Grade 9 Lab Notebook

Science in Action 9

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Space Exploration

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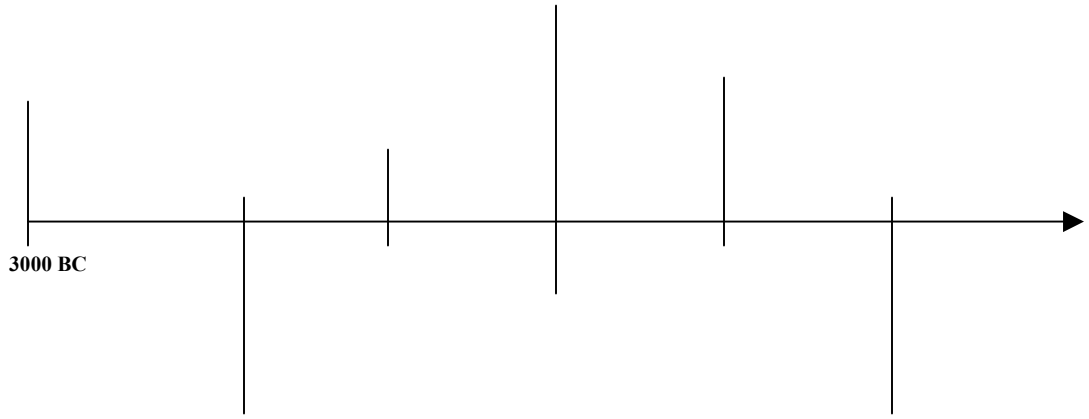
Give It A TRY
CRATER PATTERNS ON THE MOON (p. 369)

Observations (illustrate)

Give It A TRY
EVOLVING IDEAS ABOUT PLANETARY MOTION (p.371)



QuickLAB

Elliptical Loops (p. 375)

Questions:

6. _____

_____

7. _____

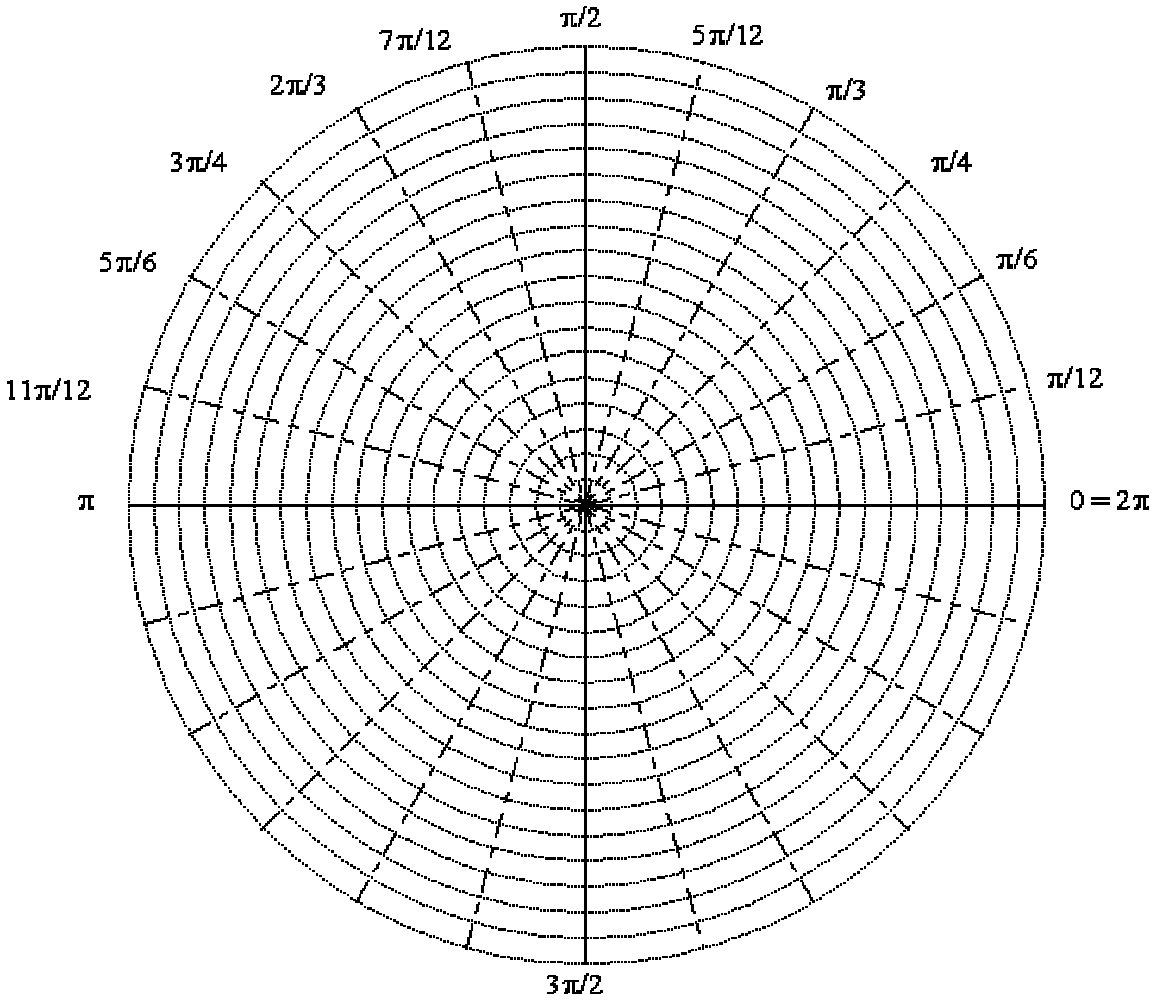
_____

8. _____

_____

QuickLAB

Telling SunDial Time (p. 377)



Questions:

4. _____

_____

5. _____

_____

Inquiry E-1

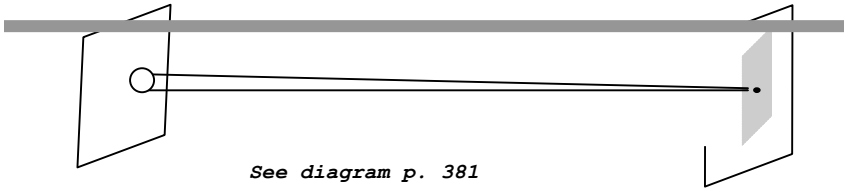
How Big Is The Sun? (p. 380-381)

Question: Can we accurately measure the diameter of the Sun by using an indirect method?

Hypothesis: _____

_____

Materials and Procedure: (p. 380-381)



See diagram p. 381

Data Collection:

Trial 1 Diameter	Trial 2 Diameter	Trial 3 Diameter

Analyzing and Interpreting:

7. Average diameter = _____

8. $\frac{\text{d}}{\text{100 cm}} = \frac{\text{D}}{\text{150 000 000 km}}$

9. 'Percent error' calculation = $\frac{\text{(actual value – measured value)}}{\text{actual value}} \text{ X } 100$

10. _____

_____

_____

_____

Forming Conclusions:

11. _____

_____

_____

_____

12. _____

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_____

_____

Applying and Connecting *(p. 381)*

13. _____

_____

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_____

_____

14. _____

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_____

_____

_____

Give It A TRY

TAKE A WALK THROUGH THE SOLAR SYSTEM (p. 382)

Class Participation (groups of 10) **Creating a Model**

3. _____

_____

_____

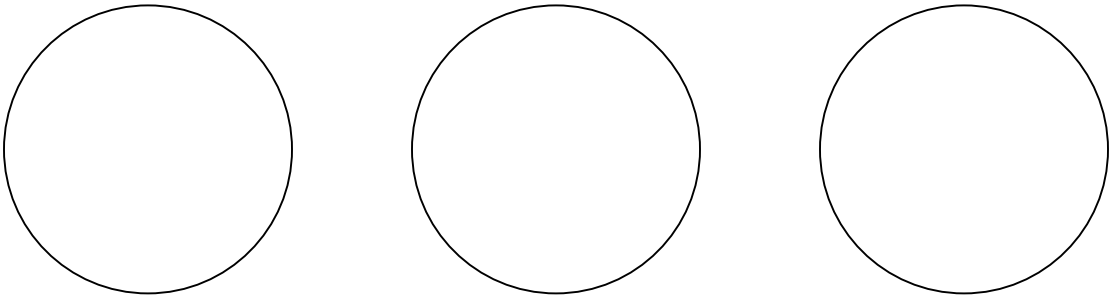
4. _____

_____

_____

QUICKLAB

WHAT COLOR & TEMPERATURE TELL US ABOUT ELEMENTS (p. 385)



6. _____

_____

7. _____

_____

8. _____

_____

Give It A TRY

CLASSIFYING STARS BY SIZE (p. 389)

1. Classification of Sample Stars

Red Supergiants	Giants	Main Sequence Stars	White Dwarfs

2. a) _____

_____

b) _____

_____

c) _____

_____

d)

_____ **because** _____

_____

_____ **because** _____

_____

SKILL **PRACTICE**

Building A Planetary Spreadsheet (p.393)

Sun	**Characteristics:** - - - -

Planets	Composition	Atmosphere	Moons	Ring system	Axis of Rotation	Length of Day	Length of Year
Mercury							
Venus							
Earth							
Mars							
Jupiter							
Saturn							
Uranus							
Neptune							
Pluto							
Planet X							

Give It A TRY

HOW CAN COLLISIONS OCCUR IN ALL THAT SPACE? (p. 397)

4. _____

_____

_____

5. _____

_____

_____

_____

_____

_____

_____

_____

Give It A TRY

ESTIMATING POSITIONS IN SPACE (p. 401)

Object	Fists (Elevation)	Direction

_____

_____

_____

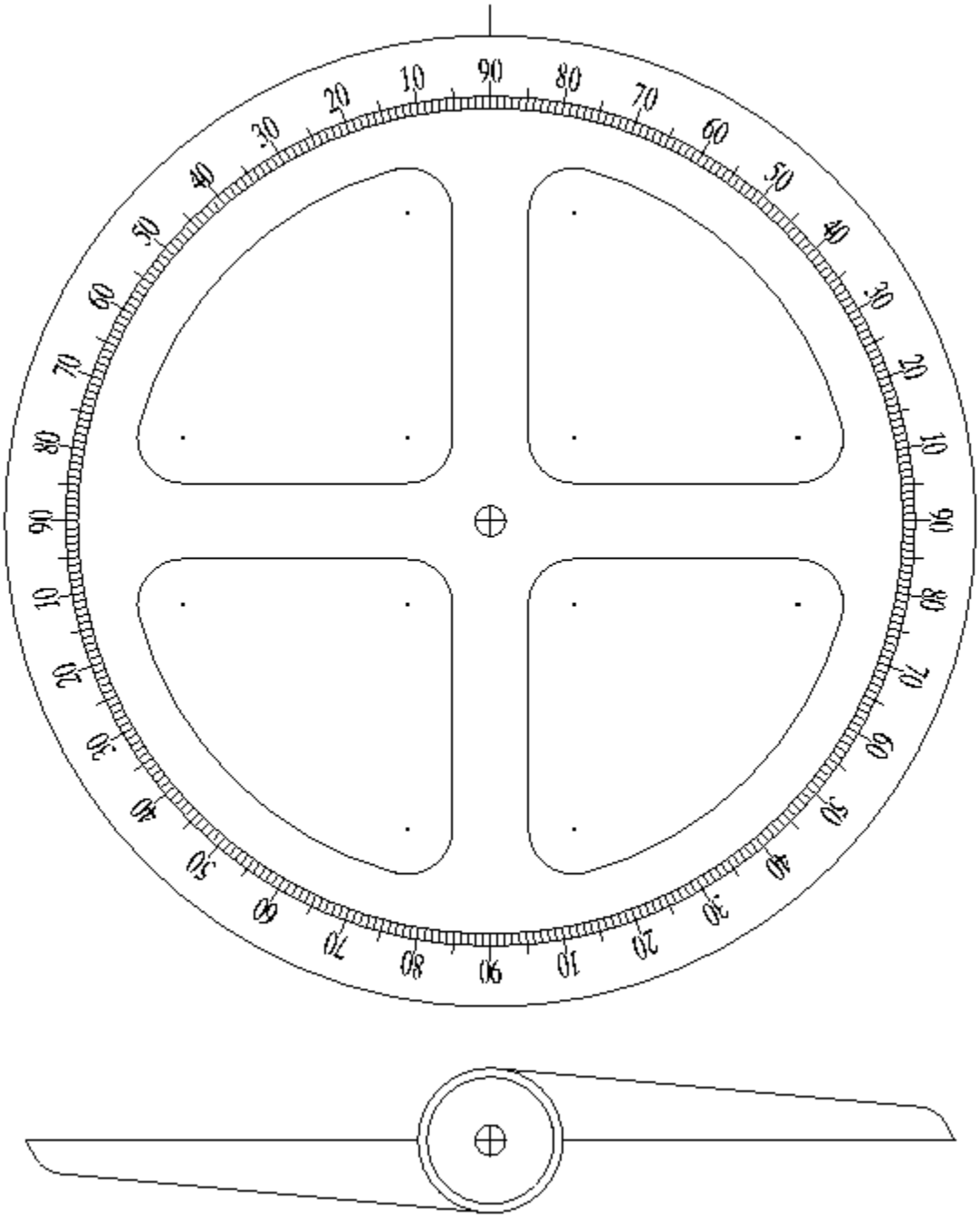
Problem Solving E-2
WHERE DO WE LOOK? (p. 402 - 403)

Question: Can you build your own '**astrolabe**'?

Hypothesis: _____

_____

Materials and Procedure: (p. 402 - 403) Use this to make yours!



Communicate:

8. _____

_____

9. _____

_____

10. _____

_____

Extension:

(EXTREME CAUTION - DO NOT LOOK DIRECTLY AT THE SUN WITH THIS OR ANY OTHER 'Astrolabe' DEVICE)

Day 1	Day 2	Day 3	Day 4	Day 5

QUICKLAB
THE POWER OF STEAM (P. 409)

OBSERVATIONS

Questions

6. _____

_____

7. _____

_____

8. _____

_____

9. _____

_____

QUICKLAB

STABILIZING ROCKET FLIGHT (p. 411)

	Test Flight 1	Test Flight 2
Distance		
Flight Pattern		

Questions

6. _____

Conclusion _____

_____

7. _____

Inquiry E-3

DESIGNING A SOLAR SAIL-POWERED SPACECRAFT (p. 414-415)

Follow the procedures outlined for this activity (on p. 414-415**) as a Lab, or use this Alternative Project Activity**

Description of Goal

To design and construct a prototype model of a **Solar Sail-powered Spacecraft**. (**optional**: a ***working*** model should be solar powered and perform the task using only light as the power source)

Background:

The solar sail is likely the next great advance for interplanetary flight. Using the power of the sun (to generate electricity) to run a fan, your prototype model will carry a payload to a specified destination and will be scored on the success of the mission.

Specifications:

- Prototype must be your own design.
- Size is limited to spacecraft body which should not exceed 15cm long and 6cm wide
- Choice of materials is open
  (no commercially-developed robotic kits will be allowed – ie. Lego, Knex, Mechano, etc.)
- You will be required to sail your spacecraft to the **target planet**, during the test phase.
- Spacecraft must travel in a straight line to its destination.
- It will be timed (speed is important).
- Impact or loss of payload will be penalized.
- Project **Report** should include:
  - Design Blueprint
  - Procedural Outline
    - *Construction Details*
  - Troubleshooting
  - Questions that you developed as a self analysis (reflection) of this project and the reality or science fiction it holds for you
  - Feedback sheet and recommendations from peers

Give It A TRY

Problems encountered:	Solutions:
1.	
2.	
3.	
4.	
5.	

Experiment On Your Own *E-4*

Designing And Building A Water Filter (p. 423)

Question: How effective are various materials for filtering water and improving its clarity?

Hypothesis: _____

_____

Materials and Procedure: (p. 423)

2. a) _____

b) _____

c) _____

3. a) _____

b) _____

c) _____

d) _____

e) _____

4. ***Experimental Design (Scientific Illustration)***

Data Collection:

6. _____

_____

7.

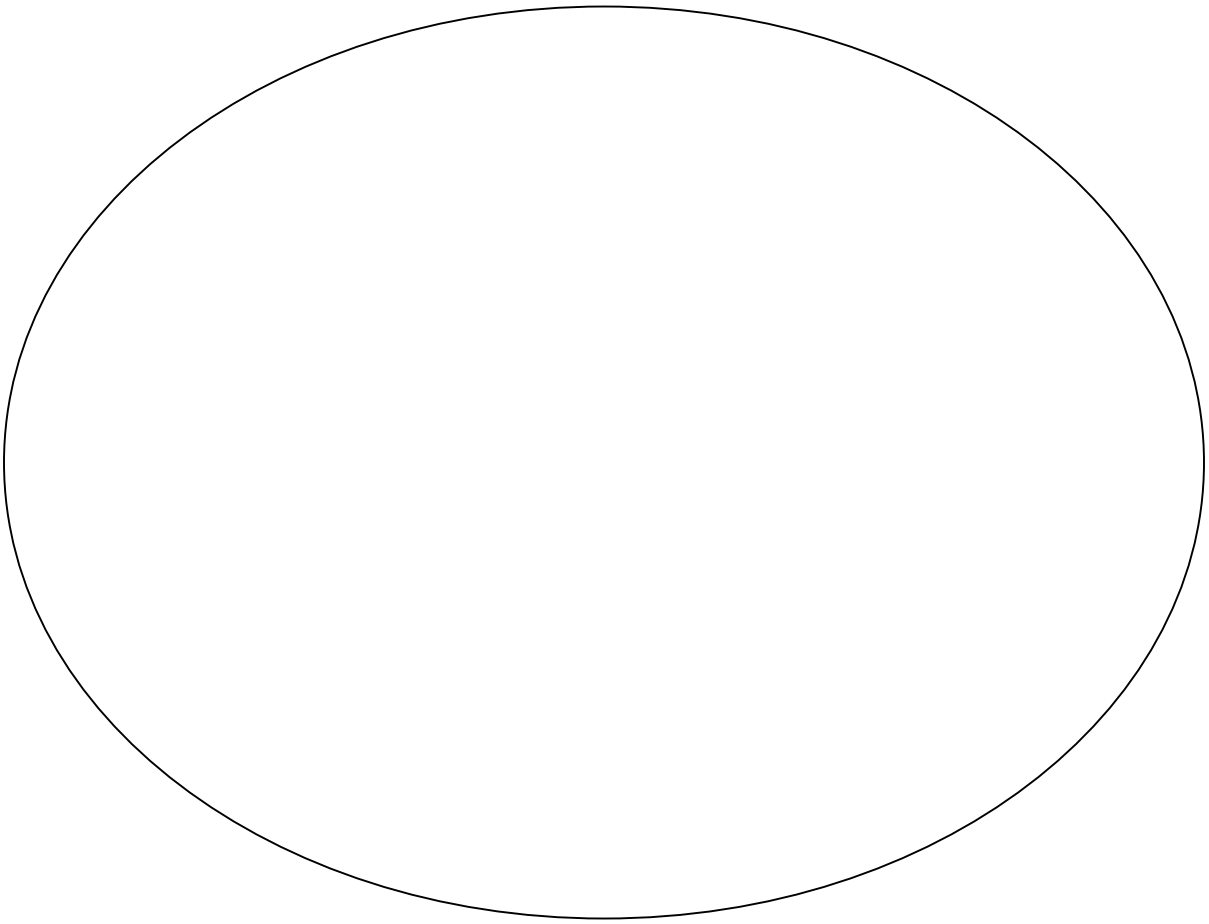
Comparisons	Your Experiment	Peer Experiments
Procedure		
Set-Up		
Results		
8. Controls		

Inquiry E-5

SPACE STATION DESIGN: THE VALUE OF TEAMWORK (p. 424)

Task: To design a module for an imaginary space station

A SKETCH OF '*PANGEA*' (_____'S ORBITING SPACE STATION)



MODULES INCLUDED BY YOUR CLASS ....

_____ _____

_____ _____

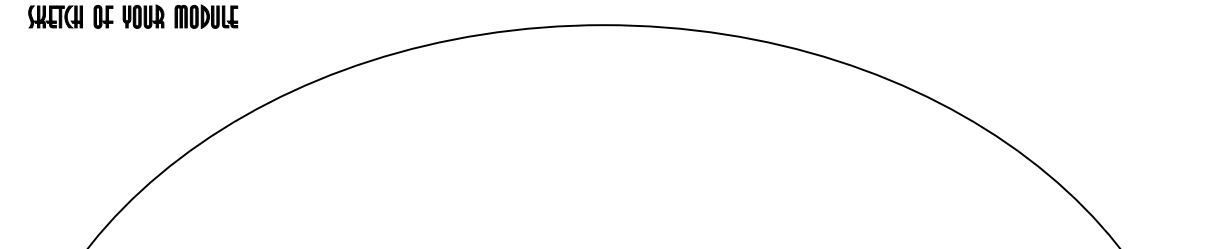
_____ _____

_____ _____

MODULE YOU ARE ASSIGNED TO DESIGN

_____

SKETCH OF YOUR MODULE



HOW IT WAS CONSTRUCTED ....

_____

_____

_____

_____

_____

_____

EVALUATION:

6. _____

_____

_____

_____

QUICKLAB

DATA RELAY FROM SPACE TO EARTH (P. 428)

Questions

8. _____

_____

9. _____

_____

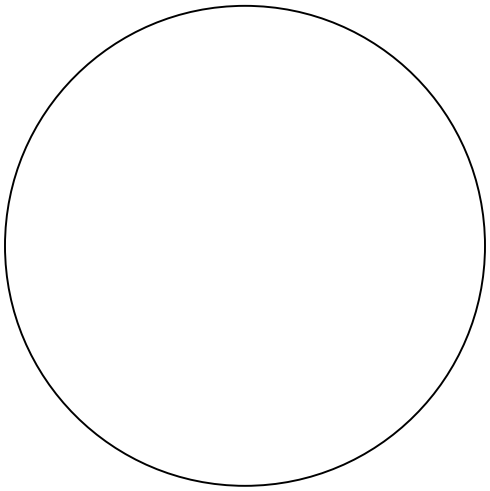
10. _____

_____

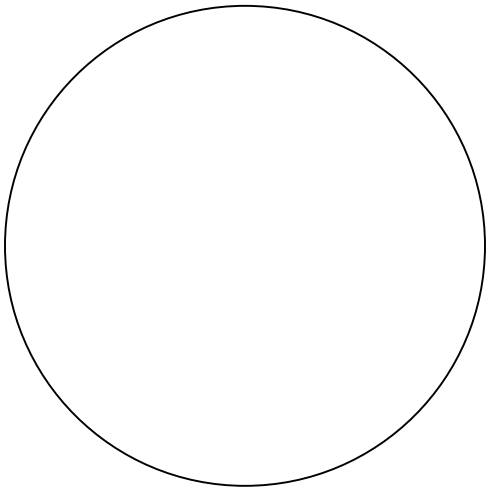
SKILL PRACTICE
ON LOCATION WITH GPS (P. 430) (USING IMAGE ON P. 430)

SKILL PRACTICE
SHARPEN YOUR STAR-GAZING SKILLS (P. 432)

(Do this activity at **HOME**0



View Before



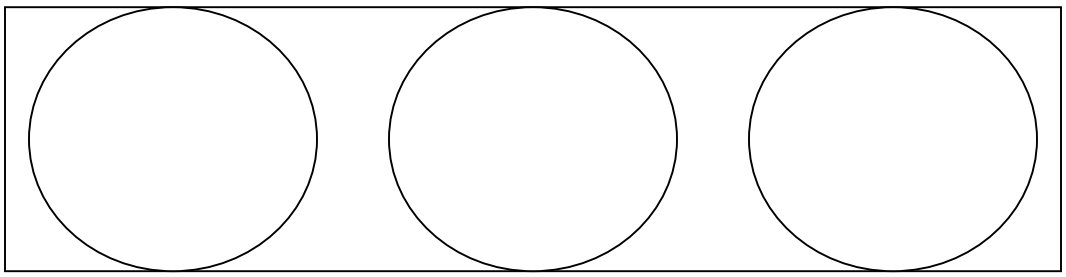
View After

Explanation:

_____

_____

QUICKLAB
COMPARING LIGHT SPECTRA (p. 441)



Light 1 **Light 2** **Light 3**

Questions:

3. _____

_____

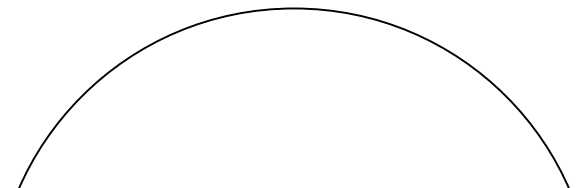
4. _____

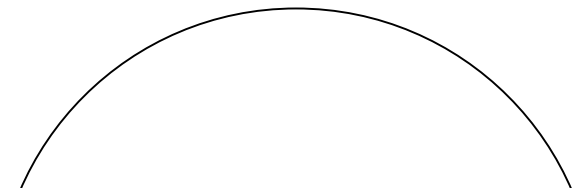
_____

5. _____

_____

GIVE IT A TRY
LIGHT BULB STARS (p. 446)





Light 1 **Light 2**

Observations:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Inquiry E-6

HOW FAR IS IT? (p. 448-449)

Question: How accurately can the length of a playing field be measured using triangulation?

Prediction: _____

Baseline Length (**m**)	Angle Position A (º)	Angle Position B (º)	Calculated length of field (**m**)	Actual length of field (**m**)	Percent Error (**%**)
10					
20					
30					

Analyzing and Interpreting:

7. Scale Drawings

10m

20m

30m

8. _____

_____

9. **See Table**

10. **See Table**

Formula … **percent error = (actual value – measured value) X 100**
actual value

11. Average % error

(10m % error) (20m % error) (30m % error) = _____% error
3

Forming Conclusions:

12. _____

_____

13. _____

_____

14. _____

_____

Applying and Connecting:

Sources of Error were likely _____

_____

_____

Question: Which shows greater parallax: close objects or distant objects?

Hypothesis: _____

Materials and Procedure: (p. 451)

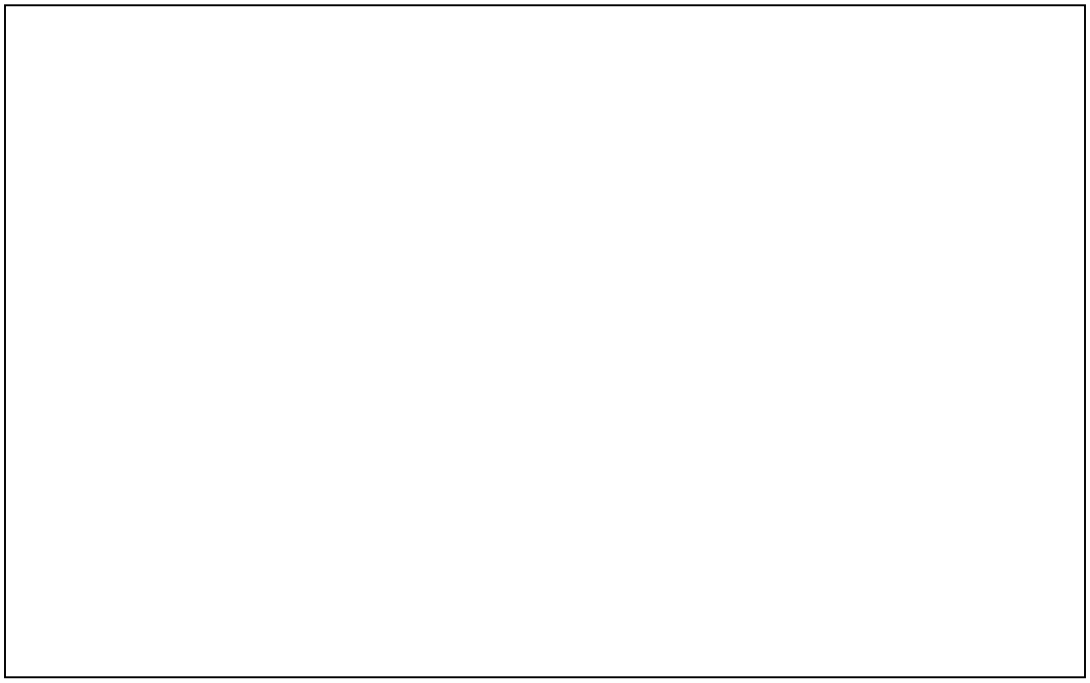
Data Collection:

original view (right)	**original** view (left)
view **2m closer** (right)	view **2m closer** (left)
view **2m farther away** (right)	view **2m farther away** (left)

Analyzing and Interpreting:

9. _____

10. Apparent shift … map-view sketch



Forming Conclusions:

11. _____

_____

12. _____

_____

_____

_____

Applying and Connecting:

_____

_____

_____

_____

_____

GIVE IT A TRY

EXPERIENCING THE DOPPLER EFFECT (p. 454)

Questions:

1. _____

_____

2. _____

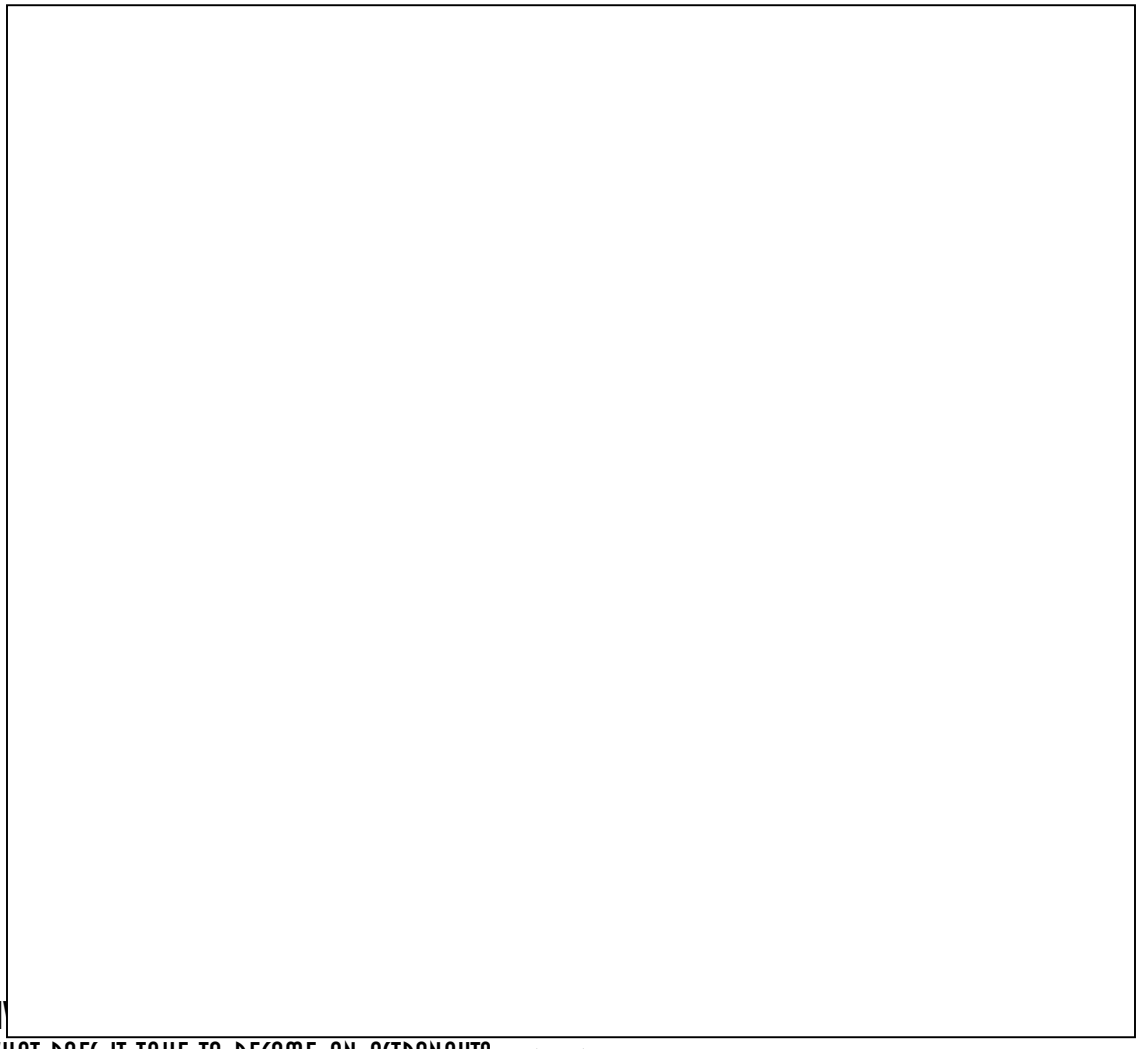
_____

3. _____

_____

4. _____

_____



GI

WHAT DOES IT TAKE TO BECOME AN ASTRONAUT? (P. 462)

1. Criteria of an *'ideal'* astronaut

2. Canadian Space Agency requirements to become an astronaut

3. Canadian Astronauts (Biographical Information)

4. _____

_____

_____

_____

_____

5. (presentation to class)

6. (class discussion)

7. _____

_____

_____

_____

_____

SHOULD WE CONTINUE INVESTING IN SPACE EXPLORATION & RESEARCH?

Issue: Are the benefits worth the cost?

Position: _____

_____

Supporting Information	***Documentation/Proof/Evidence***

Questions: _____

_____

_____

_____

_____

_____

_____

GIVE IT A TRY

1. _____

2. _____

3. _____

Class Discussion Summary and Analysis:

Supporting Information (PRO)	***Supporting Information (CON)***

Conclusion: _____

_____

_____

_____

_____