Middle Level English Language Arts (ELA)
Grade 6
A Model Interdisciplinary, Inquiry Unit

Taking Flight

A Note To The Teacher

Students need opportunities to make sense of the world around them and to find out how things work. An interdisciplinary, inquiry unit offers students the opportunity to develop research and study skills in order to find and to use information from a variety of sources.

An English language arts unit can:

- give students opportunities to develop their language abilities as a function of their thinking abilities
- develop students' proficiency as well as enjoyment in speaking, listening, writing, reading, representing, and viewing
- develop students' knowledge and use of the English language, its cueing systems and conventions
- develop students' ability to appreciate and respond to a range of texts
- develop students' use of language to learn and manage ideas and information as they learn.

A science unit can:

- develop an understanding of the nature of science and technology, the relationships between science and technology, and the social and environmental contexts of science and technology
- develop the skills required for scientific and technological inquiry, solving problems, communicating scientific ideas and results, working collaboratively, and making informed decisions
- construct knowledge and understanding of concepts in science and apply these understandings to interpret, integrate, and extend knowledge.
- develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment (*Common Framework of Science Learning Outcomes K-12*, 1997, p. 6).

An interdisciplinary (science and English language arts) inquiry unit on flight and space can:

- give students opportunities to develop a critical sense of wonder and curiosity about flight and space science
- give students opportunities to learn and apply language skills, strategies, and understandings
- give students opportunities to learn skills and strategies required in both areas of study (e.g., ask questions, observe and investigate, interpret findings, communicate ideas, procedures, and results, work collaboratively)
- give students opportunities to solve problems, gain knowledge, and hone their inquiry skills by posing intriguing questions and seeking their answers
- help students understand the world by developing personal conceptions, constructing mental images, and sharing these with others using everyday language in diverse situations
- give students opportunities to address specific learning outcomes and concepts from each subject area.

Unit Overview

Context(s): Environmental and Technological

Timeline: Approximately six weeks

People have always wondered about flight and about space. In this interdisciplinary unit (English language arts and science), students will have the opportunity to listen, read, and view different texts related to flight, space, and space exploration – some factual, some imaginary. They will learn how to gather and organize information and how to report and document factual information in different ways.

The unit is organized around three focus questions (which teachers should post and have visible for the duration of the unit) with sample lessons and suggested resources included. Approximately one to two weeks could be spent on each focus question topic, with the remainder of the time devoted to end-of-unit activities. (Time allocations given are approximations only. Teachers can choose to spend more or less time on each lesson depending on the needs and interests of their students.)

Throughout this model unit, the suggested activities show how teachers can help students achieve the aim, goals, and outcomes for ELA 6 in the environmental and technological context. The Learning Activities in this model unit may be adapted based on the interests and needs of the students. For example, on page 9, the learning activity suggested is as follows:

"Ask the students if they have ever dreamt of being able to fly or travel in space. The ability to fly is shared by a variety of living things and human inventions. For many centuries, humans have marvelled at the ability of living things to attain flight and have developed a variety of devices to recreate that ability (*Common Framework of Science Learning Outcomes K-12*, 1997, p. 163)."

Although CC 6.5 (use oral language to …) is one of the outcomes explored in this learning activity, teachers may select a different outcome such as CC 6.4 (create and represent …) and invite students to represent their dreams of flight or space travel. As teachers explore this unit with students, teachers have the opportunity to create their own learning activities that help students achieve the curricular outcomes. In addition, for students to successfully achieve the curricular outcomes, teachers must plan for and address the outcomes many times throughout the year.

Understanding: Humans have always been fascinated by and have had a desire to explain flight, flying devices, and space.

Possible Questions for Deeper Understanding

- How can birds, insects, bats, kites, planes, and rockets fly? Can people fly? (How do living things and flying devices achieve lift, movement, and control? Why can we not fly an airplane to the moon?)
- How can we explore and learn about space? (What technologies have been developed to find out about space? How do people on Earth gather information about space? What have we learned about space?)
- What have we accomplished through space exploration? (What is needed to travel and to live in space? How has the exploration of space changed people's lives on Earth? How will space be used in the future?)
- Questions students would like to explore:

Note: The beginning of the unit includes teacher-directed activities to focus students and to help them begin thinking about the questions that will direct the unit. The teacher also can model the inquiry process and gradually begin to ask students to establish a need and purpose for their personal inquiry. Students should choose a specific topic, based on their own needs, purposes, and goals, and then develop a research plan and review it with their teachers and peers.

Science Concepts

Understands the nature of flight and space including:

Flight:

- ❑ The features of living things and constructed devices that fly
- ❑ The role of lift in enabling devices or living things to fly
- ❑ Characteristics and adaptations that enable birds and insects to fly
- ❑ Differences in design between aircraft and spacecraft
- ❑ Historical events and milestones in the history of flight
- ❑ Means of propulsion for flying devices
- ❑ Other:

Space:

- ❑ The physical characteristics of components in the solar system – specifically, the sun, planets, moons, comets, asteroids, and meteors
- ❑ An aspect of space or space technology
- ❑ The challenges and new opportunities created by space science
- ❑ How astronauts are able to meet their basic needs in space
- ❑ Other:

English Language Arts Goals and Outcomes Overview [Grade 6]

Comprehend and Respond (CR). Students will extend their abilities to view, listen to, read, comprehend, and respond to a range of contemporary and traditional grade-level texts from First Nations, Métis, and other cultures in a variety of forms (oral, print, and other texts) for a variety of purposes including for learning, interest, and enjoyment.

CR6.1 View, listen to, read, comprehend, and respond to a variety of texts that address identity (e.g., Growing Up), social responsibility (e.g., Going the Distance), and efficacy (e.g., Making Our Community More Peaceful).

CR6.2 Select and use the appropriate strategies to construct meaning before (e.g., considering what they know and need to know about topic), during (e.g., making connections to prior knowledge and experiences), and after (e.g., drawing conclusions) viewing, listening, and reading.

CR6.3 Use pragmatic (e.g., function and purpose of texts), textual (e.g., form/genre, sequence of ideas), syntactic (e.g., word order and emphasis on particular words), semantic/lexical/ morphological (e.g., capture particular aspect of intended meaning), graphophonic (e.g., sound-symbol patterns and relationships), and other cues (e.g., the speaker's non-verbal cues) to construct and confirm meaning.

CR6.4 View, respond, and demonstrate comprehension of visual and multimedia grade-appropriate texts including traditional and contemporary texts from First Nations, Métis, and other cultures containing special features (e.g.,) the visual components of magazines, newspapers, websites, comic books, broadcast media, video, and advertising).

CR6.5 Listen purposefully to, understand, respond, and analyze oral information and ideas from a range of texts including narratives, instructions, oral explanations and reports, and opinions.

CR6.6 Read and demonstrate comprehension and interpretation of grade-appropriate texts including traditional and contemporary prose fiction, poetry, and plays from First Nations, Métis, and other cultures.

CR6.7 Read independently and demonstrate comprehension of a variety of information texts with some specialized language including grade-level instructional materials, non-fiction books, reports and articles from magazines and journals, reference materials, and written instructions.

CR6.8 Read grade 6 appropriate texts to increase fluency (120-160 wcpm orally; 160-210 wpm silently) and expression.

Compose and Create (CC). Students will extend their abilities to speak, write, and use other forms of representation to explore and present thoughts, feelings, and experiences in a variety of forms for a variety of purposes and audiences.

CC6.1 Create various visual, multimedia, oral, and written texts that explore identity (e.g., Your Choices), social responsibility (e.g., Looking for Answers), and efficacy (e.g., Systems for Living).

CC6.2 Select and use the appropriate strategies to communicate meaning before (e.g., identifying purpose and audience), during (e.g., acknowledging sources), and after (e.g., revising to enhance clarity) speaking, writing, and other representing activities.

CC6.3 Use pragmatic (e.g., function and purpose), textual (e.g., paragraphs), syntactic (e.g., complete sentences with appropriate subordination and modification), semantic/lexical/morphological (e.g., figurative

words), graphophonic (e.g., spelling strategies) and other cues (e.g., appropriate volume and intonation) to construct and to communicate meaning.

CC6.4 Create and present a variety of representations that communicate ideas and information to inform or persuade and to entertain an audience, including illustrations, diagrams, posters, displays, and cartoons.

CC6.5 Use oral language to interact appropriately with others in pairs, and small and large group situations (e.g., asking questions to explore others' ideas and viewpoints, discussing and comparing ideas and opinions, completing tasks and contributing to group success).

CC6.6 Use oral language appropriately to express a range of information and ideas in formal and informal situations including presenting an oral report based on research, a demonstration, and a short dramatization.

CC6.7 Write to describe a place; to narrate an incident from own experience in a multi-paragraph composition and in a friendly letter; to explain and inform in multi-step directions and a short report explaining a problem and providing a solution; and, to persuade to support a viewpoint or stand.

CC6.8 Experiment with a variety of text forms (e.g., a peer interview, presentation at an assembly, poem, letter to parents, short review, poster, tableau, graphic organizer) and techniques (e.g., surprise ending).

CC6.9 Prepare a teacher-guided inquiry report related to a stand on a topic, theme, or issue studied in English language arts.

Assess and Reflect on Language Abilities (AR). Students will extend their abilities to assess and reflect on their own language skills, discuss the skills of effective viewers, representers, listeners, speakers, readers, and writers, and set goals for future improvement.

AR6.1 Consider which viewing, listening, reading, representing, speaking, and writing strategies work best for each task and situation.

AR6.2 Appraise own viewing, listening, reading, representing, speaking, and writing skills and strategies, and set goals for improvement.

AR6.3 Appraise own and others' work for clarity.

Each outcome is supported by indicators which provide the breadth and depth of the expectations for the outcomes. The outcomes and their indicators are listed on pages 33-46 of the English Language Arts 6 Curriculum. Teachers are encouraged to build upon outcomes in the previous grades and provide scaffolding to support student achievement of the Grade 6 outcomes.

Science Outcomes:

FL6.1 Examine connections between human fascination with flight and technologies and careers based on the scientific principles of flight.

FL6.2 Investigate how the forces of thrust, drag, lift, and gravity act on living things and constructed devices that fly through the air.

FL6.3 Design a working prototype of a flying object that meets specified performance criteria.

SS6.1 Research and represent the physical characteristics of the major components of the solar system, including the sun, planets, moons, asteroids, and comets.

SS6.2 Assess the efficacy of various methods of representing and interpreting astronomical phenomena, including phases, eclipses, and seasons.

SS6.3 Evaluate past, current, and possible future contributions of space exploration programs, including space probes and human spaceflight, which support living and working in the inner solar system.

Suggested Resources for the Unit

A range of language, prose (fiction and non-fiction), poetry, and plays (scripts), as well as human, video, and other resources are suggested.

Language Resources

Writers Express: A Handbook for Young Writers, Thinkers, and Learners (Write Source, Nelson Language Arts).
Nelson Spelling 6.

Poetry

"Flight" (George Johnston) (*The Wind Has Wings: Poems from Canada*).
"Humming Bird" (Felice Holman) (*Literature and Language Arts: Exploring Literature,* 2001).
"High Flight" (John Gillespie Magee Jr.) (*Literature and Language Arts: Exploring Literature*, 2001).
"Unique?" (Adrian Rumble) (*Cornerstones 6b*).
"Alpha – B375 – Earth Visitors' Guide …" (John Cunliffe) (*Space, Stars, and Quasars*, Teacher's Guide).
"E.T." (Jean Kenward) (*Space, Stars, and Quasars*).

Plays/Scripts

"Is There Life on Other Planets?" (Marion Lane) (*Space, Stars, and Quasars*).

Prose Non-Fiction

Shorter Prose Selections

"Flying" (Reeve Lindbergh) (*Literature and Language Arts 7*, 2001).
"Seeing Stars" (Robert Schemeanauer) (*Space, Stars, and Quasars*) .
"The Milky Way" ("Seeing Stars 18", *Space, Stars, and Quasars,* Teacher's Guide).
"Far-Out Jobs" (Nancy Finton and Laura Allen) *(Space, Stars, and Quasars)*.
"Along the Space Continuum" ("Earth and Moon 3", *Space, Stars, and Quasars*, Teacher's Guide).
"The Astronaut Files" (no author) (*Space, Stars, and Quasars*).
"Spaced-Out Food" (Barbara Bondar and Roberta Bondar) (*Cornerstones 6b*).
"Where Do We Go from Here?" (Buzz Aldrin) (*Space, Stars, and Quasars*).
"It Came from Outer Space" (Terence Dickinson) (*Space, Stars, and Quasars*).
"Our Solar System: News and Views" (*Space, Stars, and Quasars*).
"Life in 2060" (*Cornerstones 6b*).
"How the Planets Got Their Names" (Peter Limburg) (*Responses: Non-fiction in Context,* Scarborough, ON: Nelson, 1990).

Full-Length Non-Fiction

See suggested titles for this unit in accompanying bibliography and subsequent updates.

Science Resources
Pearson Saskatchewan Science 6.

Prose Fiction

Short Stories

"How Fisher Went to the Skyland: The Origin of the Big Dipper" (Joseph Bruchac) (*Space, Stars, and Quasars*) or
"Coyote Makes the Constellations" (Gretchen Will Mayo) (*Tell Me a Tale*, Heath, 1995).
"Spacewalk" (Doug Murray) (*Space, Stars, and Quasars*).
"The Stranger" (Monica Hughes) (*What If…?*) .
"The Night of the Pomegranate" (Tim Wynne-Jones) (*Space, Stars, and Quasars*) .
"Status Extinct" (Eric Brown) (*Space, Stars, and Quasars*).
"Chris and Sandy" (Monica Hughes) (*Cornerstones 6b*).

Novels

See suggested titles for this unit in accompanying bibliography and subsequent updates.

Visuals/Media/Magazines/Websites

How the Stars Fell into the Sky: A Navajo Legend (Jerrie Oughton) (picture book).
The Wonders of Earth and Space Series (1994 video).
Planetary Taxi (Voyager, MAC/WIN).
The Flight of the Gossamer Condor (Giant Screen Films, Shedd Productions, Inc.).
http://www.nasm.edu/galleries/gal109/NewHtf/Htf624.htm
http://www.pbs.org/kcet/chasingthesun/timeline/
http://educate.si.edu/resources/lessons/siyc/flight/page02.html
http://www.ksc.nasa.gov/ksc.html

Suggested References for the Unit

Council of Ministers of Education, Canada. (1997). *Common framework of science learning outcomes K-12, pan-Canadian protocol for collaboration on school curriculum*. Toronto, ON: Author.
Herber, H. (1978). Teaching reading in content areas (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.
McInnes, J., & Toutant, A. (1991). Network: *Spin among the stars: Language links*. Scarborough, ON.

Outcomes	Learning Activities	Assessment and Evaluation
	Imagine, Investigate, and Inquire	
CR 6.5	"When once you have tasted flight, you will forever walk the earth with your eyes turned skyward, for there you have been, and there you will always long to return." (Leonardo da Vinci) "The sky is the only place where there is no prejudice. Up there, everyone is equal. Everyone is free." (Bessie Coleman) **Flight** Sample Lessons 1 through 5 (approximately 1½ weeks)	Informally, assess students' interest in various topics and ideas associated with the unit. As they work through the unit, consider their understanding of the science and language concepts and processes.
CC 6.5	Ask the students if they have ever dreamt of being able to fly or travel in space. The ability to fly is shared by a variety of living things and human inventions. For many centuries, humans have marvelled at the ability of living things to attain flight and have developed a variety of devices to recreate that ability (*Common Framework of Science Learning Outcomes K-12*, 1997, p. 163).	Begin a language profile for the class.
CC 6.5	**Question 1: How can birds, insects, bats, kites, planes, and rockets fly? Can people fly? (How do living things and flying devices achieve lift, movement, and control? Why can we not fly an airplane to the moon?)**	Note students' abilities and willingness to explore the focus questions as well as to make connections with each of the activities and the related science concepts.
CC 6.8	**Finding Out (Science Inquiry): How Do Things Fly? Let's Go Fly a Kite ...** Lesson 1 – 50 to 100 minutes including introduction to the unit	
	How does flight work? What makes a kite fly? What factors affect its flight?	Encourage students throughout the unit to share their personal questions and to note them for possible inquiry.
	Possible Science Concepts • Forces such as weight, lift, thrust, and drag affect flight. • Other factors such as pitch (angle of attack) play a role. • Bernoulli's Principle offers an explanation of lift. • Wind speed and turbulence affect the flight of a kite.	Are students able to reflect and imagine? What aspects of flight and space seem to pique their interest?
CR 6.3	**Some Vocabulary:** weight, lift, thrust, drag Note: Decide how much attention to give to vocabulary, which words should be taught, and when and how they should be taught. Science texts are often dense in new words and concepts. In selecting the vocabulary to be taught, consider Herber's (1978) four criteria: relation to key concepts, relative importance, students' ability and background, and potential for enhancing independent learning. The judicious choice of a few	Are the students willing to participate in a discussion? Do they listen courteously and attentively to others? Do they build on each other's ideas? Do the students speculate and reflect? Are they problem solvers?

	key words can maximize students' learning. **Suggested Resources:** "Flying a Kite" (Grade 6 Appendix B) or a similar article about what makes a kite fly <u>Before Reading</u> • "Any kite will fly if it finds enough wind to lift it and keep it in the sky." Kites work the same way as all other flying things. They put air and wind to work to help them fly. • To help students learn about what makes a kite fly, have them read the article with the following questions in mind: o What role does wind and design play in flying a kite? o What are the four main parts of a kite? o What are the four forces that affect a kite as it flies? o What did Daniel Bernoulli discover? o What are some steps in making a kite? o What are some different shapes that a kite can take? o How does one get and keep a kite in the air?	
CR 6.2		Do students formulate predictions and questions to guide their reading?
	<u>During Reading</u> • Read the article aloud to the students and note the text features including title, headings, organization of text, and diagrams. • Review the seven questions above with the students. • With these questions in mind, have students read the article silently. Encourage them to make use of the text features (i.e., title, headings, text, and diagrams) to help locate where the answer to each question may be found. • When students think that they have located the answer to a question, encourage them to pause and think about how they might answer the question as if they were explaining the answer to a friend. • Have students then write the answer in their own words trying to be as clear as they can in their explanation. • Model one or two question responses for students.	
CR 6.2 and 6.3		Do students locate text information in response to questions? Do students use text features (including illustrations) as an aid to meaning?
	<u>After Reading</u> • When authors write articles (texts), they keep their audience in mind. They look for parts that could be made clearer by the addition of a special heading, illustration, chart, map, or explanation of a special term or word. • Ask students how these text features can help understand this article. o How many headings are in the article? o What makes the headings easy to identify (bold type, space apart from paragraphs)? o How do the headings help readers know what the article	
CR 6.2 CR 6.3		Do students record and organize information (e.g., in their jot-notes, webs, charts)? What do students know about text features

	discusses before reading the article (they are the main ideas)? o How was the text organized to help understand the ideas presented? o Which diagrams made the text easier to understand? **Language Study**	and how they can be used as an aid to meaning?
CR 6.3	• Many articles on science contain some specialized terms related to the topic. Understanding the meaning of words can help students understand what they are hearing, seeing, and reading. To learn a word and use it effectively requires students to understand and associate meanings based on background knowledge. • Use one of the following words to model the use of a word family tree: gravity, weight, lift, thrust, drag, bridle, frame, or covering.	What word attack strategies do students employ? Can they talk about their strategies?
CC 6.8	**Science Inquiry: How Do Birds, Bats, and Insects Fly?** Lesson 2 – 100 minutes Though humans cannot fly like birds, we can learn a great deal about lift and thrust by how birds' wings work. How do birds and other flying creatures such as insects and bats use their wings to fly?	What do students know? What strategies do they suggest for finding out more about a topic or question?
	Possible Science Concepts • The lift is created by the movement of the air around the birds' wings. • Thrust is created by birds flapping their wings. • Flight and thrust require huge amounts of energy, metabolism, and oxygen. • Important parts of a bird's body include the feathers, wings, skeletal structure, tail, flight muscles, and breastbone. **Some Vocabulary:** lift, thrust, parts of the bird's body **Suggested Resources:** "Flight" (George Johnston) (*The Wind Has Wings: Poems from Canada)*, "Humming Bird" (Felice Holman) (*Literature and Language Arts: Exploring Literature*, 2001), or another poem about a bird or insect (e.g., dragonfly) and the ability to fly <u>Before Reading</u>	
CR 6.2	• It has been argued that birds inspired humans' first attempts to fly. Read aloud the following poem by Victor Hugo and ask students to explain the main idea communicated in the poem. Be like the bird, who	The text features of a poem are very different from an article. What use of text features do students make? Are students able to

CR 6.5	Halting in his flight On limb too slight Feels it give way beneath him, Yet sings Knowing he hath wings. • Remind students that poems have very different text features than an article and ask students to keep this in mind when they read the poems "Flight" and "Humming Bird."	explain the main idea communicated in the poem?
	<u>During Reading</u>	
CR 6.2 and 6.3	• During the first reading ask the students to think about what images the poems create in their minds. • Have students read the poems again and consider the following: o What does this poem capture about hummingbirds? o Why are we fascinated by the hummingbird's ability to fly? o You are a person living in prehistoric times. You see a large bird soaring in the sky. What are you thinking?	Can students respond appropriately to the ideas presented and the prompts? Do students support their responses with references to text? Do students build on the ideas of others?
	<u>After Reading</u>	
CR 6.2 CC 6.4	• Use the K-W-L Inquiry Chart (Grade 6 Appendix A) to show students how to find out about things. • Pose Question 1: How is a kite similar to a bird? • Pose Question 2: What physical traits help a bird fly? What do we already know? What do our resources tell us (e.g., light weight, feathers, wings, tail, shape of body)?	
CC 6.6	• Pose Question 3: How is a bird affected by the same forces that affect kites (i.e., weight, lift, thrust, and drag)? What do we already know? What can we speculate? What do our resources tell us? • Encourage students to put information from other sources in their own words and when others' ideas are worthy of direct quotation, how to document the source. Also encourage students to note other interesting information they have learned and always ask other questions. What else do they want to know?	Can students formulate questions and predictions to guide their investigations ("finding out")? What resources do students use? Do students think carefully about what they know and need to know?
	Note: Use a variety of sources to model this K-W-L Inquiry including science resources, general knowledge resources such as encyclopedia, and Internet sites.	
CC 6.8	**How Do Planes Fly?** Lesson 3 – 100 minutes Because humans cannot fly like birds, they had to invent a different approach to flight and separate the functions of lift and thrust. How do constructed devices such as gliders and planes fly? How do they work? How do they control direction and altitude while in flight? **Possible Science Concepts**	Can students see the relationships between the kite and the bird? Do they understand how each force affects the kite and the bird? Can students compose meaning by writing? Are

CR 6.3	• An airplane must create enough lift to support its own weight. • An airplane must produce thrust to propel itself and to overcome drag. Note: Each area of study has its own specialized technical vocabulary that helps students comprehend concepts and major ideas and communicate about them. Students can learn this vocabulary (1) incidentally, (2) through self-inquiry, and (3) through direct teaching. In addition, students need strategies for learning vocabulary including consideration of context, structure, sound, and dictionary (CSSD). **Listening to a Poem About Flight** Activity 1 **Suggested Resources:** "High Flight" (John Gillespie Magee Jr.) [see online listening package on Ministry of Education website] or a similar poem about the joy of flight <u>Before Listening</u>	they able to express what they have learned clearly in their own words? What strategies do students use to explore a question? What resources do they seek? How clearly and effectively can students explain to someone else the role of lift and thrust in the flight of an airplane? Do students use a word attack strategy? Do they rely on one cueing system over another?
CR 6.5	• Ask the students if they have ever flown in a plane. What was it like? How did they feel? What is it like to fly in a small plane? In a glider or balloon? • In 1940, Magee enlisted in the Royal Canadian Air Force and became a pilot. He wrote "High Flight" while flying one day and sent it to his parents with the note, "I am enclosing a verse I wrote the other day. It started at 30, 000 feet and was finished soon after I landed." Three months later, Magee was killed when his Spitfire collided with another plane inside a cloud during the Battle of Britain. "High Flight" is the official poem of the Royal Canadian Air Force. How did Magee feel about flying? <u>During Listening</u>	
CR 6.2	• Have students listen twice to a reading of the poem. First, have them listen for the general idea and tone of the poem. • Prepare a cloze version of the poem and ask students to listen a second time using a listening guide. In the cloze version, delete the descriptive verbs and adjectives (e.g., danced, wheeled, soared, sung, hovering, shouted, flung, topped, flew, touched) and have students record the words as they hear them. <u>After Listening</u>	Did students set a "reasonable" purpose for listening?
CR 6.2 and 6.3	• What is Magee's view of flight? How do the words that he chose support your opinion? • How is Magee's view of flying similar to or different from	Did students comprehend the poem? Were they able

	yours? **Listening to a Personal Essay About Flight** Activity 2 **Suggested Resources:** "Flying" (Reeve Lindbergh) (*Literature and Language Arts* 7) or a similar personal essay or narrative about flying <u>Before Listening</u>	to relate the tone of the poem to their own attitude to flight? What listening strategies do students use?
CR 6.2	• Should grade 6 students be able to fly or to obtain a pilot's licence? Why or why not?	
CR 6.5	• Reeve Lindbergh is the youngest daughter of Charles and Anne Morrow Lindbergh. Her father was a famous pioneer aviator who taught her to fly. She was in sixth grade when she learned to fly. Have students listen to a reading of this personal essay using a listening guide such as the following: o Why does Reeve think her father took his children flying on Saturdays? o What did Reeve's father do to demonstrate weightlessness to her sister? o What did her father think about skydiving? o What part of flying did Reeve not like? o What did her mother like best about flying? o Where did Reeve imagine she was going when she flew with her father? o What impressions did Reeve have of things on the ground when she was flying? o What alerted Reeve that something was wrong with the plane? o What did Reeve's father have to do to safely land the plane?	
	<u>During Listening</u>	
CR 6.2	• As students listen to each section, encourage them to use their imaginations to increase understanding by creating pictures in their minds of what they are hearing (guided imaging/visualizing) or to sketch or doodle on a notepad. Pause after each section in order for students to make their notes.	Can students complete the listening guide to show understanding of main ideas in text?
	<u>After Listening</u>	
CR 6.2 and 6.3	• Ask the students how they might have felt when the engine stopped." In her notes on this essay, Reeve writes that "her father and other people had told the story of the failed engine before, but she never had."	Can students use note-making strategies as they listen?
	• Ask the students to imagine that they are Charles Lindbergh and they have landed the plane. How would their telling of	

	the story differ from Reeve's telling of the story? **Inquiry:** How is a plane affected by the same forces that affect kites and birds? **Possible Extension** • What is required to obtain a pilot's licence in Canada? **Finding Out (Science Inquiry): How Does a Rocket Move? How Is It Different From a Bird or an Airplane?** Lesson 4 – 100 minutes	Do students associate what they are hearing with personal experience?
CR 6.2	On April 12, 1961, Uri Gagarin from the Soviet Union became the first person to travel in space. On May 5 of the same year, Alan B. Shepard became the first North American to travel in space. These first cosmonauts/astronauts were able to fly into space aboard rockets. Satellites, space shuttles, space probes, and other spacecraft are launched into space with the help of rockets. How do rockets move? **Possible Science Concepts** • There are two main types of rockets – liquid-fuel and solid-fuel. **Some Vocabulary:** gravity, liquid, solid, oxygen, oxidizer, thrusters	Do students recognize relationships? Do they connect previous knowledge to new? Do they understand the role that lift and thrust play in flight?
CR 6.3	Note: Knowing the meanings of word parts – roots, prefixes, or suffixes – can help students understand the vocabulary in science material (e.g., pre-flight, interplanetary, extraterrestrial, stratosphere, troposphere, exosphere). Take the opportunity to point this out and to help students understand the common prefixes, roots, and suffixes that they encounter in words that they hear, read, or see in charts and diagrams. **Suggested Resources:** an Internet site on space, a science resource, a visual	What understanding do students have of word parts? What prefixes, roots, and suffixes do they recognize in daily listening, reading, and viewing?
CC 6.4 CR 6.4 and 6.6	<u>Before Reading</u> • Using their K-W-L chart, have students pose three questions about rockets. • Use "How does a rocket move?" for question one. Use an Internet website to attempt an answer to the question. <u>During Reading</u>	Do students know how to search for information on the Internet?

CR 6.3	• On the website, have the students read the title and the picture caption if there is one. What big ideas do they think they will read about on this site? Have students write the big ideas in their notebooks. • Have students write the key vocabulary words they encounter and give a "best guess" definition of each. • Encourage students to study all the visual aids (photographs and diagrams) and read the captions. What new ideas or questions do they have after studying the visual aids? <u>After Reading</u> • Ask students to summarize the information they have learned that helps them understand the big ideas presented. • Ask students to review two additional sources (e.g., their science resources and a visual) to add to their information. • Encourage students to consider the question, "How is a rocket different from a bird or an airplane?" and ask additional questions and speculate on their answer.	Do students recognize key ideas and associated vocabulary? Share rubric for summarizing.
CR 6.2 and 6.3		
CR 6.5 and 6.4 CC 6.2, 6.7, and 6.8	**Putting Yourself Into History** Lesson 5 – 100 minutes Throughout history, people have wanted to travel in the air. Invite students to let their imaginations take them through time to think about the way people have felt about flying. • Distribute the following tasks among the class members. • Have each student (or each group of students) consider what the following events or artifacts might tell us and then speculate about the history of flight. o Have each student (or group) prepare a poster to illustrate what (s)he has found and then prepare and present a short "poster talk" about the findings and speculations (McInnes and Toutant, 1991, pp. 44-45). o About 6000 years ago, the Egyptians drew pictures about flight on tombs. These pictures showed gods that could fly like birds. If you were a person living in Egyptian times, how might you have explained this? o The early Greeks told a story about Daedalus and his son Icarus who escaped from their enemies using wings made of feathers, wax, and string. If you were a person living in Greek times, how might you have explained this? o In Roman times, it is believed that children played with a "whirligig" toy, a propeller on the end of a stick that they spun between the palms of their hands. If you were a person living in Roman times, how might you have explained this? o Five hundred years ago, Leonardo da Vinci thought that the way to fly was to flap wings as birds do. He made numerous	Can students imagine and speculate how people might have felt, what they might have known, and how they might have explained flight? Create and share rubric for poster with students. Do students employ before, during, and after viewing strategies? Do students revise carefully and consciously with their audience and purpose in mind?

	drawings of the flying machines ("ornithopters") but never built any. If you were Leonardo da Vinci, how might you have explained this? o Between 1891 and 1896, Otto Lilienthal of Germany made over 2000 flights in gliders constructed of wood, cloth, and wire. If you were Lilienthal, how might you explain this? o In 1903, Orville and Wilbur Wright built passenger-carrying gliders out of metal tubes used for bicycle frames, wires used for wheel spokes, and a propeller driven with a bicycle chain. After many glider flights and a long search for the right engine, they built a flyer biplane, the first successful engine-powered airplane. You are watching the first flight of the Wright Brothers. How might you explain what you are seeing? o By 1909, J. A. D. McCurdy and Casey Baldwin built and flew the *Silver Dart*. You are McCurdy or Baldwin. How might you explain how this works? o Between 1918 and the mid-1920s, bush pilots and barnstormers flew into remote areas to transport people and supplies. What are some of the challenges these pilots faced? o You are travelling on the first trans-Atlantic/trans-Canada airliner. What are you thinking? o In 1978, Paul MacCready and his team from Aerovironment, Inc. built and flew the first successful human-powered airplane. The pilot was Bryan Allen. How did he do it? o You are watching the Concorde take off. You know it can travel faster than sound. What are you thinking? o You are watching the space shuttle *Challenger* take off … **Possible Extension** • What are some other significant events in the history of aviation? Consider "Chasing the Sun" (http://www.pbs.org/kcet/chasingthesun/timeline/). • "Me too! I would like to fly …" (George Johnston). Can human beings learn to fly? Consider the activities found in "Look Mom, No Wings!" (http://educate.si.edu/resources/lessons/siyc/flight/page02.html). • Watch the film/video *The Flight of the Gossamer Condor* (Giant Screen Films, Shedd Productions, Inc.). • Write a poem about flight. • Interview someone who has flown a glider, airplane, or rocket.	Do students use talk to explore ideas?
CR 6.2 and 6.3		What ideas and questions do students raise? Are they beginning to show confidence in exploring these ideas and questions?
CC 6.8 and 6.5	**Space – Planet Earth and Beyond** Sample Lessons 6 through 10 (1½ to 2 weeks) Space science involves learning about objects in the sky to discover their form, movements, and interactions. In learning about space, students come to appreciate that human ability to observe and study objects in space is now greatly enhanced by	

CC 6.5 CR 6.2, 6.3, 6.4, 6.5	technology. Students learn that manned and unmanned probes and Earth-based devices are contributing to our knowledge of space and that new capabilities are being developed for monitoring the Earth, communications, and further exploration of space (*Common Framework of Science Learning Outcomes K-12,* 1997, p. 165). **Question 2: How can we explore and learn about space? (What technologies have been developed to find out about space? How do people on Earth gather information about space? What have we learned about space?)** **Thinking About Planet Earth, the Sun, the Moon, the Star Groups (Constellations), and the "Wandering Stars" (Planets)** Lesson 6 – 200 minutes For a very long time, people have observed and studied the sky. Using only their eyes, ancient skywatchers studied the moon, stars, planets, and Earth itself. From these observations, people have made inferences (i.e., they have drawn conclusions from what they have seen). **Possible Science Concepts** • Astronomy is the study of space and the many things it contains. • Astroarchaeology is the study of how much ancient civilization knew about the stars and planets. • Constellations are patterns of stars in the sky. • The solar system is the sun and everything that revolves around the sun. • A galaxy is a star system made up of billions of stars and clouds of dust and gas. • Earth belongs to our solar system whose central star, the sun, is one of billions in the Milky Way Galaxy. • All the galaxies and space around the galaxies make up the universe. • Galileo was the first scientist to make important discoveries about the sky using a telescope (an instrument that is used for viewing distant objects). • A refracting telescope uses a large glass lens to gather and focus light while a reflecting telescope uses a large mirror to gather and focus light. • A radio telescope is a large saucer-like dish designed to collect radio waves coming from objects in space. • A satellite is an object that orbits Earth, moon, or some other object in space and gathers information about the object. • Space probes gather information about the planets. • Astronomers and scientists still have much to learn about space.	What do students know already about the solar system? What have students wondered about the solar system? How do students think they might find answers to their questions about our solar system? About what technologies are students interested in learning?

CR 6.2 and 6.3	**Some Vocabulary:** constellations, galaxy, sun, Milky Way, universe, solar system, telescope, satellite, probes, astronomers, scientists Note: Many English words come from Greek, Latin, and other languages. You can often understand words in science by breaking words into parts (e.g., aster = star; cosmo = universe; lumen = light; sphere = ball or globe; -logy = science of; -nomy = knowledge of; -scope = for seeing).	Are students beginning to note the important prefixes, roots, and suffixes commonly used in science vocabulary?
	Reading a Traditional North American Explanation Activity 1 **Suggested Resources:** "How Fisher Went to the Skyland: The Origin of the Big Dipper" (Joseph Bruchac) (*Space, Stars, and Quasars*) or "Coyote Makes the Constellations" (Gretchen Will Mayo) (*Tell Me a Tale)* or another tale that explains how something came to be from the perspective of First Nations peoples of Canada Note: Consider using some of the non-fiction titles listed in the bibliography and subsequent updates. Using a Book Talk strategy, invite students to consider some titles for their personal reading while studying this unit.	Do students read independently?
CR 6.6, 6.2, and 6.3	<u>Before Reading</u> • Invite students to imagine that they had never heard about airplanes or satellites, or that they had never seen a model or photograph of the Earth. Have them look out the window of the classroom. What evidence would they have of the Earth's shape? How would they explain this? • Some Native American ancestors looked at the night sky and saw the outlines of familiar animals dotted by stars. Other Aboriginal peoples, though, imagined that each individual star was a person, animal, or object in the sky country. • Ask students to read the title and skim the selection to look at the illustrations. What might they predict the origin of the Big Dipper to be according to this tale?	Are students able to explain their ideas clearly and elaborate with appropriate explanations?
CR 6.6, 6.2 and 6.3	<u>During Reading</u> • Use the Read and Reflect strategy and the guide provided in the Teacher's Guide to focus students' thinking about the events in the tale and on the explanations offered for a variety of phenomena within the tale. <u>After Reading</u>	What reading strategies do students employ before, during, and after reading a text?

CC 6.6, 6.8, 6.1, 6.2 and 6.3	• Have students revise and edit a tale using the "Begin with the End in Mind" sheet provided in the Teacher's Guide for *Space, Stars, and Quasars*. • Point out that revising includes considering the content of a piece (adding, deleting, enhancing); its organization (ordering, reordering, paragraphing); and looking at the sentence types and length, vocabulary used, and conventions of spelling, punctuation, and usage. • Establish the criteria of a well-told Pourquoi tale (i.e, the elements) and criteria for clarity (sense making), organization, sentence types and lengths, vocabulary, mechanics. • Once students have revised (edited and proofread) their tale, have them practise its telling. Discuss the elements of a good story well-told and the elements that a good storyteller uses to sustain audience interest.	What strategies do students use for editing and proofreading?
	Storytelling Activity 2 **Suggested Resources:** "How the Planets Got Their Names" (Peter Limburg) (*Responses: Non-fiction in Context)* or another explanation of how something related to the sky was named	
CR 6.4, 6.6 and 6.7	<u>Before Speaking</u> • The early Greeks saw the sun as a flaming chariot and named the constellations after folk heroes, gods, and animals. • Have students read the explanations of how something related to the sky was named. • Have students select one that they think is interesting and that they would like to retell. • Model storytelling.	
CC 6.6, 6.2	<u>During Speaking</u> • Have students meet first with a partner and then in small groups to practise telling how the constellations were named. • Review with them the elements of voice that can enhance their explanations and stories.	Establish a storytelling rubric with students. What are the important elements students think should be included in the rubric?
AR 6.1, 6.2, 6.3	<u>After Speaking</u> • Have students record each of their stories and reflect on and assess their individual presentations. • Ask them to set goals to improve.	Are students able to self-reflect? Can they set goals for improvement?
	The Sky and How We Study It Lesson 7 – 200 minutes	

CR 6.5 CC 6.4 CC 6.3 CC 6.2, 6.3, 6.4, and 6.8	In the year 100, Ptolemy (early Greek astronomer) developed a model that put the sun, stars, and planets moving around the Earth. Based on what he could see with his eyes alone, he made a model of the universe that was accepted by most astronomers for hundreds of years, until Copernicus (Poland, late 1400s) concluded that everything moved around the sun. Note: This is an opportunity to highlight the evolution of knowledge and understanding. **Creating a Model** • Have students compare Ptolemy's model of the solar system with the model developed by Copernicus by creating a model of the Earth-centred versus the sun-centred version. • Using a science resource for ideas, make a living model of the Earth, sun, and zodiac constellations. • Discuss what is important in representing ideas. Note: Eventually, people were able to use technology such as telescopes to view objects in the sky. Galileo was the first person to use a telescope to study the sky. Making new instruments helped them observe with greater accuracy. **Possible Extension** • Have students compare a refracting telescope and a reflecting telescope. Use a T-chart to note the similarities and differences. • Have students make a simple refracting telescope. • Have students find out how a radio telescope works. **Exploring the Sky** Lesson 8 – 200 minutes **Some Vocabulary:** nebula, supernova, light year, black hole, quasars, corona **Reading a Photo Essay** Activity 1 **Suggested Resources:** "Seeing Stars" (Robert Schemeanauer) (*Space, Stars, and Quasars)* or a similar essay about instruments astronomers use to find out about stars and other celestial bodies <u>Before Reading and Viewing</u>	Can students clarify and extend their understanding of a concept by representing it? Can students recognize similarities and differences? Can students follow instructions and directions?

CR 6.2 and 6.3	• Brainstorm what instruments improve the ability of the unaided eye to see (e.g., telescopes, microscopes, cameras, magnifying glasses, binoculars). How do these instruments work? • Have students skim the article, looking at the headings and the photographs. What do they predict will be learned from reading this article carefully? <u>During Reading and Viewing</u> • Have students read the article and make notes about the main ideas that they learn about each sub-topic. • Model the first two sections. <u>After Reading and Viewing</u> • What topic in the article interested students most? Why? • What information did students find difficult to understand? Why? What could they do to make understanding easier? • Have the students reread the article after explaining that reading with a clear purpose in mind can promote understanding. Ask students to reread for two specific purposes: (1) finding information on instruments used to study the stars and (2) finding information about wonders in the sky. • Discuss whether reading with a specific purpose in mind helped students to better understand the article?	What strategies do students use before, during, and after viewing? Notemaking check. Review what students found when they read with a specific purpose in mind.
CR 6.2, 6.3, and 6.6 CR 6.6 CC 6.5 CR 6.7 CC 6.5		
CR 6.2 and 6.3	**Exploring the Planets of Our Solar System** Activity 2 **Suggested Resources:** Websites: http://www.seds.org/nineplanets or http://www.nasm.si.edu/ceps/etp/ss, overhead transparency of article "The Milky Way" ("Seeing Stars 18", *Space, Stars, and Quasars,* Teacher's Guide) <u>Before Reading and Viewing</u> • As students read the article on the overhead transparency (or on a print copy), guide students through the steps they might use if they were to make a summary of the article including: o reading the title to determine the topic o skimming the selection the first time to get the overall meaning o rereading carefully to identify key words and information o listing the important main ideas o skimming over the section to check that all main ideas have been included. • Next model the steps to write a paragraph summarizing the most important or main ideas of the article. The paragraph	Review expectations for a summary.

CC 6.2

should include: (1) an opening sentence that is a clear statement of the main ideas of the whole article, (2) the important points stated in clear sentences and arranged in a logical order, and (3) a concluding sentence that draws all the points together.

- Show students how to document the source of these ideas.

<u>During Reading and Viewing</u>

- Have students select one planet and write a paragraph summarizing the information from the website following a similar process to that modelled.

CC 6.7

- If students require more practice, use one common section and model the summarizing process a second time.

Share rubric for summary paragraph.

<u>After Reading and Viewing</u>

- Have students create a short article about their planet. The article should contain:
  - a title that explains the topic of the text
  - a clear photograph or two from the Internet or from a magazine that can be easily "read" (and labelled)
  - accompanying text in the students' own words, which gives key and additional information that cannot be gained through the photographs, and summarizes what was learned about the planet
  - documentation of the source of the ideas.

CC 6.7, 6.2, 6.3

- Students edit and proofread their final copy carefully.

Share/create rubric for article on a planet.

Interpreting Data
Lesson 9 – 100 minutes

Reading a Chart
Activity 1

<u>Before Reading</u>

- Create a chart like the one that follows.

CC 6.4

Feature	Earth	Mars	Jupiter	Others:
Diameter (km)	12, 756	6, 787	142, 800	
Distance from sun (millions of km)	152	249	815	
Period of orbit (earth days/years)	365 d	687 d	12 a	
Rotation period	23 h 56 min	24 h 37 min	9 h 50 min	

Can students glean information from a chart?

(length of 1day and night in earth time)	4 s	23 s	30 s	
Number of satellites	1	2	14	

based on *Journeys in Science*, page 233)

<u>During Reading</u>

- Using the chart created, ask students to respond to the following questions:
  - Which planet is the largest? Which is the second smallest?
  - Which planet rotates slowest on its axis?
  - Which of the planets is closest to the sun? Farthest from the sun?
  - Which planet is the hottest? The coldest?
  - On which planets is the force of gravity the strongest?
  - What would be a good title for the chart?

<u>After Reading</u>

- Use a Planet Chart to answer these questions:
  - Which planet(s) have oxygen in the atmosphere? Why is that significant?
  - Which planets have very similar atmospheres?
  - Which planet has a day most like Earth's?
  - Look at the length of year for each planet. Do you see a pattern? What is it? Why do you think that happens?

Viewing Pictures/Photographs and Interpreting Data From Visuals
Activity 2

Suggested Resources: Website such as http://www.nasm.si.edu/research/ceps/outreach/earthday/what_see.htm or a set of recent colour photographs taken from space and reproduced in a magazine or newspaper

"To look down on your own planet and be able to see absolutely out-of-this-world incredible views of the entire subcontinent and the seas is very beautiful, very moving. You appreciate what the world is really like." (Marc Garneau, Canadian astronaut)

Note: Satellites were among the first objects launched into space by rockets. They provide information about space and about Earth.

<u>Before Viewing</u>

CR 6.2, 6.3, and 6.7

CC 6.2
CC 6.3
CC 6.4
CC 6.5

What before, during, and after viewing skills and strategies do students employ?

CR 6.3 and 6.4	• Satellites and rockets allow us to view Earth from space and space beyond Earth. Ask students to think about the following questions: "What would you like to view from Earth and from space? Why? If you were to take a picture of Earth from space, what would you include and what would it tell us? If you were to take a picture of space from Earth, what would you include and what would it tell us?" • Have students consider the photographs. <u>During Viewing</u>	What elements of the photographs do the students recognize?
CR 6.2	• Ask students, "What do you notice in each of the photographs? What does each photograph tell us?" • Photo 1: • Photo 2: • Photo 3: • Photo 4: <u>After Viewing</u>	
CR 6.2 and 6.3	• Ask students which photograph appeals to them the most. What can they see in these photographs? What ideas do they learn? What emotion does the photograph evoke in them? • Photographers use different techniques including perspective. Perspective in a photograph is the technique of representing the size and distance of objects as they might appear to the eye. After analyzing and observing these photographs, from what perspective are the photographs taken? How do the photographs use size and distance to convey their perspective?	Can students use the appropriate before, during, and after strategies? Do they know how and when a strategy works?
	What Do We Learn From Satellites? Lesson 10 – 100 minutes **Reading a Non-Fiction Article** Activity 1 **Suggested Resources:** "Far-Out Jobs" (Nancy Finton and Laura Allen) (*Space, Stars, and Quasars)* or a similar article about satellites and the information they help us learn	
CR 6.2 CC 6.6	<u>Before Reading</u> • Have students skim the text and illustrations to note the headings and two different sections in the article. • What do students think will be learned about satellites by reading this article? <u>During Reading</u>	

CR 6.7	• For the first section of the article, have students read silently each subsection of the article. Ask students to pause at the end of each section and discuss the following three questions with a partner: o What did you learn that you did not know before? o What are other ways this technology could be used? o What more would you like to know about this topic? • For the second section of the article, have students read each experiment and then explain to their partner what they have to do to carry out the experiment. <u>After Reading</u> • Ask students to share what they found most interesting and to consider how satellites might be important to them. What might satellites be used for 100 years from now?	
CC 6.5	• Ask students to review what they think has to be done and in what sequence to complete each experiment. **Conducting an Experiment** Activity 2	
CC 6.8	• Once the class has clarified the steps and materials required, have students form groups according to which of the experiments in the article they want to do. • Have students conduct the experiment and when they have completed it, summarize and share with the class what they have learned from the experiment. • Review the importance of writing and presenting clear summaries. • Remind students of the importance of including all the information needed in a logical sequence (purpose, list of materials, steps, and conclusion). Also note that diagrams and specific vocabulary are important to clarify an idea.	How well do students work in groups? What roles can they assume comfortably?
CC 6.9,and 6.7 CR 6.6, 6.2 and 6.3	**Possible Extension: Thinking Scientifically and Finding Out** • Scientists are always asking interesting questions and seeking answers to those questions. Have students conduct a personal or group inquiry on one of the topics or questions listed below. • Encourage students to use a range of resources and to document them in their answers. • After students have collected their information, show the students how to write a mini-article. Note the role of headings, diagrams, and good, clear paragraphs. • Some topics/questions for inquiry might include: o What do astronomers do? o What evidence is there that Earth is a sphere that rotates on its axis once every 24 hours?	Review writing an article and the rubric for the process and product. Do students show interest and feel comfortable posing questions about

	o What evidence is there that the Earth revolves around the sun? o How many planets revolve around our sun? o How does a telescope work? What is the difference between a refracting telescope and a reflecting telescope? Where could you find out how to build a telescope? o How does a radio telescope work? o Choose one of the following astronomers and use resources to find out as much as possible about his or her life, theories, and what each discovered: Nicolaus Copernicus, Galileo, Tycho Brahe, Johannes Kepler, Isaac Newton, Edwin Hubble, Karl Jansky, Helen Sawyer Hogg, Carl Sagan. o What is a satellite? What is a LANDSAT satellite? What types of information are obtained from LANDSAT satellites? How are satellites used to send radio and television signals? What have we learned from Infrared Astronomical Satellites (IRAS)? o What is a space probe? What can we learn from space probes? What do satellites and space probes, *Voyager I* and *Voyager II* tell us? What have we learned about the moon by analyzing moon rocks? What have we learned about comets, asteroids, and meteoroids from space probes? **Thinking About Space as a New Frontier** Sample Lessons 11 through 18 (approximately 2 weeks) **Question 3: What have we accomplished through space exploration? (What is needed to travel and to live in space? How has the exploration of space changed people's lives on Earth? How will space be used in the future?)** **Accomplishments Through Space Exploration: Reading a Chart** Lesson 11 – 100 minutes **Possible Science Concepts** • People travel in space. Some have explored the moon. Others perform experiments, test products, and gather data while in space. • Astronauts have problems in space (e.g., minerals leaving the bones and muscles of the body, motion sickness). • People may live and work in space in the future. • Many products now in use on Earth were developed as a result of the space program. Note: Some words are printed in italic type and defined in the article suggested. Show students how science resources can often provide definitions in the text for important items. These definitions can be provided in parentheses, in commas, as a	which they are wondering? Do they indicate knowledge of and interest in unusual but relevant ideas and points of view? Do they indicate an awareness of some of the issues? Do they explore unclear or unresolved issues? Do they acknowledge opposing points of view? Do they indicate a willingness to explore a topic in more depth?
CC 6.7 CR 6.3		

	statement, through an explanation or example, and in a diagram. Also, help students identify relationships and make associations among words in order to learn the important vocabulary in science material (e.g., meteor, meteoroid, meteorite, meteoritics, meteorology). **Suggested Resources:** "Along the Space Continuum" ("Earth and Moon 3", *Space, Stars, and Quasars,* Teacher's Guide), or a similar timeline chart Note: Some suggested resources for Book Talks and for students' personal reading: *On the Shuttle: Eight Days in Space* (Barbara Bondar and Roberta Bondar) and *Spaceways: An Anthology of Space Poems* (John Foster, Ed.)	Are students able to speculate on the meaning of a word based on the information (clues) associated with it? Are students reading or willing to read independently for information and enjoyment?
CR 6.4	<u>Before Reading</u> • A chart is an arrangement of information showing how pieces of information relate to each other. A calendar, for example, uses columns and rows to show the days of the week and the actual date. A timeline summarizes events in chronological order. What are some of the important "firsts" in space?	Are students showing the ability to read a chart more independently?
CR 6.2, 6.3, and 6.6	<u>During Reading</u> • Ask students to identify who were the first man and woman in space. • Who (both men and women) has made significant contributions since that time? • What Canadians have been involved in the space program? Who was the first Canadian to enter space?	Can students justify or support their answers with evidence found in the text?
CC 6.5	<u>After Reading</u> • Have students trace the role that satellites have played in space travel. • What role have rockets had in each of the accomplishments on the Space Continuum? • There have been several disasters and near-disasters in space. What happened on January 28, 1986?	
CR 6.4 and 6.6 CC 6.5	**Possible Extension** • What has each flight into space accomplished? Students might use the library and the Internet to explore one event on the continuum that interests them (see the Canadian Space Agency's website and NASA's website). • An explosion in 1986 destroyed the space shuttle *Challenger* less than two minutes after liftoff. Seven astronauts, including mission specialist teacher Christa McAuliffe, were killed in the disaster. As humans push the limits of technology, accidents	Can students use the Internet purposefully and independently?

	occur out of neglect, complacency, or from other causes. What were the factors that contributed to this disaster? What changes were made to the technology to ensure that such a disaster would never occur again? **Canada's Astronauts: Reading a Non-Fiction Article** Lesson 12 – 100 minutes **Suggested Resources:** "The Astronaut Files" (no author) (*Space, Stars, and Quasars)* or a similar article that provides factual information about Canada's astronauts <u>Before Reading</u> • The contributions of Canadian astronauts have been significant. Have students consider the jobs that Canadian astronauts have done and the thoughts they have had about space. <u>During Reading</u> • Have students read the introductory part of the article. What are the two types of astronaut specialists? • Ask students to read the article, pause, and reflect on the profiles of each of the seven astronauts. • For each astronaut, have them make a short summary. What did each accomplish? What were their interests? What reflective thoughts do they present? <u>After Reading</u> • Have students consider what similarities they noticed among the astronauts. What qualifications do these astronauts seem to have? • What insights did the "Secret of Success" and the "Message" quotes give students into the character of the astronauts? • Have students read aloud the one "message" that impressed them most and then to explain briefly why it impressed them. **Possible Extension** • "Students might wish to write an advertisement or make a poster advertising a mission for which astronauts can apply. They could include such things as what qualifications they want the astronaut to have, what the job will entail, where the applications should be sent, and the deadlines for the applications" (*Space, Stars, and Quasars,* Teacher's Guide, p. 29). **Challenges for Astronauts** Lesson 13 – 200 minutes	
CC 6. 6 and 6.5		Can students read a non-fiction article independently?
CR 6.2, 6.3, and 6.6		Are students' summaries clear and succinct?
CC 6.6 and 6.4		Can students make generalizations? Do they make inferences and draw conclusions? Can they support their insights?
CC 6.4, 6.3, and 6.2		

	Reading a Story Activity 1 **Suggested Resources:** "Spacewalk" (Doug Murray) (*Space, Stars, and Quasars)* or a similar story about the challenges of a gravity-free spaceship <u>Before Reading</u> • Space offers astronauts a number of challenges. One of the greatest challenges is learning to move in zero gravity. This story offers some insight into the challenge and a surprise. Ask students to read the story independently and to put a sticky note where they have a surprise realization about something in the story. <u>During Reading</u> • After students have read the story and noted their "aha" or surprise moment, ask them to compare what other classmates noted. • Have students read the story a second time and to find and to jot down the clues that pointed to the real identity of "Tommy" before it was actually stated in the story. <u>After Reading</u> • The clues that students gathered foreshadowed the identity. Discuss foreshadowing and the techniques that good storytellers use. For example, the storyteller: o gives the setting and action of the story in the first few sentences so that the listener, reader, or viewer feels that (s)he gets into the story right away o describes the events so that the listener, reader, or viewer feels like (s)he can see and feel them as if they were right there o uses specific words like "squirmed", "exploded", and "squeezed" to add to the feeling of being there o tells what the main character is thinking and feeling and what the other characters say and think about this o builds the suspense by not letting the listener, reader, or viewer know everything right away. • Discuss (and find out more about) weightlessness, how people train to deal with weightlessness, and what technology has been or is being developed to deal with the problem. **Reading a Non-Fiction Article** Activity 2	
CR 6.6, 6.2, and 6.3		Can students identify the problem(s) that confront the main character(s)? Did the event(s) surprise them?
CR 6.6		Do students read a second time with more insight?
CR 6.4		What insight does the fiction offer the reader?
CC 6.6		Are students willing to speculate and explore a topic?

CR 6.2 and 6.3 CR 6.2 and 6.3 CR 6.2 CR 6.3 CR 6.7	**Suggested Resources:** "Spaced-Out Food" (Barbara Bondar and Roberta Bondar) (*Cornerstones 6b)* or a similar article about the challenges of travelling and working in space, "Space Technology in Our Lives" (*Cornerstones 6b)* <u>Before Reading</u> • Another problem for astronauts is eating. How do the lack of gravity and the space shuttle environment affect how food is stored and eaten? • When Dr. Roberta Bondar travelled into space on the *Discovery* space shuttle, she had to deal with space food, nausea, cramped quarters, and floating tools. How did she overcome these problems? <u>During Reading</u> • As students read the article, ask them to note what important factors scientists consider when planning the menu for an astronaut and how scientists overcome the problems of food preparation and consumption. <u>After Reading</u> • Ask students to identify the important points they learned about space food when they read the article. • Ask students to explain "dehydration" and "rehydration". • Consider the origin of the Greek root work "hydro" and other words that use it (e.g., hydroelectricity, hydroplane, hydroponics). • Finally, consider the sidebar on page 87 ("Space Technology in Our Lives"). Ask students to think of a new and useful invention that would assist space travellers. Have students draw and label a diagram of their invention. **The Future of Space Flight** Lesson 14 – 100 minutes **Suggested Resources:** "Where Do We Go From Here?" (Buzz Aldrin) (*Space, Stars, and Quasars)* or a similar article about the future of space flight and exploration <u>Before Reading</u> • This article presents most of the information in labelled diagrams. Discuss with students which strategy or strategies they think will be most helpful in reading this type of text. • Review "Learning Strategy Card 30" (*Space, Stars, and Quasars,* Teacher's Guide) with students. • Create a class chart of diagram types such as the one on page	How is non-fiction different from fiction? What do students prefer? Why?

	47 of *Space, Stars, and Quasars,* Teacher's Guide. <u>During Reading</u> • Use the "Thinking Things Through" grid ("Where Do We Go From Here?" *Space, Stars, and Quasars*, Teacher's Guide, p. 8) as a reading guide. • Have students jot down their thinking for each of the questions: (1) What is the diagram about? (2) What did they learn that they did not know before? (3) Were any of the words confusing and what do they mean? (4) How did the diagram help them as they read the text?	Can students use text and diagrams to construct meaning?
CR 6.2 CR 6.2 and 6.3	<u>After Reading</u> • Have students create a K-W-L chart (Things I Know, Things I Want to Know, Things I Learned). • In the second column, ask students to write questions about things that they are left wondering about or want to know about as a result of reading the diagrams.	
CC 6.5 CC 6.6	**I Have Been Wondering About ... Conducting a Personal Inquiry and Writing a Report** Lesson 15 – 200 minutes "Learning is enhanced when students identify and solve problems ... especially if these are placed in a meaningful context" (*Common Framework of Science Learning Outcomes, K-12*, 1997, p. 8). **Suggested Resources:** The Inquiry Process (Grade 6 Appendix C), "Writing a Classroom Report" (*Writer's Express: A Handbook for Young Writers, Thinkers, and Learners,* pp. 220-232)	Are students able to speculate? What awareness of unclear or unresolved issues do they have?
CC 6.9	• Students have an opportunity to pose and conduct personal inquiries on topics of interest to them. Have students review what they have been wondering about throughout the unit. What questions arose from the texts that they listened to, read, or viewed? What questions arose from their discussions, writing, or representing activities? What questions arose from simply wondering out loud? For example: o How would I have to prepare myself to explore each of the planets? o Why are astronomers still interested in exploring the universe? o What were the first space trips like? o What kinds of activities are performed by people in space? o How does space travel affect the body? What are the problems astronauts face when travelling in space? o What are the requirements to become an astronaut? What	Establish with students criteria for evaluating their personal inquiry and writing and presenting their report. Consider: *The Content* (include relevant main points and particulars, adequate elaboration and

	type of training does an astronaut need? What advice would you give to a grade 6 student who wants to become an astronaut and work in space? o What type of exercise must astronauts do to prevent body parts from becoming weak in space? o How would power plants in space work? o How can we dress, eat, sleep ... in space? o What would be the advantages of having hospitals in space? o What medical products are spin-offs from space? o How much does the Canadian government spend on space-related projects? o How has a spacesuit been designed for the conditions in space? o How does zero gravity affect eating, sleeping, dressing, and exercising? o What ...? How ...? Why ...?	explanation, understanding of the question/issue/ problem); *The Structure* (title, identify question/problem/issue, introduction, conclusion, appropriate paragraph to explain, arrangement/sequence); *The Mechanics* (sentence structure, word choice, spelling, punctuation); *The Knowledge and Interest in the question/problem/issue*; and *The Effective Use of Sources*.
CC 6.5	• Discuss and model Inquiry (Grade 6 Appendix C) and "Writing a Classroom Report". Model the process by using a question that you or the class as a whole would like to answer. Review using quotes and diagrams. Establish the expectations, discuss timelines, and share the assessment criteria with the students.	
CC 6.7, 6.2, and 6.3	1. Select a good question: o Create an initial question web and let it sit. o Ask general questions. o Ask specific questions.	Are students willing to assess and reflect on their own inquiry practices (Appendix D, page 44)?
CR 6.5, 6.6, and 6.7	2. Collect information: o Use a gathering grid. o Ask open-ended questions. o Find good sources of information. o Answer your questions. o Use note cards if needed. o Check your information.	
CC 6.2 and 6.3	3. Connect the ideas: o Begin with a hook. o Tie your facts together. o Use quotes and diagrams. o End with a strong point or conclusion. o List your sources.	
C.C. 6.2 and 6.3	4. Check the report: o Have you covered the topic completely? o Are the paragraphs well organized? o Have you used clear, complete sentences? o Have you used quotation marks correctly? o Have you checked your spelling, usage, and punctuation?	Are students assessing and reflecting on their inquiry

	o Is your report written or typed neatly? Note: As students are working through the inquiry and reporting process, alternate working days with the final section of this unit. **What If ...? Reading Poetry** Lesson 16 – 50 minutes Despite the lack of scientific evidence, scientists, writers, and moviemakers alike have been excited by the idea of intelligent life on other planets such as Mars. Have you ever wondered whether there is life on other planets? What do you think this form of life might look like? Would it be "intelligent" life? Would it have language? Transportation? What kind of lifestyle might a creature on another planet lead? **Poem 1** Activity 1 **Suggested Resources:** "Unique?" (Adrian Rumble) (*Cornerstones 6b)* or a similar poem about the possibility that human-like creatures exist somewhere in outer space <u>Before Reading</u> • Ask students, "Do you think it is possible that human-like creatures exist somewhere in outer space? Do you think it is likely? How do you think they would look?" Tell students that poet Adrian Rumble wonders about this also. <u>During Reading</u> • Have the students read the poem twice. How does poet Adrian Rumble feel about the possibility of life in outer space? Why does the poet choose the title "Unique?" for this poem?	actions (Appendix D)? Are students willing to imagine and suspend belief to consider other possibilities?
CR 6.8 CC 6.5	<u>After Reading</u> • How are "aliens" usually shown in TV shows and movies? How are they like us and how are they different? What do you think someone from another planet would look like?	
CC 6.5	**Poem 2** Activity 2 **Suggested Resources:** "Alpha – B375 – Earth Visitors' Guide ..." (John Cunliffe) (*Stars, Space, and Quasars,* Teacher's Guide) <u>Before Reading</u> • When viewers look through a telescope at Earth, what do you	Can students read the poem independently? Are they able to make connections?

	think they see that makes them think that Earth is a lovely planet?	
CR 6.6	<u>During Reading</u> • What makes the galactic Government conclude that Earth must be visited with the greatest caution? Do you think their conclusions are reasonable?	
CR 6.2	<u>After Reading</u> • What do you think Alphans are like? What is their society like? Why do you think so?	
CR 6.3	**Is There Life on Other Planets? Reading a Science Fiction Play** Lesson 17 – 100 minutes **Suggested Resources:** "Is There Life on Other Planets?" (Marion Lane) (*Space, Stars, and Quasars)* or a similar play about life on other planets	Do students comprehend the main ideas and relevant particulars within the poem?
CR 6.6 and CR 6.3	<u>Before Reading</u> • A script for a play contains some important background information including the list of characters in the play and the setting. Who are the characters in this play? Where (and when) does this play take place? What is the set (or stage) like? • Often, too, there are directions for how the parts are to be spoken. This play omits some of this information. Why? • How might the different tones of voices that could be used to portray the Chief Scientist's emotions and attitudes in the first speech sound? Have students try to say the line in a nervous way, sombre way, discouraged way, and anxious way. Which tone best fits the dialogue and the story?	
	<u>During Reading</u> • Have students read the script once through silently and then form groups of six. • Have the students choose a part, decide upon the tone of voice that they want for each of the characters, and practise reading the play as a Readers' Theatre.	Are students able to read "between the lines"?
CR 6.2 and 6.3	<u>After Reading</u> • Have each group present their readings to the rest of the class or to record their group's reading. • As others listen to each presentation, have them consider if they can tell how each character felt and if the tone fits the dialogue and the story.	

	• Discuss the significance of the last line. Students might also draw a picture of what they think an alien from a neighbouring planet might look like.	
CC 6.6, 6.2, 6.3, and 6.4	**A Visit to Earth: Reading a Science Fiction Story** Lesson 18 – 100 minutes **Suggested Resources:** "The Stranger" (Monica Hughes) (*What If...? Amazing Stories Selected by Monica Hughes)* (Thundra Books) or a similar short story about life on other planets or a visit by life from another planet	Do students use stage directions and cues in the text to interpret the play? Do they use tone of voice to create believable characters who can be heard? Do they use appropriate facial expressions and gestures to support the characters? Do they work together to present their interpretation of the play? Have they prepared and rehearsed sufficiently?
CR 6.4, 6.5, and 6.6	<u>Before Reading</u> • Many science fiction stories are set in the future and include scientific or technological elements such as aliens, spaceships, robots, or sophisticated computers. Science fiction can get readers thinking about the consequences of events that are happening in the present. • In this story, Monica Hughes asks "What if … a being from another planet were marooned on Earth?" • Have students read to find out more about her speculation. <u>During Reading</u> • As students read the story, ask them to note: o the setting o the problem o attempts to solve the problem o the solution. <u>After Reading</u> • Ask students to give their initial response to the story and then to comment on its effectiveness. Is this a good story? Why or why not?	
CR 6.6	**End-of-Unit Activities** (approximately 1½ weeks) Have students share their reports and select one of the following oral, written, and representing activities that appeals to them. Discuss timelines and expectations.	Are students able to put themselves into the story? Are they able to make images in their minds and to identify the key features of the story?
CC 6.6, 6.2, and 6.3	**Oral –choose one** <u>Interview an older person</u> • Interview several older people (e.g., parents, grandparents, neighbours, people in your community) about what they knew and how they thought about space and early space explorations when they were your age. • Consider your questions ahead of time (e.g., What did you	Can students share personal reactions to and interpretations of the text? Can students express and support opinions?

	wonder about outer space when you were my age? What are some of the things that have happened in space that have surprised you? What things do you think we will accomplish in space exploration in the next ten years?). • Prepare an oral presentation of your findings. <u>Create a radio broadcast</u> • Collect news items from newspapers and magazines: What is the latest news? • Read "Our Solar System: News and Views" (*Space, Stars, and Quasars)* or similar articles about recent insights and issues related to space. • Prepare a news broadcast about the latest insights and issues related to space. <u>Role play a space experience</u> • You are about to experience a simulation about space travel (see "Spacewalk6", *Space, Stars, and Quasars,* Teacher's Guide). **Written – choose one** <u>Create a message</u> • The crew of *Apollo 11* left a plaque with the following message on the moon's surface: Here Men from The Planet Earth First Set Foot upon The Moon July, 1969 AD We Came in Peace for All Mankind. • Why do you think that they chose this message? What message would you have written? <u>Write imaginatively</u> • How did the Earth come to be? • Is there life on another planet? • What will life be like in the future? <u>Write a poem about space</u> **Representing – choose one** <u>Create a model of a spacecraft</u> • Make your own spacecraft. Give it a name. Decorate your spacecraft. Test your craft's stability in an empty space at school that will give you an unobstructed flight path with predictable air currents. • Work in small groups. Take turns flying your group's	Are students able to look back on the unit and consider what they have learned? Can students take what they have learned and apply it to new situations?
CC 6.8, 6.2, and 6.3		
CC 6.4, 6.2,and 6.3		

	spacecraft and measure the length of each flight. Record your data on a chart: Name of Spacecraft, Owner, Flight Distance 1, 2, 3 ... <u>Build a model space colony</u> • Create a model of an ideal space colony. • What kinds of things will you need to consider? • Think about where the colony will be. • Who will live in your colony? How will they be able to breathe? What will they do for water and heat? How will they get food? How will they get rid of wastes? What will they do for schooling? Leisure activities? Employment? • What kinds of people will you need to carry out your designs? What will be their job descriptions or responsibilities? How long will it take to complete the project? • Where possible, use graphs or drawings to represent your answers to these questions. <u>Illustrate the future</u> • What do you think your community will look like in the future? • You are the new director of the National Aeronautics and Space Support Program (NASSP). You are directed to develop a plan for the exploration of a planet. Which planet will you select and for what reasons?	

Appendix A: Inquiry Chart
K-W-L

As students explore the different topics and ideas presented in this unit, they are encouraged to pose questions and find tentative answers to them. The following grid could be used to explore their thinking and their findings. Once students have raised some of the questions that they wish to explore, they can begin their inquiries using different sources.

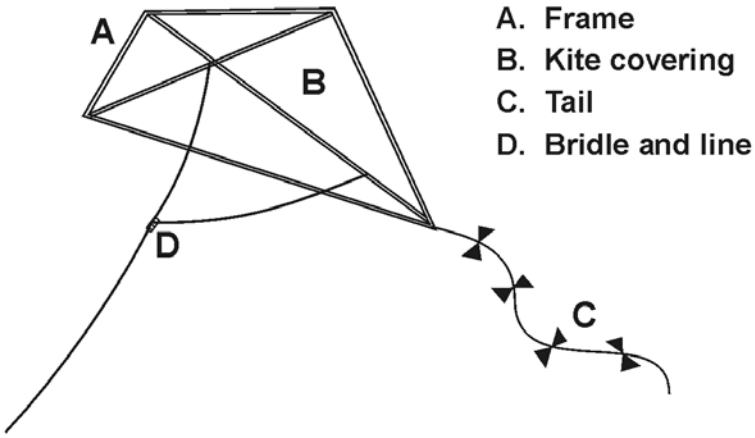
Note: This grid can be enlarged.

Topic:	Question One	Question Two	Question Three	Other Interesting Information	Other Questions (What We Know Want to Know) (W)
What We Know (K)					
Source One					
Source Two					
Source Three					
Summary (What We Learned) (L)					

Appendix B: Flying A Kite

What Makes a Kite Fly?

A **kite** is a type of aircraft without an engine. Even though it is heavier than air, the force of the **wind** and the **design** of the kite allow it to fly. A kite will fly if it finds enough wind to lift it and keep it in the sky. The design helps the kite to stay in the air. The covering (usually paper, cloth, or synthetic material), frame (wooden or a similar lightweight framework), and shape (flat, curved, or box-like) of the kite are made so that when the wind hits, it causes the kite to lift or fly. The slant of the kite (controlled by the bridle) into the wind also helps. A tail is usually important to keep the kite stable (in place). The string (also called line) is used to stop the kite from flying away with the wind.

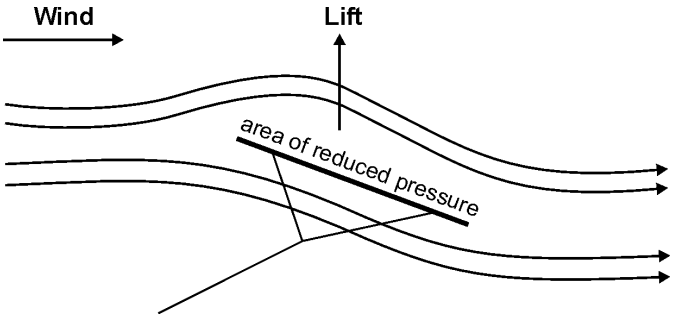


What Makes a Kite Stay in the Sky?

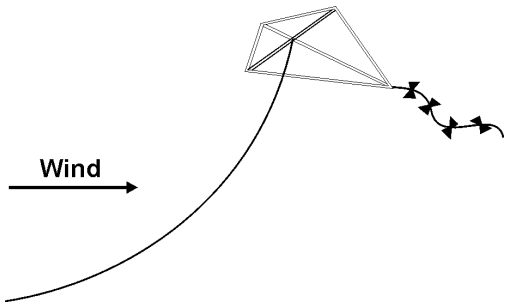
Just like a bird or a plane, there are **forces** that affect a kite when it is flying. Consider how the following forces might help a kite stay in the sky.

1. How might **weight** affect a kite's ability to fly? From what materials are kites usually made? How do these materials and their weight help a kite stay in the air or fly easily?

2. What forces push a kite up away from the earth? What effect might wind or wind pressure have on a kite? How does it give a kite **lift**?



3. When birds and airplanes fly, they use **thrust** or a force that helps them move forward through the air. A kite cannot produce its own thrust so it must rely on something else to move through the air? What does a kite need to move forward in the air?

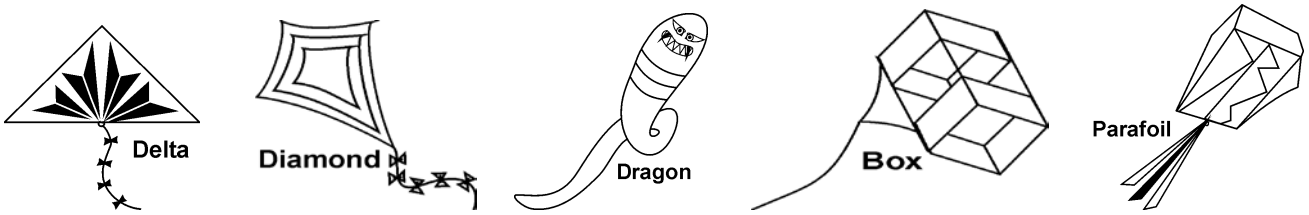


4. In addition to the effects of the forces provided by weight, lift, and thrust, a kite is affected by some **drag** or pull. What stops a kite from blowing away? What effect does the shape of the kite have on its ability to fly? What role does the tail of a kite play?

How to Make a Kite

Making a kite will allow you to experience how the forces of weight, lift, thrust, and drag affect things that fly.

1. Decide on the shape or form. What do you want it to look like? How many sticks will it have? What kind of covering will be used? Will the kite be flat or curved or look like a box? Experienced kite fliers use different types of kites for different winds. Diamonds, deltas, and dragon kites fly well in light to medium winds while box kites and stickless parafoil kites fly when the winds are strong.



2. Design the sticks and frames for the kite. Are the sticks and covering strong but light in weight?
3. Choose how you will stabilize your kite. Will you have a tail? Will you use a drogue (cone shape) or a wind cup that will catch the air and act as an anchor?
4. Bowing the kite can help keep it stable. This can be done by bending the stick frame.
5. Putting holes in your kite (venting) can keep it stable too. Venting allows some air to go through the kite and can add stability to some kites.

Experiment with different shapes and sizes for your kite. Try fastening the string to your kite in different places.

How to Fly a Kite

When you are ready to launch your kite, be sure that you are in an open area away from trees, electrical and telephone lines, buildings, and automobile traffic. You will need a little breeze to make the kite lift. Walk into the wind with your kite held up behind you. Let the wind lift the kite and as it does, feed out the string to the height you wish. Walk in the direction of the wind as you feed out the line. If the kite will not climb, you can reduce the bridle angle. To land the kite, walk toward it, winding the string in as you walk.

If there is enough wind to lift it and keep it in the sky, your kite will fly. The kite will fall, however, if you let out the flying line as fast or faster than the wind is blowing. The string must hold your kite against the force of the wind to maintain its flight. If there is not enough wind near the ground or the wind turbulence is too great, your kite may not fly.

If your kite has an adjustable bridle, move it higher (nearer the top) in higher winds and lower (towards the tail) in lower winds. The tail on your kite will help it remain stable in stronger winds.

Appendix C: The Inquiry Process

Initiate, Define, and Focus (These are the skills of questioning and identifying the problem.)	• What is my topic or question? What do I want to know or find out? • What strategies could I use to explore what I already know about this topic or question? • What do others know about this topic or question? • What inquiry questions would focus my task?
Consider Possible Strategies and Create a Plan (These are the skills of developing preliminary ideas and plans.)	• How might I find out more about this topic or question? Where might I find information about this topic or question? From whom might I find out more about what I want to learn? • What resources are there in my classroom to help me? In my school? In my community? What resources will best help me clarify my topic or question? • What processes or procedures could I use? What materials and equipment could I use? • What criteria will I use to judge how effective the sources and processes are in addressing my topic or answering my question? • What sources or procedures are the most useful and appropriate to my topic or question? • How will I access these sources or carry out these procedures?
Carry Out a Plan of Action (These are the skills of considering what is known, what needs to be learned, and how to gather evidence or support.)	• What will I listen to, read, and view to gain pertinent information about my topic or question? • What procedures will I use? • How will I make notes (using appropriate models such as diagrams, mind maps, note cards, computer files), summarize, paraphrase, or quote as appropriate (recording information needed for a bibliography) to record what I am learning?
Analyze, Synthesize, Interpret, and Organize (These are the skills of examining information and evidence, processing data, interpreting, evaluating, and connecting the results.)	• What have I learned? • What is my main thesis statement, main idea, or key message? • Do I need to develop or revise this thesis, main idea, or key message? • Can I formulate alternative answers, solutions, conclusions, or decisions related to my inquiry questions?
Present and Exchange (These are the skills of communicating and sharing what has been learned.)	• What will be my purpose for sharing my findings? • With whom will I share these findings? Where? When? How? • How can I prepare a presentation suitable for the purpose, audience, and situation that I have identified? • What do I need to revise and edit? • Have I prepared adequately and rehearsed for my presentation? • Present findings to audience.
Reflect and Evaluate	• How can I judge the effectiveness of the inquiry, processes, and presentation? • What new insights and questions do I have after learning what I have learned? • In what ways could I use what I have learned to improve further research?

Note: In this unit students explore questions about the nature of flight and space.

Appendix D: Inquiry Self-Evaluation

My inquiry was:

I worked:

- ❑ alone
- ❑ with others

I:

- ❑ researched information and credited sources
- ❑ did experiments
- ❑ interviewed someone
- ❑ made a model
- ❑ made a chart/graph/picture/diagram
- ❑ wrote a report
- ❑ did a presentation
- ❑ put information on display

Something I did well …

Something that I would do differently in my next project …

Appendix E: Reading Log for Unit

Title	Author	Date		Number of Pages	Comments	Rating
		Started	Finished			