

MYP 2: DIGITAL DESIGN

ROBOTICS INVESTIGATION

TASK: INVESTIGATION

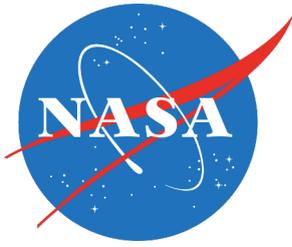
UNIT OVERVIEW

Key concept	Systems
Related concepts	Function, innovation
Global context	Scientific & technical innovation (Modernisation, industrialisation and engineering)
Statement of inquiry	Robotic systems are an invention, undergoing continual innovation, that can perform an almost unlimited variety of functions.

ASSESSMENT OVERVIEW

Within this pack is a series of tasks and challenges. The tasks will be assessed against Criterion A. The challenges will form part of the assessment towards Criterion C.

Congratulations Commander, you have received a mission briefing! Read it on the next page!



MISSION BRIEFING

To: Commander, Mars Base Alpha

A resupply vessel, bound for Mars Base Bravo, has crash landed some distance from its destination. Due to the hazardous environment and distances involved, it has been decided that a robot should be sent instead of using astronauts.

As Base Bravo lacks the proper robotics equipment, it will be your task to design and construct a robot that can find and retrieve the resupply vessel and transport it to Bravo.

Your robot will need to:

- Navigate through the roads of Alpha to safely leave the town in your base
- Drive across the *Olympus Mons* mountain ridges that don't yet have navigational markings
- Pass through the *Valles Marineris* valleys, avoiding the large rocks scattered around
- Find the resupply vessel in the *Hellas Planitia* plains
- Collect (pick up, push or pull) the resupply vessel; and
- Deliver it to Mars Base Bravo

Your robot should be autonomous enough so that it can succeed in its mission in the event communication with it is lost.

Your assistance in this matter is greatly appreciated. Successful delivery of the resupply vessel to Bravo will help ensure those astronauts don't run out of food.

Information will be provided to you in due course that will further describe each of the challenging conditions to be faced.

Yours truly,

A handwritten signature in black ink, appearing to be "Elon Musk".

Elon Musk

TASK 1: EXPLAIN THE PROBLEM

STEP 1: Study the given scenario.

STEP 2: Do some brief research into the following: (10 minutes working time)

- What factors might contribute to the environment on Mars being considered hazardous?
- Why might robots be an ideal solution to the problem presented?

Don't just use Wikipedia – find information from more than one source. Make note of the names and addresses of your source websites.

STEP 3: Write a paragraph that addresses the following: (15 minutes working time)

- What is the problem (your interpretation of it)?
- Why is the problem important? Why is it important that a working solution be found?
- Why is robotics considered the ideal solution to the problem?
- Provide evidence by quoting from the sources you found. Include your references at the end.

CHECK LIST

- Write a “comprehensive” paragraph that answers all the questions in step 3
- References from at least two websites included
- You have checked MYP Design Criterion A Strand 1 of the assessment criteria. You understand the requirements of the relevant command terms.
- Submit your response to the assignment on Google Classroom

TASK 2,3,4: LEARN THROUGH RESEARCH

Now that you have completed your research, it is time to summarise what you have learnt.

Prepare a table based on the template below, outlining the questions you need to answer in order to be able to produce your final working product for the Mars challenge.

Some ideas for research questions (you don't have to use these, and should come up with some of your own):

- How do I assemble a basic EV3 lego robot?
- How to I create a program that runs on the EV3?
- How do I create a program that turns the motors on and off?
- How do I use the touch sensor in a program?
- How do I use the ultrasonic sensor in a program?
- How do I use the colour sensor in a program?
- How can I create a program to make it's own decisions?
- How can I build a lego claw?

Some tips:

- Every programming video you watch should have taught you something about building or programming a Lego EV3 robot, so each of the videos watched should be listed.
- Every challenge you completed should have taught you something about building or programming a Lego EV3 robot, so each challenge you did should be listed.
- If you experimented with different designs, or searched for ideas on making claws etc, that should be listed.

Think of everything you have learnt about robots already (building the hardware, writing the software, how sensors work, how other robots work... etc)

Number	Category	Research question	Priority	Sources used	What we learnt / found out	How this will help me design or create our final project
1, 2, 3...	<i>Understanding the problem;</i> <i>Understanding the engineering;</i> <i>Understanding the programming;</i> <i>Understanding similar products</i>	<i>We will brainstorm some in class</i>	<i>critical, important, useful, optional</i>	<i>For websites etc, include the relevance reference.</i> <i>For teacher provided in-class exercises, just state the relevant lesson / exercise / challenge.</i>	<i>Try to keep to around 50 to 70 words per response. If some are more detailed that's fine but this shouldn't contain essays!</i>	<i>Try to keep to around 50 to 70 words per response. If some are more detailed that's fine but this shouldn't contain essays!</i>

CHECK LIST

- You have checked MYP Design Criterion A Strand 2, 3, and 4 of the assessment criteria. You understand the requirements of the relevant command terms.
- Summarise what you have learnt about each "skill".
- Answer each of the headings for each skill.
- Include screenshots, photos, links to videos if you wish
- In-text citation & references!
- Submit your response to the assignment on Google Classroom

ASSESSMENT CRITERIA

MYP 3 Design: Criterion A

3A	Needs identification	Research planning		Inspiration analysed		Design brief		
1-2	states the need for a solution to a problem	basic fact/s				states some of the main findings of relevant research	basic fact/s	
3-4	outlines the need for a solution to a problem	facts basic details	states the research needed to develop a solution to the problem, with some guidance	basic list	outlines one existing product that inspires a solution to the problem	basic fact/s; basic details	develops a basic design brief, which outlines some of relevant research	basic fact/s basic details incomplete
5-6	explains the need for a solution to a problem	facts details reasons why	constructs a research plan, which states and prioritizes the primary and secondary research needed to develop a solution to the problem, with some guidance	research questions; relevance of question; anticipated source; priority ranking; self-imposed deadline;	describes a group of similar products that inspire a solution to the problem	multiple products; facts; details;	develops a design brief, which outlines the findings of relevant research	facts; sufficient details;
7-8	explains and justifies the need for a solution to a problem	facts details reasons why evidence	constructs a research plan, which states and prioritizes the primary and secondary research needed to develop a solution to the problem independently	all of above plus: plan, if followed, will allow a solution without further guidance	analysis a group of similar products that inspire a solution to the problem	facts; details; reasons; evidence; how they inspire; & how they can be used;	develops a design brief, which presents the analysis of relevant research.	facts; details; reasons; evidence; how it can be used;