

STARS Design Template

State the Overall STARS Goals: What do you want your students to get from STARS? What are the "big ideas" or broad concepts you hope the students will learn?

Chemical energy can be stored, transferred, and changed from one type to another. Chemical energy can be harnessed in various ways.

- Specifically, what should students be able to do as a result of STARS (objectives)?
Students should be able to:
 - Students choose an aspect of chemical energy to explore further - in this case they chose "explosions".
 - Students should be able to identify different forms of energy and give examples of how energy is transferred.
 - Students should be able to describe what an explosion is (a rapid release of energy, usually accompanied the release of a gas, and transfer of energy by heat and/or light and/or sound.)
 - Students should understand that energy can be harnessed and used to do useful work.
 - Students will be able to design experiments to compare and collect data in order to evaluate different chemical reactions.
 - Students will be able to use concepts of variables, controls, and outlying data in their experiments and analysis.
 - Students will be able to graph data using Excel.
 - Students will be able to design a system that relies on the outcomes from their experiments.
 - Students will be able to revise and/or fine tune their model and/or system based on evidence from their experimental data and analysis.
 - Students will be able to draw conclusions and make claims based on their research.
 - Students will be able to share and present their findings with others.
 - Students feel ownership over experimental process used to optimize the system they design.

- How will you know that students have met these goals? What counts as evidence for what they can do (evidence that they met the "should")?
 - Responses to our questions and discussion
 - Concept map and poster paper discussions
 - Design an investigable question comparing various chemical reactions.
 - Students will design data collection methods to answer their question.
 - Students will collect data, notes, and analysis in their notebooks.
 - Student to student talk in designing experiments and analyzing data.

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- Student reasoning used in making decisions for their system.
 - Student planning and decision-making in using data for creating and optimizing their system.
 - Students create media (poster, PPT, etc.) to share information with their peers.
- What core experiences have you planned to scaffold student learning in accomplishing these goals?
 - Day 1: demonstrations of types of energy and energy release (glow stick, heat pad, baking soda/vinegar reaction, flaming methane bubbles)
 - Day 2: demonstrations of explosions using various chemical reactions to build concept map about explosions
 - Day 3: Hands-on small group experiments comparing various types of chemical reactions
 - Day 4:

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Describe how your unit design incorporates strong integration of each of the four basic project-based science components.

DRIVING QUESTION:

General: "How can we harness the power of an explosion to do useful work?"

Specific: "Which chemical reactants and conditions can make a rocket car go fastest and furthest?"

- We started out exploring types of energy, release of energy, transfer of and harnessing energy.
- We let them go in the direction of "explosions" and we have tried to help them come up with investigable projects for them to follow through on.

DESIGN OF AN INVESTIGATION:

- We explored specific real life ways that energy (via explosions) is harnessed and used to propel objects.
- We demonstrated various simple ways chemical reactions can power small rockets.
- Provided students with opportunities to compare and experiment with various rocket fuel sources.

USE OF COGNITIVE TOOLS:

- Notebooks for collecting observations and data
- Using Excel for graphing
- Using poster paper for concept maps and data tables
- Using PowerPoint or Keynote for sharing results
- Critical thinking and problem solving

COLLABORATION:

- Working in small groups (student to student)
- Sharing data between groups
- Round-robin (golden egg) sharing of ideas in larger group

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STARS Daily Planner

Day: **4** Focus: **Sharing Data and Analyzing Data**

Group Leader for the Day: **Chris**

Revisit/rewrite **Overall STARS Goals**: What do you want your students to get from STARS? What are the "big ideas" or broad concepts you hope the students will learn from STARS? (Write as complete sentences.)

1. Specifically, what should students be able to do by the end of **today**? (objectives)

Student should be able to:

- **discuss data from last week in small groups and make their own table**
- **share data and findings from last week with group and make master table**
- **possibly rule out some reactants/reactions**
- **make a prototype of a rocket car**

2. How will you know that students have met the objectives? What counts as evidence for what they can do (evidence that they met the "should" in #1)?

- **Students create data tables**
- **Student use notebooks**
- **Responses in discussion of all data**
- **Students make decisions about possible reactions to abandon**
- **Students explore construction of rocket cars and try out a design**

3. What activities will you plan to have students do?¹

Time	Brief Activity Description	Transition	Activity Facilitator
2:15p START STRONG!!	Icebreaker	"Remember the data you collected last week?"	Chris
2:25	Break into small groups to recap and make data table	"let's share with the group"	
2:35	Return to large group and share results and make master table		
2:45	Bring out parts for rocket car prototype and let girls start exploring ideas and designs hands-on (get familiar with the	"let's see if we can make a car that goes a little bit"	

¹ Make sure to list all needed materials and supplies as well as logistical concerns.

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	materials)		
3:05	Go out and try car(s) and maybe also try 2 liter rocket		
3:10	Pluses and Arrows and plans for next week		

4. How will you build on this the following day?

- **Move on to talking about variable and controls**
- **Start using data collected to design more experiments**

5. What are your contingency plans? (e.g. too much time, not enough time, supplies don't come in, new STAR starts today)

- **2 liter bottle rocket for outside demo**
- **Rely on girls to bring new girls up to speed on last weeks data collection**
- **Icebreaker for new girls**

6. What will you ask your STAR representative to highlight in the opening and closing gatherings?

- **Data collected**
- **Progress on car prototype**

7. What aspect of our teaching do you want feedback from Ashley on?

- **How to introduce and scaffold the car designs and experiment designs without it being too open-ended.**

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STARS Daily Planner

Day: **5** Focus: **Collecting Data**

Group Leader for the Day: **Kristin**

Revisit/rewrite **Overall STARS Goals**: What do you want your students to get from STARS? What are the "big ideas" or broad concepts you hope the students will learn from STARS? (Write as complete sentences.)

1. Specifically, what should students be able to do by the end of **today**? (objectives)

Student should be able to:

- a. **Identify variables and controls**
- b. **Design an experiment to collect data**

2. How will you know that students have met the objectives? What counts as evidence for what they can do (evidence that they met the "should" in #1)?

- **Perform experiments, take notes in notebook, report back to group**

3. What activities will you plan to have students do?²

Time	Brief Activity Description	Transition	Activity Facilitator
3:15p START STRONG!!			

4.

² Make sure to list all needed materials and supplies as well as logistical concerns.

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5. How will you build on this the following day?

- **They will revise experiments for more data collection**

6. What are your contingency plans? (e.g. too much time, not enough time, supplies don't come in, new STAR starts today)

- **Icebreaker**
- **Extra demo**

7. What will you ask your STAR representative to highlight in the opening and closing gatherings?

- **Describe our project/system**

8. What aspect of our teaching do you want feedback from Ashley on?

- **Discussion of controls and variables**

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STARS Daily Planner

Day: **6** Focus: **Collecting Data 2**

Group Leader for the Day: **Anne**

Revisit/rewrite **Overall STARS Goals**: What do you want your students to get from STARS? What are the "big ideas" or broad concepts you hope the students will learn from STARS? (Write as complete sentences.)

1. Specifically, what should students be able to do by the end of **today**? (objectives)

Student should be able to:

- a. **Independently put data in tables**
- b. **Start to interpret meaning of data**
- c. **Redesign of modify a previous experiment**

2. How will you know that students have met the objectives? What counts as evidence for what they can do (evidence that they met the "should" in #1)?

- **Look at notebooks, data tables**
- **Explanations & justifications for experimental design**

3. What activities will you plan to have students do?³

Time	Brief Activity Description	Transition	Activity Facilitator
3:15p START STRONG!!			

³ Make sure to list all needed materials and supplies as well as logistical concerns.

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4. How will you build on this the following day?

- **Make graphs/charts from data in excel**

5. What are your contingency plans? (e.g. too much time, not enough time, supplies don't come in, new STAR starts today)

- **Icebreaker**
- **Extra demo**
- **closing icebreaker activity**

6. What will you ask your STAR representative to highlight in the opening and closing gatherings?

7. What aspect of our teaching do you want feedback from Ashley on?

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STARS Daily Planner

Day: 7 Focus: **Analyzing Data**

Group Leader for the Day: **Chris**

Revisit/rewrite **Overall STARS Goals**: What do you want your students to get from STARS? What are the "big ideas" or broad concepts you hope the students will learn from STARS? (Write as complete sentences.)

1. Specifically, what should students be able to do by the end of **today**? (objectives)

Student should be able to:

- a. **Put data in excel and make a chart graph and table**
- b. **Explain the chart to someone else**

2. How will you know that students have met the objectives?

What counts as evidence for what they can do (evidence that they met the "should" in #1)?

- **Examine excel sheets**
- **Listen to them share data with others**

3. What activities will you plan to have students do?⁴

Time	Brief Activity Description	Transition	Activity Facilitator
3:15p START STRONG!!			

4. How will you build on this the following day?

⁴ Make sure to list all needed materials and supplies as well as logistical concerns.

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- use graphs to draw conclusions and look for trends/patterns

5. What are your contingency plans? (e.g. too much time, not enough time, supplies don't come in, new STAR starts today)

- Icebreaker
- Extra demo
- closing icebreaker activity

6. What will you ask your STAR representative to highlight in the opening and closing gatherings?

7. What aspect of our teaching do you want feedback from Ashley on?

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STARS Daily Planner

Day: **8** Focus: **Drawing Conclusions**

Group Leader for the Day: **Kristin**

Revisit/rewrite **Overall STARS Goals**: What do you want your students to get from STARS? What are the "big ideas" or broad concepts you hope the students will learn from STARS? (Write as complete sentences.)

1. Specifically, what should students be able to do by the end of **today**? (objectives)

Student should be able to:

- Use graphs to formulate specific conclusions
- Explain any outliers

2. How will you know that students have met the objectives? What counts as evidence for what they can do (evidence that they met the "should" in #1)?

3. What activities will you plan to have students do?⁵

Time	Brief Activity Description	Transition	Activity Facilitator
3:15p START STRONG!!			

⁵ Make sure to list all needed materials and supplies as well as logistical concerns.

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4. How will you build on this the following day?
 - start to create poster presentation

5. What are your contingency plans? (e.g. too much time, not enough time, supplies don't come in, new STAR starts today)
 - Icebreaker
 - Extra demo
 - closing icebreaker activity

6. What will you ask your STAR representative to highlight in the opening and closing gatherings?

7. What aspect of our teaching do you want feedback from Ashley on?

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STARS Daily Planner

Day: **9** Focus: **Defensible Claims/Presentation Design**

Group Leader for the Day: **Chris**

Revisit/rewrite **Overall STARS Goals**: What do you want your students to get from STARS? What are the "big ideas" or broad concepts you hope the students will learn from STARS? (Write as complete sentences.)

1. Specifically, what should students be able to do by the end of **today**? (objectives)

Student should be able to:

- **Decide what information they want to share in their poster**
- **Decide on a demonstration to include in their presentation**

2. How will you know that students have met the objectives? What counts as evidence for what they can do (evidence that they met the "should" in #1)?

3. What activities will you plan to have students do?⁶

Time	Brief Activity Description	Transition	Activity Facilitator
3:15p START STRONG!!			

4. How will you build on this the following day?

⁶ Make sure to list all needed materials and supplies as well as logistical concerns.

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- Finalizing the poster constructions

5. What are your contingency plans? (e.g. too much time, not enough time, supplies don't come in, new STAR starts today)

- Icebreaker
- Extra demo
- closing icebreaker activity

6. What will you ask your STAR representative to highlight in the opening and closing gatherings?

7. What aspect of our teaching do you want feedback from Ashley on?

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STARS Daily Planner

Day: **10** Focus: **Making Science Accessible**

Group Leader for the Day: **Anne**

Revisit/rewrite **Overall STARS Goals**: What do you want your students to get from STARS? What are the "big ideas" or broad concepts you hope the students will learn from STARS? (Write as complete sentences.)

1. Specifically, what should students be able to do by the end of **today**? (objectives)
Student should be able to:

- **Finalizing poster**
- **Dry run of presentation**

2. How will you know that students have met the objectives? What counts as evidence for what they can do (evidence that they met the "should" in #1)?

3. What activities will you plan to have students do?⁷

Time	Brief Activity Description	Transition	Activity Facilitator
3:15p START STRONG!!			

4. How will you build on this the following day?

⁷ Make sure to list all needed materials and supplies as well as logistical concerns.

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- **Does not apply**

5. What are your contingency plans? (e.g. too much time, not enough time, supplies don't come in, new STAR starts today)

- If some STARS don't make it, other will have to cover their part of presentation.

6. What will you ask your STAR representative to highlight in the opening and closing gatherings?

- **Does not apply**

7. What aspect of our teaching do you want feedback from Ashley on?

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STARS Daily Planner

Day: **11** Focus: **Interactive Posters**

Group Leader for the Day: **Kristin**

Revisit/rewrite **Overall STARS Goals**: What do you want your students to get from STARS? What are the "big ideas" or broad concepts you hope the students will learn from STARS? (Write as complete sentences.)

1. Specifically, what should students be able to do by the end of **today**? (objectives)

Student should be able to:

- **Discuss their projects and conclusions with the audience**

2. How will you know that students have met the objectives? What counts as evidence for what they can do (evidence that they met the "should" in #1)?

3. What activities will you plan to have students do?⁸

Time	Brief Activity Description	Transition	Activity Facilitator
3:15p START STRONG!!			

⁸ Make sure to list all needed materials and supplies as well as logistical concerns.

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4. How will you build on this the following day?

5. What are your contingency plans? (e.g. too much time, not enough time, supplies don't come in, new STAR starts today)

6. What will you ask your STAR representative to highlight in the opening and closing gatherings?

7. What aspect of our teaching do you want feedback from Ashley on?