Interactive Science Notebooks

What are Interactive Science Notebooks?

- A student thinking tool
- And organizer for inquiry questions and what I learned…
- A way to access and process the learning utilizing various modalities (writing, drawing, and discussion)
- A place for writing rough drafts based on hands-on learning
- A formative assessment tool for teachers

Why are we using Interactive Science Notebooks?

- Record data
- Study for tests
- Record progress
- Communication

Science Notebook Supplies

Composition Notebook

Glue

pens & pencils

colored pencils

scissors

NO MARKERS!

LET'S GET STARTED…

Cover or Title Page

Give your science notebook a title.

This should give the reader an idea of what this notebook will be about.

SCIENCE NOTEBOOK EXPECTATIONS AND RUBRIC

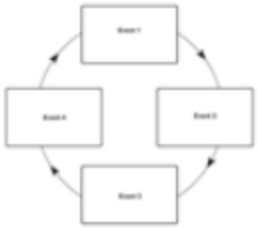
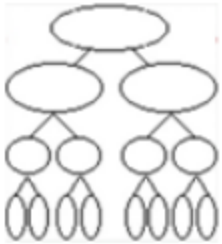
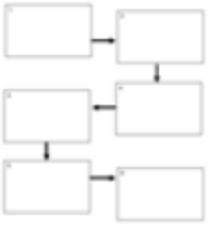
*Your Science Notebook is evidence of **your** hard work and learning, so treat it with utmost care. You are expected to have it with you at all times. Use the posted example of the notebook as a guide for the correct format.*

1. Begin each new lesson by adding the title to the top of your next blank page and recording the date in the upper RIGHT corner. Your title can be at the top of either page. Page numbers are always located in the bottom RIGHT corner.
2. If time allows you may add the lesson title and page number to your table of contents, otherwise, you'll need to complete that at the end of the lesson.
3. **Each** page must have the title, date, and page number. Lessons must be in order and listed in the appropriate table of contents, based on the current six-week period.
4. All papers associated with each lesson must be taped or glued neatly on the page of the activity. No papers should be loose or sticking out from the Notebook.
5. Everything you're asked to write in the course of a lesson should be written in your notebook neatly.
6. Skip lines between the IN activity and the OUT activity.
7. The notebook should be relatively clear of doodling. Use the white space instead for illustrations related to and explaining the science information.
8. The IN Activities must be answered in such a way that you know what the question was asking. For example:
   a. IN Activity: "Which of the following items are examples of physical characteristics?"
   b. Appropriate answer: "Color, size, and shape are examples of physical characteristics." This answer will allow you to study from it and understand the content of the lesson later.
   c. Not an appropriate answer: "Color, size, and shape." When you read this later, you won't have any idea what the lesson was about.
9. Table of Contents needs to be updated regularly with date, lesson title, and page #.
10. AFTER EACH ACTIVITY you should go through your science notebook to:
    - Add color to any diagrams and/or illustrations from the lesson.
    - Ensure that your OUT activity is fully complete and reflective of your learning.

Inside Cover

Student Name
Ms. Wolfe
2015-2016

Science Graphic Organizers

T-Chart	Box & T-Chart	Fish Bones	Net
			
Venn Diagram	Triple Venn Diagram	Wheel	Cycle
			
Tree	Cause & Effect	Chain or Sequence	Layer
			

Graphic Organizers

- There are twelve graphic organizers that are acceptable to use in this classroom.

- I may ask you to use a specific GO, or sometimes you will be able to choose one.

Title

Date

Student Side

(1) IN activity

Essential Question
Bell Ringer
Quick-Write

(3) OUT activity

Exit Ticket
Quick-Write
Graphic Organizer

Teacher Side

(2) THROUGH activity

Lesson Notes
Diagrams/Illustrations
Lab Sheets
Data and Graphs

Pg. #

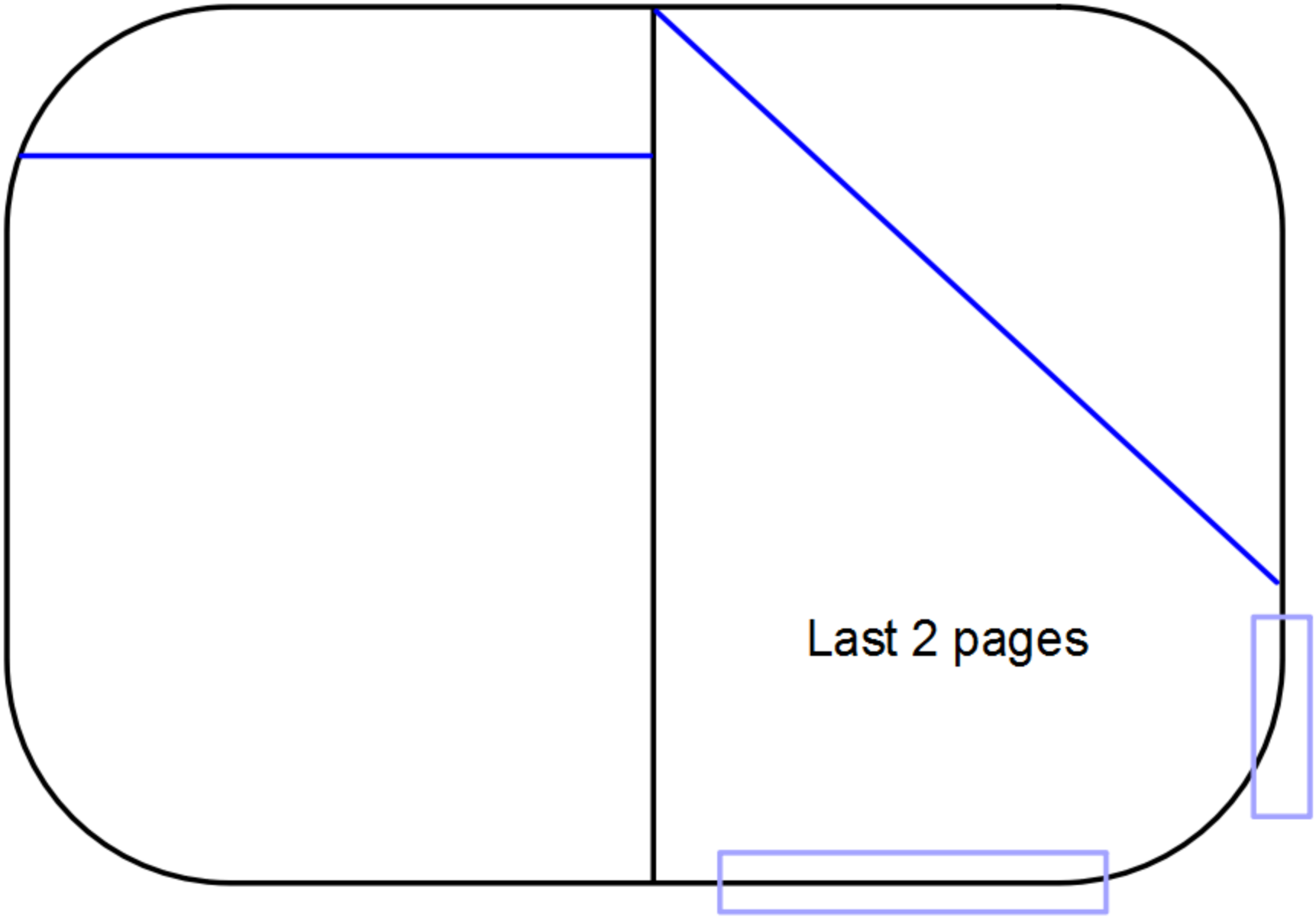
Table of Contents

Date	Title	Page

Table of Contents

Date	Title	Page

You will need 6 TOC Pages


Last 2 pages

Scientific Toolbox

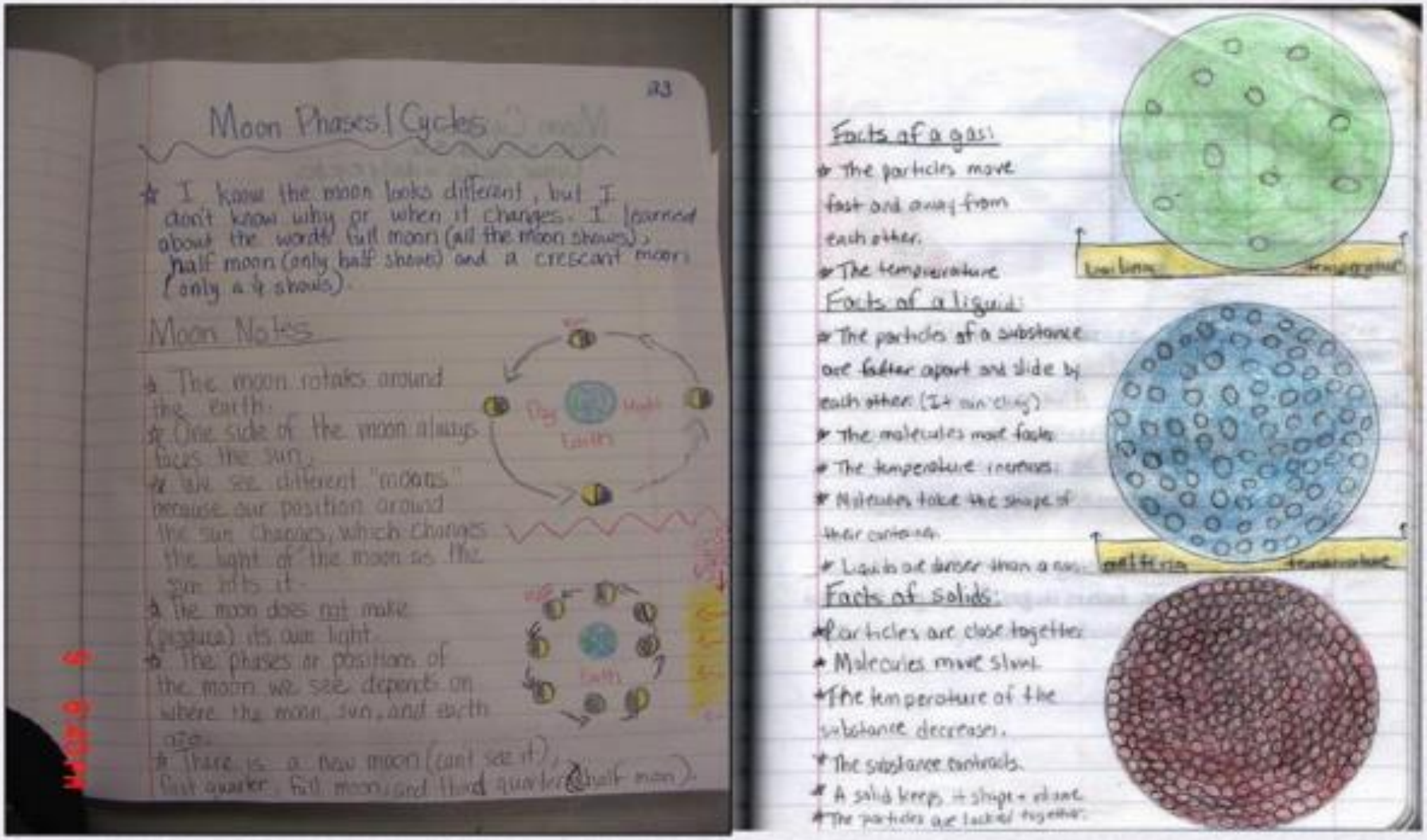
Scientific Toolbox

You will trim 4 ST Pages

Starting behind the TOC, number all of the right-hand pages.

STOP when you reach the Scientific Toolbox.

Example



23

Moon Phases / Cycles

☆ I know the moon looks different, but I don't know why or when it changes. I learned about the words full moon (all the moon shows), half moon (only half shows) and a crescent moon (only a ¼ shows).

Moon Notes

☆ The moon rotates around the earth.
☆ One side of the moon always faces the sun.
☆ We see different "moons" because our position around the sun changes, which changes the light of the moon as the sun hits it.
☆ The moon does not make (produce) its own light.
☆ The phases or position of the moon we see depends on where the moon, sun, and earth are.
☆ There is a new moon (can't see it), first quarter, full moon, and third quarter (half moon).

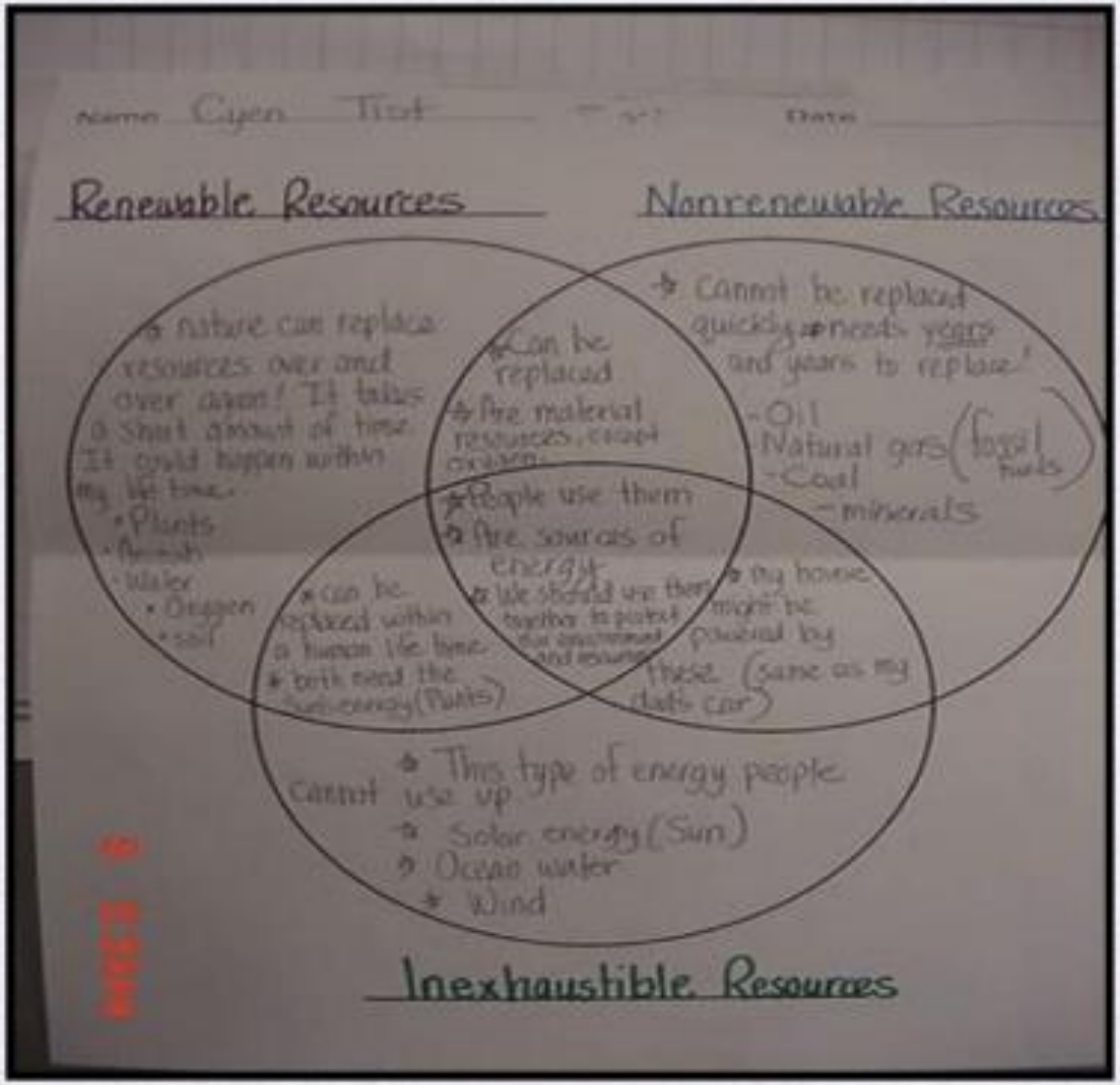
Day
Night
Earth

Facts of a gas:
☆ The particles move fast and away from each other.
☆ The temperature

Facts of a liquid:
☆ The particles of a substance are closer apart and slide by each other. (It can clump)
☆ The molecules move faster.
☆ The temperature increases.
☆ Molecules take the shape of their container.
☆ Liquids are denser than a gas.

Facts of solids:
☆ Particles are close together.
☆ Molecules move slow.
☆ The temperature of the substance decreases.
☆ The substance contracts.
☆ A solid keeps its shape + volume.
☆ The particles are locked together.

Graphic Organizer



Mistakes should be struck out with one line!

The ~~larva~~ larvae wriggled atop the grain.

Information should be clear and understandable by any reader.

Observations & Sketches

8/25/15

IN Activity

1. How do scientists use ISNs?

(Interactive Science Notebooks)

Team chat and write down your answer

SCIENTIST'S NOTEBOOKS

- The following slides show real notebooks from scientists who work at Battelle – Pacific Northwest National Laboratory in Richland, Washington.

- Watch carefully as important parts to a scientist's notebook are shared.

Computational Chemist

"Something wrong with this"

4

1 June 96

BLYP/aug-cc-pVDZ sym. relaxed UHF

r (Å)	BLYP
1.10	-149.890988839
1.11	-149.893260068
1.115	-149.892802792
1.12	-149.893174980
1.125	-149.893433969
1.13	UHF unable to resolve instability - claims 2
1.14	-149.893611856
1.15	-149.893260068

Something wrong with this → (1)

(2) → obviously an odd surface. Going to look @ S.C. BLYP.

(3) → will have all of these check for instability and optimize.

	r (Å)	BLYP 1	BLYP 2	BLYP 3	BLYP 4	charge / dipole ?
*	1.00	-149.842029270	-149.842029270			okay
	1.10	-149.890976811	-149.890976939			"
	1.11	-149.892302486	-149.892302612			"
	1.125	-149.892786915	-149.892787041			"
*	1.12	-149.893158468	-149.893158468			okay.
	~~1.13~~	~~-149.893158468~~	~~-149.893158~~			
	~~1.14~~ 1.13	-149.893580217	-149.893580348			"
	~~1.15~~ 1.14	-149.893600832	-149.893600832	-149.893600832	-149.893600968	"
	1.15	-149.893251227	-149.893251367			"

(4) → * found second instability, unable to resolve it.

additional pts:

1.16	-149.892560527	-149.892560527	-149.892560527	-149.892560
1.17	-149.891555562	-149.891555707		

(5) → I think there's only 1 instability, but it has trouble getting there. Note identical energies for multiple instabilities.

1.18	-149.890261689	-149.890261831

Battelle

. . . Putting Technology To Work

Computational Chemist

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Reference graphs and tables pasted into notebook

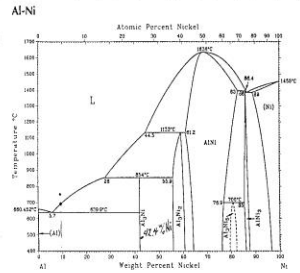
Materials Scientist

9/13

B. Centrifugal Casting of Al (A356 or A390) w/ pptn. of Intermetallics.

Initially attempting an Al-Ni intermetallic.

(1)



P. Nash, M.F. Singleton, and J.L. Murray, 1991

Phase	Composition, wt% Ni	Pearson symbol	Space group
(Al)	0 to 0.24	cF4	$Fm\bar{3}m$
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AlNi	61 to 83.0	cP2	$Pm\bar{3}m$
Al_3Ni_5	79 to ~82	...	$Cmmm$
$AlNi_3$	85 to 87	cP4	$Pm\bar{3}m$
(Ni)	89.0 to 100	cF4	$Fm\bar{3}m$

$\rho_{Al_3Ni} = 3.957\ g/cc$

$\rho_{Ni} = 8.9\ g/cc$

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$\rho_{MMC} = 2.83$

(2)

We want 10 vol.% Al_3Ni in a 90% Aluminum Matrix.

from R.O.M., we know:

$$\rho_{MMC} = \%_{Al}\rho_{Al} + \%_{Al_3Ni}\rho_{Al_3Ni} = .90(2.70) + .10(3.96) = 2.83\ g/cm^3\ \rho_{MMC}$$

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Thus $\%_{Ni}$ in the in-situ MMC is $= \dfrac{\frac{(8.9)(2.70)}{2.83} - 8.9}{2.70 - 8.9} = 0.066$ or $\underline{6.6\ w\%\ Ni}$

Compare this to a simple volume to mass conversion using the density of the Al_3Ni yields:

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$\rho_{MMC} = (.85)(2.70) + (.15)(3.957) = 2.89\ g/cm^3$.

$$\%_{Ni} = \frac{\frac{(8.9)(2.70)}{2.89} - 8.9}{2.70 - 8.9} = 0.0944 \text{ OR } \boxed{9.4\ w\%\ Ni}$$

This indicates that from the melt 1st solidification (of Al_3Ni) occurs at approx. 700°C

3-5-96 Samples Taken to L. Priest for Metallography Prep. (+ C.E. Chamberlain)

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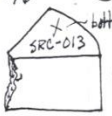

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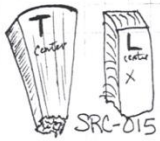
Metall. Results: Heavy Rxn between matrix and reinforcement indicative of feather-like/Needle-like products.

SRC-014: Al 339/8.7% NiAl (Oxidized @ 1000°C, 24 hrs) [stock Mat'l for SRC-015]

(2)



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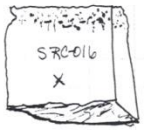

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Metallographic Results indicate distinct reinforcement mixed in Matrix.

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Same as SRC-015. Inner Region: Unreinforced
Outer Region: Reinforced

See Page 36 for Copies of Metallographs

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Materials Scientist

Sample sketch

9/13

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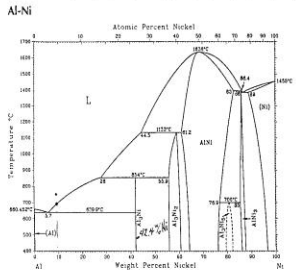

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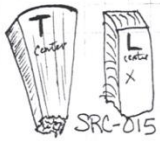

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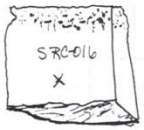

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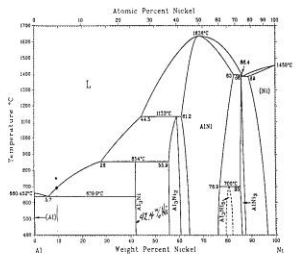

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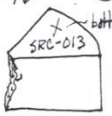
$\%_{Al_3Ni}\ \%_{Ni} = \frac{\frac{(8.9)(2.70)}{2.89} - 8.9}{2.70 - 8.9} = 0.0944$ or $9.4\ \%_{Ni}$

This indicates that from the melt 1st solidification (of Al_3Ni) occurs at approx. 700°C

3-5-96 Samples Taken to L. Priest for Metallography Prep. (+ C.E. Chamberlain)

(1)

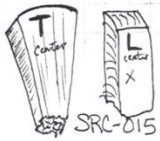


SRC-013: Al 339/5% NiAl (Un-Oxidized)

Metall. Results: Heavy Rxn between matrix and reinforcement indicative of feather-like/Needle-like products.

SRC-014: Al 339/8.7% NiAl (Oxidized @ 1000°C, 24 hrs) [stock Mat'l for SRC-015]

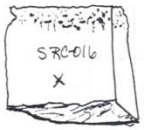
(2)



SRC-015: Al 339/8.7% NiAl (Oxidized Powder @ 1000°C, 24 hrs) [Remelted SRC-014]

Metallog. Results indicate distinct regions of Unreinforced and reinforced matrix. Particles in outer reinforced region are both unreacted and reacted w/ matrix.

(3)



SRC-016: Al 339/3.2% NiAl (Oxidized NiAl powder @ 1000°C, 24 hrs) [Stock Mat'l. for SRC-017]

Metallographic Results indicate distinct reinforcement mixed in Matrix.

SRC-017: Al 339/6% NiAl (Oxidized NiAl @ 1000°C, 24 hrs) [Remelted SRC-016 PLUS ADD 4g NiAl to melt]

Same as SRC-015. Inner Region: Unreinforced
Outer Region: Reinforced

See Page 36 for Copies of Metallographs

Results (crossed out)

Description of work to date pertaining to ELK EXCLOSURES on ALE.

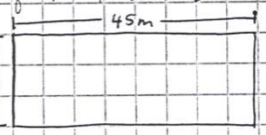
July 1997:

(1) Due to growing elk populations on ALE, the need to assess their impact on vegetation became apparent. Kent Johnson (PALS) and Jen Morse (AWU/SERS) went to ALE to look for potential sites for Elk exclosures. Also they located fenceposts left from old fences on the Reserve. Criteria for sites included accessibility from roads, evidence of elk presence (including trails), different vegetation types, and likelihood of continued elk presence.

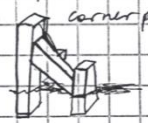
(2) Four sites were chosen: near Rattlesnake Springs, near the power lines at gate 120, at Upper Snively canyon, and the last past Rattlesnake Springs off a road which is a right turn from the main road of Gate 118. (Sorry that I don't know the Road name

August 1997.

(3) Larry Cadwell, Bob Feldpausch, Kent Johnson, WA Dept of Fish + Wildlife workcrews, and I (J Morse) built the four exclosures:



A railroad tie, about 5 ft in ground and 7 ft above ground, was placed at each corner. Supporting posts/braces were also put in place at each corner post.



Metal fence posts were placed along the perimeter of the rectangle and driven into the ground. About 4 or 5 rows of barbed wire were strung around the perimeter as well. The structures seem very sturdy and durable.

October 1997

(4) I went to each elk exclosure and set up 3 10m x 10m plots within the Exclosure, and two sets of 3 10x10 plots outside the exclosure. These control plots are in place so that vegetation inside + outside can be sampled and compared, thus evaluating the impact elk are having on ALE. The control plots were sited with attention to elk trails (tried to include part of at least one in a control plot) + maintaining similar vegetation types + distribution, similar topography and slope. Also the control plots were located at about 15-25 m from the structures. ~~[illegible]~~ white fiberglass poles mark the corners of each 10x10m control plot. The vegetation in the control plots has not been sampled to date.

Project No. _____ Date of Work 8/97

Entered By Jennifer Morse Date 11/9/97

Disclosed To and Understood By

ECOLOGIST

Describing the problem – the purpose of the study

ECOLOGIST

Description of work to date pertaining to ELK EXCLOSURES on ALE.

25

July 1997:

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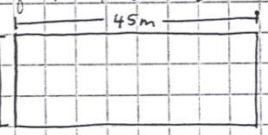

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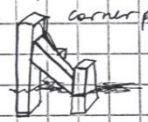

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Project No. _____ Date of Work _____

Entered By Jennifer Morse Date 11/19/97

Disclosed To and Understood By

Identifying the site including selection criteria

ECOLOGIST

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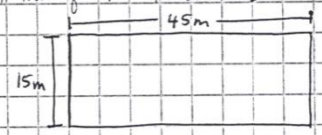

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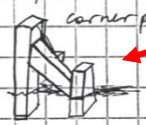

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Project No. _____ Date of Work ~~[illegible]~~

Entered By Jennifer Morse Date 11/19/97

Disclosed To and Understood By

Specifications regarding the Elk Enclosures

THINKING ABOUT YOUR SCIENCE NOTEBOOK…

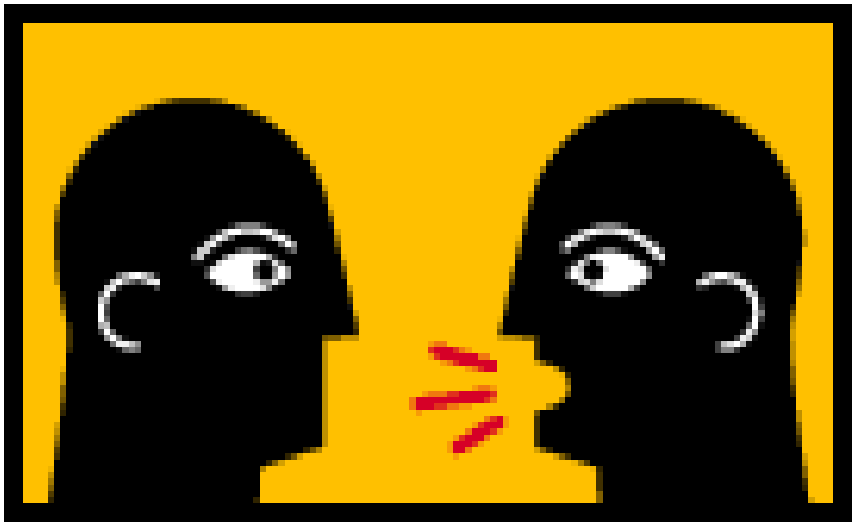
- What are some of the things you saw happening in the scientists' notebooks?

OUT Activity

List 6 things that you observed form the scientists ISNs

THINKING ABOUT NOTEBOOKS…

Share out with your table group…



REFLECT…

Which of those things do you think you could incorporate in YOUR notebook?

SKETCH YOUR OBJECT

Model first – describing what you are doing…

Outside shape

Split object into parts

Move from Sketch to Scientific Illustration

Label the parts

Add color and dimension

Drawing now is detailed,

accurate, and labeled

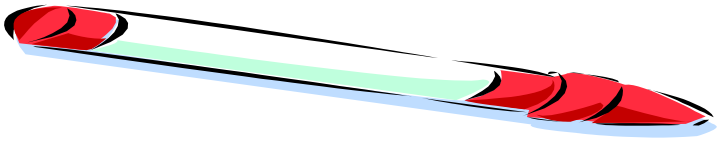
OBSERVATIONS ORGANIZER

Writing Frame

Think of properties you can see such as size, shape, color, lines, texture, pattern, behavior…	I observed
Think of the other senses of smell, sound, touch, and perhaps taste!	I noticed
Connect it with something that you already know.	It reminds me of
Add more detail as needed.	This is so because
Be curious and ask questions you could investigate.	I am curious about It surprised me that I wonder what would happen if

This organizer or writing frame is one part of a comprehensive, research-based approach to teaching students how to think, talk and write like scientists. (See Writing in Science by Betsy Rupp Fulwiler, © 2007, Portsmouth, NH: Heinemann.)

Now add a new object…



THE BOX & T-CHART

Similarities

Object #1	Object #2

Differences

THE BOX & T-CHART

Similarities

Object #1	Object #2

Differences

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COMPARE AND CONTRAST

Writing Frame

Start with how things are the same or similar.	The _____ and the _____ are the same because they both _____.
Add more details as needed.	In addition, they both _____.
Explain how they are different. You can compare the same property or characteristic in the same sentence. Use "and", "but", or "whereas" to set up the contrast.	They are different because the _____, but the _____ does not.
Add more detail as needed.	Also, the _____, whereas the _____ does not.

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Update Your Table of Contents

- Turn back to your Table of Contents.
- Add “Observations and Sketches” with the corresponding date and page numbers.
- Now that you have had a basic experience in using your science notebook you are ready to record your experiences while at work in your science class!

THEN…

Don’t forget to let your notebook reflect your…

ARTISTIC PERSONALITY


Maggie
Gonzalez
1st period