

# Procedure “SEARCH AND RESCUE/ EMERGENCY EXPERIMENT. A REAL-LIFE PLANETARY EXPLORATION EVA EMERGENCY SCENARIO RECREATION”

## GENERAL INFORMATION

Principal Investigator	Dr. Gabriel G. de la Torre	
Author(s)	Dr. Miguel Ángel Ramallo, Sara González-Torre, Jelena Savic	
Version number	1	
Last edited on	Oct-2023	
Corresponding SEIF	File name	SEIF_Template_v3.3.1_PRESSURE_GG.pdf
	Version number	3.3.1.
	Last edited on	21.03.2024

## SHORT EXPERIMENT DESCRIPTION

During an EVA an accident occurs. The members who carry out the EVA will have a limited time to solve it, but to do so, they will also need the help of the member who has remained in the habitat. So they will have to communicate with each other to solve the problem.

## CHECKLIST

- ☐ Walkie talkie / Radio
- ☐ PC / Laptop
- ☐ Envelope “PRESSURE”
- ☐ Black box “AMADEE-24” with reward in habitat

## A. SET-UP HABITAT / BEFORE EVA

Step	Action	NOTES	Duration	Check
A1.	One of the crewmembers staying in the habitat may help the others in EVA. Two crew members go out to perform the EVA.	This scenario only takes place once. It will be the MSC who decides when it starts. The crew will not know the day chosen by the MSC. Safeties will pass the AAs the envelope as soon as the experiment starts.	20 min	
A2.	As in any EVA first decision is who will be part of the EVA and who will remain			

Step	Action	NOTES	Duration	Check
	at Habitat. The Flight Planning Team and MSC decide which members will carry out the sortie and which member will remain on base. In conclusion, one of the AA crew members stays in the habitat and can help the two AAs in the field, but he/she has no tasks/problems in front of him/her except Task 3, so the one in the habitat can help, but needs information on the tasks from the AAs in the field. This can be done by radio. The AAs in the field need to tell the digits to the AA staying in the habitat. The AA in the habitat needs to put the three digits in the lock of the black box and try to open it.	The black box stays in the habitat next to the AA, which is performing the PRESSURE experiment in the habitat.		
A3.	EVA protocols and activity should run as usual until MSC informs of the Emergency incident	Safeties will hand the envelope with the 3 problems to the AAs as soon as the experiment starts.	10 min	

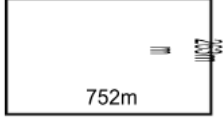



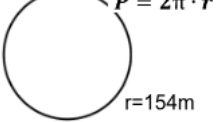
## B. EXPERIMENT RUN

Step	Action	NOTES	Duration	Check
B1.	During the EVA all AAs are informed by the MSC that an accident happened. A technical problem has been detected. A technical problem in the O2 valve of one of the crewmembers' spacesuit. Some calculations with a limited time are necessary to solve this. This technical problem needs to be solved as soon as possible but keep calm, the safety of the crew members is at danger! In order to solve the problem and restore the oxygen supply, it is necessary to enter a 3-digit deactivation code. In order to obtain those digits, the EVA-AAs problem-solving skills will be tested. To solve these three	<ul style="list-style-type: none"> <li>- It is not possible to send photos of the problems.</li> <li>- You can find the 3 problems (next page) they need to solve.</li> <li>- AAs in EVA will receive the 3 problems in an envelope from the safeties. (for safety and handy purposes)</li> </ul>	24 m	

Step	Action	NOTES	Duration	Check
	<p>problems (each problem's solution gives you one of the 3 digits needed) the two AAs in the field can only count on their intellect, and the help of one AA in the habitat, but you will only be able to communicate with him/her by radio and he/she doesn't see the tasks, except task 3.</p> <p>When the astronauts arrive at task 3, they need to communicate this to the AA in the habitat, so he or she can open the Task 3. Problem 3. png, which is found in the EMERGENCY folder and help the two AAs in the habitat.</p>			
B2.	<p>Once the AAs in the EVA have the 3 digits that they think are correct, they must tell them to the base personnel in the habitat to try to open the box in the habitat with these 3 digits. Therefore the AA at the base needs to enter these digits in a lock. They can try to enter the 3 digits as often as they want.</p>	<p>At the base they will have a box protected by the three-digit code. If they discover it (solving the 3 problems), they will be able to open it and there will be a reward. For MSC: the right code for the MSC can be found in the document MCC EMERGENCY EVA INSTRUCTIONS.pdf on the hive &gt; Science &gt; Experiments &gt; PRESSURE.</p>		

## C. PROBLEMS

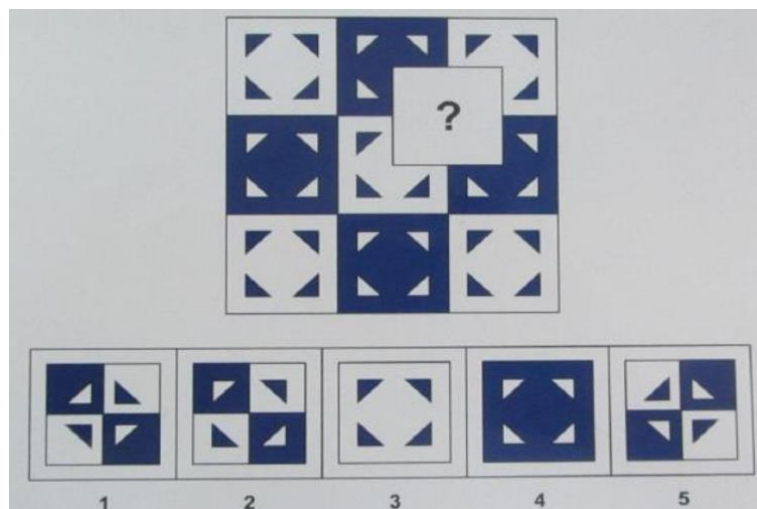
1) The first key is obtained as follows (Number of figures with SHORTEST perimeter value + 3)

1.	2.	3.	4.	5.
				

2) Solve the following operation to obtain the second DIGIT, IGNORING decimals:

$$\frac{(5^8 \times \sqrt{68}) - (9^4 \times 30)}{5 \times (1354 + 654)} - 294.98 =$$

3) Select from the options BELLOW the answer that best completes the matrix. (NOTE THAT the third crew member AT THE HABITAT has an image like this on the base)



## D. AFTER EVA

Step	Action	NOTES	Duration	Check
D1.	After completing the EVA, and with all the crew members back in the habitat, all members must complete the TEAM METER and the NASA TLX test.	Questionnaires (excel files) should be done after the EVA ends and back to base. Excel files are named EVA1 and EVA2 for the crew members who performed the EVA during the Emergency Scenario, and HABITAT 1 for the crew member who stayed at the base and helped them.	15 min	

## E. PREPARATION OF SCENARIO

Step	Action	NOTES	Duration	Check
E1.	It is necessary to install the Folder sent by Neurotek Lab called EMERGENCY on one of the base computers. This folder can be found on the Hive > AMADEE-24 project internal > Science > Experiments > PRESSURE. Here you can find the 3 excel files with the tests to be done by the crew members participating in the PRESSURE experiment, as well as the Task nr. 3 for the AA staying in the habitat. The black box needs to be prepared for the AA in the habitat. Place it visible for the AA in the habitat, so he/she can easily access it and try to enter the digits in the lock at the end.		15 min	
E2.	The two AAs which perform the experiment in the EVA will get the envelope handed by the safeties as soon as the MSC gives the start for the experiment.			
E3.	When the EVA designated by the MSC for the emergency scenario is			

Step	Action	NOTES	Duration	Check
	carried out, the crew will be informed to open the PRESSURE envelope.	The MSC needs to read the instructions from the first page of the document O2 EMERGENCY INSTRUCCIONES FOR CREWMEMBERS.pdf, which is on the Hive > Science > Experiments > PRESSURE. The instructions are marked yellow.		
E4.	MSC will indicate to the base that there is also a folder called EMERGENCY on the Computer, where they can find the questionnaires which need to be filled out after the EVA.			
E5.	AT THIS MOMENT THE EMERGENCY SCENARIO STARTS.	The AAs in the EVA have 24 minutes to solve the tasks.	24 m	