Stage 1 Physics

Skills and Applications Task

🚀 Kerbal Space Program Rocket Design Challenge 🚀

You are a rocket scientist in the Kerbal Space Program. (http://www.kerbaledu.com/)

You are competing with other rocket scientists to design, build, and test the best rocket, with your ultimate goal of capable of sending a Kerbal into orbit.

Piloting your rocket is very challenging so there is a good chance that you will not accomplish this goal.

You will iterate your design to the best of your ability. Assessment focuses on your understanding and articulation of the physics behind your design, failures, and successes.

Your choices in the design process need to be considered and understood so that you can explain in your report.

*Please note: Succeeding at getting your rocket into orbit is not necessary to produce a successful report.*

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| **Lesson** | **Activity** |
| *ONE*  Getting started.  Collaborative learning is encouraged. | 1. Download the Kerbal Space Program Demo.  2. Getting started. You could:   * Select training so you can learn construction and flight basics. * Consult the KSP wiki, e.g. *Basic Rocket Design* (45 minute tutorial) * Search for video tutorials e.g. *absolute beginners guide to KSP* |
| *TWO & THREE*  Rocket science! | Design, build and test your rocket and understand the physics behind the rocket. It is expected that you go through prototypes to arrive at your final design. Annotate the deconstructions to justify what you are doing as you create new prototypes. |
| *FOUR*  Preparation of the report.  Individual Work. | Your report may be presented as   * a 5 minute screencast. * a slideshow. * a poster.   Narration or annotations must explain the aspects of your rocket design and analyse the outcomes to form and justify a conclusion about its success or otherwise. |
| *FIVE*  Presentation. | Present to the class - maximum of 5 minutes. Peer feedback on the best design. Best designer to present their rocket design to the whole school assembly or in a one page synopsis for the school newsletter. |

You must consider and explain your choices of components and design using physics concepts that you have learnt through the topic such as (but not limited to) weight, thrust, drag, energy, heat, momentum, pressure, speed, acceleration, height, centre of mass, centre of thrust and centre of lift, rocket staging.

There is 1 week of class time to complete this task.

Student Name:

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KSP Rocket Design Challenge

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|  | **A** | **B** | **C** | **D** | **E** |  |
| **IAE1** | Critically deconstructs a problem and designs a logical and coherent physics investigation with detailed justification. | Logically deconstructs a problem and designs a well-considered and clear physics investigation with reasonable justification. | Deconstructs a problem and designs a considered and generally clear physics investigation with some justification. | Prepares a basic deconstruction of a problem and an outline of a physics investigation. | Attempts a simple deconstruction of a problem and a procedure for a physics investigation. | I |
| **IAE3** | Systematically analyses and interprets data and evidence to formulate logical conclusions with detailed justification. | Logically analyses and interprets data and evidence to formulate suitable conclusions with reasonable justification. | Undertakes some analysis and interpretation of data and evidence to formulate generally appropriate conclusions with some justification. | Describes data and undertakes some basic interpretation to formulate a basic conclusion. | Attempts to describe results and/or interpret data to formulate a basic conclusion. | I |
| **KA1** | Demonstrates deep and broad knowledge and understanding of a range of physics concepts. | Demonstrates some depth and breadth of knowledge and understanding of a range of physics concepts. | Demonstrates knowledge and understanding of a general range of physics concepts. | Demonstrates some basic knowledge and partial understanding of physics concepts. | Demonstrates limited recognition and awareness of physics concepts. | I |
| **KA2** | Applies physics concepts highly effectively in new and familiar contexts. | Applies physics concepts mostly effectively in new and familiar contexts. | Applies physics concepts generally effectively in new or familiar contexts. | Applies some physics concepts in familiar contexts. | Attempts to apply physics concepts in familiar contexts. | I |
| **KA4** | Communicates knowledge and understanding of physics coherently with highly effective use of appropriate terms, conventions, and representations. | Communicates knowledge and understanding of physics mostly coherently with effective use of appropriate terms, conventions, and representations. | Communicates knowledge and understanding of physics generally effectively, using some appropriate terms, conventions, and representations. | Communicates basic physics information, using some appropriate terms, conventions, and/or representations. | Attempts to communicate information about physics. | I |