

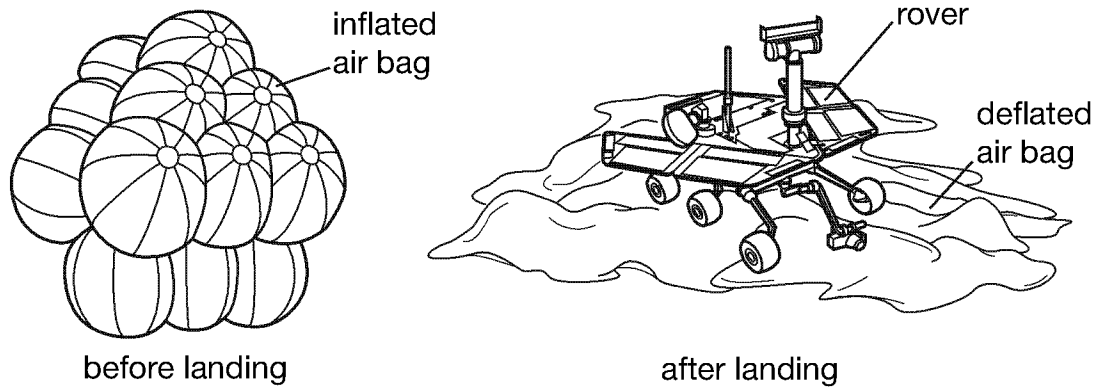
PSSA, Grade 8 Science

Rover Landing System

Handscoring Anchor Set

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

Part B: Explain how crash tests help engineers test the air bag design.

Rover Landing System Scoring Guide

2	<p>The response demonstrates a <i>thorough</i> understanding of how engineers use models to develop new and improved technologies to solve problems by</p> <ul style="list-style-type: none"> describing one benefit of using a computer simulation to test the air bag design before conducting crash tests and explaining how crash tests help engineers test the air bag design. <p>The response is clear, complete, and correct.</p>
1	<p>The response demonstrates a <i>partial</i> understanding of how engineers use models to develop new and improved technologies to solve problems by</p> <ul style="list-style-type: none"> describing one benefit of using a computer simulation to test the air bag design before conducting crash tests or explaining how crash tests help engineers test the air bag design. <p>The response may contain some work that is incomplete or unclear.</p>
0	<p>The response provides <i>insufficient</i> evidence to demonstrate any understanding of the concept being tested.</p>

Note: No deductions should be taken for misspelled words or grammatical errors.

Responses that will receive credit:

Part A (1 point):

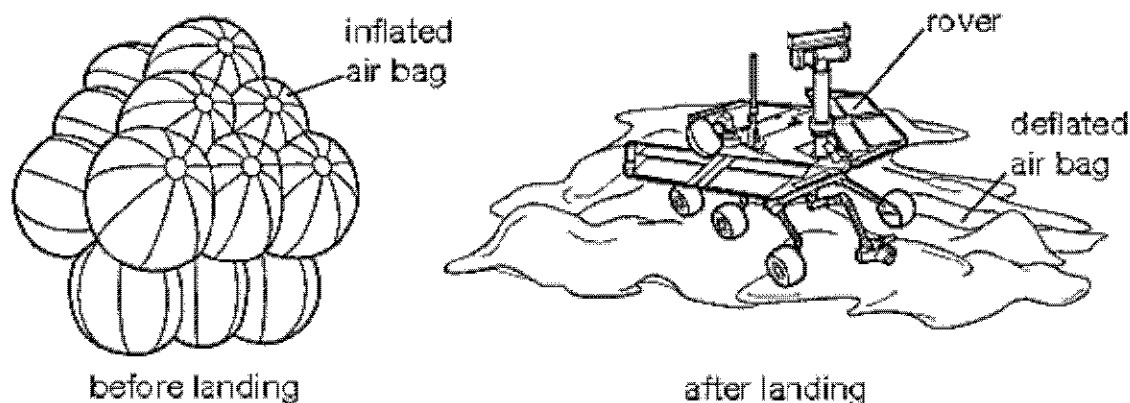
- One benefit of using a computer simulation to test the air bag design before a crash test is safety.
- Computer simulations can save money and/or resources during product development.
- Computer simulations benefit the testing process by modeling conditions in which equipment will operate that are not present on Earth (i.e. conditions on Mars).
- Computer simulations make the testing process easier by allowing for different calculations to be made and tested quickly and efficiently.
- Computer simulations make it possible to collect large amounts of data in a short time and at a lower cost than conducting crash tests.

Part B (1 point):

- Crash tests help engineers test the air bag design by allowing for direct observation.
- Crash tests allow engineers to put theory into practice by observing how materials within a product perform.
- Crash tests allow engineers to study landing gear materials after a crash to identify potential weaknesses in the materials, their production, or how the landing process was executed.

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

If it does not work on the computer you are saving time and money.

66 / 1000

Part B: Explain how crash tests help engineers test the air bag design.

When you do the crash test if something goes wrong you can improve it before actually using it.

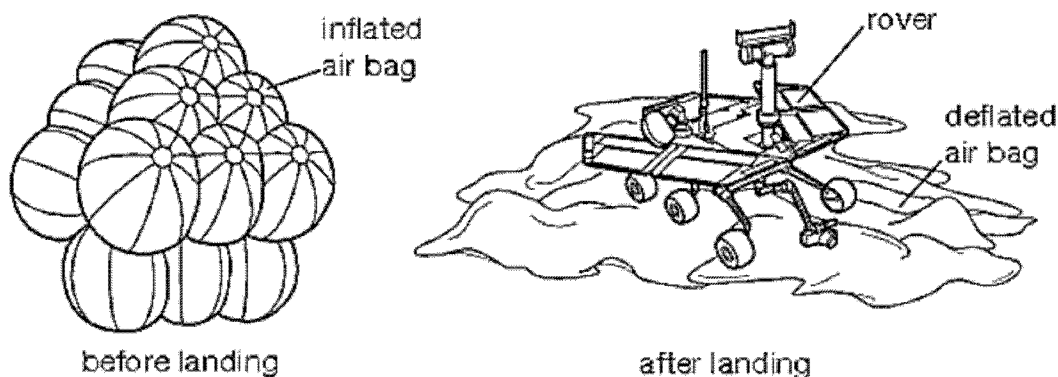
95 / 1000

A-1 Score Point 2

The response demonstrates a thorough understanding of how engineers use models to develop new and improved technologies to solve problems by completing both of the tasks presented. The student describes that "if it does not work on the computer you are [saving] time and money." This response is an acceptable description of a benefit of using a computer simulation. The student explanation how crash tests help engineer test the air bag design (*if something goes wrong you can improve it before actually using it*) indicates that crash tests can help identify potential weaknesses. This response is complete and correct.

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

There are numerous benefits to using simulations to test something, before you physically test it. For example: If you used a physical test each and every single time, you would need to start from scratch, but if you used a simulation, you can figure out what the most effective materials, patterns, and assembly would be before you even start building. Also, martian rovers are probably not cheap, so it's wise to use a simulated and inexpensive computer program in place of the delicate rover. If there was anyone driving the rover, or vehicles used during the crash test (which is unlikely, but possible), it would be wise to test the safety of the air-bags with a simulation before you endangered the lives of the crash tester.

728 / 1000

Part B: Explain how crash tests help engineers test the air bag design.

Let me give an example of the uses of crash tests using a short, simple illustration: Imagine there were two different ideas for the air bag designs before the crash tests; one scientist wanted the air bags to be square, the other wanted them to be circular. They crash tested each design, and discovered that the square air bags were 200% less effective than the circular air bags, even though the computer simulation said the two shapes were similar in effectiveness. Imagine if they hadn't used the crash test, and went with the square design! Their results would have been terrible, and they wouldn't have anticipated anything because they hadn't physically tested the air bags. This is the benefit of using crash tests.

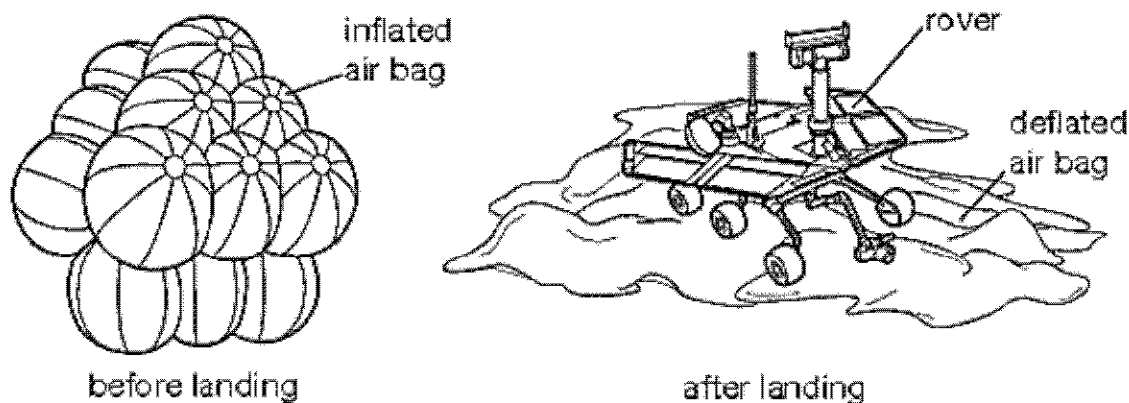
722 / 1000

A-2 Score Point 2

The response demonstrates a thorough understanding of how engineers use models to develop new and improved technologies to solve problems by completing both of the tasks presented. The student fully explains that the computer simulations would save resources, time and money. The student clearly indicates that the rover could be a manned vehicle. There is enough additional description to show engineers are not doing a test on car air bags. The student then explains that the engineers can use crash tests to actually observe the performance of the airbag. He/she indicates that the computer simulation may not be as accurate as actually watching the rover crash and evaluating the effectiveness of the airbags. This response is complete and correct.

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

it saves time and money.

24 / 1000

Part B: Explain how crash tests help engineers test the air bag design.

it helps them decide what needs to be changed so it will work properly.

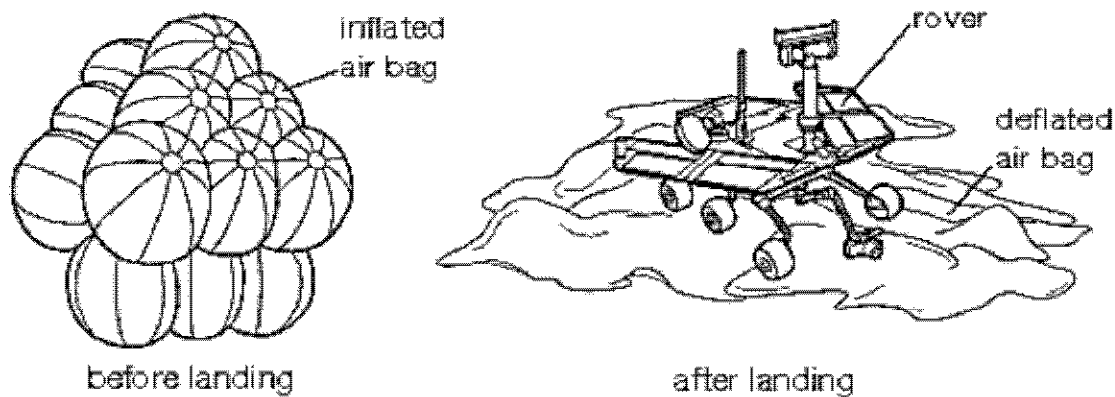
71 / 1000

A-3 Score Point 2

The response demonstrates a thorough understanding of how engineers use models to develop new and improved technologies to solve problems by completing both of the tasks presented. The student correctly states the benefits of using a computer simulation is "it saves time and money." The student goes on to explain that crash tests can help engineers test the air bag design by "[helping] them decide what needs to be changed so it will work properly." This indicates that a crash test can help identify potential weaknesses of the design and help them improve the performance. This response is complete and correct.

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

This is helpful so that you know if the experiment is worth while. If the air bags don't protect the rover at all during the computer simulation, well then their probably not going to protect them during the test in real life. You will use the computer simulation to find out if your design is even good enough to actually be tested.

335 / 1000

Part B: Explain how crash tests help engineers test the air bag design.

The crash tests help because they show the engineers how well their design would protect the rover in a crash such as the rover landing on Mars. They help to show if the design would be able to work at the right times and in the right situation.

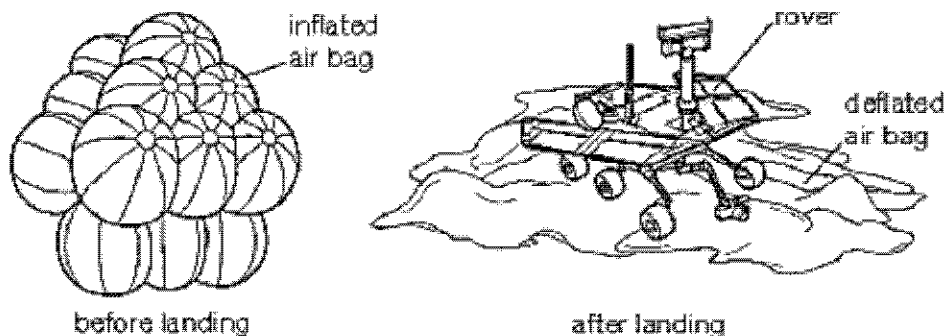
246 / 1000

A-4 Score Point 2

The response demonstrates a thorough understanding of how engineers use models to develop new and improved technologies to solve problems by completing both of the tasks presented. The student describes that a benefit of a computer simulation is "to find out if your design is even good enough to actually be tested." The additional part of the response indicates that engineers could save time and resources by running computer simulations first. The student explains that the crash test can help show engineers "how well their design would protect the rover in a crash." This response is enough to indicate that engineers can directly observe the product performance. The response is complete and correct.

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

One benefit from using a computer simulation to test the air bag design before conducting crash tests is because a computer is sometimes better at predicting things rather than the human brain. I always thought that a computer could do much more work and improvement than an actual human being. Im also seeing and hearing now that more and more compaines arent even doing there work by hand, just pressing a botton to get the work done. And plains are being fied by a talking computer not by the actual piolet? Obviously, using a computer to get the work done rather then using your hands has been really smart latley. Thats why I think using a computer would a benifit rather than using the human hands for the crash, becuae one the computer knows more and its smarter.

771 / 1000

Part B: Explain how crash tests help engineers test the air bag design.

The crash helps enigneers because they will be able to see what they need to improve or take out plus fix. I think testing things before using them is always a smart idea becuae they might think that its perfect until they crash it and something goes wrong. Thats why I think them using the crash tests can help them because if they dont test it and it kills a human being, they could lose there business or get fired or even take a life!

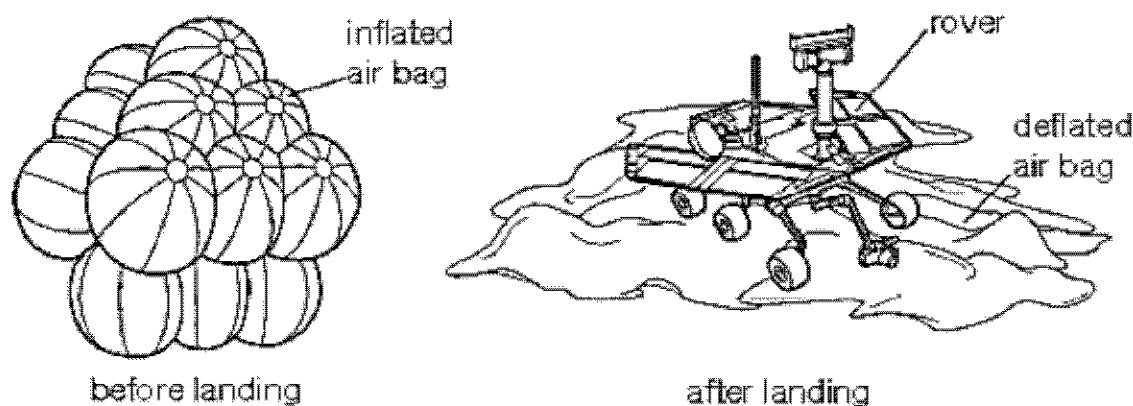
440 / 1000

A-5 Score Point 1

The response demonstrates a partial understanding of how engineers use models to develop new and improved technologies to solve problems by completing one of the tasks presented. The student describes why companies would run computer simulations, but the benefits are not presented clearly. There is no credit earned for this part of the response. The student continues to explain that "crash [tests] helps engineer because they will be able to see what they need to improve or take out plus fix." This part of the response is enough for credit. The commentary about why he/she thinks performing a crash test is good practice does not detract from the correct answer. This response contains some information that is unclear and receives partial credit.

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

If you use a computer to build and test the air bag first then you would know where to put the details and where to put the air bag before taking the time to use the tools and build it, then you will have an idea on how the compartment of the air bag and all of the details with it will work throughout your experiment.

319 / 1000

Part B: Explain how crash tests help engineers test the air bag design.

The crash test will help because if an actual person got into a crash then you know how the air bag will react and the changes you need to make on it before distributing it to the world to use for safety.

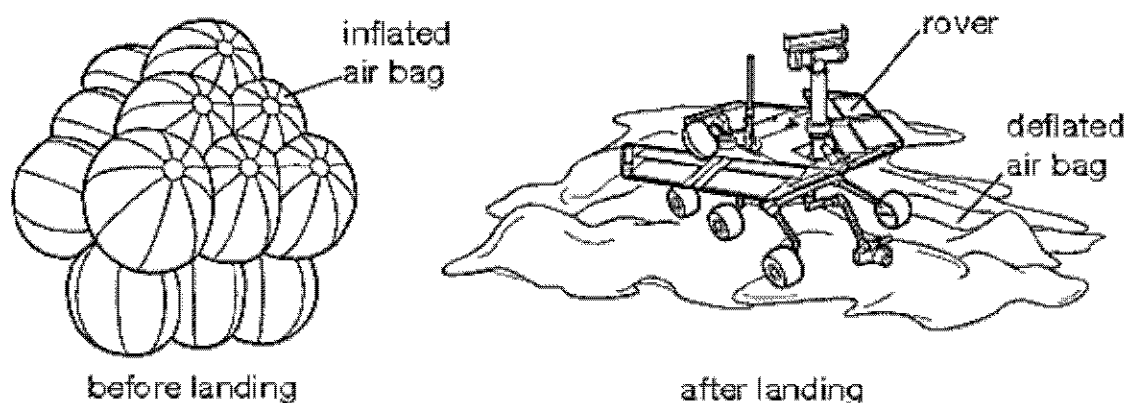
203 / 1000

A-6 Score Point 1

The response demonstrates a partial understanding of how engineers use models to develop new and improved technologies to solve problems by completing one of the tasks presented. The student describes a benefit of a computer simulation is that "...you would know where to put the details and where to put the air bag before taking the time to use tools to build it..." This response indicates that a computer simulation will save time and resources. The explanation of how crash tests help engineers test the air bag design contains the misconception that these airbags will be distributed to the world for passenger safety (seemingly in cars) which is not acceptable. These types of responses can only receive partial credit.

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

They test them on computers to test them and not to fail.

57 / 1000

Part B: Explain how crash tests help engineers test the air bag design.

The crash tests help them to see how good it lands or bad it lands.

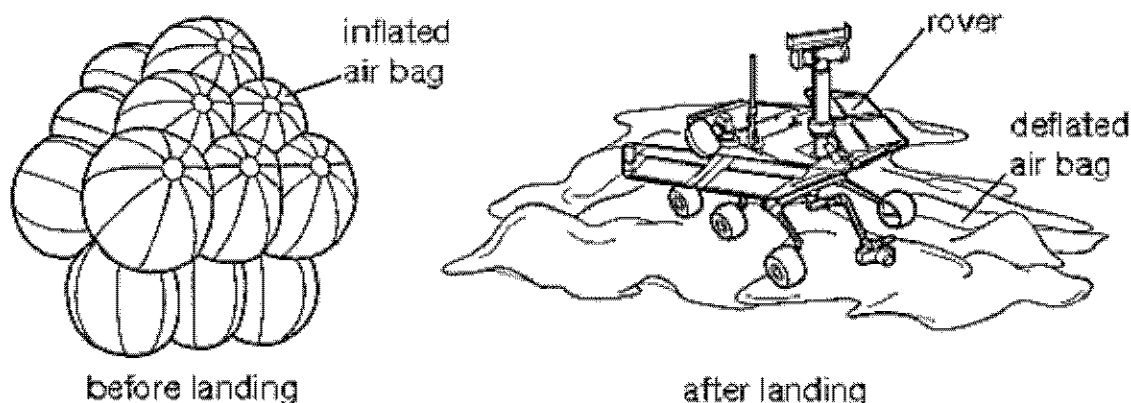
67 / 1000

A-7 Score Point 1

The response demonstrates a partial understanding of how engineers use models to develop new and improve technologies to solve problems by completing one of the tasks presented. The description of the benefit of using a computer simulation (*to test them and not to fail*) is too general to be given credit. The explanation how crash tests help engineers test the air bag design (*help them to see how good it lands or bad it land*) is acceptable. Engineers that use crash tests can directly observe the product performance to make sure it works. This response contains work that is unclear and receives partial credit.

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

One benefit is knowing that the air bag is helpful and safe for car crashes.

76 / 1000

Part B: Explain how crash tests help engineers test the air bag design.

Crash test help engineers know if the air bag will help and protect the driver when he/she is in a car wreck.

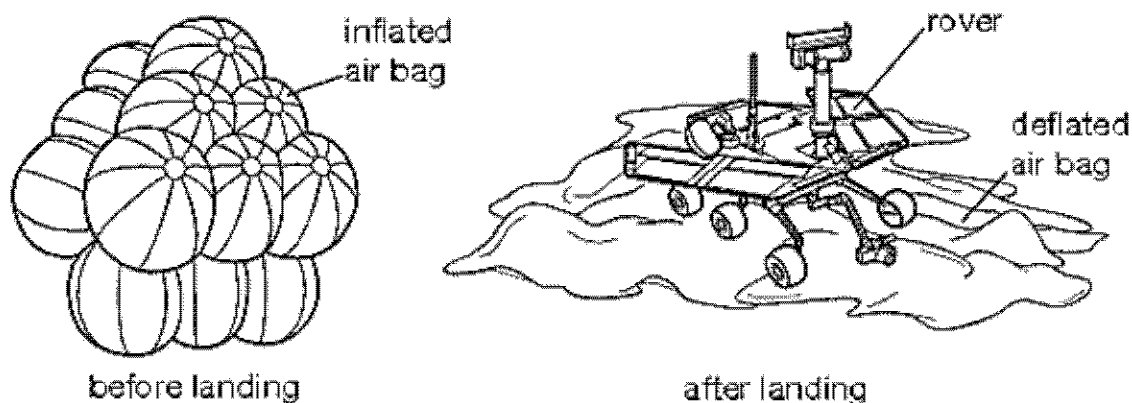
110 / 1000

A-8 Score Point 0

The response demonstrates insufficient understanding of how engineers use models to develop new and improved technologies to solve problems by completing none of the tasks presented. The student response clearly describes the results of a car air bag crash test. This type of response demonstrates a misunderstanding of the prompt and receives a score of zero.

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

it gives you a better understanding to see if it will work

58 / 1000

Part B: Explain how crash tests help engineers test the air bag design.

to see if the airbags would come out to protect the people in it.

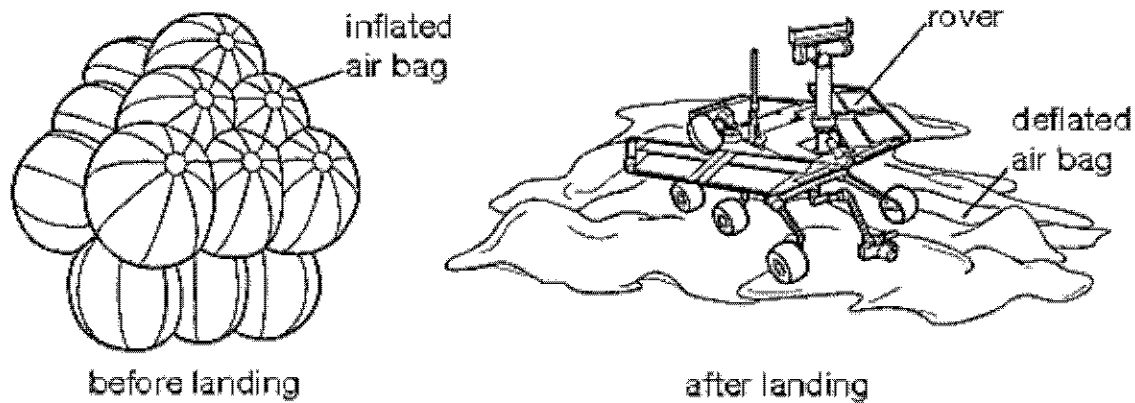
65 / 1000

A-9 Score Point 0

The response demonstrates insufficient understanding of how engineers use models to develop new and improved technologies to solve problems by completing none of the tasks presented. The description of one benefit of using a computer simulation (*gives you better understanding to see if it will work*) is incomplete. The computer simulation will not show engineers if the design will actually work, they would still need to perform a crash test. The explanation how crash tests help engineers test the air bag design contains the misconception that the air bags will be used to protect the people in the rover. This is response does not demonstrate enough understanding for credit.

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

so that people know that the rover is not ruined

48 / 1000

Part B: Explain how crash tests help engineers test the air bag design.

to get a safe landing

21 / 1000

A-10 Score Point 0

The response demonstrates insufficient understanding of how engineers use models to develop new and improved technologies to solve problems by completing none of the tasks presented. The student description (*so that people know that the rover is not ruined*) is not an acceptable benefit of using a computer simulation. Since it is only a simulation, engineers must still run a crash test to see if the product actually works. The explanation of how crash tests help engineers test the air bag design is not acceptable for credit. This response does not show enough understanding to receive credit.

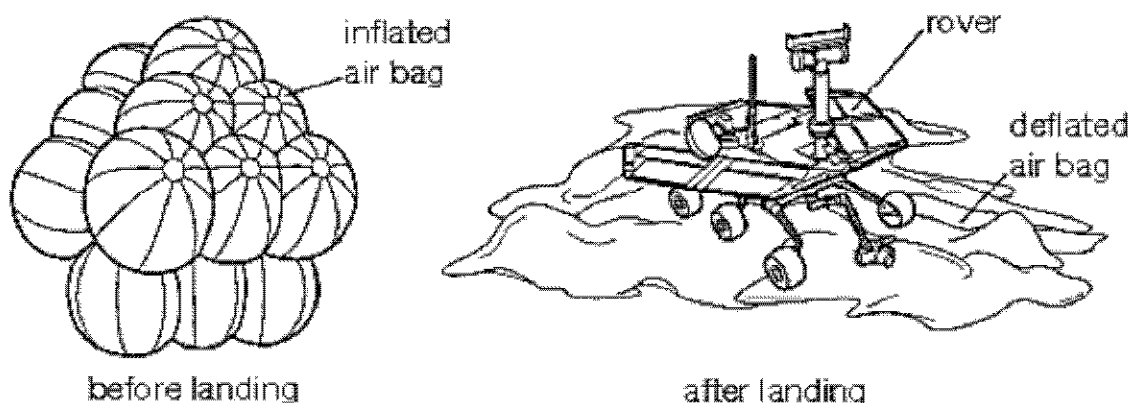
PSSA, Grade 8 Science

Rover Landing System

Handscoring Training Set 1

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

Using a computer stimulation would be better to do before starting the crash test, because if they take the crash test first then they could possibly ruin the Rover which would not be the smartest thing to do.

209 / 1000

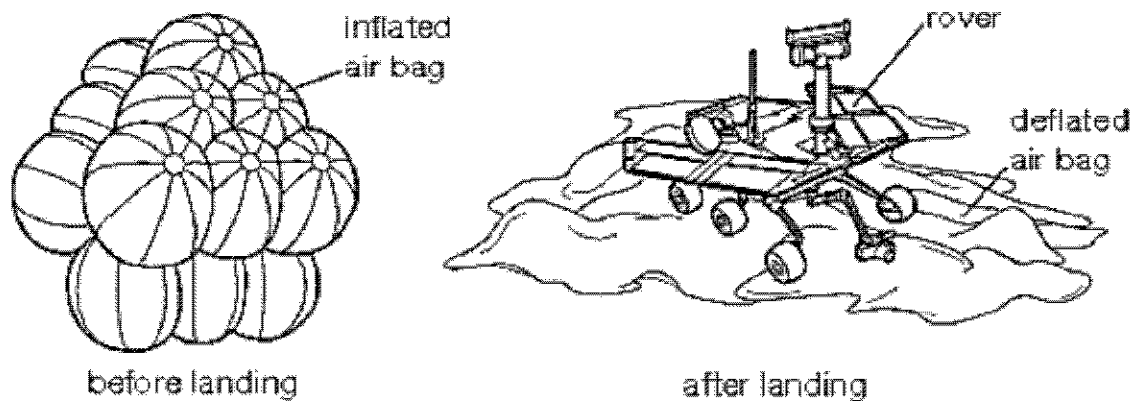
Part B: Explain how crash tests help engineers test the air bag design.

Crash tests help Engineers test their air bag design, because if they just get in and take and crash, then they could die, so they take tests first that way they know its safe to be in. Also i think that it would be safer to do first instead of just getting in right away.

271 / 1000

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

one benefit of using a computer simulation before crash testing it is to see if you need to make any changes to it because if you go right in to the crash test with a whole bunch of crash testers the first one you test will show what you need to change but then you need to trash the other copies because they are no good to use anymore. that is why it is a benifit to use a computer simulation before crash testing.

416 / 1000

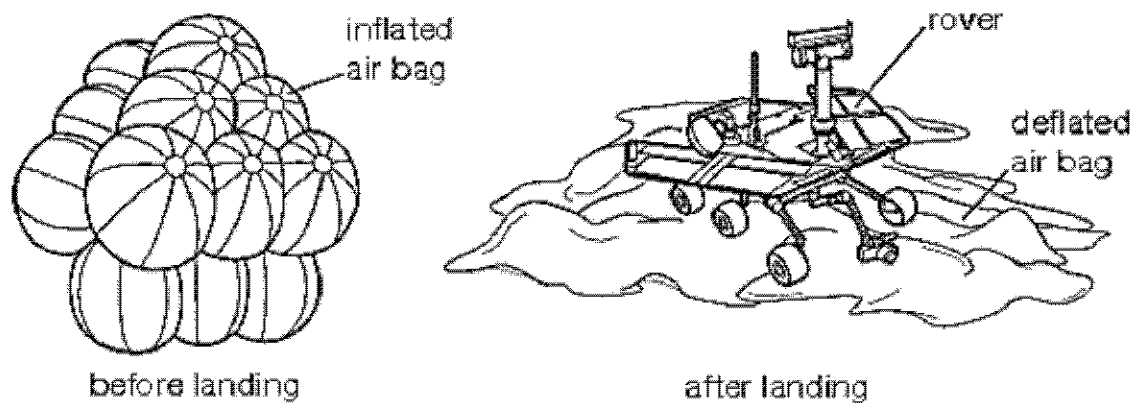
Part B: Explain how crash tests help engineers test the air bag design.

The crash test help the engineers test the air bags because it will allow them to make notes and observe what they need to improve on if they need to improve on anything.

170 / 1000

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

One benefit of using a computer simulation to test the air bag design before conducting crash tests is, so that you know what to do and you will know what to expect when you do your crash test's

195 / 1000

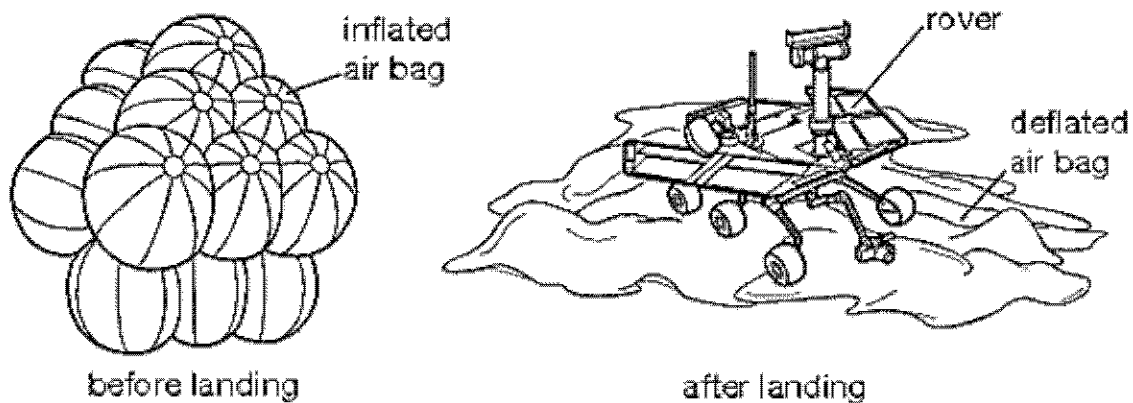
Part B: Explain how crash tests help engineers test the air bag design.

Crash tests help engineers test the air bag design by showing what the flaws are and what they will need to fix before they send it up into space to have a successful experiment.

178 / 1000

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

A computer simulation can see if the rover will brake or be okay in the reel landing

83 / 1000

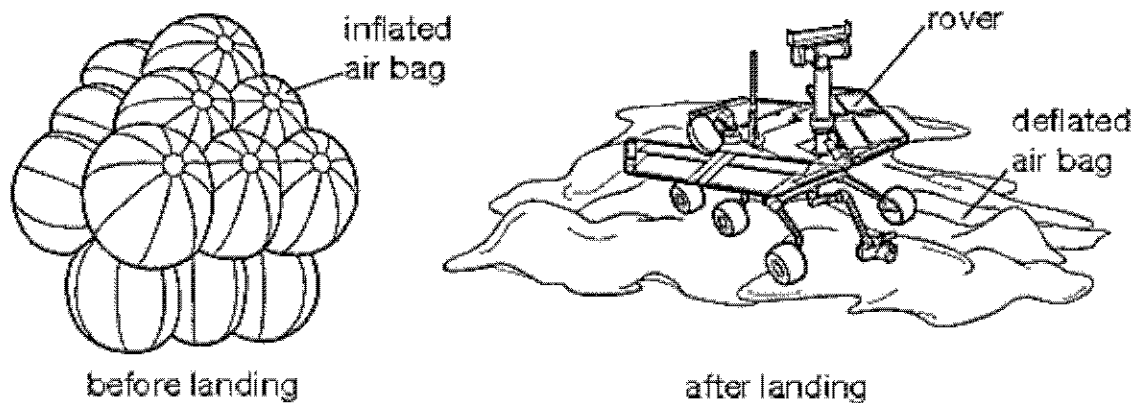
Part B: Explain how crash tests help engineers test the air bag design.

They use comuter simulations and test them on car and other things

66 / 1000

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

they can set up the test.

25 / 1000

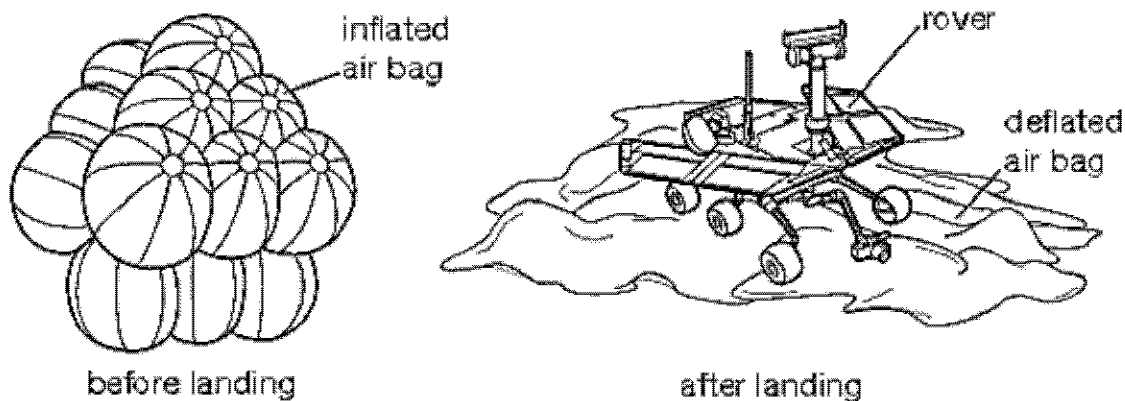
Part B: Explain how crash tests help engineers test the air bag design.

they tell wether the airbag will protect the object or not.

59 / 1000

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

When you use the computer simulation you know what will possibly work without wasting materials to conduct crash tests.

119 / 1000

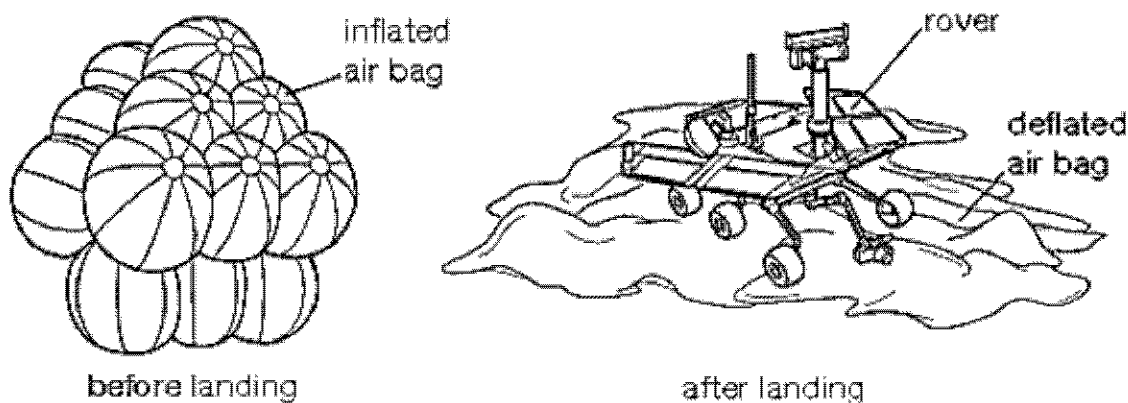
Part B: Explain how crash tests help engineers test the air bag design.

A crash test shows what would happen in real life with the landing.

67 / 1000

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

because it would have just been a waste of time and materials if the air bag is not going to even work. so that if you use a computer simulation then to can use a diagram to find out what is not working.

206 / 1000

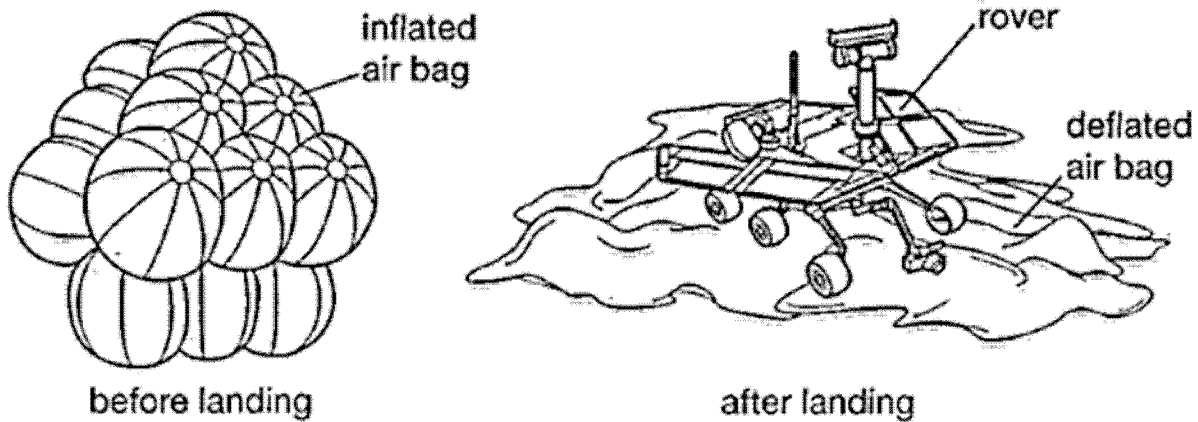
Part B: Explain how crash tests help engineers test the air bag design.

so that they know if they crash then they will be protected by the air bag. and also so no one gets hurt.

105 / 1000

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

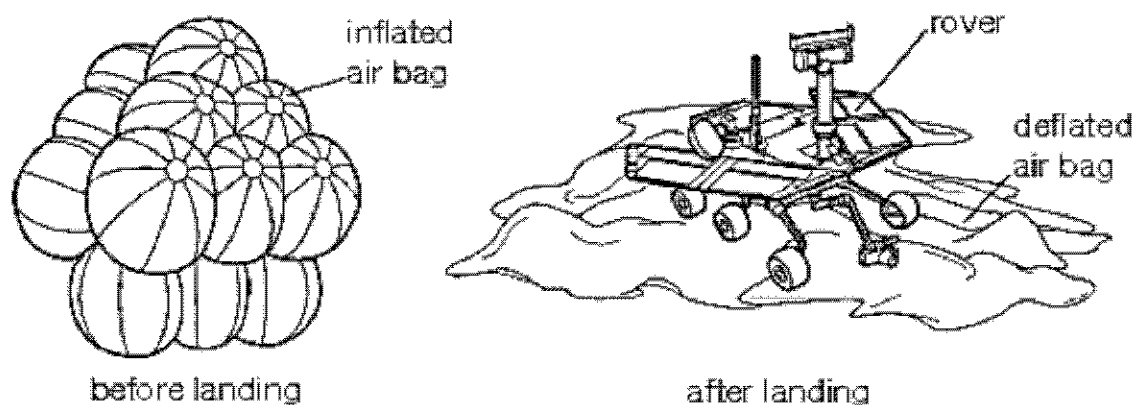
So you wouldn't spend much money on cars.

Part B: Explain how crash tests help engineers test the air bag design.

To test it on dummies when people are in car accidents.

Use the diagram below to answer the question.

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

Because it's safer to do things on the computer first so when they do the experiment they would blow anything and will have a heads up. Also it is a benefit to test the air bag on the computer because if they fail then they don't have to waste time on conducting an experiment they already know won't work if it didn't work on the computer.

339 / 1000

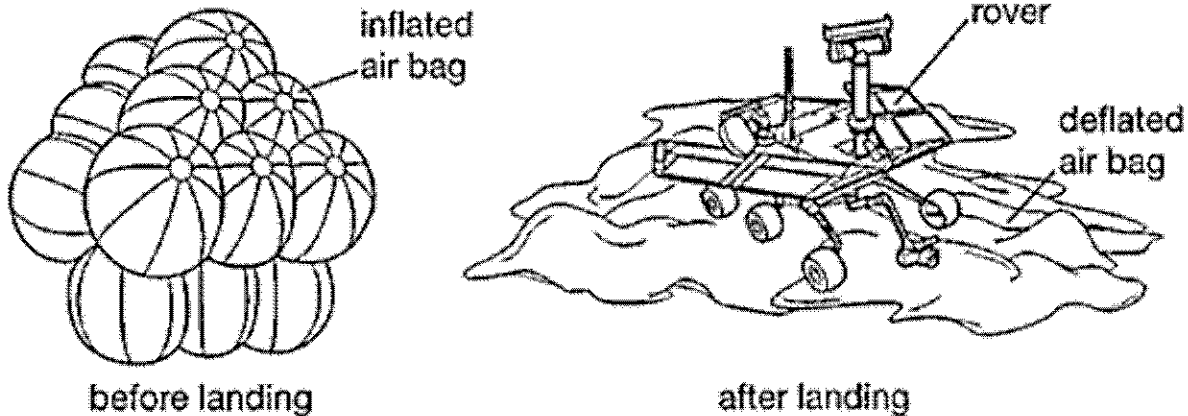
Part B: Explain how crash tests help engineers test the air bag design.

When the engineers use the test vehicles then they will see what really happens when the Rover uses airbags.

108 / 1000

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

One benefit of using a computer is that you really can't tell now it's gonna turn out. But also gives an idea.

Part B: Explain how crash tests help engineers test the air bag design.

The crash test help them by getting a idea of what's really gonna happen.

Subject: **Science**

Item: **Rover Landing System**

Grade 8

Name _____

Number	Score	Notes
T1-1		
T1-2		
T1-3		
T1-4		
T1-5		
T1-6		
T1-7		
T1-8		
T1-9		
T1-10		

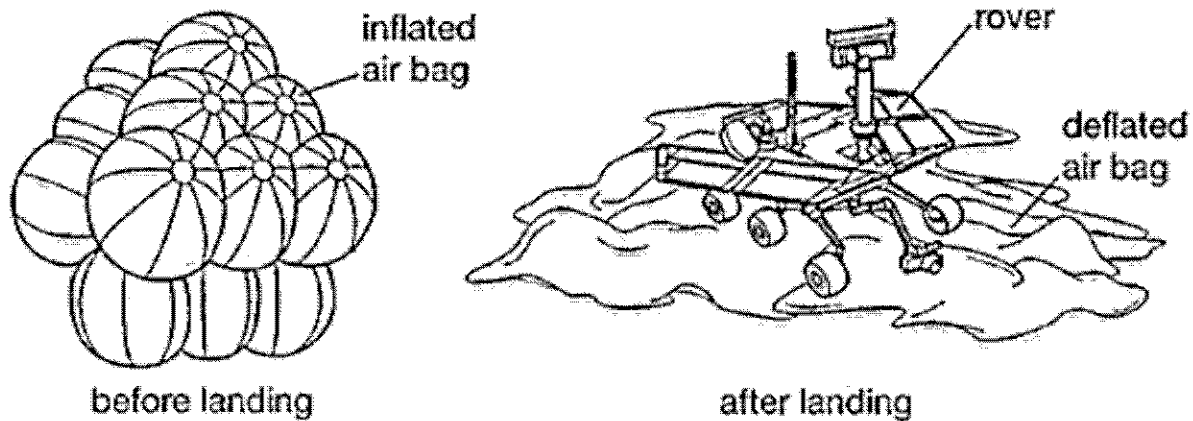
PSSA Grade 8 Science

Rover Landing System

Handscoring Training Set 2

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

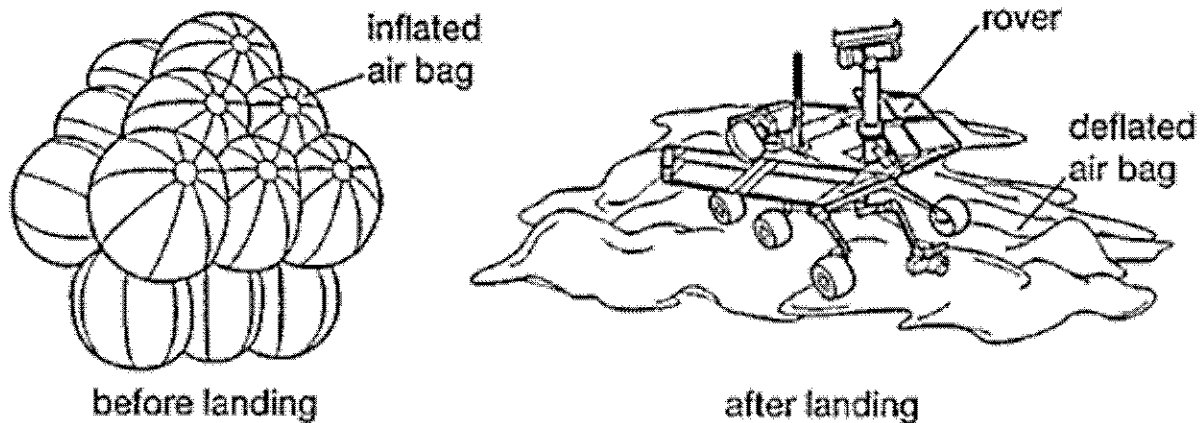
It gives scientist a very
real and close simulation to
what may happen

Part B: Explain how crash tests help engineers test the air bag design.

They can help test it because
if the air bag doesn't work they
can observe the failure and fix
the problem

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

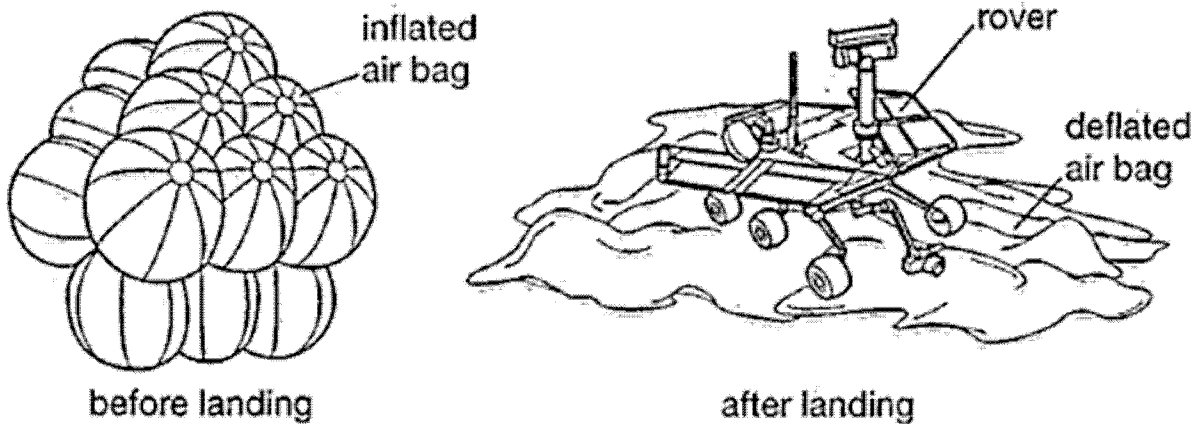
By using a computer first, the engineers got to see a general idea of how it if the landing system would work.

Part B: Explain how crash tests help engineers test the air bag design.

Crash tests help because the engineers get to see what is happening and why the air bag design is or isn't working.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

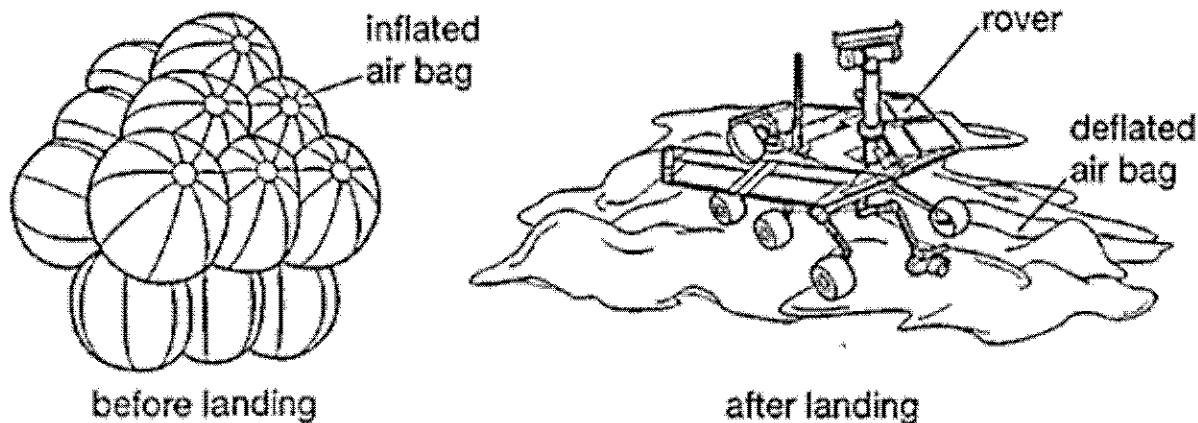
By using the computer simulation, the real design wouldn't become damaged by the test because it's just a simulation.

Part B: Explain how crash tests help engineers test the air bag design.

The test lets them know how the design held up. If the design works good and does its job.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

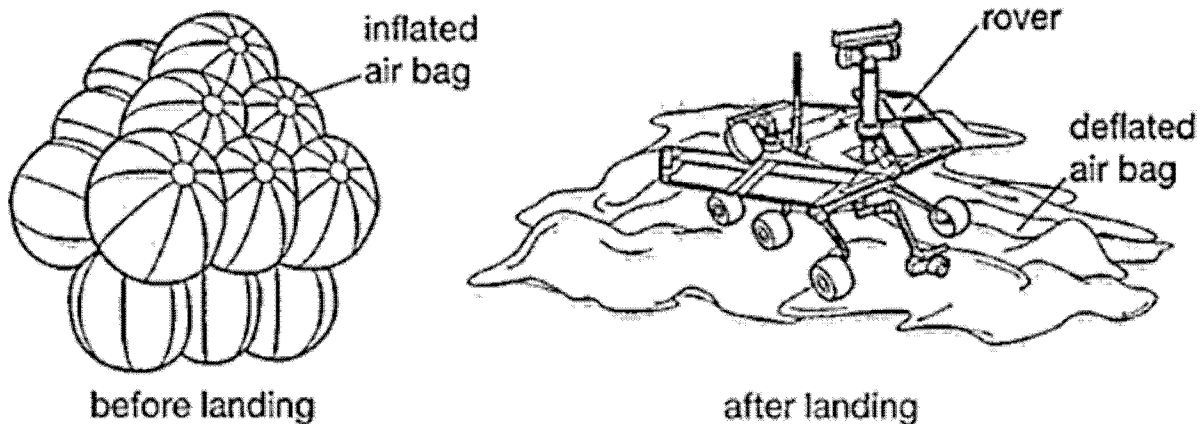
To see if it will brake when it lands.

Part B: Explain how crash tests help engineers test the air bag design.

It helps them because its like a test to see what goes wrong.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

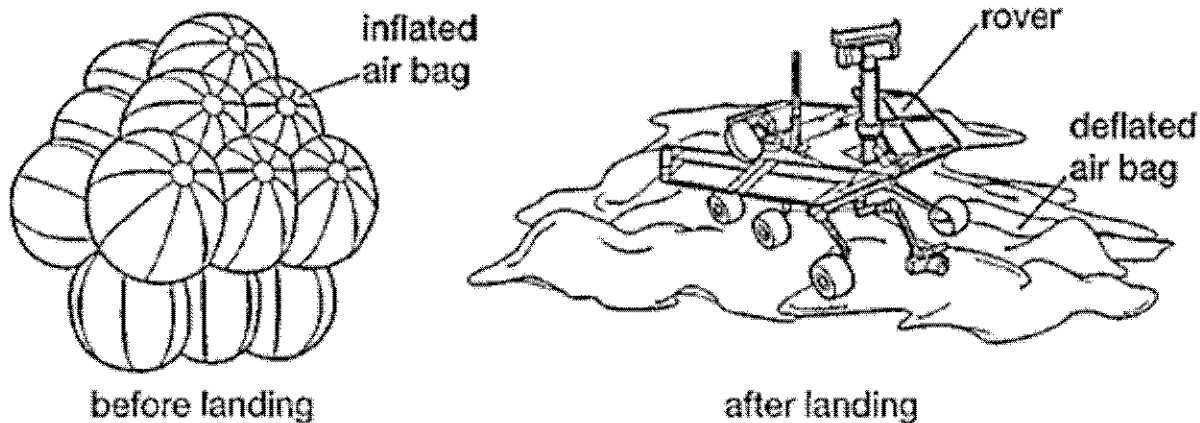
A Benefit is so if you know its not gonna work on computer you dont waste materials.

Part B: Explain how crash tests help engineers test the air bag design.

It lets them know if the air bag is strong enough and know if its going to pop or not.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

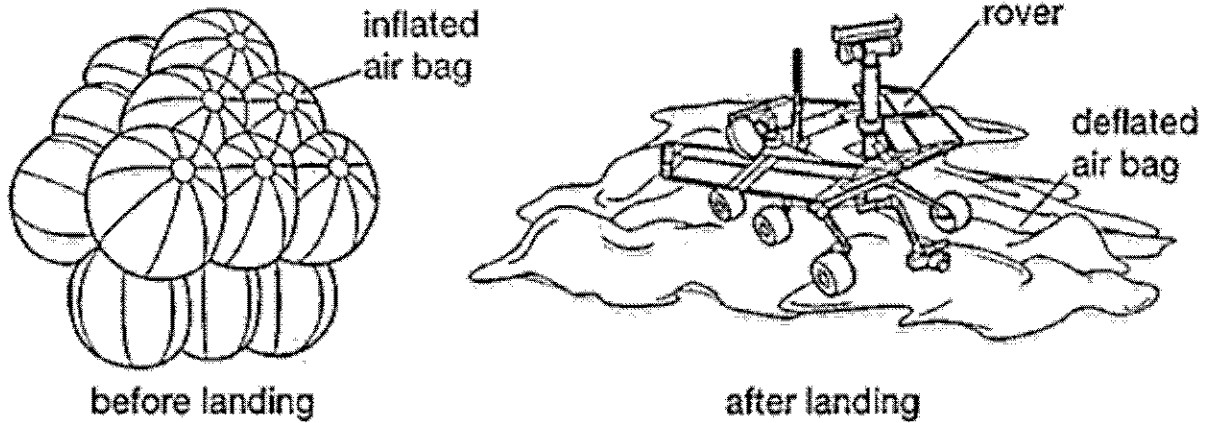
It will give you an idea if the landing system will work.

Part B: Explain how crash tests help engineers test the air bag design.

The crash tests will tell the engineers the air bags will more than likely work.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

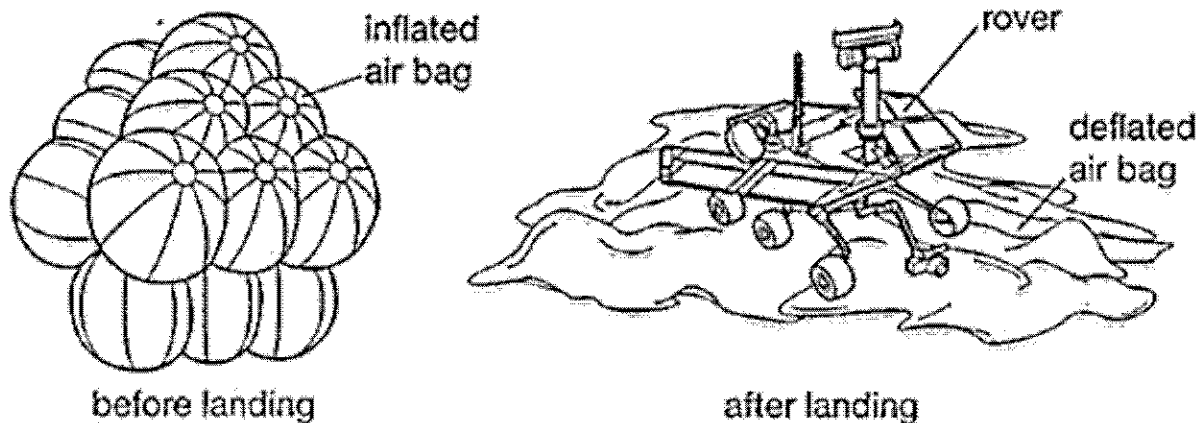
So if you crash the air bag
will save you

Part B: Explain how crash tests help engineers test the air bag design.

To see if it works first

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

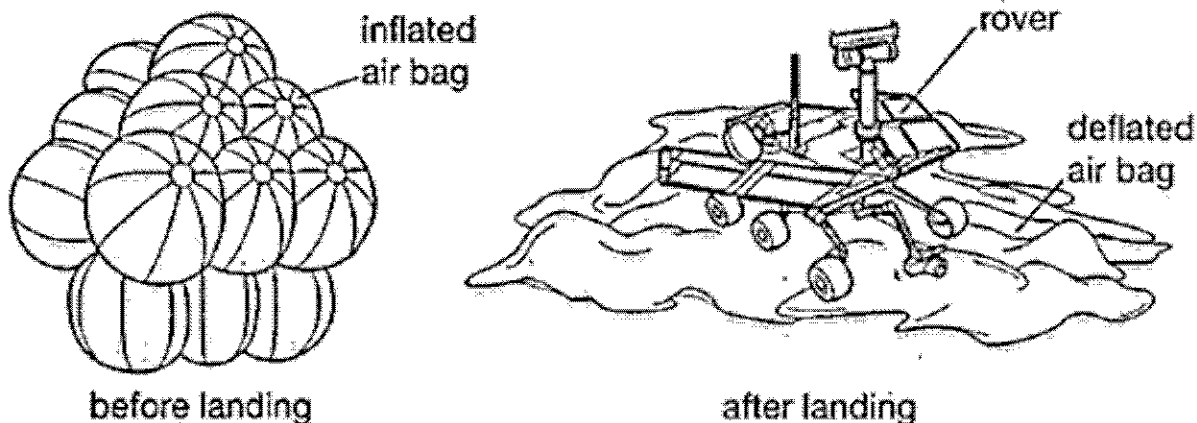
By conducting a computer simulation first, you have a better idea of how the crash test will go.

Part B: Explain how crash tests help engineers test the air bag design.

Crash tests show how the rover will react if the landing goes wrong.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

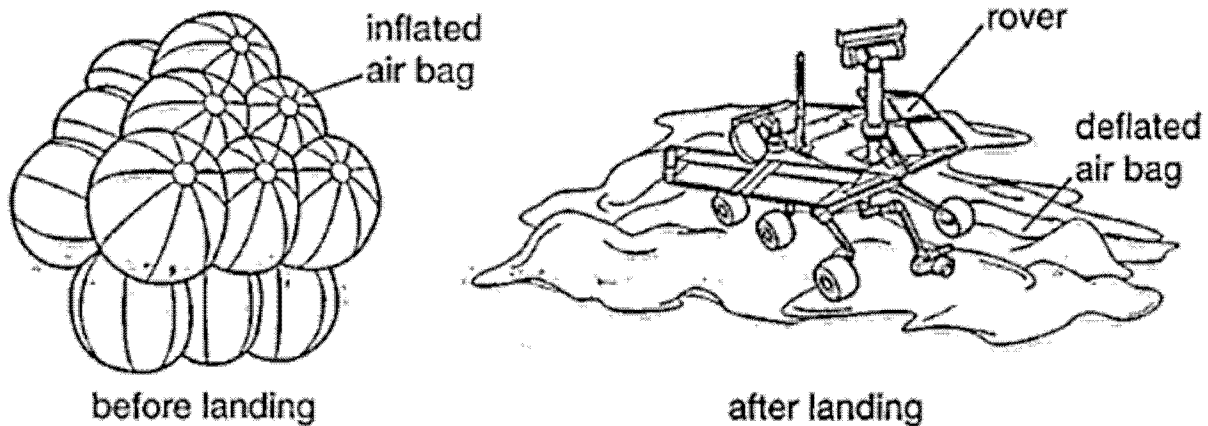
So they could predict what would happen and fixed the problem.

Part B: Explain how crash tests help engineers test the air bag design.

The crash tests tell them what they need to improve in before sending them off.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

They will know if the product works or not.

Part B: Explain how crash tests help engineers test the air bag design.

They can use vehicles that aren't important to test things for vehicles that are important.

PSSA Grade 8 Science

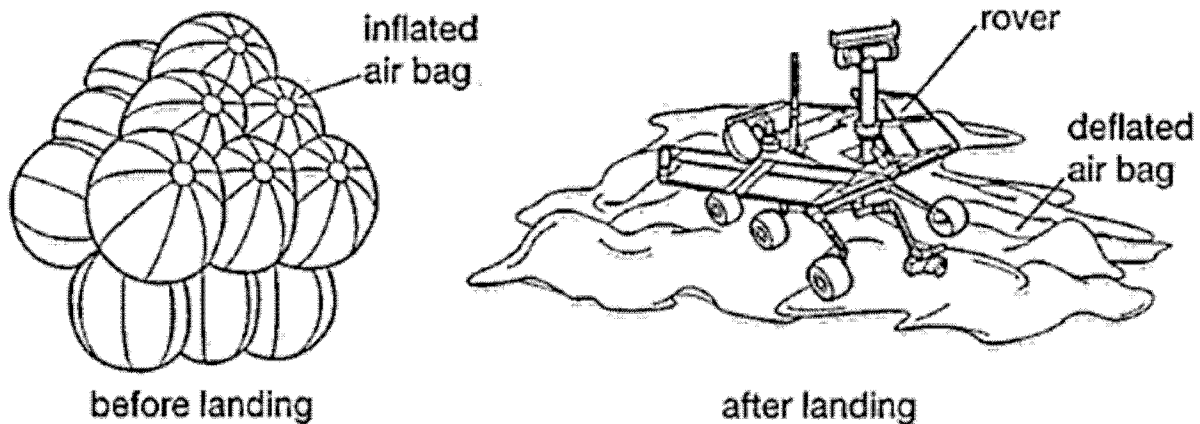
Rover Landing System

Handscoring Practice Set^{*}

*Responses in this set do not have true scores. Apply scores based on scoring criteria.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

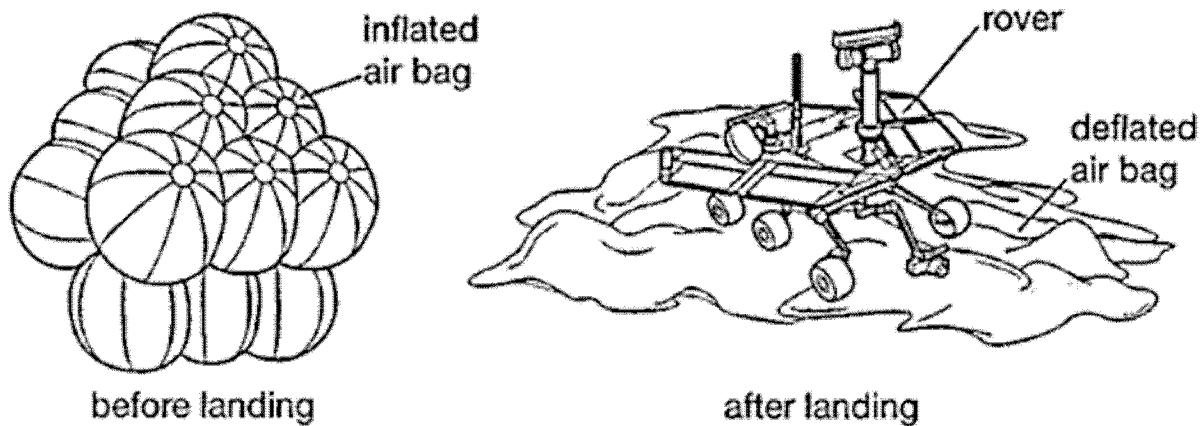
Using a computer simulation to test the air bag design is best because that way anything won't be destroyed in the process with the computer simulation.

Part B: Explain how crash tests help engineers test the air bag design.

Crash test help engineers to test the air bag design because to see how the air bag will help prevent anything from getting broken.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

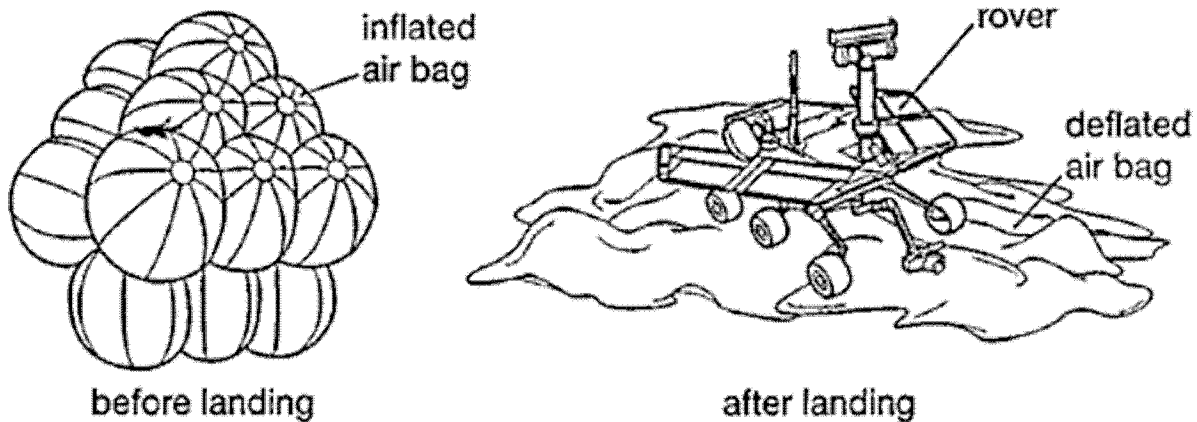
Using a computer simulation can tell you if it may work before you waste money on the real crash tests.

Part B: Explain how crash tests help engineers test the air bag design.

The actual thing is very expensive to make so scientists use similar objects to simulate how it will be with the actual thing.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

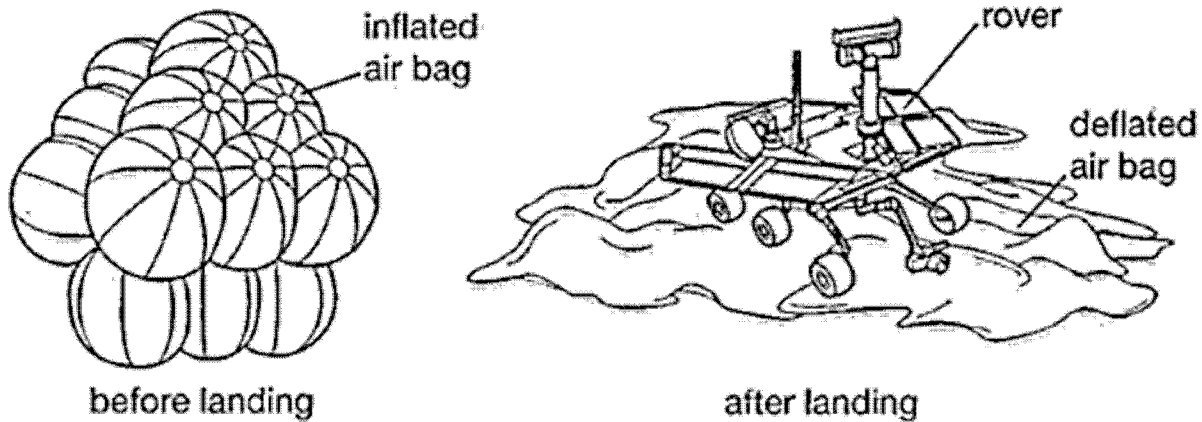
They would be able to eliminate some air bag designs which would save them money

Part B: Explain how crash tests help engineers test the air bag design.

They would eliminate more designs since they would not have to worry about putting numbers into a computer.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

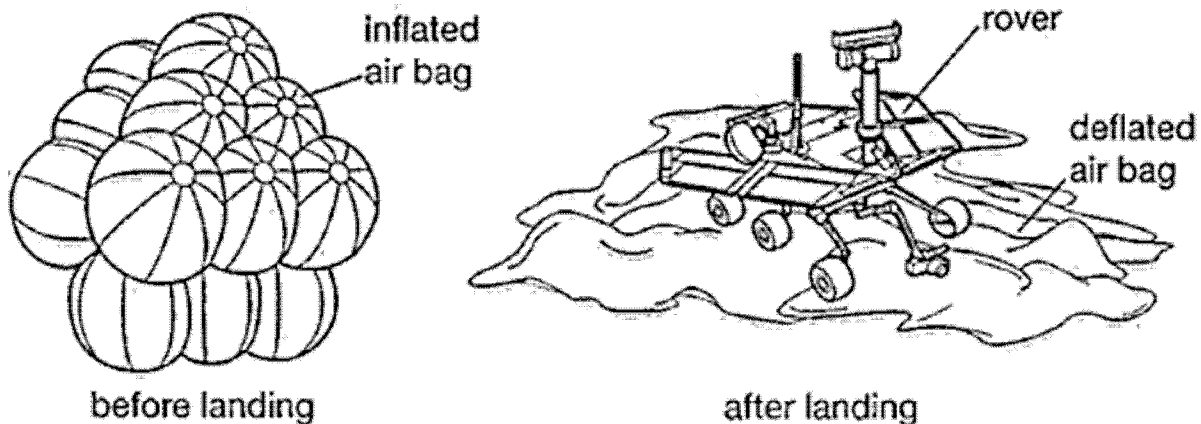
You don't have to physically go through the process of making several "dummies" to test, to see if they will work or not.

Part B: Explain how crash tests help engineers test the air bag design.

It allows engineers to see which designs do and do not work before making the final product.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

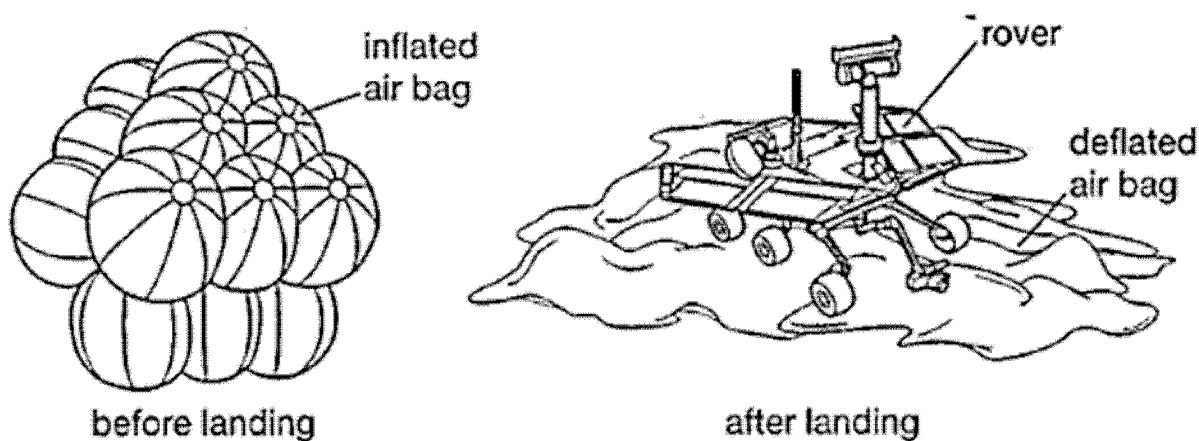
To make sure the air bag will work at all.

Part B: Explain how crash tests help engineers test the air bag design.

To make sure the vehicles will land safely without damage.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

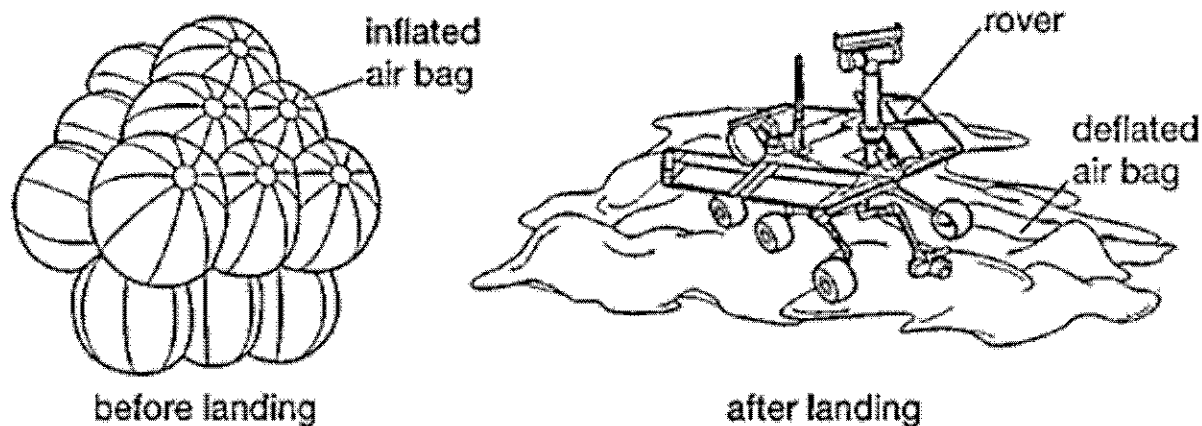
The benefit is that no one or nothing gets hurt.

Part B: Explain how crash tests help engineers test the air bag design.

Tests will show if the product is good enough to be put in use.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

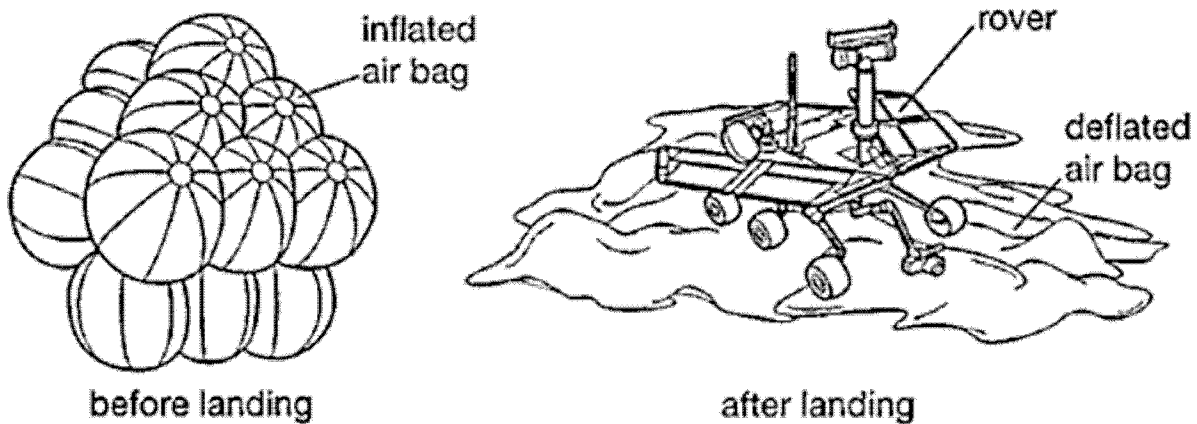
A benefit of using a computer simulation to test the air bag design was that it helped the engineers understand their design and how to improve it, if necessary.

Part B: Explain how crash tests help engineers test the air bag design.

The crash tests helped engineers test the air bag design, because they 'needed to' know how it would work and how to improve the air bag design before sending it to Mars.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

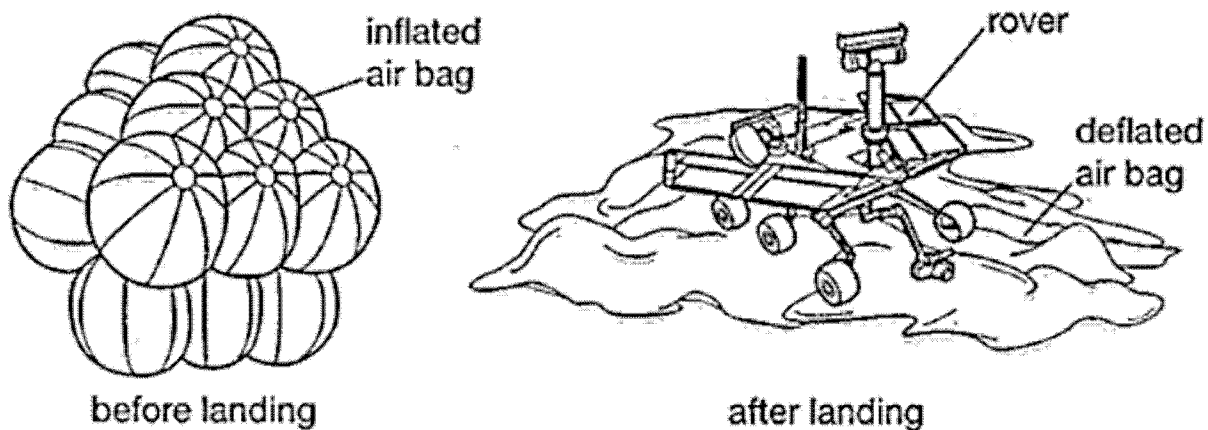
If they test it then they'll know for sure that it would work.

Part B: Explain how crash tests help engineers test the air bag design.

It helps because when they actually send the rover it would have a better chance of landing in Mars.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

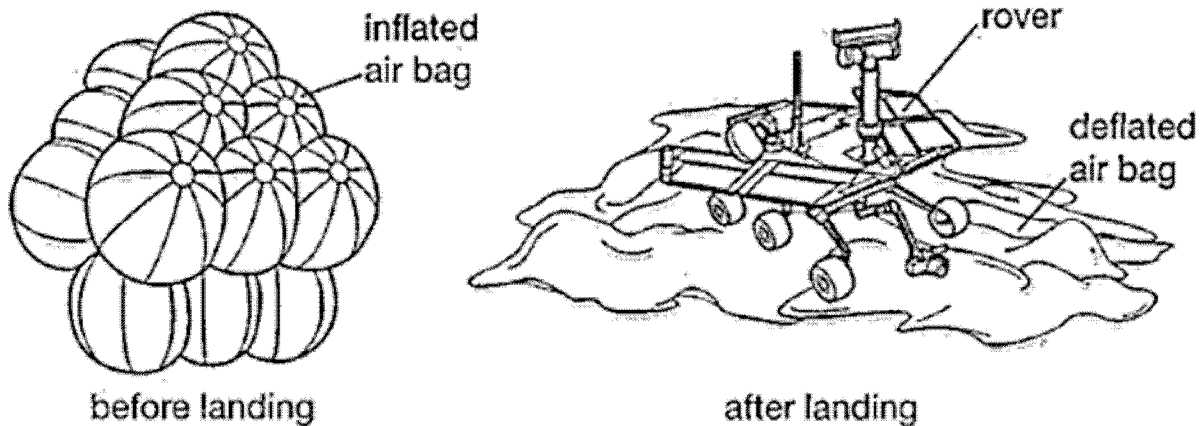
Using a computer simulation to test the air bag design saves the need to use materials to physically construct scale models many times to test.

Part B: Explain how crash tests help engineers test the air bag design.

Crash tests test the air bag design by showing engineers whether or not the air bag can protect the rover from any circumstance, such as a crash landing.

Use the diagram below to answer question

Mars Exploration Rover Landing System



The landing system for the Mars Exploration Rover spacecraft used a system of air bags to protect its fragile rover during landing. Engineers first used a computer simulation to test the new air bag design; then they used crash tests with various types of vehicles.

Part A: Describe one benefit of using a computer simulation to test the air bag design before conducting crash tests.

So results can be recorded incase of the rover collapsing on mars.

Part B: Explain how crash tests help engineers test the air bag design.

So the rover can land safely and the results can be recorded

Practice Set*

Subject: **Science**Item: **Rover Landing System**

Grade 4

Name _____

Number	Score	Consensus	Annotation
P-1			
P-2			
P-3			
P-4			
P-5			
P-6			
P-7			
P-8			
P-9			
P-10			

*Responses in this set do not have true scores. Apply scores based on scoring criteria.

PSSA Grade 8 Science

Rover Landing System

Handscoring
Training Sets 1 and 2
True Scores/Annotations

Paper	Score	Comments
T1-1	1	Part A: “because if they take the crash test first then they could possibly ruin the Rover” (saving resources) – response gives a little more information than A10 – seems to imply that a computer simulation could inform the crash test Part B: Must discuss situations that would apply to the rover – safety of the passengers would not be tested during the crash test
T1-2	2	Part A: “...the first one you test will show you what you need to change, but then you need to trash the other copies” (saving resources) Part B: “observe what they need to improve on...” (identify potential weaknesses)
T1-3	2	Part A: “so that you know what to do and you will know what to expect when you do your crash test’s” Part B: “showing what the flaws are and what they will need to fix” (identify potential weaknesses)
T1-4	0	Part A: Too vague for credit in part A—does not clearly identify an advantage of doing a simulation before a crash test Part B: No credit.
T1-5	1	Part A: No credit. Unclear. Part B: “tell wether the airbag will protect the object or not” (observing product performance)
T1-6	2	Part A: “you know what will possibly work without wasting materials” (saving resources) Part B: “shows what will happen in real life with the landing” (direct observation)
T1-7	1	Part A: “it would have just been a waste of time and materials if the air bag is not going to even work” (saving resources) Part B: No credit. Appears to be referring to car airbags.
T1-8	0	Part A: No credit Part B: No credit Response clearly addresses car crash test and is not acceptable given the scenario
T1-9	2	Part A: “if they fail then they don’t have to waste time on conducting an experiment they already know won’t work if it didn’t work on the computer” (saving resources) Part B: “they will see what really happens when the Rover uses airbags” (direct observation)
T1-10	1	Part A: No credit. Unclear. Part B: “help them by getting a idea of whats really gonna happend” (minimal, but receives credit for direct observation)

Paper	Score	Comments
T2-1	1	Part A: No credit for “real...simulation to what will happen.” Incomplete answer. Part B: “If the airbag doesn’t work they can observe the failure and fix the problem.” (product performance/identify weaknesses)
T2-2	1	Part A: No credit for “idea of how or if the landing system would work.” Incomplete answer. Part B: “to see what is happening and why the design is or isn’t working” (direct observation/identify weaknesses)
T2-3	2	Part A: saving resources; the real design (rover model) would become damaged by the test Part B: product performance; lets them know if the design will hold up; if the design works good and does its job
T2-4	1	Part A: No credit. Same idea as “seeing what happens”, which is an incomplete response. Part B: “to see what goes wrong” (identifying weaknesses)
T2-5	2	Part A: saving resources; see if it is going to work...[so] you don’t waste materials Part B: product performance; know if it is going to pop or not
T2-6	1	Part A: No credit for “give you an idea if the landing system will work.” Part B: “crash tests will tell the engineers the airbags will more than likely work” (product performance)
T2-7	1	Part A: No credit. Addresses passenger safety only. Part B: “to see if it work first” (product performance)
T2-8	2	Part A: “you have a better idea of how the crash test will go” (specific predictability related to crash test) Part B: “show how the rover will react if the landing goes wrong” (direct observation)
T2-9	2	Part A: “predict what would happen and fixed the problem” (identifying weaknesses) Part B: “tell them what they need to improve in before sending them off” (identifying weaknesses) Both parts A and B can receive credit at the same time for this correct idea.
T2-10	0	Part A: No credit – to know if the product works or not is not acceptable in pt A Part B: No credit – student provides an unclear explanation