A Snowmobile Trailer Lighting System

End Task update may 23/12

The Task

Students were presented with the following scenario and instructions:

> You are asked to design, construct, and test a tail-light trailer-wiring circuit (brake lights, turn signals, licence-plate light, tail lights) for a new model of snowmobile trailer that is to be mass-produced. (The trailer is used to haul snowmobiles and is pulled by a car or truck.) You will develop a presentation package for the snowmobile company containing a design brief, one top-view and one bottom-view drawing of the trailer, a schematic detailing the lighting system circuit, and steps for constructing an artefact of the circuit.
>
> You will construct and test your circuit (i.e., the artefact) in accordance with existing regulations and recognized safety standards. Materials provided for this construction must be used effectively and efficiently with little waste.

Final Product

Each student was to submit a presentation package containing:

- a design brief that outlines how the lighting system works, and that includes a list of the wiring circuit's parts, and explanations of the function of each part and of how the design will satisfy the snowmobile company;
- a schematic of the circuit;
- one top-view and one bottom-view drawing of the trailer;
- construction steps for the artefact;
- safety standards for the construction of the artefact;
- an artefact consisting of a trailer wiring circuit that is scaled down to fit onto a board that is approximately 200 mm x 300 mm. The circuit must work and be securely mounted onto the board in a way that simulates its location on the final product. All connections must meet industry standards, and the circuit must contain all the components required by law for highway operation.

Expectations Addressed in the Exemplar Task

This task gave students the opportunity to demonstrate achievement of all or part of each of the following selected expectations from the Theory and Foundation strand.

Students will:

1. explain the use of each component of a vehicle system;
2. gather and record information, and establish a plan of procedures [to solve a transportation technology challenge];
3. explain how human needs or wants related to transportation can be met through a new or improved vehicle or system;
4. produce presentation and working drawings, sketches, graphics, mathematical and physical models, or a prototype of the best solution [to a transportation technology challenge];
5. apply the design process to develop solutions, products, processes, or services in response to challenges or problems in transportation technology.

For information on the process used to prepare students for the task and on the materials and resources required, see the Teacher Package, reproduced on pages 84–94 of this document.

Task Rubric – A Snowmobile Trailer Lighting System

Expectations*	Criteria	Level 1	Level 2	Level 3	Level 4
Knowledge/Understanding	**The student:**				
1	– accurately describes the lighting system (e.g., provides a complete list of its parts, explains the function of each part)	– describes the lighting system with limited accuracy	– describes the lighting system with some accuracy	– describes the lighting system with considerable accuracy	– describes the lighting system with a high degree of accuracy
Thinking/Inquiry	**The student:**				
2	– provides detailed and logical steps for the construction of the artefact	– provides steps for the construction of the artefact that are detailed and logical to a limited degree	– provides steps for the construction of the artefact that are somewhat detailed and logical	– provides steps for the construction of the artefact that are detailed and logical to a considerable degree	– provides steps for the construction of the artefact that are detailed and logical to a high degree
Communication	**The student:**				
3	– clearly explains in the design brief how the proposed lighting system will satisfy the snowmobile company	– explains with limited clarity how the proposed lighting system will satisfy the snowmobile company	– explains with some clarity how the proposed lighting system will satisfy the snowmobile company	– explains with considerable clarity how the proposed lighting system will satisfy the snowmobile company	– explains with a high degree of clarity how the proposed lighting system will satisfy the snowmobile company
Application	**The student:**				
4	– effectively demonstrates the interdependence of the circuit components through the schematic and the drawings	– demonstrates the interdependence of the circuit components with limited effectiveness	– demonstrates the interdependence of the circuit components with some effectiveness	– demonstrates the interdependence of the circuit components with considerable effectiveness	– demonstrates the interdependence of the circuit components with a high degree of effectiveness
5	– constructs an effective snowmobile trailer lighting system	– constructs a trailer lighting system of limited effectiveness	– constructs a trailer lighting system of some effectiveness	– constructs a trailer lighting system of considerable effectiveness	– constructs a trailer lighting system that is highly effective

*The expectations that correspond to the numbers given in this chart are listed on page 58.

Note: A student whose overall achievement at the end of a course is below level 1 (that is, below 50%) will not obtain a credit for the course.

Appendix C: Presentation Package Format Instructions

The presentation package you submit for evaluation must follow the format outlined below. Use the same headings and provide the requested content for each heading. All text is to be word processed or neatly written on 8½-x-11-inch paper, and pages are to be numbered.

not needed

✓ **Cover page**
Provide project title, date, and course name.

Table of contents
Indicate the pages on which the components of your presentation package appear.

✓ **Design brief**
In your own words describe your wiring system and any special considerations that you had in mind when designing it for the snowmobile company (e.g., weather protection for soldered joints). List each part used in your system and explain its function within the system (e.g., wire – to conduct current from one point to another).

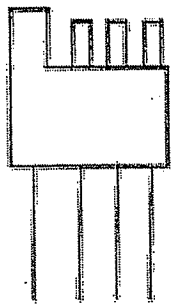
✓ **Drawings**
Create one top-view and one bottom-view drawing in block-diagram format (i.e., components are to be labelled to show their location on the trailer). The drawings need to be labelled so that the connection details and the method used to secure the components to the trailer are clear. Use a pencil and straight edge to produce neat drawings. Each drawing is to be on a separate 8½-x-11-inch page.

✓ **Schematic**
Create a schematic based on the best design produced from the top-view diagrams. The schematic is to be neatly drawn, using a pencil and straight edge, on a separate 8½-x-11-inch page and use standard symbols.

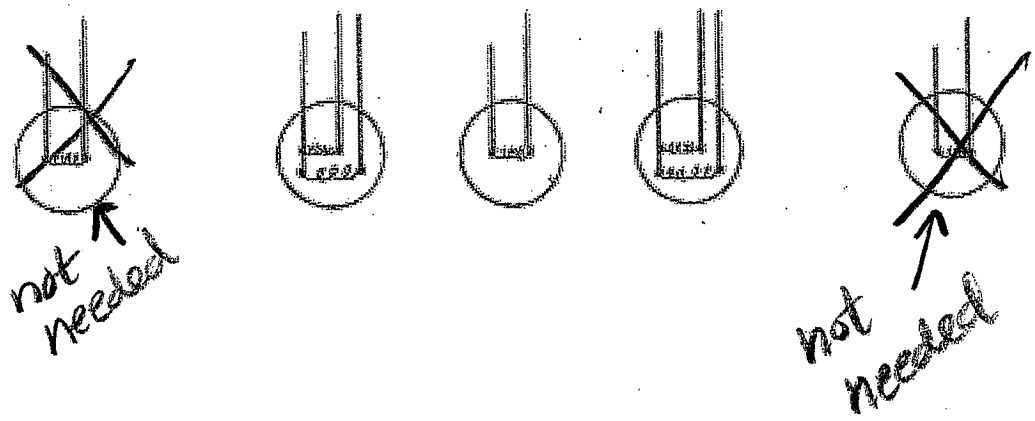
one page

- **Construction steps**
  List each of the steps you took to construct the artefact of your circuit. Include any revisions you had to make to your drawings. Explain the reasons for your decisions.
  - wiring test chart.
- **Safety standards**
  List all of the safety concerns to keep in mind when you or others are performing this type of work in a real-life situation. Includes jacking and supporting of an actual trailer, blocking wheels etc.

Appendix D: Template for Wiring Diagram (schematic)



Example only



Appendix E: Template for Block-Format Drawing of Trailer (Layout of wiring on your trailer)

Appendix B: Artefact Operation Checklist

Test the operation of each of the following lighting subsystems in your artefact, using your method of choice, and place a checkmark in the appropriate table cell.

Lighting Subsystem	Working	Intermittently Working	Not Working
Tail lights			
Brake lights			
Left signal light			
Right signal light			
License plate light			

Used as a checklist to test your wiring on the plywood with trailer plug, (2) 1157 sockets and 1 1156 socket. Cut and paste between construction steps and safety standards.