Name: _____ Group: _____

THE PROBLEM

PART A

FORUM
Talking technology

Author	Subject	Message	Date
Hi-Tech	**Vibration**	**Hi!** My neighbour does aerobics three times a week in her apartment and my computer and CD player vibrate whenever she jumps. This is the third time I've had to repair them. Does anyone have a solution?	03-09
007 Trek		**Hi Hi-Tech!** There are sites that sell systems to reduce vibrations on a computer . . . Do some research!	05-09
Hyperbar		**Hi Hi-Tech,** I've come up with a little technological design concept to absorb shocks . . . But I haven't quite perfected it yet. I'm trying to identify the constraints placed on the materials I've chosen to finish my design plan. I'll let you know what happens.	07-09
Hi-Tech		**To 007 Trek and Hyperbar** I'd like to be able to build something low-cost. Hyperbar, if you manage to build your support at a lower cost, would you be willing to put your technical diagram online?	10-09
Hyperbar		**Sure!** I'll construct a prototype and test its efficiency before sending it to you.	11-09

In this simulation exercise, you are to assume the role of Hyperbar. To construct your prototype of an anti-vibration support, you must meet the specifications. To verify its efficiency, you must follow the proposed protocol.

Name: _____ Group: _____

THE PROBLEM (*continued*) PART A

Specifications for the anti-vibration support prototype

Overall function

- The anti-vibration support must be able to support an electronic device such as a CD player, DVD player, computer, speaker, etc., and reduce the vibrations to which these devices are subjected.

Material constraints

- Support must be able to adapt to different types of electronic devices.
- Support must include one material or part that has elasticity as a mechanical property.
- Support will comprise two systems to absorb vibrations. One of these systems must include a part that operates with pressurized air.
- Support should be made primarily of wood or metal.
- Support should be strong.

Human constraints

- Support should be easy to maintain.
- Support should be easy to move.

Safety constraints

- Handling the support should not pose any danger.
- Support should not contain any electrical components.

Financial constraints

- Cost of building the anti-vibration support must be low enough so that it is advantageous to build it oneself.

Environmental constraints

- Recycled or recyclable materials should be favoured.

Name: _____ Group: _____

THE PROBLEM (*continued*)

PART A

PROTOCOL FOR THE EFFICIENCY TEST OF THE PROTOTYPE

1. Fill two identical containers with water to two-thirds of their capacity.
2. To simulate the presence of an electronic device, place a load on the anti-vibration support.
3. Place the first container on the load.
4. Place the second container on the counter near the support.
5. Hit the counter near the support.
6. Observe whether ripples form on the surface of the water in both containers.
7. Record your observations.
8. Repeat steps 5–7, varying the intensity or location of where you hit the counter.
9. Hit the floor near the counter.
10. Observe whether ripples form on the surface of the water in both containers.
11. Record your observations.
12. Repeat steps 9–11, varying the intensity of the blow to the floor or its location.

Name: _____ Group: _____

CREATING THE CONTEXT

PART A

I ask myself questions

Name: _____ Group: _____

CREATING THE CONTEXT (*continued*)

PART A

I must

I think

Name: _____ Group: _____

CREATING THE CONTEXT (*continued*)

PART A

I think

Design plan

Reflection

	Yes	No
Does my design plan meet the specifications?	☐	☐
Do I fully understand the scientific and technological concepts involved in the problem?	☐	☐

Name: _____ Group: _____

PLANNING THE PROBLEM SOLVING

PART A

I plan

Technical diagram

Name: _____ Group: _____

PLANNING THE PROBLEM SOLVING (*continued*)

PART A

I plan

Materials

Equipment

Reflection

	Yes	No
Have I considered other possibilities for building the anti-vibration support?	☐	☐

Teacher's approval

Name: _____ Group: _____

INITIATING THE PROBLEM SOLVING

PART A

I design

Reflection

	Yes	No
Have I recorded and justified all the modifications made to my plan of action?	☐	☐

Name: _____ Group: _____

THE FINAL TEST

PART A

I verify my results

Name: _____ Group: _____

MY EVALUATION

PART A

Use the evaluation grid on page 22 to do a self-evaluation. Write A, B, C, D or E in the appropriate space.

SSC1 Seeks answers or solutions to scientific or technological problems				
Criteria*	**Observable indicators**	**Me**	**Teacher**	**Comments**
1	**Creating the context** Definition of the goal and production of design plan		☐ With help	
2	**Planning the problem solving** Relevance of elements in the plan of action: materials, equipment and a technical diagram		☐ With help	
3	**Initiating the problem solving** Compliance with the technical diagram and safety rules while building the prototype		☐ With help	
4	**The final test** Verification of the prototype's performance		☐ With help	

*** Evaluation criteria**

1 Appropriate representation of the situation
2 Development of a suitable plan of action for the situation
3 Appropriate implementation of the plan of action
4 Development of relevant conclusions, explanations or solutions

Name: _____ Group: _____

THE CASE STUDY

PART B

FORUM
Talking technology

Author	Subject	Message	Date
Hi-Tech	**Vibration**	**Hi Hyperbar!** My cousin sent me a prototype that looks interesting. I'd like you to check its strengths and weaknesses before investing in building one for myself. Could I send it to you?	03-09
Hyperbar		**Hi Hi-Tech!** Sure. I can do a technological analysis of the prototype.	07-09
Hi-Tech		**Thanks Hyperbar!** Could you suggest improvements?	10-09
Hyperbar		**Sure!** I could even draw a design plan and technical diagram, if you want.	11-09
Hi-Tech		**Great!** The drawings will help me build an improved model. I'll send you the prototype. Thanks again!	12-09

In this case study, you are to assume the role of Hyperbar and respond to Hi-Tech. The teacher will give you a prototype of an anti-vibration support to analyze. You must verify whether this prototype meets the specifications, and propose three improvements.

Name: _____ Group: _____

CREATING THE CONTEXT

PART B

I ask myself questions

I must

I think

Name: _____ Group: _____

CREATING THE CONTEXT (*continued*) PART B

What I know and what I must find out

What I know . . .	What I must find out . . .

I prepare my work

Reflection

	Yes	No
Do I fully understand what I need to do?	☐	☐

Name: _____ Group: _____

GATHERING INFORMATION

PART B

I do research

I analyze my results

Name: _____ Group: _____

GATHERING INFORMATION (*continued*) PART B

I analyze my results (*continued*)

Design plan

Name: _____ Group: _____

GATHERING INFORMATION (*continued*) PART B

I analyze my results (*continued*)

Technical diagram

Reflection

	Yes	No
Do I fully understand the scientific and technological concepts involved in this case study?	☐	☐

Name: _____ Group: _____

COMPLETING THE CASE STUDY

PART B

I make suggestions

Reflection

	Yes	No
Have I considered other solutions?	☐	☐

Name: _____ Group: _____

VALIDATING THE CASE STUDY

PART B

I justify my approach

Name: _____ Group: _____

MY EVALUATION

PART B

Use the evaluation grid on page 23 to do a self-evaluation. Write A, B, C, D or E in the appropriate space.

SSC2 Makes the most of his/her knowledge of science and technology				
Criteria*	**Observable indicators**	**Me**	**Teacher**	**Comments**
1	**Creating the context** Definition of the goal and outline of the work steps		☐ With help	
2	**Gathering information** Production of a design plan and technical diagram for the prototype under study		☐ With help	
3	**Completing the case study** Formulation of improvements		☐ With help	
4	**Validating the case study** Justification of proposed improvements		☐ With help	

*** Evaluation criteria**

1 Formulation of appropriate questions
2 Appropriate use of scientific and technological concepts, laws, models and theories
3 Relevant explanations, solutions or actions
4 Suitable justification of explanations, solutions or actions

Name: _____ Group: _____

MY EVALUATION (*continued*)

Use the evaluation grid on page 24 to do a self-evaluation. Write A, B, C, D or E in the appropriate space.

SSC3 Communicates in the languages used in science and technology				
Criteria*	**Observable indicators**	**Me**	**Teacher**	**Comments**
1	**Gathering information** Verification of conformance with the specifications		☐ With help	
2	**Validating the case study** Formulation of justifications		☐ With help	
3	**Gathering information** Use of symbols in the design plan and technical diagram		☐ With help	

*** Evaluation criteria**

1 Accurate interpretation of scientific and technological messages
2 Appropriate production or sharing of scientific and technological messages
3 Use of appropriate scientific and technological terminology, rules and conventions

EVALUATION GRIDS

Name: _____ Group: _____

SSC1 Seeks answers or solutions to scientific or technological problems

Criteria*	Observable indicators	A	B	C	D	E
1	**CREATING THE CONTEXT** Definition of the goal and production of a design plan	The goal is very clearly stated and linked to the problem to solve. The design plan is complete.	The goal is clearly stated and linked to the problem to solve. The design plan contains a few minor errors.	The goal is more or less clearly stated or is not linked to the problem to solve OR the design plan contains several errors.	The goal is more or less clearly stated or is not linked to the problem to solve AND the design plan contains major errors.	Work needs to be redone.
2	**PLANNING THE PROBLEM SOLVING** Relevance of elements in the plan of action: materials, equipment and a technical diagram	All the materials and equipment are appropriate and the technical diagram is complete.	The materials and equipment are appropriate. The technical diagram contains a few minor errors.	The materials and equipment are more or less appropriate OR the technical diagram contains several errors.	Most of the materials and equipment are more or less appropriate AND the technical diagram contains several errors.	Work needs to be redone.
3	**INITIATING THE PROBLEM SOLVING** Compliance with the technical diagram and safety rules while building the prototype	The prototype complies with the technical diagram. The work is done in a safe manner.	A few elements of the prototype do not comply with the technical diagram. The work is done in a safe manner.	Several elements of the prototype do not comply with the technical diagram. The work is done in a safe manner.	The prototype does not comply with the technical diagram OR the work is not done in a safe manner.	Work needs to be redone.
4	**THE FINAL TEST** Verification of the prototype's performance	The prototype is operational and meets all the constraints in the specifications. The proposed improvements are relevant.	The prototype meets most of the constraints in the specifications. Most of the proposed improvements are relevant.	The prototype meets most of the constraints in the specifications, but the proposed improvements are more or less relevant.	The prototype does not meet most of the constraints in the specifications.	Work needs to be redone.

*** Evaluation criteria**

1 Appropriate representation of the situation
2 Development of a suitable plan of action for the situation
3 Appropriate implementation of the plan of action
4 Development of relevant conclusions, explanations or solutions

ES

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Name: _____

Group: _____

EVALUATION GRIDS (*continued*)

SSC 2 Makes the most of his/her knowledge of science and technology

Criteria*	Observable indicators	A	B	C	D	E
1	**CREATING THE CONTEXT** Definition of the goal and outline of the work steps	The goal of the case study is very clear and the planning steps are relevant.	The goal of the case study is clear and the planning steps are relevant.	The goal of the case study is more or less clear or the planning steps are more or less relevant.	The goal of the case study is more or less clear and the planning steps are more or less relevant.	Work needs to be redone.
2	**GATHERING INFORMATION** Production of a design plan and technical diagram for the prototype under study	The design plan and technical diagram are complete.	The design plan and technical diagram are complete, but contain a few minor errors.	The design plan and technical diagram are incomplete or contain several errors.	The design plan and technical diagram are incomplete and contain several errors.	Work needs to be redone.
3	**COMPLETING THE CASE STUDY** Formulation of improvements	More than three improvements are very clearly stated and relevant.	Three improvements are clearly stated and relevant.	One or two improvements are clearly stated and relevant.	The proposed improvements are more or less clearly stated and more or less relevant.	Work needs to be redone.
4	**VALIDATING THE CASE STUDY** Justification of proposed improvements	All the justifications are relevant.	Most of the justifications are relevant.	Some of the justifications are relevant.	The justifications are not relevant.	Work needs to be redone.

* Evaluation criteria

1 Formulation of appropriate questions
2 Appropriate use of scientific and technological concepts, laws, models and theories
3 Relevant explanations, solutions or actions
4 Suitable justification of explanations, solutions or actions

Name: _____

EVALUATION GRIDS (*continued*)

SSC 3 Communicates in the languages used in science and technology

Criteria*	Observable indicators	A	B	C	D	E
1	**GATHERING INFORMATION** Verification of conformance with the specifications	The technological analysis very clearly shows whether the prototype meets the specifications.	The technological analysis clearly shows whether the prototype meets the specifications.	The technological analysis more or less shows whether the prototype meets the specifications.	The technological analysis does not show whether the prototype meets the specifications.	Work needs to be redone.
2	**VALIDATING THE CASE STUDY** Formulation of justifications	All the justifications are very clearly stated and refer to scientific and technological concepts.	All the justifications are clearly stated and refer to scientific and technological concepts.	All the justifications are more or less clearly stated or do not refer to scientific and technological concepts.	All the justifications are more or less clearly stated and do not refer to scientific and technological concepts.	Work needs to be redone.
3	**GATHERING INFORMATION** Use of symbols in the design plan and technical diagram	All the symbols are drawn correctly and used in the proper context.	Most of the symbols are drawn correctly and used in the proper context.	Some of the symbols are drawn correctly and used in the proper context.	The symbols are not used in the proper context.	Work needs to be redone.

* Evaluation criteria

1 Accurate interpretation of scientific and technological messages
2 Appropriate production or sharing of scientific and technological messages
3 Use of appropriate scientific and technological terminology, rules and conventions

Group: _____

ES

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