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**Development of Canadian National Marsville
New Teacher Support for National Research
Council Canada**

Final

March 2008

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... inspiring discovery

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Development of Canadian National Marsville New Teacher Support for National Research Council Canada

1.0 Introduction

Canadian National Marsville (CNM) is an innovative, interdisciplinary project-based learning experience for students and teachers across Canada. CNM has considerable potential as a teaching and learning resource, but its ability to grow and expand is hindered by insufficient program support for new teachers. As a means of providing this support, NRC will provide teachers with new teacher support pages on the CNM web site. This will go a long way towards addressing program support issues, as it will help teachers with web site navigation, comfort and confidence with different levels of program implementation, curriculum matching, assessment and evaluation and regional accessibility. These new web pages should help to demystify and simplify the implementation of CNM, which should ultimately increase teacher participation in the program.

2.0 Summary of Recommendations from Research Report

Stakeholders of CNM have recommended that teachers need additional support in order to implement the program. As in-person professional development is prohibitively expensive, a more cost-effective and sustainable way is to create a new teacher support pages on the CNM web site that could be used by teachers on their own in remote areas or as a part of regional orientation sessions.

As there is already a lot of information for teachers on the CNM web site, both in the student section and elsewhere, the new teacher support pages on the CNM web site would not repeat information, but rather get teachers excited about the program, show them visually how the program is structured and send them to the relevant sections of the web site for more detailed information. Ideally, the information from the web pages would be combined to form a single document that could be downloaded and printed by teachers to read at their leisure.

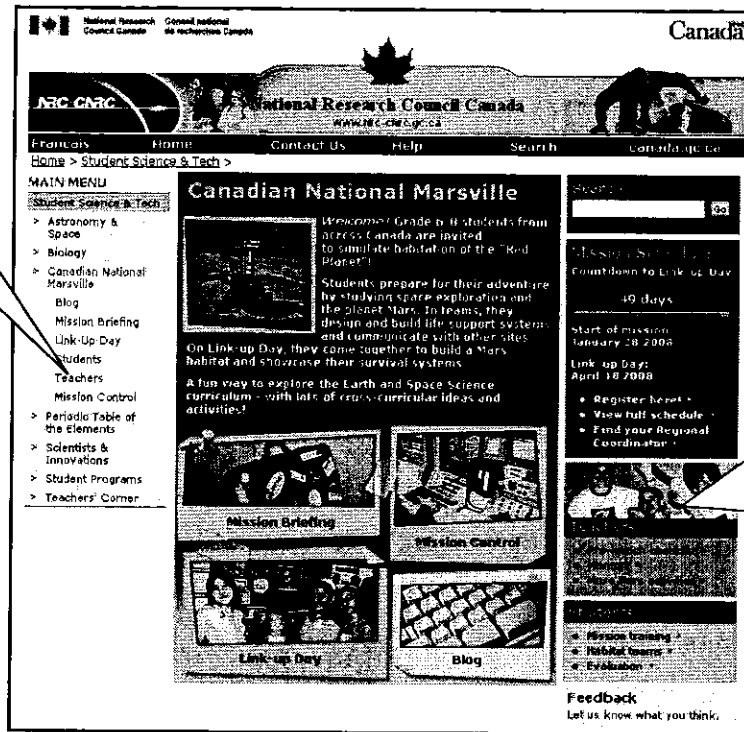
Below is a summary of sections suggested for the new teacher support pages on the CNM web site.

- a) **New Teacher Home Page** – would have links to four main areas: ***Program Overview***, ***Planning & Assessment***, ***Program Logistics*** and ***Program Support***, as well as a hotlink to **Marsville in Action**
 - i) **Marsville in Action** – engaging, visual, provides an overall orientation to CNM – accessible from link on new **Teacher Home Page**
 - ii) **Program Overview**
 - (1) Identify core components (mandatory vs. optional activities)
 - (2) Levels of participation (full CNM vs. 'Mini-Marsville')
 - (3) Timelines
 - iii) **Program Logistics** – student roles and responsibilities, materials management, space management, time management, etc.
 - iv) **Planning & Assessment**
 - (1) Classification of core components by subject
 - (2) Curriculum alignment – specific jurisdictional charts would be accessible by clicking on hotlinks on this page
 - (3) Assessment (strategies for activities in core components, sample assessment tools such as checklists and rubrics, determination of prior knowledge and skills)
 - v) **Program Support** – Where to Find Help, Tips and Hints, Frequently Asked Questions, Additional Resources

3.0 New Teacher Web Pages

3.1 New Teacher Home Page

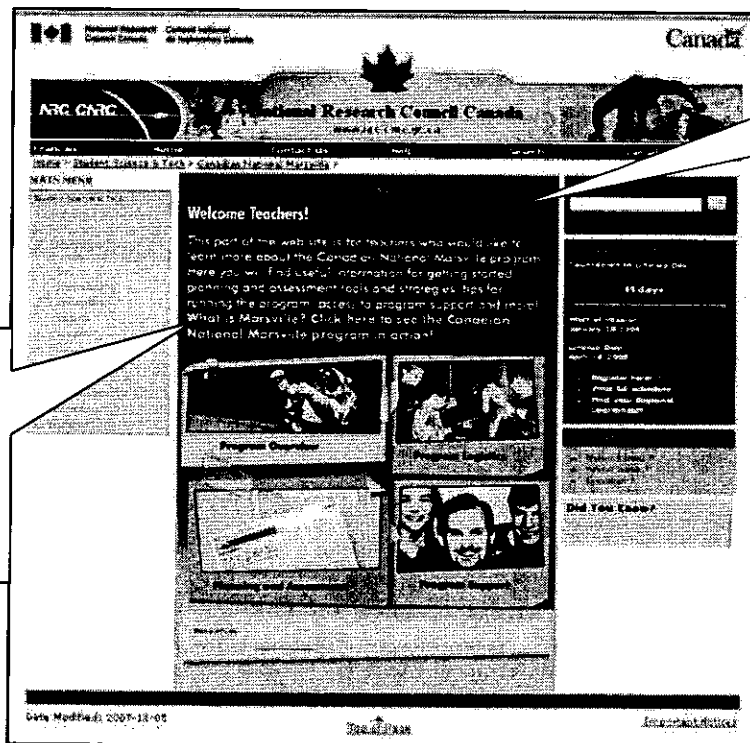
On the CNM home page, it is suggested that the **Teacher** hot links go directly to a new **Teacher Home Page** (see diagram on next page).



From here teachers will go to new Teacher Home Page.

From here teachers will go to new Teacher Home Page. The bullet points could be for Planning & Assessment, Program Logistics and Program Support.

The proposed new Teacher Home Page would look as follows:



There would be a new Marsville in Action overview which could be accessed by clicking this hotlink.

New welcome message for teachers (new and existing teachers).

Four main sections would be accessed from this page.

Program Overview

Program Logistics

Planning & Assessment

Program Support

The introductory text at the top of the page would be the following:

Welcome Teachers!

section intended for you
This part of the web site is for teachers who would like to learn more about the Canadian National Marsville program. *?* Here you will find *useful* information for getting started, planning and assessment tools and strategies, *in this section* tips for running the program, access to program support and more!

What is Marsville? Click here to see the Canadian National Marsville program in action!

This home page would have a hotlink to the **Marsville in Action** page in the introductory text, and hotlinks below the four photographs to the **Program Overview, Planning & Assessment, Program Logistics** and **Program Support** sections. The side panels would remain constant and be the same as existing side panels.

3.1.1 Marsville in Action

What is Marsville?



The **Canadian National Marsville Program (CNM)** is a unique program derived from the Challenger Learning Center's Marsville program. The goal of CNM is to simulate habitation of the "Red Planet." Students prepare for their adventure by studying space exploration and the planet Mars and then apply their knowledge as they create mission patches, design and build models of human life-support systems, construct Martian habitats and share their findings with other students from across Canada.

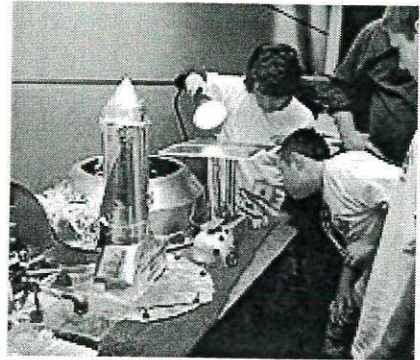
Each year the mission patches are mounted on a special poster that is available to all participants.

2001 poster

check caps on all

students work in teams

Students participating in CNM are assigned to teams. The primary task of each team is to design and build a model of one of nine different Life-support Systems. Life-support Systems include; air, communications, energy, food, health and recreation, temperature, transportation, waste and water. The choice of Life-support Systems is up to the teacher and students and can be based on curriculum requirements.



are chosen by the

Over a three month period, starting on January 28th and running to late April, student teams



work cooperatively to clarify the requirements for their Life-support Systems, brainstorm solutions and construct working models. Students are able to share their results and challenge teams across Canada via their Team Blogs.

using

Why January 28th?

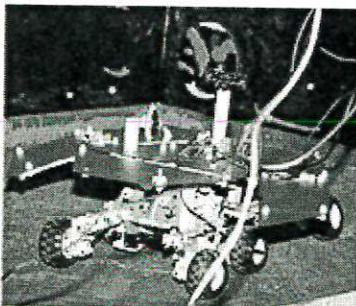
January 28th is the anniversary of the explosion of the space shuttle Challenger. Families of shuttle crew members created the original Marsville program as homage to their loved ones' passion for space

exploration.

Marsville

Teachers can recruit volunteer scientists and engineers as mentors. Mentors can offer guidance during the design of Life-support Systems and can respond online to student questions.

research and



In addition to or in lieu of building Life-support Systems, teams can choose to develop and build a remotely-controlled Mars Rover.

Students can also take part in other space-related science and engineering activities, keep a mission log and even do astronaut training!

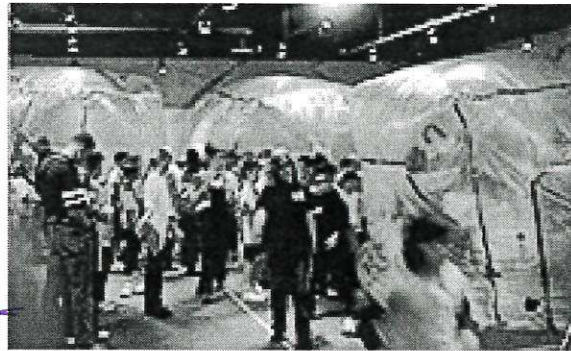
To create Martian habitats in class size plastic domes. ~~where~~
Student-constructed ~~the L.S.S. one~~

The program culminates in a "Link-up Day."
Teams from across a region come together
on Link-up Day to combine their Life-support
Systems to form Martian habitats in class-size
plastic domes that the students build
themselves.

~~Marsville is a non-competitive activity~~
~~There are no judges and no competition - the~~

message is cooperative problem-solving!

~~This part of the CNM web site is designed for teachers and will provide you with everything~~
The Teacher's section of the
you need to get started in this amazing program.



where the L.S.S. are
installed.

Follow the links below to blast off!

[Program Overview](#)

[Planning & Assessment](#)

[Program Logistics](#)

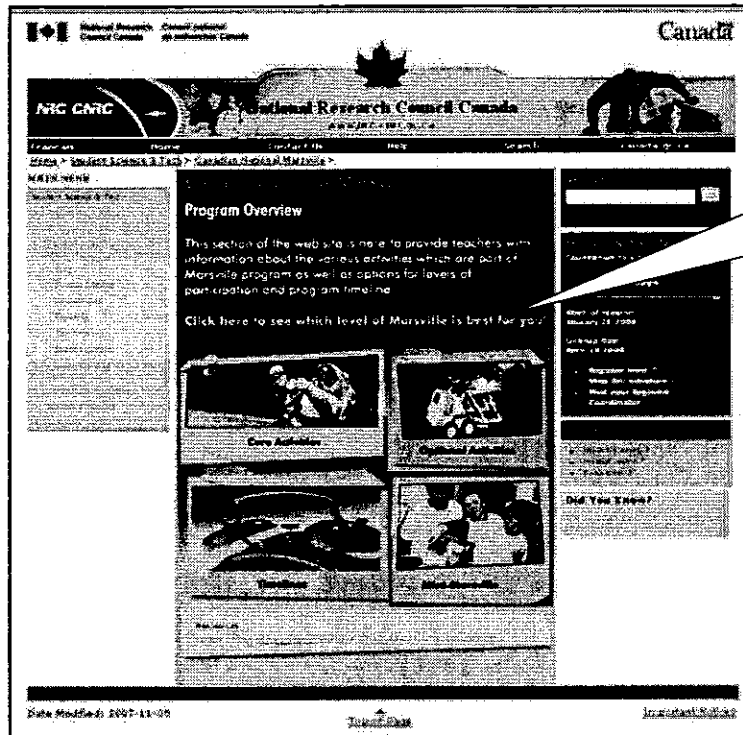
[Program Support](#)

[Program Registration](#)



3.1.2 Program Overview

This part of the web site is designed to explain what is involved
in participating in CNM, as well as provide suggestions for
timelines and alternate levels of participation. When teachers
click on the **Program Overview** link on the new **Teacher Home Page**, it will open up the
Program Overview Landing Page (see diagram on next page).



This message would contain link to a page comparing CNM with Mini-Marsville.

Four main sections would be accessed from this page.

Core Activities

Optional Activities

Timeline

Mini-Marsville

This Landing Page would have a hotlink to a **CNM/Mini-Marsville Comparison** in the introductory text, and hotlinks below the four photographs to sections on **Core Activities**, **Optional Activities**, **Timeline** and **Mini-Marsville**. The side panels would remain constant and be the same as existing side panels.

The introductory text at the top of the page would be the following:

Program Overview

This section of the web site is here to provide teachers with information about the various activities which are part of the Marsville program, as well as options for levels of participation and program timeline.

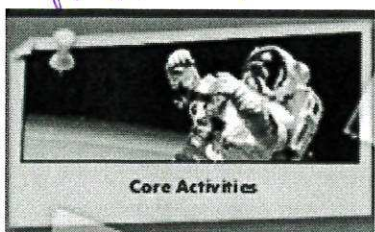
[Click here to see which level of Marsville is best for you!](#)

From the hotlink in the introductory paragraph, teachers would be directed to a page which compares CNM with Mini-Marsville. On the following page is the text for that page.

Which level of Marsville is right for you and your students?

Canadian National Marsville is a comprehensive, cross-curricular program for grade 6-8 students. Teachers and students who choose to participate do so knowing what is involved and commit to completing the core activities of the program. As CNM requires time, resources and commitment on the part of both teachers and students, teachers new to CNM may wish to try the program by first participating in an introductory scaled-down version of CNM called **Mini-Marsville**. Below is a table outlining characteristics for Canadian National Marsville and the starter program **Mini-Marsville**. Information about **Mini-Marsville** can be found in the Mini-Marsville section.

CNM vs. Mini-Marsville	
CNM	Mini-Marsville
Suggested for teachers who have experience with CNM or who have already done Mini-Marsville	Recommended for teachers just starting out
Program lasts approximately 12 weeks starting January 28 and ending mid-April	Duration will vary
Requires use of computers, scanner or digital camera, computer software and regular access to the Internet	Use of computers, computer software and regular access to the Internet beneficial, but not required
Students will blog online with other students across Canada	No blog component
Students create Mission Patches that go on a commemorative national poster	Creation of Mission Patches is optional (will not go on national poster)
Requires significant space for building and displaying Life-support Systems	Requires less space for building and displaying Life-support Systems
Requires significant materials for building Life-support Systems	Requires fewer materials for building Life-support Systems
Requires travel to a regional Link-up Day	Requires no travel

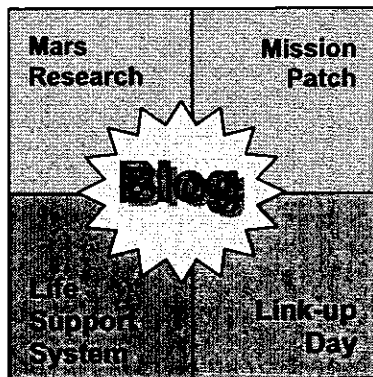


3.1.2A Core Activities

Students work cooperatively to complete the core activities of their CNM Mission in a small group called a **Habitat Team** (for more information about **Habitat Teams**, visit the Habitat

Teams page as well as the Program Logistics section.).

Below are the **Core Activities** for Canadian National Marsville.



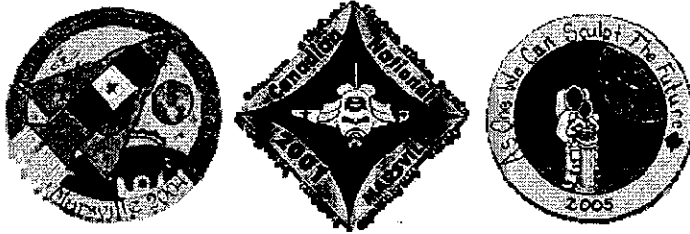
(Caption for illustration: Core components of CNM are: Mars Research; creation of a Mission Patch; design, construction and presentation of a Life-support System; participation in a regional Link-up Day where possible; and communication with other teams using the Team Blog.)

Core Activities – CNM	
Each Habitat Team Will:	
<u>Research Martian environment</u>	and Life-support Systems
Design a Team <u>Mission Patch</u> (patch <u>will</u> be on CNM commemorative poster)	
Create a <u>Team Blog</u>	
Upload their Mission Patch to their Team Blog	
Communicate with other teams via their Team Blog	
Plan, construct and present a 3D model of ONE <u>Life-support System</u>	
Build a <u>Habitat</u> for living on Mars from plastic and duct tape with other teams	
Participate in a regional CNM <u>Link-up Day</u> (whenever possible)	

Research

Students must have a thorough understanding of the Martian environment before they can create a model Life-support System or build a Habitat. Students can access a number of online resources by going to the Online Resources section or by going to the Additional Resources page in the **Program Support** section.

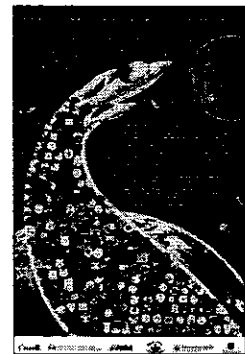
Mission Patches



Each **Habitat Team** participating in CNM will create a **Mission Patch** for their space adventure. Mission Patches focus on science, technology and Canada's role in

Mars exploration. Students can find general information about the **Mission Patch** activity on the **Mission Patch** page and they can learn more about designing effective patches by going to the **How to Design a Mission Patch** page.

Habitat Teams participating in CNM will have their **Mission Patches** mounted on a **Commemorative Poster** that is given to all participants on **Link-up Day**. Students participating in **Mini-Marsville** can also create **Mission Patches**, but they will not be on the commemorative poster.



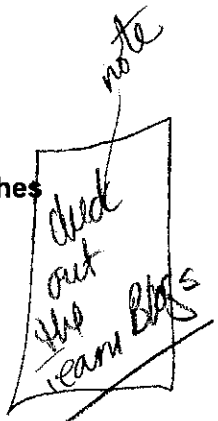
Team Blog

Every **Habitat Team** participating in CNM is required to set up a **Team Blog**. The CNM **Team Blogs** are designed to encourage students across Canada to record their observations, discoveries, etc., and share these with other CNM participants while researching Mars, developing model **Life-Support Systems** and preparing for **Link-up Day**.

A **blog** is type of online journal.

Habitat Teams participating in CNM will, with the help of their teachers, set up and manage their own blogs. The blogs enable students to develop both Information Communication Technology skills and Language Arts Skills (see the **Planning & Assessment** section for curriculum outcomes in these areas).

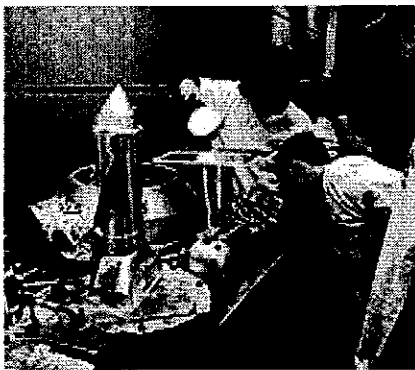
On the **Team Blogs** students describe their team, upload and describe their **Mission Patches** and write about their experiences creating **Life-support Systems** (see next section). Students can also ask questions of, and respond to, other **Habitat Teams** about their blog postings.



Teachers participating in CNM will be trained in how to set up and manage the student **Team Blogs**. For more information or questions about the **Team Blogs**, contact education@ncr-cnrc.gc.ca.

Life-Support Systems

As part of CNM, students will imagine that humans are settling on Mars, and it will be their job to create **Life-support Systems** for the settlers. Each **Habitat Team** will plan, construct and present one of nine different **Life-Support Systems** (visit the [Life-support Systems](#) page for complete descriptions of the nine systems).



A **Life-Support System** is a 3D model designed and built by students which shows how they think a specific human need would be met on Mars.

The choice of system may be based on student interest or on the strength of provincial or territorial curriculum (visit the [Planning & Assessment](#) section for curriculum connections to the nine **Life-support Systems**).

On the **Life-support Systems** page, students will find links to each of the **Life-support Systems**. These links go to pages which include information about requirements for the systems, getting started and questions which will help guide the students in the creation of the **Life-support System** models. Each page also has links to **Tips** for building the particular type of system.

On **Link-up Day**, **Habitat Teams** will present their systems to each other (visit the [System Presentation](#) page for more information). This is an excellent opportunity for students to practice their public speaking and interpersonal skills.

Habitats

Prior to **Link-up Day**, **Habitat Teams** are connected in groups of three to make **Habitat Crews** (for more information, visit the [Habitat Team](#) page and read about Habitat Crews at the bottom of the page). A **Habitat Crew**



Habitats are large structures made of plastic and duct tape that are inflated with fans.

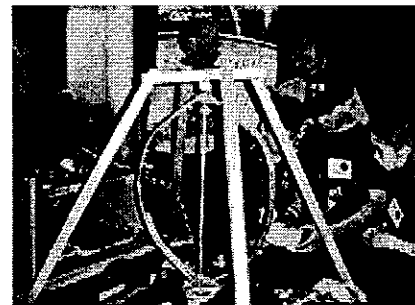
may consist of teams from the same class/school or may be formed by teams from different schools.



Together, the Habitat Crew will plan (either in person or online) and build (on **Link-up Day**) a **Habitat** for the crew to 'live in.' **Habitats** are linked to one another via tunnels. For **Habitat** schematics, visit the [Habitat](#) page, and for **Habitat** requirements, visit the [Habitat Requirements](#) page. **Habitat Crews** determine among themselves which other materials are necessary (for a list of all materials required for **Link-up Day**, visit the [Team Manifest List](#) page in the **Link-up Day** section).

Link-up Day

Link-up Day is the culmination of the CNM program and a memorable event for students. On **Link-up Day**, students from across a region come together to build their **Habitats**, present their **Life-support Systems** and participate in design challenges. To find the **Link-up Day** location near you, visit the [Site Contacts and Link-up Day Locations](#) page. For a sample plan of a typical **Link-up Day**, visit the [Link-up Day Sample Agenda](#) page. As the **Link-up Day** events at each location are slightly different, contact your regional [Site Contact](#) for more information. For more information about **Link-up Day**, including Preparation Checklists, Team Roles and Activities, go to the [Link-up Day](#) page.



Timeline

Below is a timeline for the **Core Activities**.

Week	1	2	3	4	5	6	7	8	9	10	11	12	13
Introduce program	X												
Assign Team Roles	X												
Learn about conditions on Mars		X	X	X	X	X	X	X	X	X	X	X	X
Mission Patch		X	X	X									
Life Support Systems					X	X	X	X	X	X	X		
Communicate using Team Blog		X	X	X	X	X	X	X	X	X	X	X	X
Complete all Core Activities												X	X
Prepare for Link-up Day												X	X
Link-up Day!													X

Space themed engineering activities + Science exp. for your students



3.1.2B Optional Activities

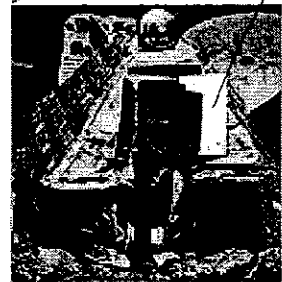
In addition to the **Core Activities**, teachers may wish to have students participate in optional activities. Below is a list of optional CNM activities and where to find them on the CNM website.

Mission Training

The Mission Training activities are a great way to get students to imagine that they are astronauts. As part of the **Astronaut Training Program**, students can complete a Job Application, participate in Physical Fitness activities, explore the Nutrition requirements of living in space and keep a Mission Log.

Digging Deeper

The Digging Deeper section includes a number of space-themed science and engineering classroom activities. These activities can help students to better understand the conditions on Mars, as well as provide a chance to hone their engineering skills before creating their **Life-support Systems**.



Marsville Rover

Marsville Rovers are student-designed and built computer-controlled vehicles. The Rovers are designed to do a series of specific tasks. Information including the **Rover Design Manual, Terrain Construction, Rover Team Roles, Teleoperations** and **Rover Team Resources** can all be found in the Marsville Rovers section. The Rovers are to be constructed from LEGO® MINDSTORMS® kits. Some of these kits are available for borrowing during CNM. Contact your regional Site Contact for availability.

Lunch on Mars

On **Link-up Day**, students have the option of creating a nutritionally complete, low-waste Lunch on Marsville. This is a great opportunity for students to meal-plan using Canada's Food Guide. Students will consider how they would transport food to Mars, as well as how to

minimize their footprint left on Mars (i.e., what is the mass of food in vs. the mass of waste food and packaging at the end). Although this is an optional activity, it is highly recommended.

Optional Activities Timeline

Below is a timeline for the **Optional Activities**.

Week	1	2	3	4	5	6	7	8	9	10	11	12	13
<i>Astronaut Training</i>	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Mission Log</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Scientific Journal</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Mission Dairy</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Science Experiments (Digging Deeper)</i>			X	X	X	X	X	X	X	X	X	X	
<i>Engineering Activities (Digging Deeper)</i>				X	X	X	X	X	X	X	X	X	
<i>Plan Team Lunch</i>											X	X	
<i>Plan Team Uniform</i>											X	X	
<i>Habitat Crew Activities</i>												X	X



3.1.2C Timelines

Each year, a new CNM mission starts on January 28. The registration deadline is December of the previous year, so planning ahead is required. Registration can be done using the online [Registration Form](#). Registration is free.

January – April

A week by week suggested **Mission Schedule** for CNM is located in the **Pre-launch Checklist**. Below is a graphic representation of the **Mission Timeline**. The activities below are considered **Core Activities**.

Week	1	2	3	4	5	6	7	8	9	10	11	12	13
<i>Introduce program</i>	X												
<i>Assign Team Roles</i>	X												
<i>Learn about conditions on Mars</i>		X	X	X	X	X	X	X	X	X	X	X	X
<i>Mission Patch</i>		X	X	X									
<i>Life Support Systems</i>					X	X	X	X	X	X	X		
<i>Communicate using Team Blog</i>		X	X	X	X	X	X	X	X	X	X	X	X
<i>Complete all Core Activities</i>												X	X
<i>Prepare for Link-up Day</i>												X	X
<i>Link-up Day!</i>													X

There are also a number of optional activities. The timeline for these is below.

Week	1	2	3	4	5	6	7	8	9	10	11	12	13
<i>Astronaut Training</i>	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Mission Log</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Scientific Journal</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Mission Dairy</i>	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Science Experiments (Digging Deeper)</i>			X	X	X	X	X	X	X	X	X	X	
<i>Engineering Activities (Digging Deeper)</i>				X	X	X	X	X	X	X	X	X	
<i>Plan Team Lunch</i>											X	X	
<i>Plan Team Uniform</i>											X	X	
<i>Habitat Crew Activities</i>												X	X



3.1.2D Mini-Marsville

Have you thought about having your students explore the 'Red Planet' but are not ready to take flight with Canadian National Marsville? **Mini-Marsville** might be just what you need.

What is Mini-Marsville?

Mini-Marsville is a scaled-down version of the Canadian National Marsville program and is an excellent introduction to the study of Mars. **Mini-Marsville** is scaled down both in terms of size (it's mini!) and in terms of complexity of implementation. Below is a chart outlining the differences between CNM and **Mini-Marsville**. *Link to 1st version on pg. 11*

CNM vs. Mini-Marsville	
CNM	Mini-Marsville
Suggested for teachers who have experience with CNM or who have already done Mini-Marsville	Recommended for teachers just starting out
Program lasts approximately 12 weeks starting January 28 and ending late April	Duration will vary
Requires use of computers, scanner or digital camera, computer software and regular access to the Internet	Use of computers, computer software and regular access to the Internet beneficial, but not required
Students will blog online with other students across Canada	No blog component
Students create Mission Patches that go on	Creation of Mission Patches is optional

a commemorative national poster	(will not go on national poster)
Requires significant space for building and displaying Life-support Systems (each system is up to 1 m x 1 m x 1 m)	Requires less space for building and displaying Life-support Systems (3 systems fit on a 1 m x 1m base)
Requires significant materials for building Life-support Systems	Requires fewer materials for building Life-support Systems
Requires travel to a regional Link-up Day	Requires no travel

Mini-Marsville Overview

For **Mini-Marsville**, teams of students work together to create **Mini Life-support Systems** in two **Mini Habitats** which will be combined on **Link-up Day** to form a **Mini Colony**.

Mini-Marsville Overview

Mini-Marsville Activities

Activity 1: Research Mars

Activity 2: Select Mini Life-support Systems

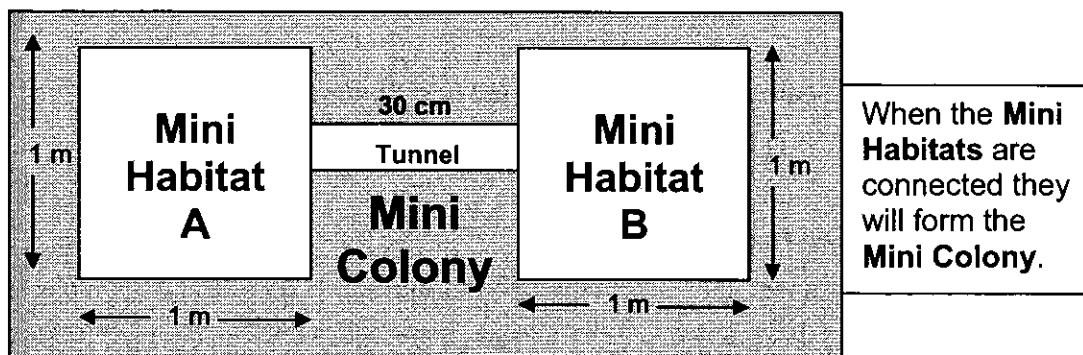
Activity 3: Research and Preparation

Activity 4: Design Mini Life-support Systems

Activity 5: Build Mini Life-support Systems

Activity 6: Link-up Day

Assessment



Each Mini Colony will demonstrate the students' understanding of the needs of humans in space and the challenges humans face when living in a closed system.

Single classes can do **Mini-Marsville** on their own, or several classes could do **Mini-Marsville** simultaneously and come together to do a school-based **Link-up Day**. The **Mini Life-support Systems** built by the students are modelled on those done by students in CNM. To see the CNM **Life-support Systems**, go to the [Life-support Systems](#) section, and for curriculum alignments and assessment rubrics for the CNM **Life-support Systems** go to the [Planning & Assessment](#) section. These will also be relevant to the **Mini Life-support Systems**.

Mini-Marsville Activities

Activity 1: Research Mars

Students begin by developing an understanding of the Martian environment and the requirements for humans to live in space by doing research. A good place to start is the [Investigate Mars](#) page. Once students have ideas about what they want to research, they can find annotated web sites on the [Additional Resources](#) page.

Activity 2: Select Mini Life-support Systems

Split the class into seven teams of 3-5 students. Six of the teams will create **Mini Life-support Systems**, while the seventh team will be responsible for the plastic **Habitat** structures that will protect the **Mini Life-support Systems**. The structures team will also be responsible for the Air Supply and Temperature Control.

The six types of **Mini Life-support Systems** are:

- | | |
|---------------------------------|---------------------|
| 1. Energy Supply | 4. Waste Management |
| 2. Food Production and Delivery | 5. Water Supply |
| 3. Transportation | 6. Communication |

How the students are allocated to each **Mini Life-support System** is up to you. You may have students vote for their choice, draw lots, etc.

Activity 3: Research and Preparation

Students will need to do research on the type of **Mini Life-support System** their team is going to create. Students can find questions and tips for each type of CNM [Life-support System](#), which may help them to build their own **Mini Life-support System**.

In addition to doing research, students can do space-themed science and technology activities as a way to develop background knowledge and practice their design-build-evaluate skills. These optional activities are in the [Digging Deeper](#) section.

You may also want to consider having the students do different jobs when it comes to designing, building and presenting the **Mini Life-support Systems**. For some ideas as to team roles, go to the [Team Mission Roles](#). Feel free to modify the roles to suit your own situation.

Activity 4: Design Mini Life-support Systems

You must choose in advance whether the students will be constructing functioning or static models of the **Mini Life-support Systems**.

If the students are creating **functioning Mini Life-support System** models, they could use the following criteria for each system. Each system:

- a) must function;
- b) must connect with at least one other system;
- c) must not be taller than 90 cm or wider than 90 cm; and
- d) must fit on a 1 m x 1 m base with two other systems.

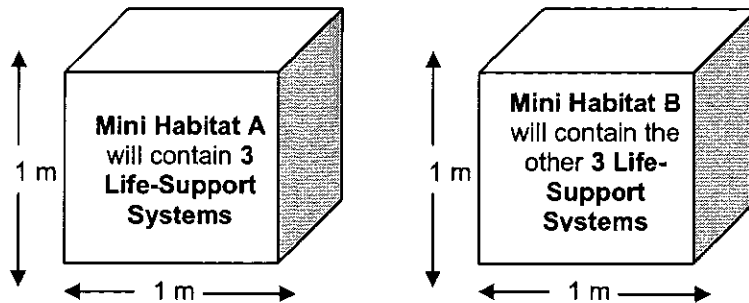
Each of the six **Mini Life-support Systems** will have its own specific design criteria.

1. **Energy Supply Team** – Energy source must power at least one light bulb in each **Habitat**.
There can only be one power supply for the entire **Mini Colony**.
2. **Food Production Team** – There must be a living source of food in at least one **Habitat**.
The plant must receive water from the water supply.
3. **Transportation Team** – Self-propelled vehicle must be able to move between **Habitats**, as well as enter and leave the **Mini Colony**. The vehicle must be able to transport at least 50 g worth of materials.
4. **Waste Management Team** - Create a filtration system for recycling water and a system for recycling plant waste.
5. **Water Supply Team** – Must be able to pump water from a single point source to both **Habitats** of the **Mini Colony**, and must provide water for the food production team.
6. **Communication Team** – Must develop a system so that people in each **Habitat** can communicate with each other (may not use cell phones or similar devices).

If the students are creating **static Mini Life-support System** models, they could use the following criteria for each system. Each system:

- A. must resemble what a real system would look like, in scale;
- B. must use materials which are as representative as possible of the materials that would be used for a real system;
- C. must not be taller than 90 cm or wider than 90 cm; and
- D. must fit on a 1 m x 1 m base with two other systems.

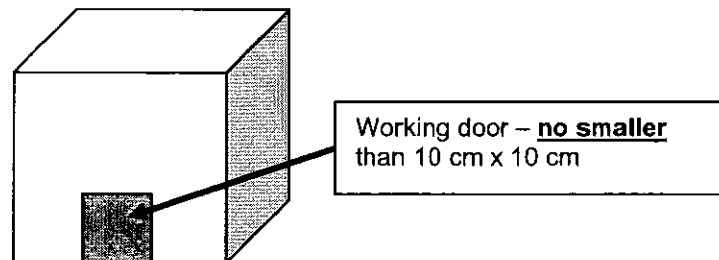
Three Mini Life-support Systems will go on one 1 m x 1 m base (wood, cardboard, Coroplast™, etc.) (**Habitat A**), while the other three Mini Life-support Systems will go on another 1 m x 1 m base (**Habitat B**). It does not matter which **Mini Life-support Systems** go in each of the **Habitats** (see diagram below).



The **Habitat Structures Team** will be tasked to create removable covers to encase the **Mini Life-support Systems** in each of the **Mini Habitats**. The covers:

- a) must be removable;
- b) must seal tightly around the base;
- c) must be at least 50% transparent (i.e., be made of transparent plastic); and
- d) must not be higher than 1 m from the base.

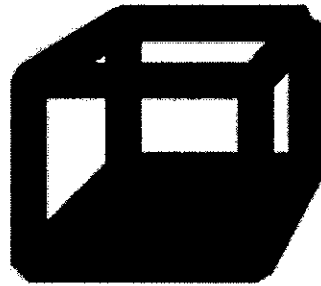
At least one cover needs to have a working door no smaller than 10 cm x 10 cm so that the self-propelled vehicle created by the Transportation team can get in and out (see diagram below).



After designs have been finalized, each team must submit a materials list to the teacher for approval.

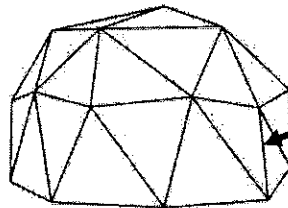
Some ideas for cover structures are:

- cardboard boxes which have windows cut out and covered with transparent plastic (e.g., plastic wrap)



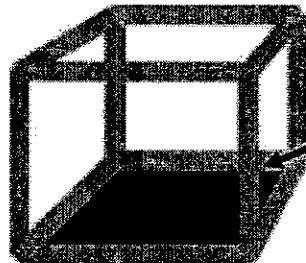
Cardboard box with windows cut out and covered in transparent plastic.

- geodesic domes which are made from wire then covered with transparent plastic



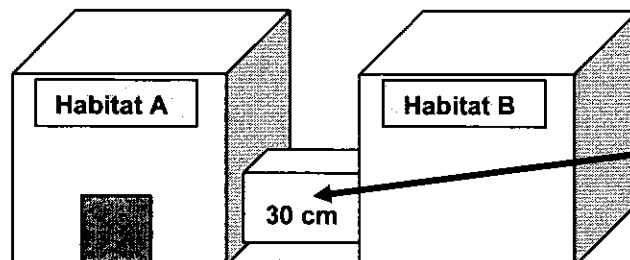
Dome made from wire and covered in transparent plastic.

- wooden frames constructed in the shape of a cube which are covered in transparent plastic



Wooden frame covered in transparent plastic.

On **Link-up Day**, **Habitat A** and **Habitat B** will be connected via a tunnel **no smaller** than 10 cm x 10 cm x 30 cm. Students will need to plan, in advance, how the interconnected elements will be designed so that they can be connected on **Link-up Day**.



Working tunnel – **no smaller** than 10 cm x 10 cm x 30 cm

When **Habitat A** connects to **Habitat B**, the **Mini Colony** is complete.

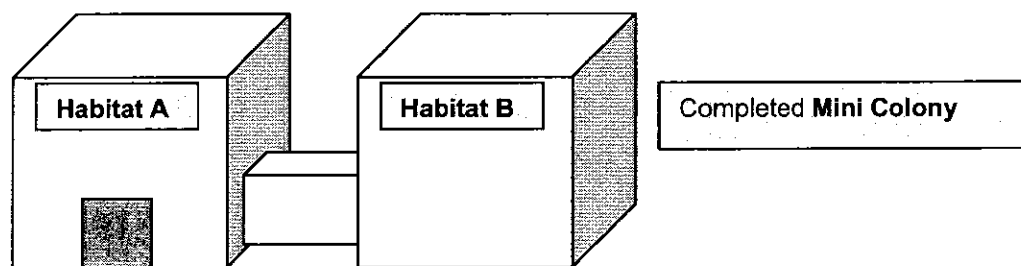
Activity 5: Build Mini Life-support Systems

You may want to have parent volunteers assist with this phase. If you don't have access to parents yourself, then tap into community resources, such as students at local universities or colleges, teachers-in-training from local faculties of education or retired persons.

A variety of different materials will be required to build the **Mini Life-support System**. Some may come out of the recycling bin, some you may already have, some may be brought in by the students and some may need to be purchased. Consider in advance what materials and equipment students may need, how you will obtain them and where they will be stored. For some ideas as to what students may need, visit the [Life-support Systems Design Materials](#) page.

Activity 6: Link-up Day

Link-up Day occurs at the end of the project when both **Habitats** have been completed. On this day, the tunnel connecting **Habitat A** and **Habitat B** is put into place and all of the systems are connected together, forming a **Mini Colony**.



On this day (or over several days if necessary), the various teams will give oral presentations and present a poster about the **Mini Life-support Systems** they created. The presentations must include information about:

- how their systems function (or would function if a static model);
- how their systems do (or would) function with other systems; and
- how the systems might actually work on Mars given the conditions of the Martian environment.

If multiple classes in a school are doing a **Mini-Marsville Link-up Day**, you may want to consider having the students link all of the **Habitats** to create one large **Mini Colony**.

The students will be excited to share and display their **Mini Colonies**. Options for sharing the **Mini Colonies** include:

- displaying the **Mini Colonies** in a public area of the school, such as the library, and inviting other classes to view them (special 'colony representatives' could give tours);
- inviting parents and family members to the **Link-up Day** activities;
- inviting school and board/district staff to the **Link-up Day** activities (send out invitations well in advance);
- having a local newspaper or TV station come to do a story about the **Link-up Day** activities; and
- having the students write stories about the project for a school newsletter.

Assessment

The rubrics in the CNM **Planning and Assessment** section could be used as part of the assessment and evaluation of students participating in **Mini-Marsville**. The rubrics provided are samples and you are welcome to use them in their entirety or modify them as you wish.

Registration

We would like to see and hear about your **Mini-Marsville** project. Please click the link below to register. Registration and participation in **Mini-Marsville** is free! With your registration you will receive Canadian National Marsville promotional materials and a **template for a certificate of participation**.

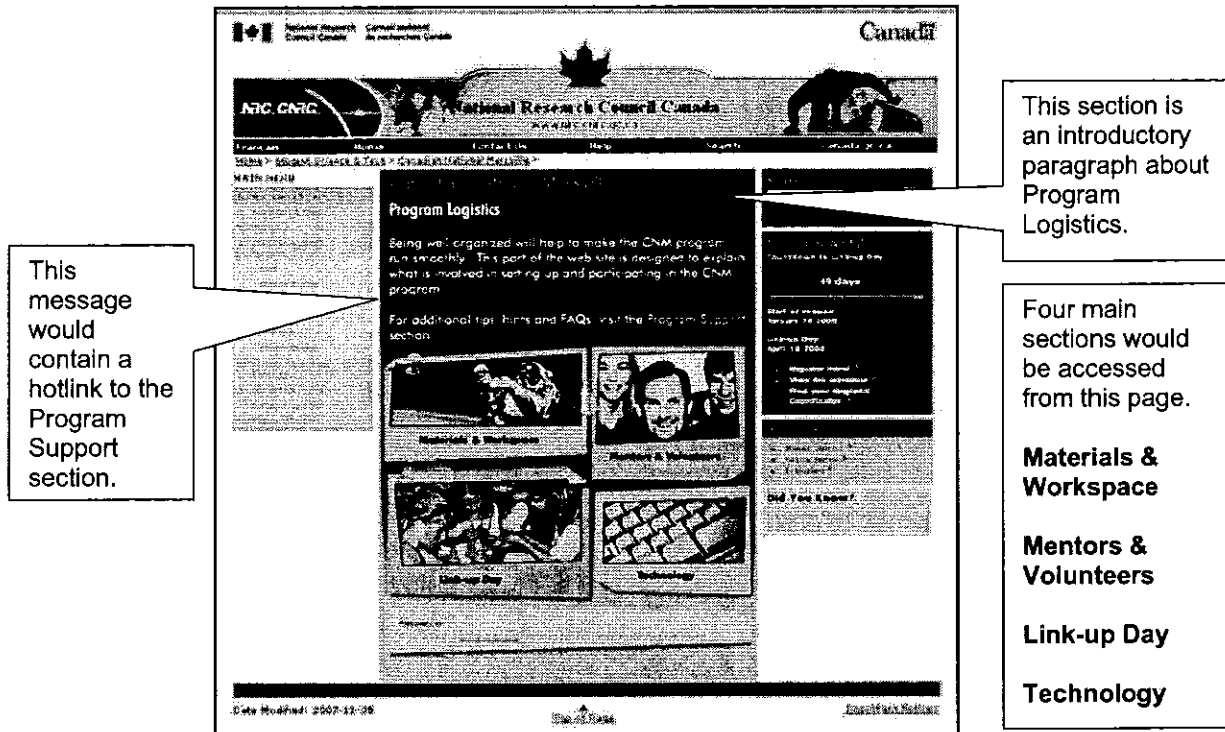
Register now for Mini-Marsville



3.1.3 Program Logistics

This part of the web site is designed to explain what is involved in setting up and participating in CNM. When teachers click on the **Program Logistics** hotlink on the new **Teacher Home Page**, it will open up the **Program Logistics Landing Page**

(see diagram on next page).



This Landing Page would have a hotlink to the **Program Support** section in the introductory text, and links below the four photographs to sections on **Materials & Workspace**, **Mentors & Volunteers**, **Link-up Day** and **Technology**. The side panels would remain constant and be the same as existing side panels.

The introductory text at the top of the page would be the following:

Program Logistics

Being well organized will help to make the CNM program run smoothly. This part of the web site is designed to explain what is involved in setting up and participating in the CNM program.

For additional tips, hints and FAQs, visit the [Program Support](#) section.



3.1.3A Materials and Workspace

Materials and Equipment

A variety of materials and equipment are required for all of the Core and Optional activities. Some may be able to come out of the recycling bin, some you may already have, some may be brought in by students and some may need to be purchased. Consider well in advance what materials and equipment you will need, how you will obtain them and where they will be stored. A number of resources on this web site will help you find out what materials you will need.

Life-support Systems Materials

- **Life-support Systems** require a number of materials. For a list of potential materials required to build **Life-support Systems**, visit the [Life-support Systems Design Materials](#) page. This page could be sent home along with a letter requesting that students collect and bring in materials. For a sample of such a letter, go to the [Sample Letter](#) page. Cut, paste and modify the letter as you see fit.
- **Life-support Systems** may also require access to specialized equipment. You may need to arrange time for students to use a design or technology classroom or have parent volunteer assistance.

Link-up Day Materials

- A number of materials need to be brought along on **Link-up Day**, including materials for each **Habitat Team** (see [Team Checklist](#)), materials for each **Habitat** (see [Habitat Checklist](#)), Emergency Supplies (see [Emergency Supply Kit](#)) and **Lunches**. It is useful to start gathering these materials well in advance of **Link-up Day**.
- **Habitat Crews** must plan together what needs to be gathered and brought to **Link-up Day** for the **Habitats**. The best way to do this is using the [Team Blog](#).

Workspace

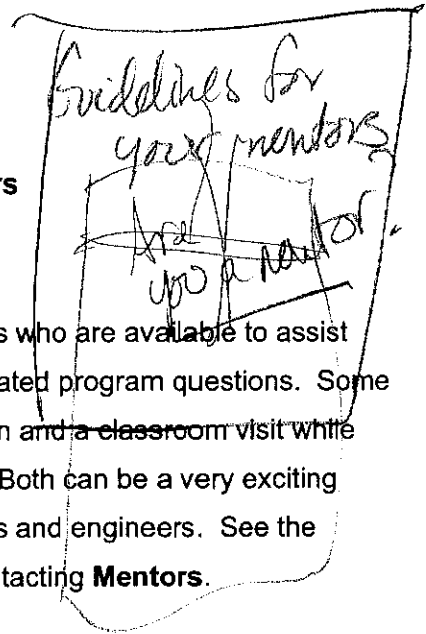
In a classroom, space is always a consideration. As with any design-build project, the students will need space for in-progress work as well as to display their finished **Life-support Systems**. Also keep in mind that space will be required as materials are gathered in preparation for **Link-up Day**. For more ideas about **Work and Display Areas** visit the [Pre-launch Checklist](#).



3.1.3B Mentors & Volunteers

Mentors

Mentors are volunteer scientists who are available to assist with science and technology-related program questions. Some **Mentors** may be able to come in and a classroom visit while others mentor students online. Both can be a very exciting opportunity as students get to meet and work with real scientists and engineers. See the [Where to Find Help](#) page for information about finding and contacting **Mentors**.



Parent Volunteers

Parents can also make great class mentors. Parents can act as role models for students doing specific jobs, offer suggestions, provide support for building **Life-support Systems**, supervise **Habitat Teams**, etc.

Community Volunteers

If you don't have access to parents yourself, then tap into community resources, such as students at local universities or colleges or teachers-in-training from local faculties of education. More suggestions can be found in the **Community Involvement** section of the [Pre-Launch Checklist](#). Community members could also be approached about in-kind donations of materials and equipment.



3.1.3C Link-up Day

Transportation

If you are planning on attending a regional **Link-up Day**, you will need to plan for student transportation. This could be in the form of a bus or could be parents driving their own children. You may need to raise funds for this transportation. Contact your [regional coordinator](#) for more information about transportation.

Also keep in mind that not only will the children themselves need to be transported, but also that their **Life-support Systems** and all of the Team materials, **Habitat** materials, Emergency Supplies and lunches will need to be transported to the site as well.

Media Permissions

Link-up Day is a great opportunity to take photographs of students in action.

Parents/guardians of students must sign both a school/board/district permission form and the form provided by the NRC. Ensure that these forms are sent out well in advance so that all are received before Link-up Day. Click here to download the [NRC Media Release Form](#).

Team Uniforms

Each **Habitat Team** will need to create [Team Uniforms](#). These should not be left to the last minute. Uniforms help to make team members stand out in a crowd and make the day feel like a team event – which it is!

Habitats

It is recommended that each team make a habitat system prototype to practice habitat-building. One way to do this would be to scale down the habitat dimensions to 1m x 1m x 1m and build this smaller version as a way of solving potential problems with the full-scale habitat.

Life-support System Presentations

Have students rehearse their **Life-support System** presentations so that they are prepared for the [Systems Presentations](#). There are suggestions for presentation roles on the Systems Presentations page.



3.1.3D Technology

In order to complete the **Core Activities**, students will need access to a number of different forms of technology. For more information about **Technical Components**, visit the [Pre-launch Checklist](#). Consult your school/board/district IT staff for any additional technology assistance.

Technology Skills

To assess if students have sufficient technology skills, read the [Technology Skills](#) page. This page also contains a link to a [Technology Skills Checklist](#) that could be completed all or in part by the students or could be used as a general guide.

Research

- Students will need adequate computer time and access to the Internet.
- Ensure that students are able to access the recommended web sites. Locating, previewing and book-marking suitable student websites would be useful.
- Familiarize yourself with the web sites so that you can assist students with their research.
- It is important to review with the students your school/board/district usage policies, as well as Intellectual Property issues (e.g., plagiarism, digital piracy, privacy of information, etc.).
- If students cannot use the Internet at school, send home a page of links so that students can do research at home.

Mission Patches

- Students will need to take a digital photograph or scan their completed **Mission Patches**. Alternately, students can design their patches using a computer drawing program and save the file in the specified format.
- If there are no cameras or scanners at school, you may need to do it yourself at home or have a parent volunteer or IT specialist do it for the students.
- Patches must then be uploaded to the blogs in the required format (see **How to Design a Mission Patch**).

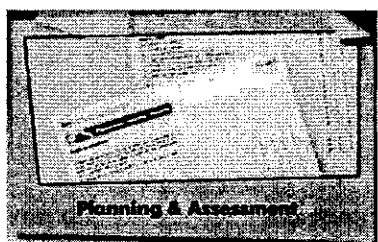
Life-support Systems

- Students may wish to keep digital portfolios of their work. If so, they will need suitable software including word processing, presentation, spreadsheet, etc. If necessary, software skills may need to be taught or reviewed.

Team Blog

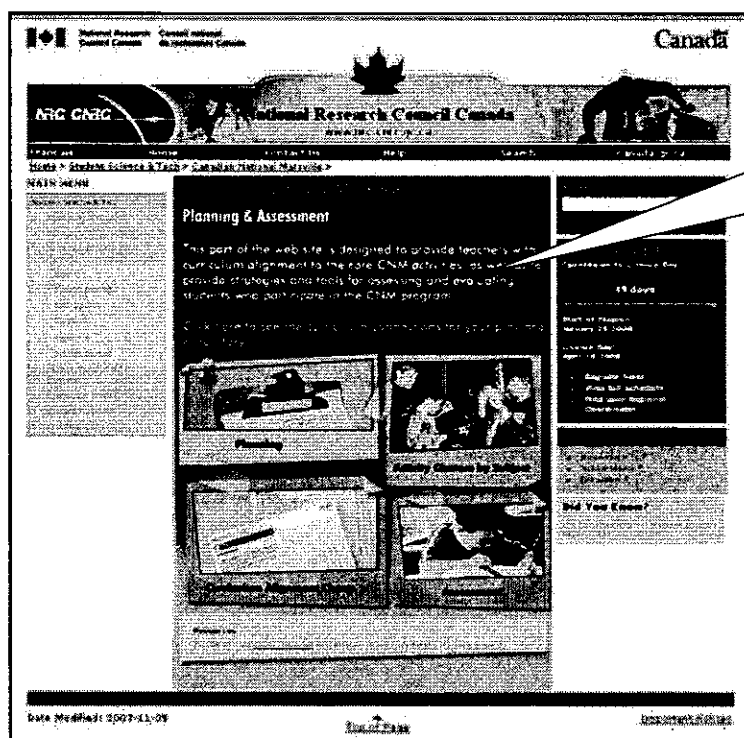
- Teachers will receive guidelines on using the blogs and uploading the **Mission Patches**.
- Students will need access to computers and the Internet on a regular basis so that they may type entries into their blogs. This will require knowledge of how to post entries as well as keyboarding skills.

- You may wish to have students compose their blog entries on paper before typing them.
- Blog entries can be time-consuming. Decide in advance what your expectations are as to the number and length of entries you wish students to do.
- You will receive guidelines for setting up the blogs. Your regional coordinator will explain the process for this when you register for the program.
- All blog postings require teacher approval before posting.



3.1.4 Planning & Assessment

This part of the web site is designed to provide strategies and tools for assessing and evaluating students participating in CNM. When teachers click on the **Planning & Assessment** link on the new **Teacher Home Page**, it will open up the **Planning & Assessment Landing Page** (see diagram below).



This hotlink would take teachers directly to the **Curriculum Alignment Page**.

Four main sections would be accessed from this page.

Planning

Activity Clusters by Subject

Curriculum Alignment Charts

Assessment

This Landing Page would have a hotlink to the **Curriculum Alignment Page** in the introductory text, and hotlinks below the four photographs to sections on **Planning, Activity Clusters by Subject, Curriculum Alignment Charts and Assessment**. The side panels

would remain constant and be the same as existing side panels.

The introductory text at the top of the page would be the following:

Planning & Assessment

This part of the web site is designed to provide teachers with curriculum alignment to the core CNM activities, as well as to provide strategies and tools for assessing and evaluating students who participate in the CNM program.

[Click here to see the curriculum connections for your province or territory.](#)



3.1.4A Planning

You will need to decide in advance whether you will be having the students do the program as part of a curriculum-aligned class project, an enrichment project, an after school club, etc.

If doing the project in class, determine how much class time the students will devote to the program (Core Activities plus any additional Optional Activities as well as **Link-Up Day**) and plan lessons accordingly. For specifics as to time required for given tasks, visit the [Timeline](#) page and the [Mission Schedule](#).

Student participation in CNM requires planning ahead. Below are some planning suggestions.

- Consider how CNM will take place in your classroom. Will it be a core unit for science or technology? Will it be an integrated unit? Will it be an enrichment project?
- Will you need approval and/or support from your school administration?
- Will your class be participating on its own, or will other classes from your school be participating?
- Do you need to plan as a grade or division team?
- In addition to the [Core Activities](#), will the students be doing any of the [Optional Activities](#)?
- How will you assess and evaluate the students? What curriculum areas will you assess/evaluate? What tools/strategies will you use?



3.1.4B Activity Clusters by Subject

In order to complete the CNM program, each team of students (**Habitat Team**) must complete a number of Core Activities (see the **Core Activities** section).

For the purposes of planning and assessment, the **Core Activities** have been grouped into subject clusters. These include **Science, Technology and Engineering** (both Design Technology and Information Communication Technology), **Language Arts, Mathematics, Health, Physical Education** and **Visual Arts**.

These same subject clusters are used on each jurisdictional curriculum chart. For the curriculum connections to your province or territory, click on the links below the activity subject clusters. Note: The nine **Life-support Systems** are: *Air Supply, Communications, Energy Supply, Food Production and Delivery, Health and Recreation, Temperature Control, Transportation, Waste Management* and *Water Supply*.

Science

- *Research Martian Environment*
- *Research Mission Patch.*
- **Research one Life-support System.**
- **Plan and Construct one 3D model Life-support System.**
- **Present one 3D model Life-support System.**
- *Construct a 'habitat' for living on Mars using plastic and duct tape on Link-up Day.*

Technology/Engineering

- *Plan, construct and present one 3D model Life-support System.*
- *Construct a 'habitat' for living on Mars using plastic and duct tape on Link-up Day.*

For Information and Communication Technology:

- *Do research.*
- *Describe the Team Mission Patch on the Team Blog.*
- *Communicate with other groups using the Team Blog.*
- **Present 3D model Life-support System.**

Language Arts

- Do research.
- Describe the Team Mission Patch on the Team Blog.
- Communicate with other groups using the Team Blog.
- Present 3D model Life-support System (oral presentation and poster).

Mathematics

- Apply mathematics skills in the planning and construction of **one** 3D model Life-support System.
- Apply mathematics skills in the construction a 'habitat' for living on Mars using plastic and duct tape on Link-up Day.

Health

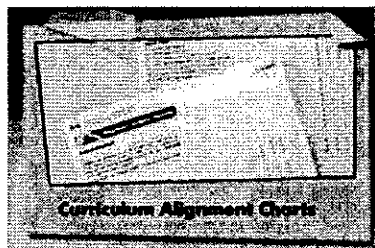
- Plan, construct and present **one** 3D model Life-support System. May include:
 - Food Production and Delivery
 - Health and Recreation
 - Water Supply

Physical Education

- Plan, construct and present **one** 3D model Life-support System. May include:
 - Health and Recreation

Visual Arts

- Apply visual arts skills in the design and creation of a Mission Patch.



3.1.4C Curriculum Alignment Charts

Curriculum alignment charts have been created for each province and territory with alignments from the **Core Activities** to **Science, Technology and Engineering** (both Design Technology and Information Communication Technology), **Language Arts, Mathematics, Health, Physical Education** and **Visual Arts**.

Specific Outcomes/Expectations have been identified for **Science, Technology and**

Engineering (both Design Technology and Information Communication Technology)
General or Overall Outcomes/Expectations have been identified for **Language Arts**,
Mathematics, **Health**, **Physical Education** and **Visual Arts**.

Click on the link below to find your province or territory's curriculum alignment chart.

[Alberta grade 6](#)

[Alberta grade 7](#)

[Alberta grade 8](#)

[British Columbia grade 6](#)

[British Columbia grade 7](#)

[British Columbia grade 8](#)

[Manitoba grade 6](#)

[Manitoba grade 7](#)

[Manitoba grade 8](#)

[New Brunswick grade 6](#)

[New Brunswick grade 7](#)

[New Brunswick grade 8](#)

[Nouveau Brunswick \(Secteur francophone\) 6^e année](#)

[Nouveau Brunswick \(Secteur francophone\) 7^e année](#)

[Nouveau Brunswick \(Secteur francophone\) 8^e année](#)

[Newfoundland and Labrador grade 6](#)

[Newfoundland and Labrador grade 7](#)

[Newfoundland and Labrador grade 8](#)

[Northwest Territories grade 6](#)

[Northwest Territories grade 7](#)

[Northwest Territories grade 8](#)

[Nova Scotia grade 6](#)

[Nova Scotia grade 7](#)

[Nova Scotia grade 8](#)

[Nouvelle-écosse \(CSAP\) 6^e année](#)

[Nouvelle-écosse \(CSAP\) 7^e année](#)

[Nouvelle-écosse \(CSAP\) 8^e année](#)

Nunavut grade 6

Nunavut grade 7

Nunavut grade 8

Ontario grade 6

Ontario grade 7

Ontario grade 8

Prince Edward Island grade 6

Prince Edward Island grade 7

Prince Edward Island grade 8

Québec Education Program – Elementary Cycle 3

Québec Education Program – Secondary Cycle 1

Québec Enseignement Primaire, Troisième Cycle

Québec Enseignement Secondaire, Premier Cycle

Saskatchewan grade 6

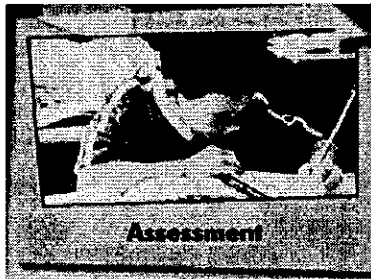
Saskatchewan grade 7

Saskatchewan grade 8

Yukon grade 6

Yukon grade 7

Yukon grade 8



3.1.4D Assessment

The rubrics below could be used as part of the assessment and evaluation of students participating in CNM. These rubrics are samples. Use them in their entirety or modify them as you wish.

Learning Objective: Make a written plan for a 3D model **Life-support System** for the planet Mars.

Assessment Strategy: Each **Habitat Team** will create a plan for their given system based on predetermined criteria (each **Life-support System** has its own design criteria). The plan should include materials, procedures and labeled diagrams.

Assessment Tool: Rubric.

Initiating and Planning	Level 1	Level 2	Level 3	Level 4	Score
Understanding the design criteria	Demonstrates a limited understanding of the design criteria when generating solutions	Demonstrates some understanding of the design criteria when generating solutions	Demonstrates considerable understanding of the design criteria when generating solutions	Demonstrates thorough understanding of the design criteria when generating solutions	
Making a Plan	Develops a plan for a chosen solution that does not take into account predetermined criteria	Develops a plan for a chosen solution that takes into account some predetermined criteria	Develops a plan for a chosen solution that takes into account most predetermined criteria	Develops a plan for a chosen solution that takes into account all predetermined criteria	
Communicating the Plan	Demonstrates limited organization in written work, including use of labelled diagrams	Demonstrates some organization in written work, including use of labelled tables, charts and diagrams	Demonstrates good organization in written work, including use of labelled tables, charts and diagrams	Demonstrates excellent and careful organization in written work, including use of labelled tables, charts and diagrams	

Learning Objective: *Select and use materials to create the Life-Support Systems.*

Assessment strategy: Each **Habitat Team** will select and safely use materials and equipment, which may either be provided by the teacher or brought in by the students.

Assessment Tool: Rubric

Initiating and Planning	Level 1	Level 2	Level 3	Level 4	Score
Selection of materials	Demonstrates limited understanding of properties and availability of resources	Demonstrates some understanding of properties and availability of resources	Demonstrates considerable understanding of properties and availability of resources	Demonstrates thorough understanding of properties and availability of resources	
Use of materials	Follows few safety procedures and rules	Follows some safety procedures and rules	Follows most safety procedures and rules	Follows all safety procedures and rules.	

Learning Objective: *Use the plan to construct, test and evaluate the Life-support System.*

Assessment strategy: Each **Habitat Team** will construct its **Life-support Systems** based on its plan and then evaluate how effectively the system meets the pre-determined criteria.

Assessment Tool: Rubric

Performing and Recording	Level 1	Level 2	Level 3	Level 4	Score
Interpreting the Plan	Makes limited use of a plan for building the system	Makes some use of a plan for building the system	Makes considerable use of a plan for building the system	Makes full use of a plan for building the system and modifies as required	
Constructing the System	Records testing the system not taking into account predetermined criteria	Records testing the prototype and takes into account some predetermined criteria	Records testing the prototype and makes modifications to meet most predetermined criteria	Records testing the prototype and makes modifications to meet all predetermined criteria	

Learning Objective: Communicate about **Life-support Systems**.

Assessment strategy: Students will present their **Life-support Systems** to others both through and oral presentation and a poster on **Link-up Day**.

Assessment Tool: Rubric.

Communication - Poster	Level 1	Level 2	Level 3	Level 4	Score
Application of scientific principles	Limited understanding of scientific principles underlying the construction and modifications	Some understanding of scientific principles underlying the construction and modifications	Good understanding of scientific principles underlying the construction and modifications	Thorough understanding of scientific principles underlying the construction and modifications	
Clarity of graphics	Limited understanding of using graphics effectively	Some understanding of using graphics effectively	Good understanding of using graphics effectively	Excellent understanding of using graphics effectively	
Labels	Limited use of labels or labels are inaccurate	Some use of labels and labels are mainly accurate	Good use of labels and most labels are accurate	Excellent use of labels and all labels are accurate	
Overall appearance	Limited use of design and layout for the poster	Some use of design and layout for the poster	Good use of design and layout for the poster	Excellent use of design and layout for the poster	
Communication - Oral	Level 1	Level 2	Level 3	Level 4	Score
Presentation content	Limited clarity and some	Mainly clear and mostly	Clear and accurate	Clear, accurate and effective	

	inaccurate communication of life-support system	accurate communication of life-support system	communication of life-support system	communication of life-support system	
Vocabulary	Makes limited use of correct science and technology vocabulary	Makes some use of correct science and technology vocabulary	Makes good use of correct science and technology vocabulary	Makes excellent use of correct science and technology vocabulary	

Learning Objective: Work collaboratively and effectively in a small group to solve a practical problem.

Assessment Strategy: Students will assess their participation in the group challenge.

Assessment Tools:

Student Self-Assessment

- Have each student individually complete the **Self-evaluation Form**

Group Self-Assessment

- Have each student individually complete the **Team Evaluation Form**

Student Work Samples - Photographs, video

- A good time to take photographic or video work samples would be while the students are constructing and evaluating their **Life-support Systems**. Be sure to add annotations.
- Take photographs or video at **Link-up Day**.



3.1.5 Program Support

This part of the web site is designed to provide links to the different means by which teachers can get program support. When teachers click on the **Program Support** link on the new **Teacher Home Page**, it will open up the **Program Overview Landing Page** (see diagram on next page).



Four main sections would be accessed from this page.

Additional Resources

Tips and Hints

Frequently Asked Questions

Where to Find Help

This Landing Page would have an introductory paragraph and hotlinks below the four photographs to sections on **Additional Resources**, **Tips and Hints**, **Frequently Asked Questions** and **Where to Find Help**. The side panels would remain constant and be the same as existing side panels.

The introductory paragraph would have the following text:

Program Support: we're here to help!

When participating in CNM, you are not alone! There are many resources available to help you if you have questions, run into problems, or are looking for additional information. Below are places to find help, tips and hints, frequently asked questions and additional resources.



3.1.5A Additional Resources

There are many exciting web sites to visit to learn more

about the Red Planet. Here some recommended web sites to visit.

Canadian Skies

The National Research Council's Student Science & Tech section has a variety of space-related activities for students.

Canadian Space Agency

The Canadian Space Agency (CSA) is Canada's national space exploration agency, responsible for Canada's manned and unmanned space programs. The CSA is providing a weather station for the Phoenix Mars Mission, due to land on Mars on May 25, 2008. This probe will gather the first ever meteorological data from another planet's polar region, and is the first Canadian contribution to a Mars lander. A number of useful resources are available on the CSA's Educators page.

Canadian Space Resource Centre

The Canadian Space Resource Centre (Spacenet) is a good source for Canadian space news. It also offers a variety of space-related resources for sale to educators, as well as in-class presentations for teachers in the Toronto area.

European Space Agency – Mars Express

Mars Express is one of a number of spacecraft currently orbiting the Red Planet. This site offers some spectacular images of Mars, along with some interesting animation. Summaries of the latest research findings from this probe are also available on this site.

Haughton-Mars Project

The Haughton-Mars Project is an ambitious long-term project which is simulating human

<u>Canadian Skies</u>
<u>Canadian Space Agency</u>
<u>Canadian Space Resource Centre</u>
<u>European Space Agency-Mars Express</u>
<u>Haughton-Mars Project</u>
<u>Mars Institute</u>
<u>NASA</u>
<u>MarsToday.com</u>
<u>Mars TV</u>
<u>The Planetary Society</u>
<u>SETI Institute</u>
<u>Tomatosphere</u>
<u>The Canada Food Guide</u>

exploration of Mars by building a base camp up on Devon Island in Nunavut. The Houghton Crater on Devon Island has surprisingly similar environmental and geological conditions to Mars, and researchers are exploring how to live on Mars by building greenhouses, testing spacesuits and having researchers live at the station for long periods of time.

Mars Institute

The Mars Institute is dedicated to furthering “the scientific study, exploration, and public understanding of Mars.” Their web site contains much valuable information about Mars, including a page of Mars facts and a poster showing current conditions on Mars (updated daily).

National Aeronautics and Space Administration

The National Aeronautics and Space Administration (NASA) remains the premier agency conducting exploration of Mars, both from orbit and on the surface. NASA has an ambitious array of spacecraft operating around Mars and preparing for launch. In addition, NASA is the lead agency for the proposed long-duration human missions to Mars (part of Project Constellation) in collaboration with other space-faring countries. Below are some other useful NASA web pages.

NASA Mars Exploration Program

NASA has a significant portion of its web site devoted to its Martian exploration activities. Amongst the pages are specific sections for students and educators.

Phoenix Mars Lander

The *Phoenix* mission will be the latest spacecraft to land on the surface of Mars. Destined for the north polar region, the Lander is scheduled to touch down on May 25th, 2008. *Phoenix* will examine soil and ice samples to determine whether conditions that could support life have existed on the Red Planet. Part of the Lander’s instrument package is a meteorological station developed by the Canadian Space Agency.

Mars Exploration Rovers

NASA’s twin Martian Rovers, *Spirit* and *Opportunity*, have been active on the surface of Mars for over four years, vastly expanding our knowledge of Mars. Still images, video and lots of information on these ongoing missions can be accessed here.

Mars Pathfinder Mission

Pathfinder, with its Rover *Sojourner*, was the first spacecraft to land on the surface of Mars in over 20 years; this site has a wealth of information on the mission. The gallery of 3-D images is particularly interesting.

Viking Mission to Mars

The two *Viking* missions, which each consisted of an orbiter and a lander, arrived at Mars in 1976. The landers were the first spacecraft designed to look for signs of life on another planet. This site has large amounts of information related to those missions, including photo galleries.

MarsToday.com

This site provides daily news stories about human exploration of Mars, including an e-newsletter that one can subscribe to.

Mars.TV

This site is a comprehensive, up to date collection of video and imagery related to Mars.

The Planetary Society

The Planetary Society is an organization devoted to human exploration of space, particularly Mars. One fun activity on the site lets people figure out how much they would weigh on Mars.

The SETI Institute

The Search for ExtraTerrestrial Intelligence (SETI) Institute is dedicated to searching for life beyond Earth. While primarily concerned with intelligent life elsewhere, the SETI Institute does look at the search for life on other planets in general. Their Links page is particularly good.

Tomatosphere

Tomatosphere is a unique program that allows classrooms to grow plants from seeds which have actually flown in space on board a space shuttle and participate in research that will help astronauts survive space missions to Mars. Among the educator resources on the site is a lesson plan that has students growing the plants in simulated Martian sunlight conditions.

Growing seeds which have been flown in space would be a great enhancement to students'

Life-support Systems.

The Canada Food Guide

The latest version of Canada's Food Guide will help students to plan a well-balanced Martian lunch for **Link-up Day**. Free copies of the Food Guide are available from this site.



3.1.5B Tips and Hints

Below are some implementation tips and hints compiled by teachers who have participated in the program. To share your tips

and hints, contact education@nrc-cnrc.gc.ca. Tips for getting started can be found in the **Pre-Launch Checklist**.

Keeping it All Together

Team Mission Roles

Mission Logs

Mission Patches

Families and Special Guests

Link-up Day Roles

Habitats

Keeping it All Together

Keeping organized will make participating in CNM go much more smoothly. Make yourself a binder and keep all related training documents, web site downloads and program information in one place.

Team Mission Roles

In order for each student to participate to the utmost, ensure that each student has a job/or role that he/she will find rewarding. This involves knowing your students and allocating jobs according to their strengths and interests. If students are allowed to choose their own jobs, this presents potential for conflict. Multiple students may choose the same job and no students may choose other jobs, which could leave important tasks unfulfilled. More tips about student roles can be found in the **Team Members** section of the **Pre-Launch Checklist**.

One way to keep students on track is to create a Team Mission Role description sheet for each student.

1. Copy and paste the descriptions of the **Team Mission Roles** from the web page into separate pages of a word processing document.

2. Add a space at the top of the page for the student's name and the team name. You could also add spaces for grade, teacher's name, etc.
3. Print and laminate copies of the role descriptions and give to students.

If the sheets are laminated, they could be used with wet or dry erase markers and reused from year to year.

The **Team Mission Roles** are very general, so you may want to add more specific tasks for each role, e.g., liaison with teacher, keep Mission Log up to date, organize supplies, make **Link-up Day** badges for each team member, etc..

Mission Logs

In the student section of the CNM web site are **Team Mission Logs**. These logs are a useful tool for keeping everyone on track and can be used in a number of ways. The logs can be downloaded and printed (a printable version is available **Team Mission Log Printable**) and used exactly as they are. The HTML version from the web site could be cut and pasted into a word processing document and elements could be added/removed/changed. If students had access to digital versions of the logs they could type into them as a way of keeping a digital checklist of activities as they are completed.

Mission Patches

Mission patches are a memorable product of each team's participation in the program. Teams participating in CNM must have their patches uploaded by the designated date in order to appear on the annual **CNM Commemorative Poster** which participants receive on **Link-up Day**. If your class is doing **Mini-Marsville**, your mission patches ***will not appear on this poster***. They could, however, be combined to form a school-based commemorative poster.

Families and Special Guests

If you are having a school-based **Link-up Day**, be sure to invite family members, school council members, school board/district staff, etc., to witness all or a portion of the **Link-up Day** activities. Seeing the students in action is a great way to get support for the program and spread the word about what an amazing experience CNM is for students. Invitations could be created by the students themselves. Keep in mind that invitations must go out well in advance of **Link-up Day**. More suggestions can be found in the **Community Involvement** section of the **Pre-Launch Checklist**.

Link-Up Day Roles

There are a variety of roles for each team member to perform specifically on **Link-up Day**.

The **Link-up Day Roles** could be treated in much the same way as the **Team Mission Roles** above. Ensure that the roles are determined before the event and that each student understands his/her role.

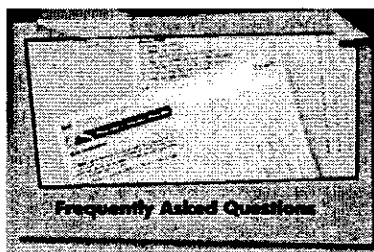
The more specific the roles are, the easier it will be for students to remain on-task. You may even wish to make the task lists into more of a checklist so that students can follow their progress over the course of the event.

Habitats

Building the plastic and duct tape **Habitats** on **Link-up Day** is a fun and challenging task. It is recommended that you build a 1 m x 1 m x 1 m scale model of the **Habitat** ahead of time (see the suggestion on the **Link-up Day** page of the Program Logistics section). Instructions for the **full-size habitat** can be found in the **Link-up Day** section.

As there are many materials required to build the **Habitats**, a good tip is to print the **Manifest List** and check off the items as you pack.

Encourage students to wear soft indoors shoes on **Link-up Day** so as not to damage the **Habitats** as they move about the colony.



3.1.5C Frequently Asked Questions

Do you have a question? It may be one that other people have too. Below is a list of Frequently Asked Questions about Canadian National Marsville.

Why does CNM start on January 28th?

January 28th is the anniversary of the explosion of the space shuttle *Challenger*. Families of shuttle crew members created the original Marsville program as homage to their loved ones' passion for space exploration.

What is the duration of Canadian National Marsville?

Canadian National Marsville (CNM) always begins on January 28. Link-up Day, which is the culmination of CNM, occurs nationally in late April. This is a day in which groups from across Canada link-up to share what they have learned about Mars. Schools doing Mini-Marsville will select a date of their choice in order for class teams to link-up. Ideally this would also be in April or early May.

Is CNM like a science fair?

Unlike a science fair, CNM is not a competitive activity, but rather a cooperative venture between groups of students. This is not to suggest that students do not strive to be the very best they can be. Like a science fair, groups of students from across a region share what they have learned with other students as well as special visitors at a regional event called Link-up Day.

Where are Link-up Days held?

A number of different cities across Canada host regional Link-up Days. You can find out which cities are having Link-up Days by going to the Site Contacts and Link-up Day Locations page. If your school is not near one of these cities, your students can still explore the Red Planet by participating in Mini-Marsville or by becoming a satellite/remote site to the nearest regional centre.

Does CNM fit with my province's/territory's curriculum?

CNM is a highly integrative cross-curricular program that aligns with a number of subject areas for all provinces and territories. CNM can be approached in a cross-curricular fashion, or done as a science and technology unit. For more information, go the Planning and Assessment section.

Do my students need to do all of the activities on the CNM web site?

There are a number of activities which are considered 'core' to the CNM program. These activities are outlined on the Core Activities page of the Program Overview. There are a number of other optional activities which add to the realism of the program and extend the program. These activities are outlined on the Optional Activities page of the Program Overview.

Where can my students get information about Mars?

Many exciting things are happening in planetary exploration of Mars, and CNM has an extensive list of online resources on the [Resources for Teachers](#) page with even more annotated online resources on the [Additional Resources](#) page in the [Program Support](#) section.

How much does it cost to participate?

Registration for CNM is free. As for materials, students could use no-cost recyclable materials to create their **Life-support Systems**, have materials donated, or use existing classroom materials (e.g., LEGO® TECHNIC® systems). Schools travelling to a regional **Link-up Day** may require transportation. The money for this may be raised through class fundraising or through school/parent councils or local community donations. Schools may also need to purchase plastic for building **Habitats** on **Link-up Day**. Please consult your regional coordinator for more details.

Do I have to register?

Staying connected is an important part of CNM, and as such, registration is required for both CNM and **Mini-Marsville**. Teachers who register for CNM will be able to attend program orientation sessions as well as receive program information, updates, [CNM promotional materials and a template for a certificate of participation](#). Teachers who register for **Mini-Marsville** will also receive program information, [CNM promotional materials and a template for a certificate of participation](#).

What If I still have questions?

NRC staff and CNM volunteers are here to help. The [Where to Find Help](#) page of this [Program Support](#) section has links to helpful people near you.



3.1.5D Where to Find Help

When you are doing CNM, you are not alone! There are many resources available to help you if you have questions or run into problems. Below are some of the people you can contact.

CNM Site Contacts

CNM national coordinators and regional volunteers are available to answer your questions about implementing the CNM program, using the **Blog**, where to go for **Link-up Day**, etc. Contact information for National Coordinators as well as regional coordinators can be found on the **Site Contacts** page.

Participating Schools

Do you want to see which other schools in your region are participating? Would you like to contact a team in your city or from another part of Canada? Starting each January, participating schools can be found on the **Schools** page of **Mission Control** section. Once you have found a school you wish to contact, go to the **Team Blog List** and click on the group you wish to contact.

Mentors

Mentors are volunteer scientists who are available to assist with science and technology-related program questions. The mentors are excellent role models for the students as many of them work in the field of space science – some have even participated in real Mars missions!

- You can send in a request for an online mentor at education@nrc-cnrc.gc.ca.
- Some mentors may also be available to visit you **at your school**. Contact your regional coordinator for tips on finding a mentor in your area.
- Many mentors also attend **Link-up Days** and will do activities and share their expertise with students.

