

TNA

Constellation Challenge



1 Introduction

Welcome to the Thompson Nicola Area Constellation Challenge. Astronomy is one of the oldest sciences. In ancient cultures, an understanding of astronomy was needed to predict the coming of the seasons and when to plant and harvest crops. Before the invention of GPS devices, sailors at sea used the position of objects in the sky to track where they were on Earth.

Astronomy is also a young science. In the last decades, we have learned a great deal about the universe we live in and are part of - from the size and age of the universe to exotic objects such as black holes.

The sky holds as much fascination now as it did in ancient times but many of us have lost our connection to the night sky. How many of our girls can identify even the most widely known constellation, the Big Dipper, or the North Star?

This challenge will help reconnect our girls to the wonders of the night sky, the science of astronomy and the mythology behind the constellations.

There are six individual crests for this challenge:

- Constellation Challenge banner crest
- Aquila (Science focus)
- Draco (Observation focus)
- Corvus (Arts focus)
- Pegasus
- Cygnus

You can complete any portion of this challenge.

1.1 Objective of the Challenge

This challenge is designed to introduce girls and Guiders to the history of constellations and the concepts in the science of astronomy.

1.2 About this Booklet

This booklet outlines a variety of activities for you and your girls to choose from when deciding how to earn the challenge crests. While all of the activities are related in some way to our starry sky, many of the activities can be used in virtually any context at all. Section 2 gives puzzles that can be quiet activities at any meeting or camp. Section 3 involves observation skills with a simple Kim's game to constellation identification. Section 4 contains art, craft and drama projects that can be done anytime, as part of a constellation-themed meeting or on their own.

Section 5 presents hands-on science activities and Section 6 has suggestions for guest speakers and field trips.

Don't feel restricted to the activities in this booklet. Feel free to substitute. As long as the activity you substitute is challenging for your girls and meets the objective of the challenge, you can earn the crests.

1.3 Taking the Constellation Challenge

To earn the challenge crests, you will do a variety of activities from each section. The number of activities required to earn the crest is different for each Guiding branch.

Branch		Sparks	Brownies	Guides	Pathfinders	Rangers
Aquila						
Do at least this many activities:		2	3	4	5	5
Including this many from each of these categories	Puzzles					
	Observation Activities				1	1
	Arts, Crafts and Drama					
	Science	1	1	2	2	2
Draco						
Do at least this many activities		2	3	4	5	5
Including this many from each of these categories	Puzzles				1	1
	Observation Activities	1	1	1	1	1
	Arts, Crafts and Drama					
	Science			1	1	1
Corvus						
Do at least this many activities		2	3	4	5	5
Including this many from each of these categories	Puzzles					
	Observation Activities					
	Arts, Crafts and Drama	1	1	1	2	2
	Science					

Pegasus						
Do at least this many activities		2	3	4	5	5
Including this many from each of these categories	Puzzles	1	1	1	1	1
	Observation Activities					
	Arts, Crafts and Drama			1	1	1
	Science					
Cygnus						
Do at least this many activities		2	3	4	5	5
Including this many from each of these categories	Puzzles					
	Observation Activities					
	Arts, Crafts and Drama					
	Science	1	1	1	1	1

2 Puzzles

2.1 Word Scramble #1

O O M N _ _ _ _

G T N I H _ _ _ _ _

N S U _ _ _ _

E P L N A T _ _ _ _ _

S R A S T _ _ _ _ _

A M R S _ _ _ _ _

C P A E S _ _ _ _ _

I J P T E U R _ _ _ _ _

R H E T A _ _ _ _ _

U E N V S _ _ _ _ _

Answers:

Moon, Sun, Stars, Space, Earth, Night, Planet, Mars, Jupiter, Venus

2.2 Word Search #1

C Y G N U S R N O O M V F L O
O H T B I N E M P L B E R O P
R S E V X Y P N O P L K T C R
V I L E D S P A C E P O N A W
U G E T R N I M B P O I L R E
S D S P S T D A R S N M I D S
T Y C A H R G A L A X Y D E A
G V O Q S D I C T Y P M I E M
R T P U A O B A E N R O G T L
F T E I A K L B A T N N A H O
Q P X L C D A P R T Y O N D P
P E G A S U S F T J L R A T S
S A F T D G Y H H I K T L P R
Q E R Y T N I G H T Z S U N D
Z X C E A I B G M N P A O E X

Words:

EARTH STAR MOON GALAXY SPACE ASTRONOMY NIGHT SUN
BIG DIPPER TELESCOPE AQUILA CORVUS DRACO PEGASUS CYGNUS

Answer Key

C Y G N U S R N O O M V F L O
O H T B I N E M P L B E R O P
R S E V X Y P N O P L K T C R
V I L E D S P A C E P O N A W
U G E T R N I M B P O I L R E
S D S P S T D A R S N M I D S
T Y C A H R G A L A X Y D E A
G V O Q S D I C T Y P M I E M
R T P U A O B A E N R O G T L
F T E I A K L B A T N N A H O
Q P X L C D A P R T Y O N D P
P E G A S U S F T J L R A T S
S A F T D G Y H H I K T L P R
Q E R Y T N I G H T Z S U N D
Z X C E A I B G M N P A O E X

2.3 Word Search #2

X I N E O H P R E T Q U O S N E P R E S
D O P N D O R A D O P A B N O S O D S X
E R B A R Q D C X Y T N I K L U R N I L
C O N S T E L L A T I O N S F S L Y R A
O R T N R E T H K O N D E C N A I G O P
L D H E F C G P O K D O P A S G B H E C
U E K M I O R E B L U I T N R E R D Y L
M L E J A R I E S C S Y X C E P A G T N
B P P T B V D G H U I O W E O D N C A O
A H E D C U N P I S C E S R L U D S E S
Q I D T R S N E A U U R T I S E O P K E
D N V O P K N F E R V I N H Y D R U S L
G U Y I E S O D O U P O R H G T O I P U
T S F Q R K I R T A D P I A E R T N L C
H T E P Y G R K I T E R C A T O L I G R
I A P L I T O E D N M O E L F T K M Q E
O U P I R T W Q U E N P I I H D I E J H
K R O K Y T D R A C O H N U I K L G C Q
L U P U S R Y U I O P N E Q L O P T A V
V S A G T F E O R O J A M A S R U E O S

Words

CONSTELLATIONS AQUILA CORVUS CYGNUS DRACO PEGASUS LEO

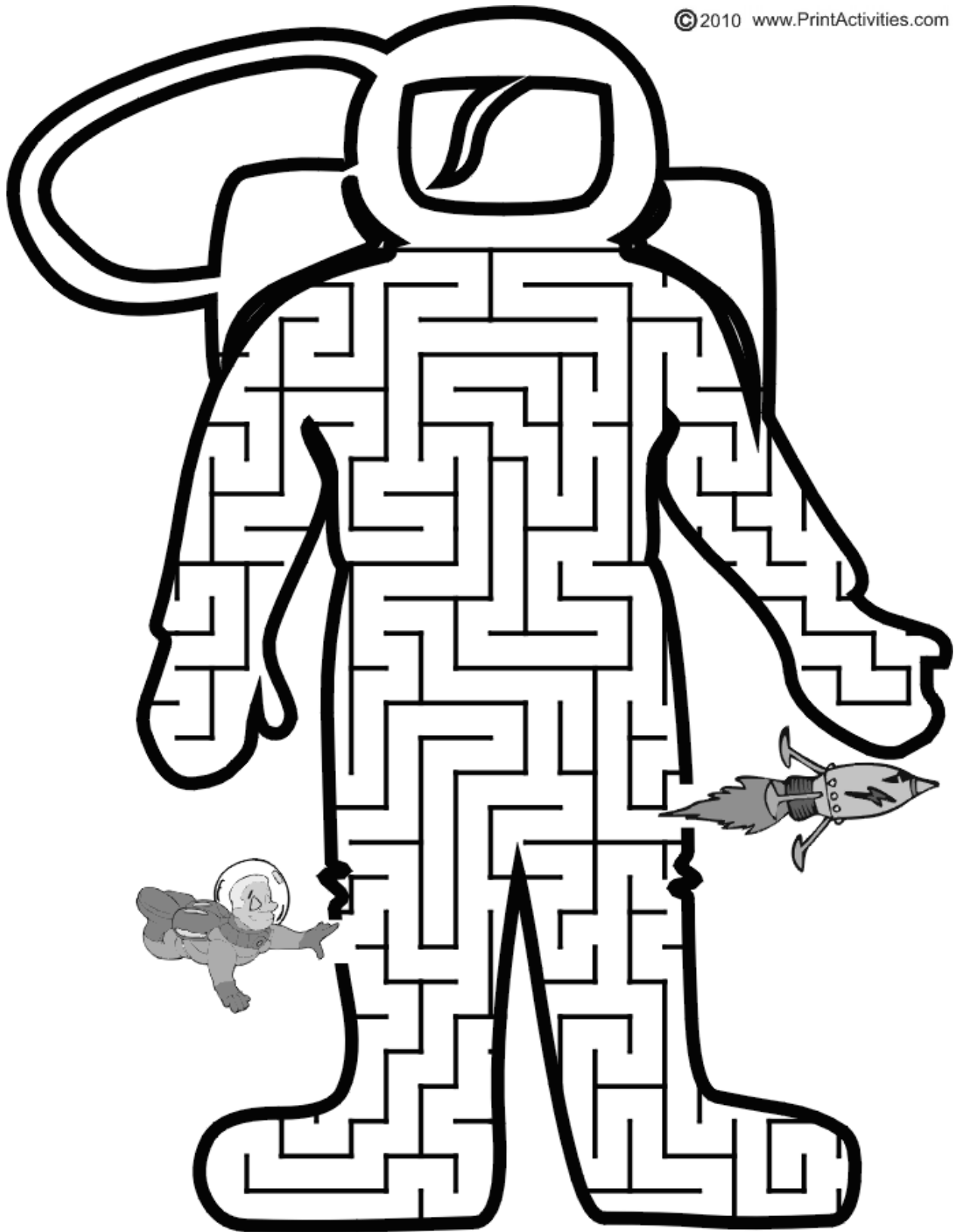
ARIES CANCER HERCULES ORION DELPHINUS URSA MAJOR PISCES
HYDRUS PHOENIX SAGITTARIUS CENTAURUS GEMINI LUPUS
TAURUS VIRGO SERPENS LYRA INDUS COLUMBA DORADO LIBRA
MENSA SEXTANS

Answer Key

X I N E O H P R E T Q U O S N E P R E S
D O P N D O R A D O P A B N O S O D S X
E R B A R Q D C X Y T N I K L U R N I L
C O N S T E L L A T I O N S F S L Y R A
O R T N R E T H K O N D E C N A I G O P
L D H E F C G P O K D O P A S G B H E C
U E K M I O R E B L U I T N R E R D Y L
M L E J A R I E S C S Y X C E P A G T N
B P P T B V D G H U I O W E O D N C A O
A H E D C U N P I S C E S R L U D S E S
Q I D T R S N E A U U R T I S E O P K E
D N V O P K N F E R V I N H Y D R U S L
G U Y I E S O D O U P O R H G T O I P U
T S F Q R K I R T A D P I A E R T N L C
H T E P Y G R K I T E R C A T O L I G R
I A P L I T O E D N M O E L F T K M Q E
O U P I R T W Q U E N P I I H D I E J H
K R O K Y T D R A C O H N U I K L G C Q
L U P U S R Y U I O P N E Q L O P T A V
V S A G T F E O R O J A M A S R U E O S

2.4 Astronaut Maze

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2.5 Code Word

20 23 9 14 11 12 5, 20 23 9 14 11 12 5, 12 9 20 20 12 5 19 20 1 18
8 15 23 9 23 15 14 4 5 18 23 8 1 20 25 15 21 1 18 5

Clue – 1=A

Answer: Twinkle, Twinkle, Little Star, How I Wonder What You Are

3 Observation Activities

3.1 Kim's Game

What you need:

- a variety of everyday objects. They may be related to a particular theme or chosen randomly.
- cookie sheet or similar tray
- cloth

What to do:

1. Place the objects on the tray and cover them with the cloth.
2. When the girls are ready, let them study the objects for 30 seconds.
3. Cover the objects again and ask the girls to list them all.

The more objects you use, the more challenging this game is. You can make it easier by putting the girls into small groups and letting them work together to name all the objects. Select objects that relate to the constellations or night sky – animals represented by the Zodiac, sun, moon, stars, rocket ship, etc.

3.2 Moon Phases

Sketch the phase and the daily position of the Moon at the same hour and place, for a week. Include landmarks on the horizon such as hills, trees, and buildings. Explain the changes you observe.

3.3 Planet Movement

At approximately weekly intervals, sketch the position of Venus, Mars or Jupiter in relation to the stars. Do this for at least four weeks and at the same time of night. On your sketch, record the date and time next to the planet's position. Use your sketch to explain how planets move.

3.4 Constellation Identification

Find the constellations of Cassiopeia & Ursa Major (which includes the Big Dipper) and: two of the constellations Cygnus, Taurus, Leo, Gemini, Pegasus or the stars of the summer triangle or

any two of the bright stars: Capella, Sirius, Aldebaran, Arcturus, Antares or one planet in the night or morning sky.

Modification for Sparks - identify the Big Dipper and two of the other items (constellation, bright star or planet)

4 Arts, Crafts and Drama

4.1 The Solar System

Draw a picture or make a model of our solar system. Show the different planets.

4.2 Colouring Pages

You can find colouring pages related to a space or star theme in colouring books and online (try a search for “kids colouring pages” and you will turn up all sorts of them). Challenge-related colouring pages might include pictures of stars, spaceships, planets, meteors, etc.

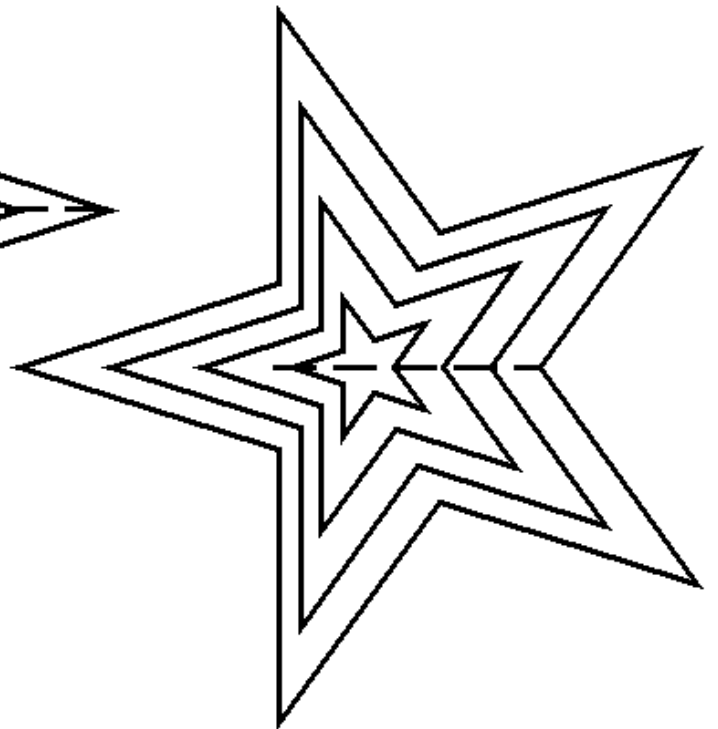
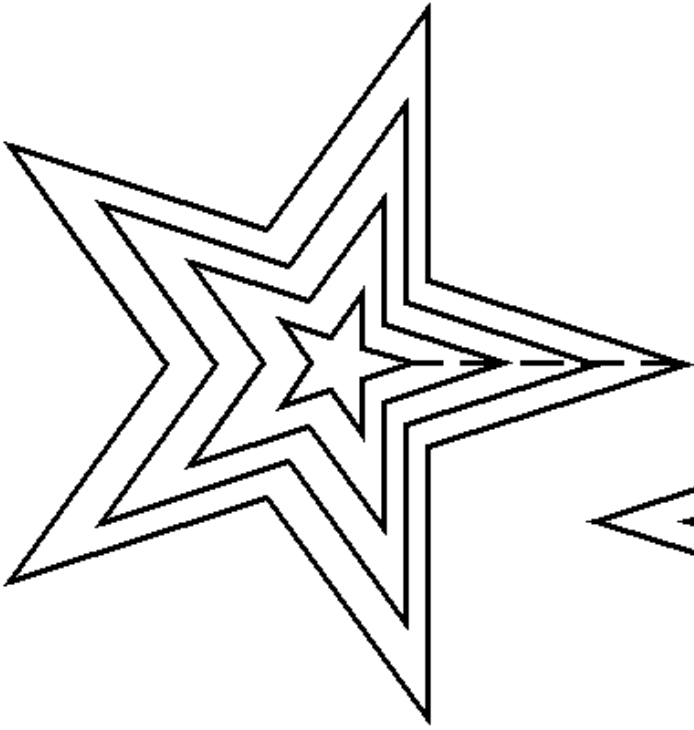
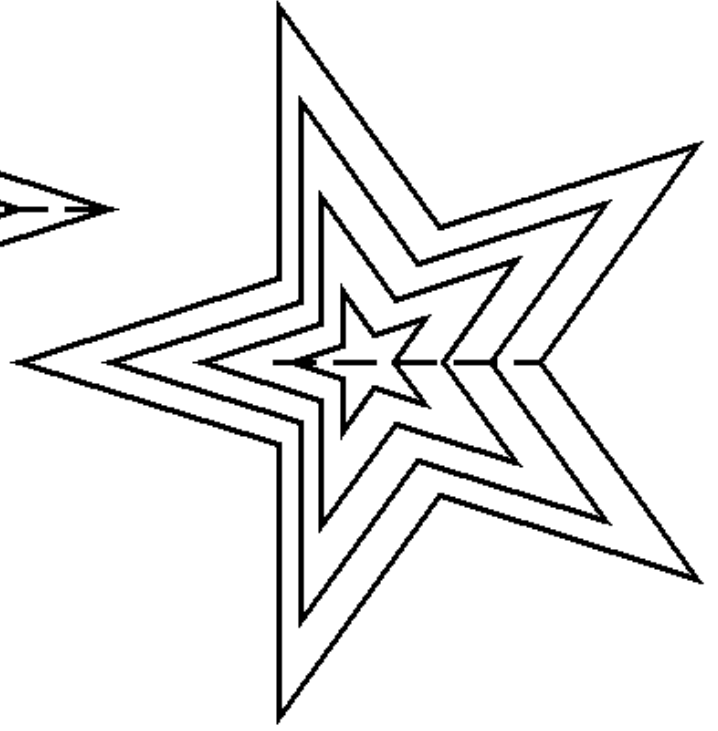
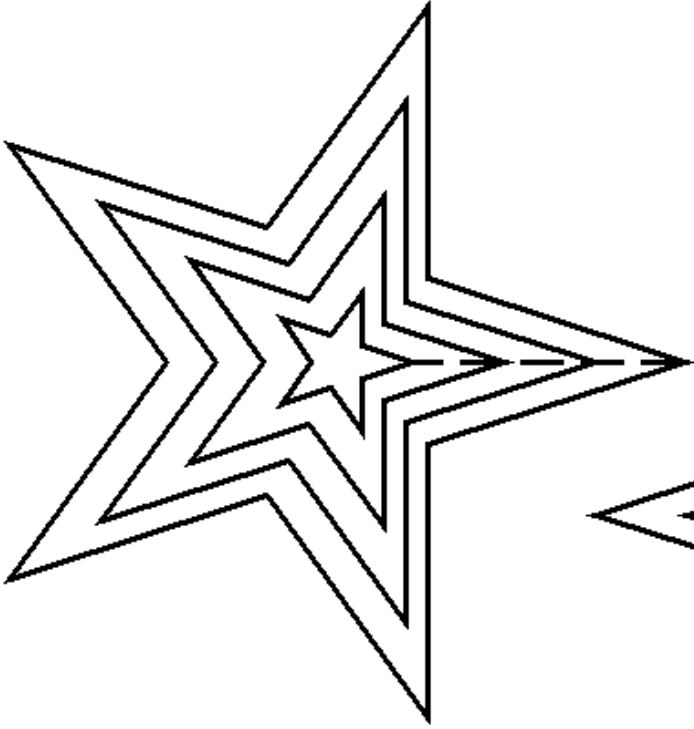
4.3 3-D Star Ornament

Materials: construction paper, scissors, crayons (or paint, markers or other decorations), string/thread or wool, hole punch

Advanced preparation – print template on coloured construction paper as desired

Instructions:

- Cut out the template pieces
- Cut on one of the dotted lines right up to the center
- Colour/decorate as desired
- Pick out the two matching stars
- Slide the stars together, top to bottom
- Glue a ribbon or thread on top (or punch a small hole at the top and tie a piece of ribbon through it)



4.4 Paper Star Mobile

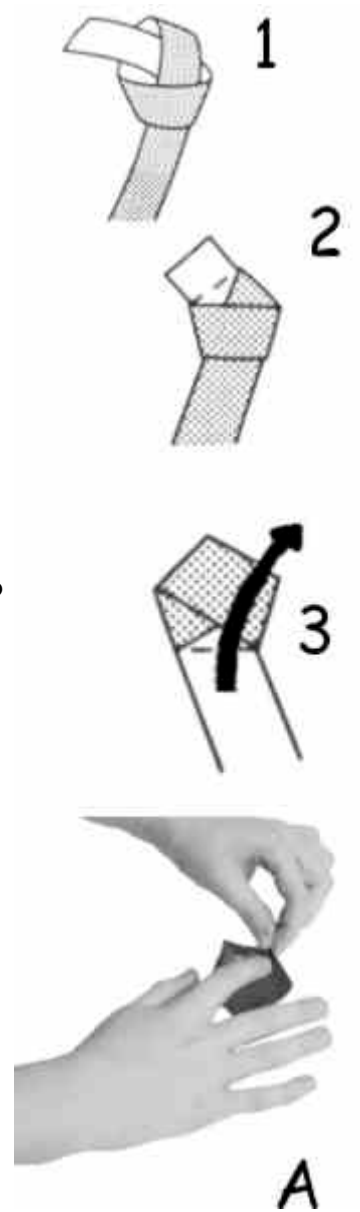
4.4.1 Paper Stars

This is a fun way to use up scraps of wrapping paper or other fancy paper you may have.

Materials – paper, scissors, ruler and pencil (optional)

Instructions:

1. Cut paper into strips about 1/2" wide and 8 inches long.
2. Take one paper strip and tie a knot close to one end of the strip (diagram 1). Flatten the knot into a five-sided shape (a pentagon).
3. Tuck the short end into the knot (diagram 2). You might have to cut it a bit shorter so that it fits completely into the knot.
4. Fold the long strip over the pentagon creating more layers (diagram 3). Keep folding until the strip is too short to fold over another time. Tuck the end into a knot.
5. Gently pinch up two sides of one point with the thumb and first finger of one hand, while pushing down with the first finger of the other hand, inside the point (picture A).
6. Work your way around each of the five points. You may need to do it a second time to get a true star shape.



4.4.2 Paper Mobile

Materials – paper stars (above), pipe cleaner (gold or silver), thread (black or gold)

Instructions:

1. Cut a 10-14 cm length of string for each paper star and glue to each star.
2. Shape pipe cleaner into a star, spiral or any other shape you wish.
3. Tie the stars to the pipe cleaner.

4.5 Name That Tune

Record small portions of songs that have a star theme and see if the girls can “Name That Tune”

Song Suggestions:

- Twinkle, Twinkle Little Star
- Rock Star – Nickelback
- Star Spangled Banner
- Wishing on a Star – Beyonce
- All Star – Smashmouth
- Lucky Star – Madonna
- Star, Star – Rolling Stones
- Lucky – Britney Spears
- Various Christmas carols

4.6 The Man in the Moon

People in different parts of the world have had different ideas about just who, or what, is "in the moon." In North America, we look at the shadows on the full moon and say it is "the man in the moon."

In Germany, people say that man was sent there for something he did wrong. In Africa, the Masai people say it's "the woman in the moon." And in China, they say it's a rabbit or a toad.

What You'll Need:

- A clear night
- Binoculars
- Paper
- Pen or pencil

Step 1: Take a good look at the full moon. What do you see there?

Step 2: Write a story telling who -- or what -- is in the moon, and how it got there.

Step 3: Share your stories with your units.

Step 4 (optional): Draw a picture or make a poster about your story.

4.7 Make a Planetarium

What You'll Need:

- Shoe box
- Scissors
- Star chart
- Pen or pencil
- Pin
- Tape
- Flashlight
- Books

Step 1: On one end of a shoe box, cut a hole just big enough for a flashlight to fit into.

Step 2: Cut a rectangle out of the other end of the shoe box.

Step 3: Using the star guide, draw dots on a piece of paper to represent the stars of a constellation, and poke holes through the dots with a pin. Do this for several different constellations.

Step 4: Put one of the sheets of paper over the rectangular hole in the box, and tape it in place.

Step 5: Support the flashlight with a stack of books, and put it into the hole in the other end of the box.

Step 6: In a darkened room, turn on the flashlight, and project your constellation onto a wall. Quiz your friends or family to see if they can identify the different constellations.

4.8 The Ancient Tales of the Constellations

There are many ancient tales of how the constellations came to be; for example, there are the stories of the Big Dipper and the Little Dipper, of Pegasus the flying horse, and many others. Often, different cultures gave the constellations their own names and own stories. What we call the Big Dipper, the Vikings called the Wagon, the Chinese called the Emperor's Chariot, and the English called a Plow. Learn one of these stories and create a skit to tell the tale. Perform the skit for your unit. Number of girls required for the skit will depend on the tale they choose.

4.9 Make and Name Your Own Constellation

What You'll Need:

- Newspaper
- White paper
- Paint
- Paintbrush
- Pencil

Step 1: Spread some newspaper over the floor or over a table. Place a sheet of white paper in the middle of the newspaper.

Step 2: Dip a paintbrush into paint.

Step 3: Hold the brush over the paper, and tap your hand so small paint specks fall on the paper.

Step 4: Think of these as stars, and examine them for patterns or shapes you recognize that could be constellations.

Step 5: When the paint has dried, connect the paint specks with a pencil to form shapes you can recognize.

Step 6: Then paint more detailed pictures of the image. Write names for your constellations.

Step 7 (optional): Write a story about how your constellation came to be.

5 Science Activities

5.1 The Terminology of Astronomy

Sparks and Brownies:

- Define star, constellation, planet and galaxy

Guides, Pathfinders and Rangers:

- Define star, constellation, planet, galaxy, comet, meteor, meteorite and the Milky Way

5.2 Tools of the Trade

Learn the parts of a telescope and how to use one

5.3 The Moon and Its Phases

Learn more about the moon - the phases its age, names of features - and then take a closer look with binoculars or a small telescope.

Re-create the phases of the moon:

What You'll Need:

- Pencil
- Plastic foam ball
- Lamp without a shade
- Dark room

Step 1: Stick a pencil into a plastic foam ball. The ball stands for the moon. Use the pencil as a handle.

Step 2: Darken the room, and turn on a lamp that doesn't have a shade.

Step 3: Put the lamp at eye level in the middle of the room. Now face the lamp. The lamp is the sun, and you are the Earth!

Step 4: Hold the plastic foam ball directly between you and the light. The side of the ball that is facing you will be dark. This is called the new moon.

Step 5: Turn in place while you hold the ball at arm's length. You might want to hold the ball above your head so the light can always reach it as you turn.

Step 6: Watch the ball. It will go through the phases of the moon as different sides of the ball are hit with light. When you are between the lamp and the ball, with the light shining completely on the ball, the ball will look like a full moon.

5.4 Star Map

Learn about the movement of the stars. Use a star map.

5.4.1 Star Gazing

What You'll Need:

- Star chart
- Clear night
- Flashlight
- Piece of red cellophane

Step 1: Get a star chart, and learn about the night sky. You can find one in many books at the library.

Step 2: On a clear night, go outdoors and see if you can find the constellations in the sky. The stars move throughout the year, so you'll see different constellations at different times of year.

Step 3: Look for the starting point for star-gazing, usually the North Star, also called Polaris. It's the only star that does not move. To find the North Star, find the Little Dipper. The last star on its handle is the North Star. Another way to find the North Star is to locate the Big Dipper and trace an imaginary line from the two stars in the dipper's front edge, leading up from the dipper. The North Star is along this line.

Step 4: Once you've found the North Star, try to locate the other constellations. Use a flashlight to refer to your star chart. (Cover the flashlight with red cellophane so you can still see the stars when you look back up at the sky.)

5.4.2 Umbrella Full of Constellations

What You'll Need:

- Clear night when the moon is invisible or very small
- Black umbrella (that it's OK to mark up with chalk)
- White chalk
- Star chart

Step 1: Open the umbrella, and hold it over your head.

Step 2: Point the tip of the umbrella at the North Star. (Use a star chart to find the North Star.)

Step 3: Look up at the underside of the umbrella. You may see the stars shining through.

Step 4: Use white chalk to mark on the umbrella each place where you see a star. (This will be easier if someone else holds the umbrella for you.) If you can't see the stars through the umbrella, just look in the sky and mark the stars in the same positions as you see them in the sky.

Step 5: When you've marked all the stars you can see, take the umbrella inside. Compare your marks to a star chart. What stars and constellations did you mark?

Step 6: Draw lines connecting the constellations, and label them with their names.

5.5 Make an Astrolabe

When scientists describe the position of a star in the sky, they measure its position relative to the horizon. An astrolabe measures how high above the horizon the star is in degrees.

What You'll Need:

- String
- Plastic protractor

- Weight (washer, rock, or fishing weight)
- Pen and paper

Step 1: Tie a 12-inch piece of string to the hole in the middle of the crossbar on the protractor. Tie a weight to the other end.

Step 2: Hold the protractor so that the curved part is down and the zero degree mark is closest to you.

Step 3: Sit on the ground, and look along the flat edge of the protractor with your eye at the zero mark. Point the flat edge at the star whose position you want to measure.

Step 4: Once you have the star at the end of your sight, hold the string against the side of the protractor.

Step 5: Note which degree mark the string crosses. Write this down in your notebook. This number tells you how many degrees above the horizon your star is.

Step 6: Take readings for several stars.

Step 7: Return every 30 minutes, and take new readings. Notice the pattern in which the stars seem to move across the sky as the earth turns.

6 Guest Speakers and Field Trips

6.1 TRU Astronomy Walk and Model Project

Take a stroll through the TRU campus and see models of various parts of our solar system. Portions of the Astronomy Walk can also be found on the City of Kamloops Millenium Trail.

Each of TRU`s satellite campuses also has an astronomy walk.

For more information about this, go to <http://www.tru.ca/astro.html>

6.2 Kamloops Astronomical Society

Contact the society to see if one of its members might be able to speak to your unit. Older girls may also be able to attend one of the Society`s meetings.

6.3 TRU – Department of Physics and Astronomy

TRU has an observatory atop the new International Building. Contact the Physics department to see if a guided tour could be arranged or a presentation with one of their instructors.

6.4 Vancouver – H.R. MacMillan Space Center

It may be far away but the H.R. MacMillan Space Center in Vancouver has a number of programs/shows that they offer and do take group bookings.

7 Resources

7.1 Books:

Here is a small sample of the titles available through the TNRD Library System:

- *Exploring the Night Sky: The Equinox Astronomy Guide for Beginners* by Terence Dickinson
- *The Nature Company Guides Skywatching* by David H. Levy
- *New Atlas of the Moon* by Thierry Legault and Serge Bernier
- *Star Maps for Beginners* by I.M. Levitt
- *Zoo in the Sky: A Book of Animal Constellations* by Jacqueline Milton
- *Astronomy Made Simple* by Michael Hamburg
- *Astronomy: A Beginner's Guide to the Sky at Night* by Paul Graham Sutherland
- *Dot to Dot in the Sky: Stories in the Stars* by Joan Marie Galat

7.2 Star Maps

For a free download of a monthly star map, go to www.skymaps.com. There are many other sites with star maps but this one prints quite nicely.