**DIRECTOR**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Agency: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**DESCRIPTION**

Congratulations on being hired as the **DIRECTOR** for your nation’s space agency! You were hired based on your leadership skills, organization, and efficiency. Your job is to work closely with the members of your agency to ensure their tasks are completed. You are also the point person with the *International Advisor*.

**TASKS AND OBJECTIVES**

***Before the Launch***

* Meet with the members of your agency to decide on an agency name.
* With the *Engineer*, *Research Scientist*, and *Economist*, decide which shielding materials to purchase. Coordinate with the *Economist* to purchase the materials.
* Make sure members of your agency are staying on task.
* Begin working on the first **♦DIRECTOR’S PRESENTATION♦**. Gather presentation material and information from your experts. Put together a short presentation that explains why your agency chose your payload design (see back).
* Finish working on your first presentation and deliver it in front of both agencies before the launch.

***Launch Day***

* Make sure everyone is well prepared. Assist with the launch.

***After the Launch***

* Gather presentation material and information from your experts, including plots/graphs of the radiation data.
* Discuss the data and the performance of your agency’s radiation shield.
* Complete the final **♦DIRECTOR’S PRESENTATION♦** and deliver it in front both agencies at the end of the activity.

**♦ THE DIRECTOR’S PRESENTATIONS ♦**

The **DIRECTOR** will deliver two presentations, one before the launch and the other at the very end of the project. The purpose of these presentations is to inform the world of your space agency’s progress.

Both presentations should be brief (only 5–10 minutes) and informal. You can use PowerPoint or Google Slides. You should recruit the help of your experts when preparing the presentation. Tip: ask the *Marketing Specialist* to help you format and organize the presentations.

1. Your first Director’s Presentation (delivered BEFORE the launch) should:
* Include your agency name and logo.
* Include at least one photograph of each member of your agency and a short description of what they’re working on.
* Discuss your agency’s radiation shield design and why you think it will work.
* Highlight your agency’s social media account or website.
1. Your final Director’s Presentation (delivered AFTER the launch) must:
* Include photos from the balloon launch.
* Include a budget analysis of how much money your agency spent and earned.
* Show plots/graphs of the data analyzed by your agency.
* Include a discussion about the data and how well your radiation shield performed.

**TIPS FOR MANAGING A SPACE AGENCY**

It won’t be easy managing your nation’s space agency. The most important thing to remember is that you need to communicate well with the members of your group. Here are a few other tips:

* Be a good leader but try not to micromanage. Let your experts do their jobs!
* Make sure you are involved in the major decisions (e.g., purchasing supplies).
* Talk often with your *Economist* to make sure your agency is staying within budget.
* Don’t hesitate to ask the *International Advisor* for guidance or advice.

**ENGINEER**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Agency: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**DESCRIPTION**

Congratulations on being hired as an **ENGINEER** for your nation’s space agency! Your job is to help design, construct, and mount the payload for your nation, specifically the radiation shield. You will also be help test the payload prior to the launch and assist with the data analysis after.

**TASKS AND OBJECTIVES**

***Before the Launch***

* Meet with the rest of the agency to decide on an agency name.
* Work with the *Research Scientist* and *Economist* to determine which shielding materials would be best to use based on cost, mass, and effectiveness.
* Design the radiation shield on your **♦SHIELDING DESIGN WORKSHEET♦** and determine where everything will be mounted inside the payload box.
* Acquire the shielding materials from the *Economist* and construct the radiation shield to the specifications laid out in your design.
* Securely mount the radiation shield, sensor, and Arduino inside the payload box.
* Test the payload with the *Computer Scientist* and *Research Scientist* and get it approved for the launch by the *International Advisor*.

***Launch Day***

* Help with any potential payload issues. Assist with the launch.

***After the Launch***

* Help the *Research Scientist* graph, analyze, and interpret the radiation data. Use your expertise to assess how well your radiation shield worked.
* Give the *Director* recommendations for how the radiation shield can be improved.
* Turn in your completed **♦SHIELDING DESIGN WORKSHEET♦**.

**♦ SHIELDING DESIGN WORKSHEET ♦**

The **ENGINEER** will use this worksheet to document their space agency’s radiation shield design. This worksheet must be completed and turned in to the *International Advisor* before the final Director’s Presentation at the end of the project.

**Shielding Information:**

Mass (grams): \_\_\_\_\_\_\_\_\_\_\_\_\_

Dimensions (cm): Length \_\_\_\_\_\_\_\_\_\_ Width \_\_\_\_\_\_\_\_\_\_ Height \_\_\_\_\_\_\_\_\_\_

**List of Materials Used:**

**Drawing and Description of Shielding Design:**

**MARKETING SPECIALIST**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Agency: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**DESCRIPTION**

Congratulations on being hired as a **MARKETING SPECIALIST** for your nation’s space agency! Your job is to handle public relations and outreach, including the agency’s social media page or website. You will keep the world updated on the progress of your agency’s mission. The *Director* may also ask you to help them with their presentations.

**TASKS AND OBJECTIVES**

***Before the Launch***

* Meet with the rest of the agency to decide on an agency name.
* Design your agency’s logo, either by hand or on a computer, and submit the final design to the *Director* and *International Advisor* for approval.
* Create your agency’s social media page or website (choose only one) and update it with content relevant to the mission. Be sure to first get permission to use photos of fellow agency members if any of their faces are shown.
* Begin filling out your agency’s **♦PUBLIC RELATIONS WORKSHEET♦**.
* Keep track of how many follows your agency gains on social media. Report to the *Economist* if your agency becomes eligible to receive social media payments.
* Take pictures as members of your agency work on their tasks.
* Help the *Director* prepare for their first Director’s Presentation.

***Launch Day***

* Take pictures and update social media page or website. Assist with the launch.

***After the Launch***

* Submit pictures of the launch to the *Director* and help them prepare for their final Director’s Presentation.
* Turn in your completed **♦PUBLIC RELATIONS WORKSHEET♦**.

**♦ PUBLIC RELATIONS WORKSHEET ♦**

The **MARKETING SPECIALIST** will use this worksheet to document their space agency’s social media page and keep track of their public relations tasks. This worksheet must be completed and turned in to the *International Advisor* before the final Director’s Presentation at the end of the project.

**Social Media Information:**

Agency Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Social Media Name/Website: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Platform:  *Instagram*  *Twitter*  *Website*  *Other* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Final number of social media followers (if applicable): \_\_\_\_\_\_\_\_\_\_\_

**Final Agency Logo (paste or print from computer):**

**COMPUTER SCIENTIST**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Agency: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**DESCRIPTION**

Congratulations on being hired as a **COMPUTER SCIENTIST** your nation’s space agency! Your job is to manage the Arduino code and assemble all the wires and sensors. You will also help test the payload prior to launch and assist with the data analysis after.

**TASKS AND OBJECTIVES**

***Before the Launch***

* Meet with the rest of the agency to decide on an agency name.
* Follow the **♦ASSEMBLING THE ARDUINO♦** instructions to learn about the Arduino and assemble all the Arduino payload components.
* Coordinate with the *Engineer* to determine where the Arduino and electronic components will be mounted inside the payload box.
* Follow the **♦MANAGING THE ARDUINO CODE♦** instructions to begin working on the code. You will need to organize, edit, and upload the code to the Arduino before the balloon launch.
* Help the *Engineer* securely mount the radiation shield, sensor, and Arduino inside the payload box.
* Test the payload with the *Engineer* and *Research Scientist* and get it approved for the launch by the *International Advisor*.

***Launch Day***

* Make sure the Arduino is operating correctly. Assist with the launch.

***After the Launch***

* Download the flight data from the SD card and share with the rest of your agency.
* Help the *Research Scientist* graph, analyze, and interpret the radiation data.
* Help assess how well the radiation shield worked.

**♦ ASSEMBLING THE ARDUINO ♦**

The **COMPUTER SCIENTIST** is responsible for assembling the Arduino portion of the payload. To complete the assembly, you will follow a series of online step-by-step instructions. You can access the instructions at the following link:

[**wyomingspacegrant.org/space-radiation/computer-scientist**](http://wyomingspacegrant.org/space-radiation/computer-scientist/)

If your space agency has more than one **COMPUTER SCIENTIST**, you can either work together or split up the tasks.

Here are some tips for assembling the Arduino:

* Keep all your Arduino parts and supplies organized.
* Some components are fragile and can easily break. Handle them carefully!
* The radiation sensor needs to be mounted inside the radiation shield that the *Engineer* is constructing and facing upward, so make sure to use longer wires to connect it to the Arduino.
* After the Arduino and electronic components are fully assembled, use hot glue to secure all the connection points.

**♦ MANAGING THE ARDUINO CODE ♦**

The next step is to organize and edit the code so that the Arduino operates correctly. You must then upload the code to the Arduino and test it. Instructions for managing the code can be found at the same link given above.

Here are some tips for working with the code:

* The code for this activity is provided in disorganized blocks. You must figure out the correct order of these blocks for the code to work.
* The code is like a puzzle. If you spend time learning about the components of the code, you will have an easier time figuring out how to rearrange the blocks.
* Only edit the code when instructed to do so.
* If the code cannot compile, it will not upload to the Arduino.
* After uploading, use the serial monitor to watch the live data feed on a computer.

**RESEARCH SCIENTIST**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Agency: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**DESCRIPTION**

Congratulations on being hired as a **RESEARCH SCIENTIST** for your nation’s space agency! Your job is to provide research support for other people in your agency, which includes helping decide which materials to use for your agency’s radiation shield. You will also help test the payload prior to launch and lead the data analysis after.

**TASKS AND OBJECTIVES**

***Before the Launch***

* Meet with the rest of the agency to decide on an agency name.
* Look over the shielding materials that are available. Do some online research to find out which materials would be most effective at protecting your payload from cosmic radiation.
* Work with the *Engineer* and *Economist* to determine which materials to use for the radiation shield, considering the cost, mass, and effectiveness of materials.
* Help the *Engineer* and *Computer Scientist* test the payload.
* Begin filling out your agency’s **♦SCIENTIFIC OBJECTIVES WORKSHEET♦**.
* Provide the *Director* with information for their first Director’s Presentation.

***Launch Day***

* Help with any potential payload issues. Assist with the launch.

***After the Launch***

* Graph, analyze, and interpret the radiation data with assistance from the *Engineer* and *Computer Scientist*. Help assess how well the radiation shield worked.
* Provide the graphs to the *Director* for their final Director’s Presentation.
* Turn in your completed **♦SCIENTIFIC OBJECTIVES WORKSHEET♦**.

**♦ SCIENTIFIC OBJECTIVES WORKSHEET ♦**

The **RESEARCH SCIENTIST** will use this worksheet to document the scientific objectives of their space agency’s mission. This worksheet must be completed and turned in to the *International Advisor* before the final Director’s Presentation at the end of the project.

**Scientific Background (fill out BEFORE the launch):**

What radiation shielding materials did your agency use and why?

Predict how your shield will affect the radiation measurements at various altitudes.

**Shielding Results (fill out AFTER the launch):**

Describe your agency’s radiation measurements. How did they change with altitude? How do they compare to those from the unshielded control payload?

What does this tell us about how well your radiation shield performed? Are you surprised?

**ECONOMIST**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Agency: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**DESCRIPTION**

Congratulations on being hired as the **ECONOMIST** for your nation’s space agency! Your job is to make sure your agency stays within its budget and does not overspend. You are also responsible for purchasing shielding materials and keeping track of any additional money earned through social media.

**TASKS AND OBJECTIVES**

***Before the Launch***

* Meet with the rest of the agency to decide on an agency name.
* Work with the *Engineer* and *Research Scientist* to determine the best materials to use for the radiation shield.
* With approval from your director, purchase your agency’s shielding materials from the *International Advisor*.
* Communicate with the *Marketing Specialist* and keep track of how much extra money your agency is eligible to earn from social media follows.
* Document all transactions on your agency’s **♦BUDGET WORKSHEET♦**.
* Help the *Director* prepare their first Director’s Presentation. Provide information about how much money your agency has spent and earned.

***Launch Day***

* Coordinate any last-minute purchases of materials. Assist with the launch.

***After the Launch***

* Compile final budget statistics. Determine how much money your agency spent and earned during the activity.
* Provide the *Director* with a budget analysis for their final Director’s Presentation.
* Turn in your completed **♦BUDGET WORKSHEET♦**.

**♦ BUDGET WORKSHEET ♦**

The **ECONOMIST** will use this worksheet to document their space agency’s purchases and earnings. This worksheet must be completed and turned in to the *International Advisor* before the final Director’s Presentation at the end of the project.

**Transaction Spreadsheet:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Payment Slip #** | **Type of Transaction(choose one)** | **Purchase/Deposit (millions)** | **Balance****(millions)** |
| **---** | **---** | **---** | **+/–** | **---** | **$300** |
|  |  |  Purchase  Deposit |  |  $ |  $ |
|  |  |  Purchase  Deposit |  |  $ |  $ |
|  |  |  Purchase  Deposit |  |  $ |  $ |
|  |  |  Purchase  Deposit |  |  $ |  $ |
|  |  |  Purchase  Deposit |  |  $ |  $ |
|  |  |  Purchase  Deposit |  |  $ |  $ |
|  |  |  Purchase  Deposit |  |  $ |  $ |
|  |  |  Purchase  Deposit |  |  $ |  $ |
|  |  |  Purchase  Deposit |  |  $ |  $ |
|  |  |  Purchase  Deposit |  |  $ |  $ |

**Final Budget Analysis:**

1. Starting Budget: $ 300 million
2. Extra Funding Earned: + $ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Final Budget (A plus B): $ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Total Money Spent: – $ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Final Balance (C minus D): $ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**