejected, and their entries are redirected to be considered for the prize indicated as their next priority.

- The prize distribution process is considered complete once the ranked ordered prize lists have been exhausted for all participants whose entries were previously rejected. These participants do not receive a prize. The remaining participants are awarded the prizes that were conditionally and provisionally distributed to them in the previous stages.

### **EXAMPLES: simplified version of the experiment**

There are two prizes X and Y, with  $X > Y > 0$ . Only one of each prize is available. The participants in the experiment are Anna, Maria, and Olga.

#### **Example 1**

Step 1: Each participant submits a ranked ordered list of prizes in order of priority. Suppose that each participant submits a list:

Priority 1: X

Priority 2: Y

Step 2: The participants are randomly assigned numbers from 1 to 3, with Olga receiving number 1, Anna number 2, and Maria number 3.

Step 3:

- Prize X is listed as the first priority by all participants, there are 3 bids for it. Since Olga has the lowest assigned number, she is provisionally and temporarily assigned Prize X. The applications of Maria and Anna for Prize X are rejected.

- Prize Y is listed as the second priority by both Anna and Maria. Since Anna has a lower assigned number, she is provisionally and temporarily awarded Prize Y. Maria's application for Prize Y is rejected.

- Maria's list is exhausted. Conditional and temporary prize allocation is finalized: Olga receives Prize X, Anna receives Prize Y, and Maria is awarded no prize.

#### **Example 2**

Step 1: Each participant submits a ranked ordered list of prizes in order of priority. Suppose Anna and Olga submit lists:

Priority 1: X

Priority 2: Y

Maria submits list:

Priority 1: Y

Priority 2: X

Step 2: The participants are randomly assigned numbers from 1 to 3, with Olga receiving number 1, Anna number 2, and Maria number 3 (same as in Example 1).

Step 3:

- Prize X is listed as the first priority by Anna and Olga, there are 2 bids for it. Since Olga has the lower assigned number, she is provisionally and temporarily allocated Prize X. Anna's application for prize X is rejected.

- Prize Y is listed as the first priority by Maria alone. She is conditionally and temporarily assigned Prize Y.

- Prize Y is listed as the second priority by 'rejected' Anna. Her application for Prize Y is considered together with the application of Maria, who had been conditionally and temporarily assigned Prize Y. Anna has a lower assigned number, thus, she is conditionally and temporarily awarded Prize Y. Maria's application is rejected.

- Prize X is listed as the second priority by Maria. Her application for Prize X is considered together with the application of Olga, who had been conditionally and temporarily awarded Prize X. Olga has a lower number and is conditionally and provisionally awarded Prize X again. Maria's entry for Prize X is rejected.
- Maria's list is exhausted. Conditional and temporary prize allocation is finalized: Olga receives Prize X, Anna receives Prize Y, and Maria is awarded no prize.

## PRACTICE QUESTIONS

There are two prizes X and Y, with  $X > Y > 0$ . Only one of each prize is available. The participants in the experiment are Anna, Maria, and Olga.

1) Complete the following table by determining which prize Maria will be awarded in each case:

	<u>Step 2:</u> Maria is assigned number 1	<u>Step 2:</u> Maria is assigned number 2	<u>Step 2:</u> Maria is assigned number 3
<u>Step 1:</u> Anna and Olga submit lists: Priority 1: X Priority 2: Y			
<u>Step 1:</u> Maria submits list: Priority 1: X Priority 2: Y	<u>Step 3:</u> Maria receives _____?_____	<u>Step 3:</u> Maria receives _____?_____	<u>Step 3:</u> Maria receives _____?_____

2) Complete the following table by determining which prize Maria will be awarded in each case:

	<u>Step 2:</u> Maria is assigned number 1	<u>Step 2:</u> Maria is assigned number 2	<u>Step 2:</u> Maria is assigned number 3
<u>Step 1:</u> Anna and Olga submit lists: Priority 1: X Priority 2: Y			
<u>Step 1:</u> Maria submits list: Priority 1: Y Priority 2: X	<u>Step 3:</u> Maria receives _____?_____	<u>Step 3:</u> Maria receives _____?_____	<u>Step 3:</u> Maria receives _____?_____

3) Complete the following table by determining which prize Maria will be awarded in each case:

	<u>Step 2:</u> Maria is assigned number 1	<u>Step 2:</u> Maria is assigned number 2	<u>Step 2:</u> Maria is assigned number 3
<u>Step 1:</u> Anna and Olga submit lists: Priority 1: Y Priority 2: X			
<u>Step 1:</u> Maria submits list: Priority 1: X Priority 2: Y	<u>Step 3:</u> Maria receives _____?_____	<u>Step 3:</u> Maria receives _____?_____	<u>Step 3:</u> Maria receives _____?_____

4) Complete the following table by determining which prize Maria will be awarded in each case:

	<u>Step 2:</u> Maria is assigned number 1	<u>Step 2:</u> Maria is assigned number 2	<u>Step 2:</u> Maria is assigned number 3
<u>Step 1:</u> Anna and Olga submit lists: Priority 1: Y Priority 2: X			

Step 1: Maria submits list: Priority 1: Y Priority 2: X	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____
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5) Complete the following table by determining which prize Maria will be awarded in each case:

	Step 2: Maria is assigned number 1, Anna is assigned number 2	Step 2: Maria is assigned number 1, Anna is assigned number 3	Step 2: Maria is assigned number 2, Anna is assigned number 1	Step 2: Maria is assigned number 2, Anna is assigned number 3	Step 2: Maria is assigned number 3, Anna is assigned number 1	Step 2: Maria is assigned number 3, Anna is assigned number 2
Step 1: Anna submits list: Priority 1: X Priority 2: Y	Olga submits list: Priority 1: Y Priority 2: X					
Step 1: Maria submits list: Priority 1: X Priority 2: Y	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____

6) Complete the following table by determining which prize Maria will be awarded in each case:

	Step 2: Maria is assigned number 1, Anna is assigned number 2	Step 2: Maria is assigned number 1, Anna is assigned number 3	Step 2: Maria is assigned number 2, Anna is assigned number 1	Step 2: Maria is assigned number 2, Anna is assigned number 3	Step 2: Maria is assigned number 3, Anna is assigned number 1	Step 2: Maria is assigned number 3, Anna is assigned number 2
Step 1: Anna submits list: Priority 1: X Priority 2: Y	Olga submits list: Priority 1: Y Priority 2: X					
Step 1: Maria submits list: Priority 1: Y Priority 2: X	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____	Step 3: Maria receives _____?_____

7) Compare your answers to problems 1 through 6.

An **optimal list** is one where a participant's resulting winnings can be better or the same (but cannot be worse), regardless of the numbers assigned at step 2 and the lists submitted by other participants, compared to any other list this participant could have submitted.

Is it optimal for Maria to submit a list:

Priority 1: X

Priority 2: Y

rather than the alternative list

Priority 1: Y

Priority 2: X?

Which list is optimal for Anna? What about Olga?

**8)** Suppose that all the conditions of the assignment remain the same, except that Maria has an alternative option: if she does not receive Prize X as a result of the prize distribution, she can always claim Prize O, where  $X > O > Y > 0$ .

If Maria claims the alternative Prize O, then the prize she would have received from the algorithm's distribution (if she would have received Prize Y) will be allocated to Anna or Olga based on the same rules. What is the optimal list for Maria to submit? Recall that Prize O is an alternative option; it cannot be included in the list.

Given that Maria has access to alternative option O, what is the optimal list for Anna and Olga to submit if they know that Maria has this option but they do not?

Could Maria's access to an alternative option benefit Anna and/or Olga?

**9)** Let us return to the original setting where no one has alternative options.

Suppose now that there is a limit on the length of the prize list that can be submitted. Each participant can submit a list with only one prize. Put yourself in the shoes of one of the participants and choose the correct answers (there can be more than one):

A. For you, as well as for all other participants, the optimal strategy is to submit the following list:  
Priority 1: X

B. For you, as well as for all other participants, the optimal strategy is to submit the following list:  
Priority 1: Y

C. It may be optimal for you to submit a list  
Priority 1: Y  
if you believe that all the other participants are submitting lists  
Priority 1: X

D. There may not be a single list that is always optimal, as the optimal strategy may be similar to the one in the "rock-paper-scissors" game. If playing multiple rounds, it may be optimal to submit different lists with probabilities that depend on the prize values and beliefs about the decisions of other participants.

E. Suppose that you believe that the other participants randomly choose their list by submitting X or Y with equal probability (like flipping a coin to make a decision). It is optimal for you to also flip a coin and submit X or Y with equal probability.

F. Suppose that you believe that the other participants randomly choose their list by submitting X or Y with equal probability (as if flipping a coin to make a decision). It is optimal for you to submit X, as this may increase your chances of getting X.

**10)** Combine the presence of an alternative option (Prize O for Maria) with a constraint that limits the length of the submitted prize list to a single prize. Each participant, including Maria, can submit a list with only one prize. What list is optimal for Maria to submit?

**11)** We are still examining the combination of an available alternative option (Prize O for Maria) and a limit on the length of the submitted prize list. Each participant, including Maria, is only allowed to submit a list with a single prize.

Imagine being in the shoes of Anna or Olga, participants who do not have access to the alternative option. Does Maria's having this alternative option affect the optimal choice of the lists submitted by Anna and Olga?

## **TEST AND FURTHER INSTRUCTIONS**

Next, you will take a **test**. The test consists of four questions, and a correct and complete answer to each question is worth 100 rubles. You will have 20 minutes to carefully read the tasks and answer the questions.

**You must remain silent during the test. If you talk or confer with others, your test results will be canceled.**

Following the test, the main experiment will begin. Each of you will participate in **two versions** of the experiment.

For each version, you will receive instructions and a piece of paper on which to write down your ranked ordered list of prizes in order of priority.

Please read the instructions carefully for each version, as the rules may differ. **Make sure to sign the form for both versions of the experiment!**

Each version of the experiment will consist of **12 independently realized rounds**, with the same participants and rules throughout.

For each round, you must submit a ranked ordered list of prizes in order of priority. The lists may be the same or different, the decision is yours to make!

Your earnings for each version of the experiment will be determined by the outcome of one randomly selected round.