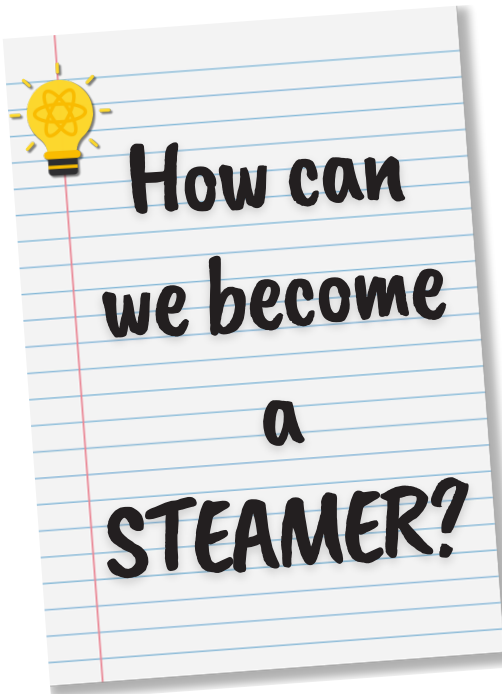


STEAM

Think like a STEAMer!



Be brave,
try new
things,
and
if you fail,
try again!

Science

Use data to prove
your ideas like a
smart scientist!



Smart
Scientist

Technology

Be a confident
coder and discover
ways to take big
challenges and
organize them into
smaller pieces!

Confident
Coder



Engineering

Solve hard
problems like an
enthusiastic
engineer!

Enthusiastic
Engineer



Art

Be creative like an
awesome artist!

Awesome
Artist



"always"
BELIEVE
- in -
YOURSELF

Math

Prove your thinking
like a mighty
mathematician!

Mighty
Mathematician



ENGINEERING

Think Like an Engineer



What
problem
are we
exploring?



Problem

Engineers are problem solvers, think about how you will solve the STEAM problem and follow the constraints.

Step #1:
Ask

Schema

Use experiences and background knowledge to form initial ideas to solve the problem.

Step #2:
Imagine

Research

Learn something new through real-world research and information.

Step #3:
Analyze

Decisions

Make strategic decisions based on your knowledge to form an effective idea and plan.

Step #4:
Plan

Experiment

Be experimental and try to create something that solves the problem.

Step #5:
Create

Changes

Use mini-tests to make predictions and make changes while building.

Step #6:
Adapt

Prove

Make final improvements to your creation and conduct evaluations to test final results.

Step #7:
Evaluate

Thinking

Find ways to think differently based on your experience with the engineering process.

Step #8:
Share



STEAM

When I Work with Others

Eyes

My eyes are on our project or who I am working with.

Ears

My ears are listening to my team's ideas.

Mouth

My mouth is quietly speaking to my team. Remember, kind words.

Hands

My hands are working on our project. They share supplies with my team.

Feet

My feet stay at our spot. I don't wander.



Remember, Tools Not Toys.

S.T.E.A.M

Engineering Design Process



Ask

Imagine

Plan

Analyze

Adapt

Create

Evaluate

Share



Remember, Tools Not Toys.

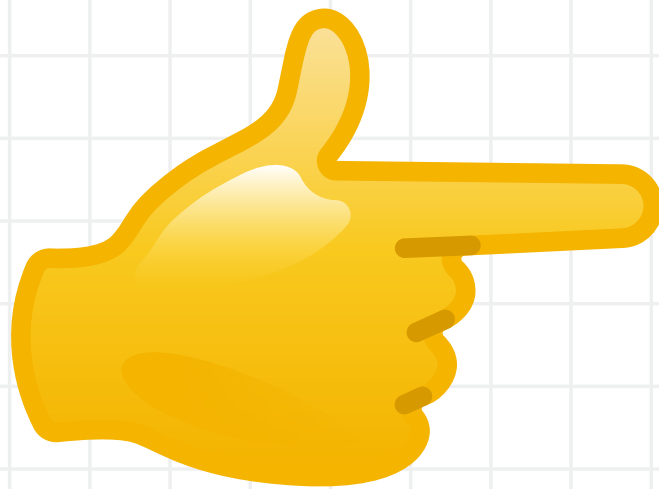
STEAM

Engineering



ENGINEERING STEAM JOURNALS

.....



STEP #1: ASK

Engineering



STEAM JOURNAL

STEP #1: ASK
What is our problem?

**REVIEW THE
PROBLEM**

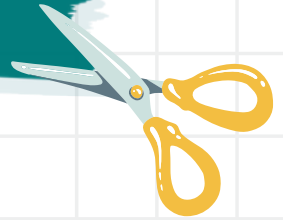


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STEP #2: IMAGINE

Engineering



STEAM JOURNAL

STEP #2: IMAGINE

What do you know that could help you?



Draw or write what you know.

STEP #3: ANALYZE

Engineering



STEAM JOURNAL

STEP #3: ANALYZE

What is something new you learned from the research?



Draw or write what you learned.

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STEP #4: PLAN

Engineering



STEAM JOURNAL



STEP #4: PLAN

What is the problem?

DIAGRAM

Draw and label your problem-solving design.

Materials Available

DIAGRAM

CITE YOUR REASONING

Check the box that best cites your evidence for success.

☐

Research

☐

Schema

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STEP #5: CREATE

Engineering



STEAM JOURNAL

STEP #5: CREATE

Check-ins



I'm doing great. I don't need help.



I'm doing okay. I could use a check-in.



I'm struggling. I could use some help.



Check-in #2

Time



STEP #6: ADAPT

Engineering



STEAM JOURNAL

STEP #6: ADAPT

Mini Test Results

Record the following:

	<u>Results</u>	<u>Changes Needed</u>
1	☐ Criteria Met ☐ Constraints Followed	
2	☐ Criteria Met ☐ Constraints Followed	
3	☐ Criteria Met ☐ Constraints Followed	
4	☐ Criteria Met ☐ Constraints Followed	
5	☐ Criteria Met ☐ Constraints Followed	



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STEP #7: EVALUATE

Engineering



STEAM JOURNAL

STEP #7: EVALUATE

Final Test Results

Check the box if the design met the requirement.

☐

Requirement 1

Totals:

☐

Requirement 2

Totals:

☐

Requirement 3

Totals:

☒

Requirement 4

Totals:



STEP #8: SHARE

Engineering



STEAM JOURNAL

STEP #8: SHARE

Final Test Results

What information do you want to share with others?

Draw or write down your information.



Results

Explain how your creation did when tested.



Reflect

Explain why you believe your creation was effective or ineffective.



Surprises

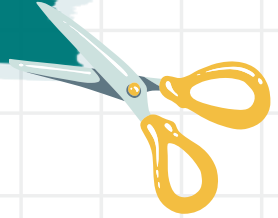
What surprised you the most when you were creating?
What did you learn?

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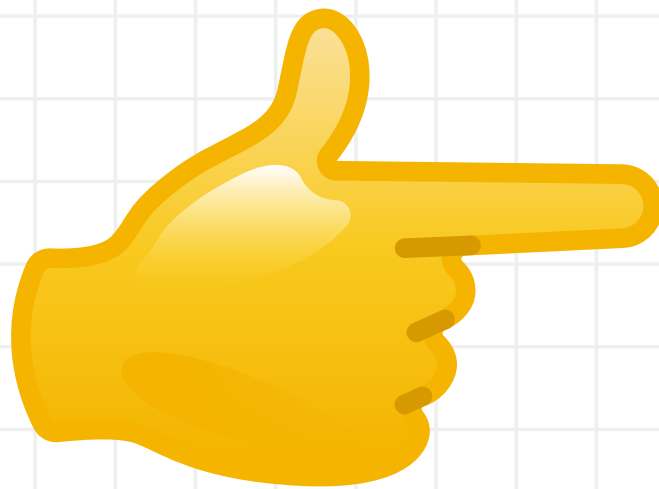


STEP #1: ASK

Engineering



ENGINEERING DESIGN PROCESS



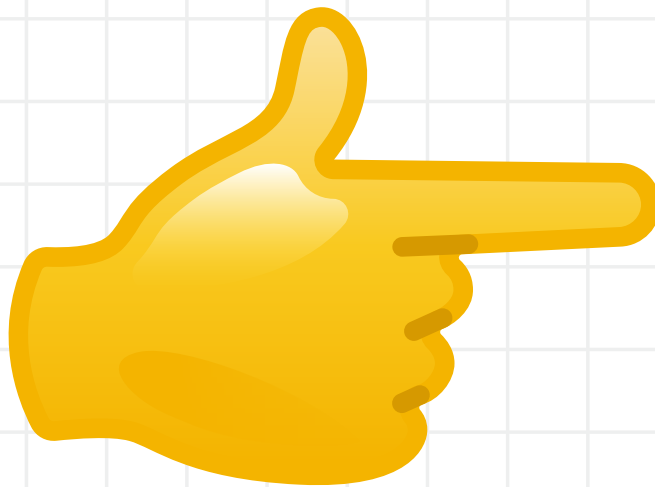
STEP #2: IMAGINE

Engineering



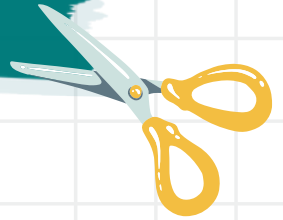
ENGINEERING DESIGN PROCESS

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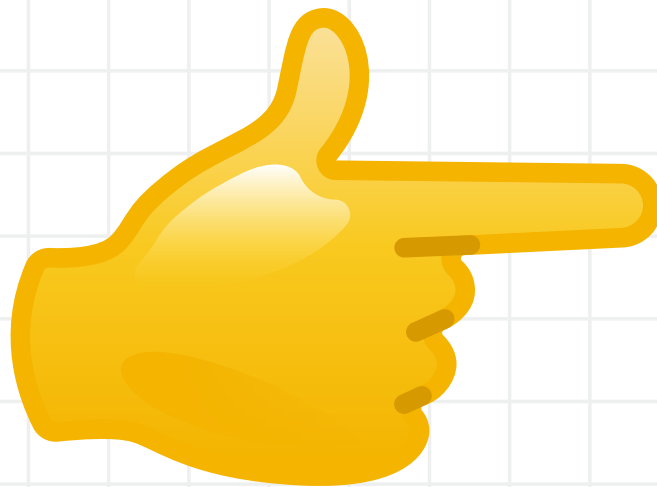


STEP #3: ANALYZE

Engineering



ENGINEERING DESIGN PROCESS

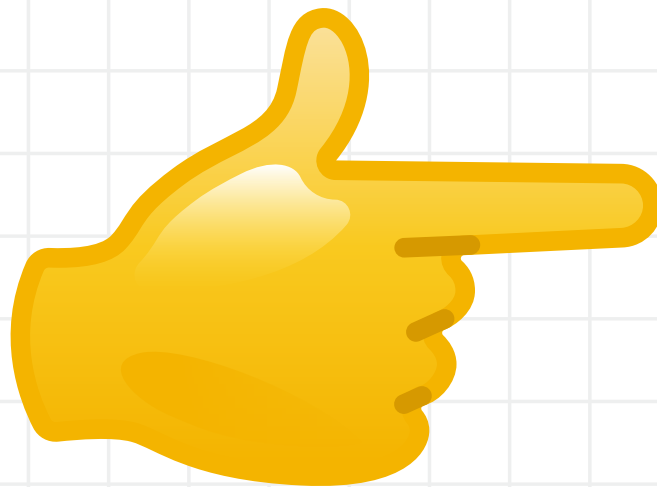


STEP #4: PLAN

Engineering



ENGINEERING DESIGN PROCESS

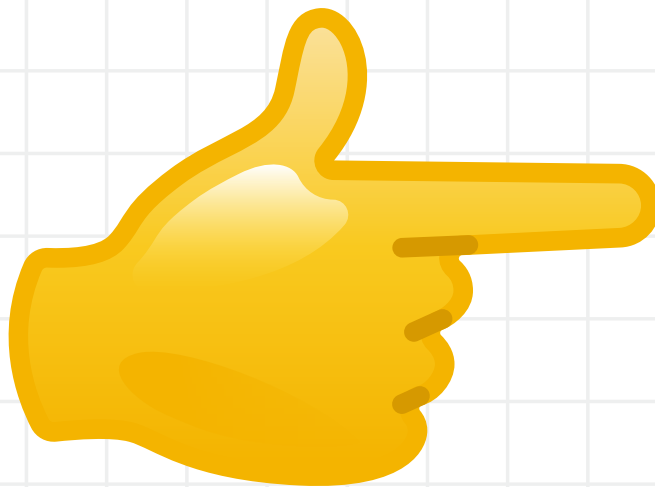


STEP #5: CREATE

Engineering



ENGINEERING DESIGN PROCESS

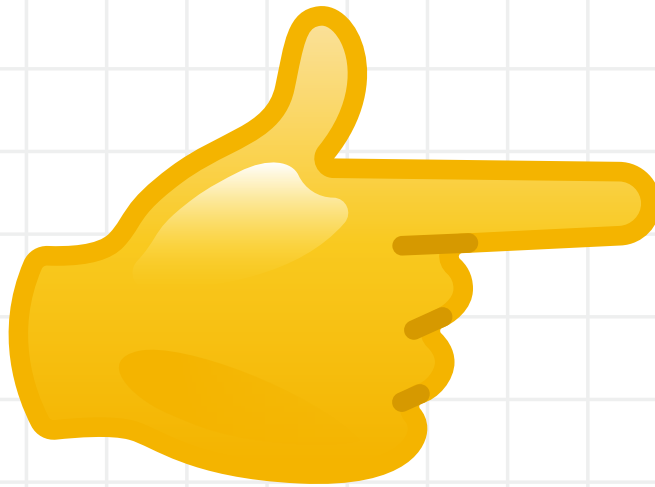


STEP #6: ADAPT

Engineering



ENGINEERING DESIGN PROCESS

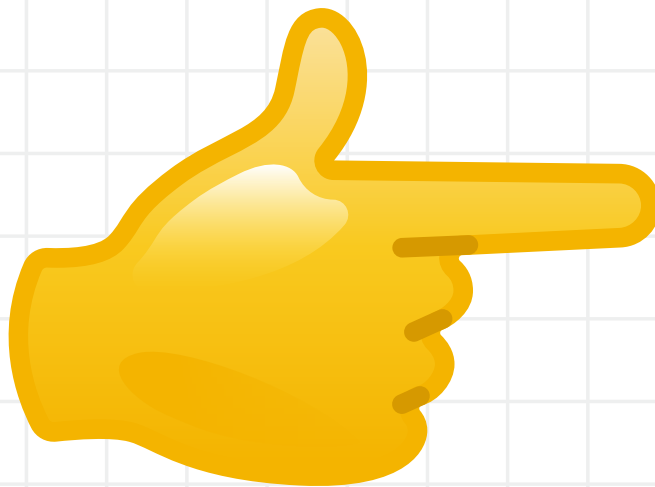


STEP #7: EVALUATE

Engineering



ENGINEERING DESIGN PROCESS

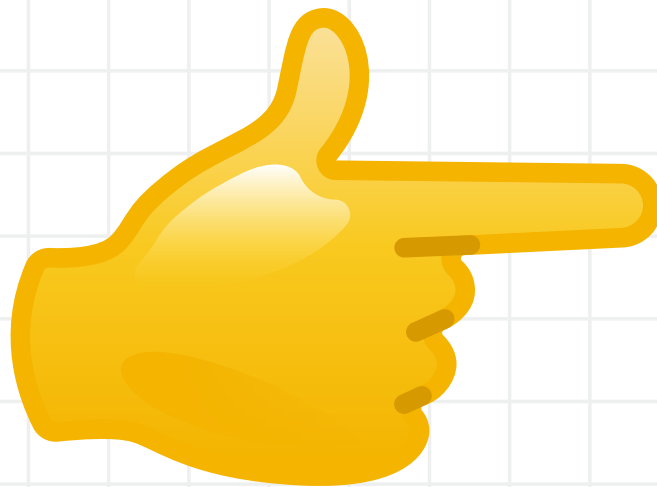


STEP #8: SHARE

Engineering



ENGINEERING DESIGN PROCESS



STEAM

Engineering Design Process

Step #1: Ask

Engineers are problem solvers.
Think about how you will solve the STEAM
problem and follow the constraints.

Define the Problem

- ⚙️ What is the problem?
- ⚙️ What can you do to fix the problem?
- ⚙️ What does success look like?



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #2: Imagine

Engineers use experience, research, and background knowledge to form initial ideas.

Activate Schema

- ⚙️ What do you know about the topic?
- ⚙️ What do you know that could help you?
- ⚙️ Have you seen this before?



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #3: Analyze

Engineers learn something new through real-world research and information.

Research

- ⚙️ What do you notice about the research topic?
- ⚙️ What can help you with your design?
- ⚙️ What is something new you learned from the research?



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #4: Plan

Engineers make strategic decisions based on their knowledge to form an effective idea and plan.

Decisions

- ⚙️ What materials will you use in your creation?
- ⚙️ What research or schema will support your plan?
- ⚙️ What constraints might be the most difficult?

Remember, Tools Not Toys.



STEAM

Engineering Design Process

Step #5: Create

Engineers experiment and try to create something that solves the problem.

Experiment

- ⚙️ Do the elements of my plan meet the constraints?
- ⚙️ How does my creation solve the problem?
- ⚙️ How will I construct my creation?



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #6: Adapt

Engineers use mini-tests to reflect and make changes as necessary to their creation.

Changes

- ⚙️ Is my creation working like I thought it would?
- ⚙️ What parts of my creation are failing?
- ⚙️ What changes should I make to my creation?



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #7: Evaluate

Engineers make final improvements to their creation and conduct evaluations to test final results.

Prove

- ⚙ Which of the requirements did my creation meet?
- ⚙ Did my creation fail any aspects of final testing?
- ⚙ Was my creation successful?



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #8: Share

Engineers find ways to think differently based on their experience with the engineering process.

Reflect

- ⚙️ What happened when you tested your creation?
- ⚙️ What did you learn about the engineering process?
- ⚙️ What did you learn from this challenge?

Remember, Tools Not Toys.



STEAM

Engineering Design Process

Step #1: Ask

Define the Problem

Engineers are problem solvers.
Think about how you will solve the STEAM
problem and follow the constraints.

- *What is the problem?*
- *What can you do to fix the problem?*
- *What does success look like?*



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #2: Imagine

Activate Schema

Engineers use experience, research, and background knowledge to form initial ideas.

- *What do you know about the topic?*
- *What do you know that could help you?*
- *Have you seen this before?*



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #3: Analyze

Research

Engineers learn something new through real-world research and information.

- *What do you notice about the research topic?*
- *What can help you with your design?*
- *What is something new you learned from the research?*



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #4: Plan

Decisions

Engineers make strategic decisions based on their knowledge to form an effective idea and plan.

- *What materials will you use in your creation?*
- *What research or schema will support your plan?*
- *What constraints might be the most difficult?*



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #5: Create

Experiment

Engineers experiment and try to create something that solves the problem.

- *Do the elements of my plan meet the constraints?*
- *How does my creation solve the problem?*
- *How will I construct my creation?*



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #6: Adapt Changes

Engineers use mini-tests to reflect and make changes as necessary to their creation.

- *Is my creation working like I thought it would?*
- *What parts of my creation are failing?*
- *What changes should I make to my creation?*



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #7: Evaluate

Prove

Engineers make final improvements to their creation and conduct evaluations to test final results.

- *Which of the requirements did my creation meet?*
- *Did my creation fail any aspects of final testing?*
- *Was my creation successful?*



Remember, Tools Not Toys.

STEAM

Engineering Design Process

Step #8: Share

Reflect

Engineers find ways to think differently based on their experience with the engineering process.

- *What happened when you tested your creation?*
- *What did you learn about the engineering process?*
- *What did you learn from this challenge?*



Remember, Tools Not Toys.

ENGINEERING

Ask



Define the Problem



Engineers are problem solvers.
Think about how you will
solve the STEAM problem
and follow the constraints.



What is the problem?

What can you do to
fix the problem?

What does success
look like?



Remember,
Tools Not Toys.

ENGINEERING

Imagine



Activate Schema



Engineers use experience, research, and background knowledge to form initial ideas.



What do you know about the topic?



What do you know that could help you?



Have you seen this before?



Remember,
Tools Not Toys.

ENGINEERING

Analyze



Research



Engineers learn something new through real-world research and information.



What do you notice about the research topic?



What can help you with your design?



What is something new you learned from the research?



Remember,
Tools Not Toys.

ENGINEERING

Plan

Decisions

Engineers make strategic decisions based on their knowledge to form an effective idea and plan.

- What materials will you use in your creation?
- What research or schema will support your plan?
- What constraints might be the most difficult?



Remember,
Tools Not Toys.

ENGINEERING

Create



Experiment



Engineers experiment and try to create something that solves the problem.



Do the elements of my plan meet the constraints?



How does my creation solve the problem?



How will I construct my creation?



Remember,
Tools Not Toys.

ENGINEERING

Adapt

Changes

Engineers use mini-tests to reflect and make changes as necessary to their creation.



Is my creation working like I thought it would?



What parts of my creation are failing?



What changes should I make to my creation?



Remember,
Tools Not Toys.

ENGINEERING

Evaluate



Prove



Engineers make final improvements to their creation and conduct evaluations to test final results.



Which of the requirements did my creation meet?



Did my creation fail any aspects of final testing?



Was my creation successful?



Remember,
Tools Not Toys.

ENGINEERING

Share



Reflect



Engineers find ways to think differently based on their experience with the engineering process.



What happened when you tested your creation?



What did you learn about the engineering process?



What did you learn from this challenge?



Remember,
Tools Not Toys.

ASK

Engineering Design Process



**ENGINEERS ARE PROBLEM
SOLVERS.**

**THINK ABOUT HOW YOU WILL
SOLVE THE STEAM PROBLEM
AND FOLLOW THE
CONSTRAINTS.**



- What is the problem?
- What can you do to fix the problem?
- What does success look like?

IMAGINE

Engineering Design Process



**ENGINEERS USE EXPERIENCE,
RESEARCH, AND
BACKGROUND KNOWLEDGE
TO FORM INITIAL IDEAS.**



- What do you know about the topic?
- What do you know that could help you?
- Have you seen this before?

ANALYZE

Engineering Design Process



ENGINEERS LEARN
SOMETHING NEW THROUGH
REAL-WORLD RESEARCH AND
INFORMATION.

- What do you notice about the research topic?
- What can help you with your design?
- What is something new you learned from the research?



PLAN

Engineering Design Process



**ENGINEERS MAKE
STRATEGIC DECISIONS
BASED ON THEIR
KNOWLEDGE TO FORM AN
EFFECTIVE IDEA AND PLAN.**

- What materials will you use in your creation?
- What research or schema will support your plan?
- What constraints might be the most difficult?



CREATE

Engineering Design Process



ENGINEERS EXPERIMENT
AND TRY TO CREATE
SOMETHING THAT SOLVES
THE PROBLEM.

- Do the elements of my plan meet the constraints?
- How does my creation solve the problem?
- How will I construct my creation?



ADAPT

Engineering Design Process



**ENGINEERS USE MINI-TESTS
TO REFLECT AND MAKE
CHANGES AS NECESSARY TO
THEIR CREATION.**



- Is my creation working like I thought it would?
- What parts of my creation are failing?
- What changes should I make to my creation?

EVALUATE

Engineering Design Process



ENGINEERS MAKE FINAL
IMPROVEMENTS
TO THEIR CREATION AND
CONDUCT EVALUATIONS TO
TEST FINAL RESULTS.

- Which of the requirements did my creation meet?
- Did my creation fail any aspects of final testing?
- Was my creation successful?



SHARE

Engineering Design Process



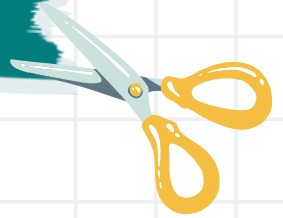
ENGINEERS FIND WAYS TO
THINK DIFFERENTLY BASED
ON THEIR EXPERIENCE WITH
THE ENGINEERING PROCESS.

- What happened when you tested your creation?
- What did you learn about the engineering process?
- What did you learn from this challenge?



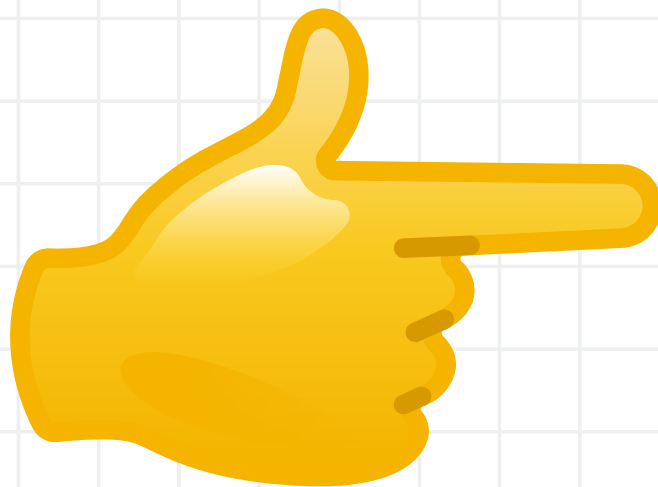
STEAM

Engineering



ENGINEERING TIPS & TRICKS

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ENGINEERING

Think Like an Engineer



**What
problem
are we
exploring?**



Problem

Engineers are problem solvers, think about how you will solve the STEAM problem and follow the constraints.

**Step #1:
Ask**

Schema

Use experiences and background knowledge to form initial ideas to solve the problem.

**Step #2:
Imagine**

Research

Learn something new through real-world research and information.

**Step #3:
Analyze**

Decisions

Make strategic decisions based on your knowledge to form an effective idea and plan.

**Step #4:
Plan**

Experiment

Be experimental and try to create something that solves the problem.

**Step #5:
Create**

Changes

Use mini-tests to make predictions and make changes while building.

**Step #6:
Adapt**

Prove

Make final improvements to your creation and conduct evaluations to test final results.

**Step #7:
Evaluate**

Thinking

Find ways to think differently based on your experience with the engineering process.

**Step #8:
Share**



STEAM

Engineering



MAKE
CONNECTIONS
TO THINGS
YOU ALREADY
KNOW



Activate Schema:
Background Information

STEAM

Engineering



LEARN FROM
OTHERS AND
WORK WITH THEM
TO FIND
SOLUTIONS



1 Tell others your "What"

⚙️ What will your creation look like?

⚙️ What will each part be made of?

I will make my _____
by _____.

2 Tell others your "Why"

⚙️ Why do you think your idea will work?

- Based on your schema?
- Based on what we saw in the research?

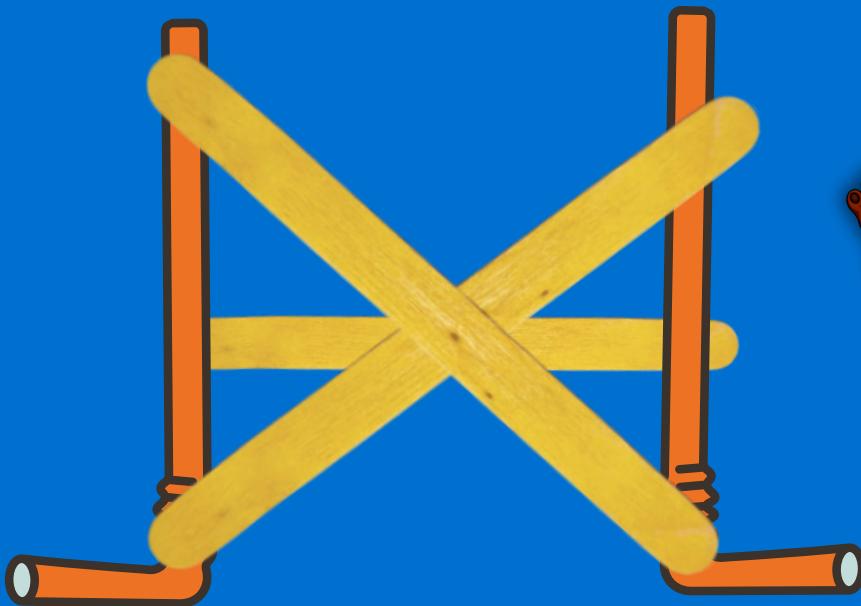
This should work
because _____.

STEAM

Engineering



ADD
SUPPORTS TO
KEEP
STRUCTURES
STURDY



STEAM

Engineering



USE MINI-TESTS
TO MAKE
PREDICTIONS
AND CHANGES



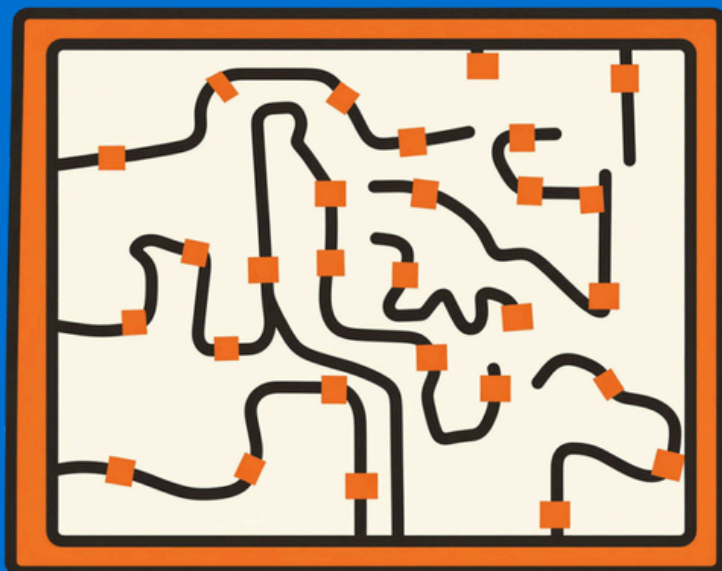
We use mini-tests to find *failure points* and determine what needs to change before final testing. Then, during the final test, we can trust *that* our creation will be *successful*.

STEAM

Engineering



DON'T BE
AFRAID
TO
TRY NEW IDEAS

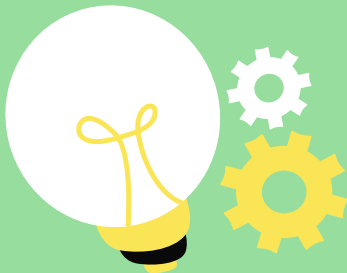


STEAM

Think like a STEAMer!

How to Diagram

Brainstorm



1 Brainstorm your idea.

2 Draw your idea.

Picture



Pictures are pretty!

Diagrams help engineers determine the materials they'll use for different parts of their designs.

Diagram

Yarn

Popsicle Sticks

Straws

Cardboard Base

Blue Paper

3 Determine what materials each part of your creation will be made of.

STEAM

Think like a STEAMer!

SHARE IDEAS WITH OTHERS

1

**Tell others your
"What"**

- ⚙️ What will your creation look like?
- ⚙️ What will each part be made of?

"I will make my

by
_____."



2

**Tell others your
"Why"**

- ⚙️ Why do you think your idea will work?
 - Based on your schema?
 - Based on what we saw in the research?

"This should work because
_____."



STEAM

Think like a STEAMer!

GIVING HELPFUL FEEDBACK

Positive Feedback

Try: "I think your idea will work well because_____."

Be specific! Focus on a specific aspect of their plan, like materials or structure.

Talk

Negative Feedback

Try: "I am concerned that_____ may not work because_____."

Be specific! Focus on a specific aspect of their plan, like materials or structure.

Talk

AGREEMENTS

TRY

Do your best to help the other person.

TRY

Try not to make it personal by focusing on the idea instead of the person.

TRY

Try to speak kindly.



STEAM

Think like a STEAMer!

ENGINEERING REMINDERS

REMEMBER

POSTS NEED BEAMS!

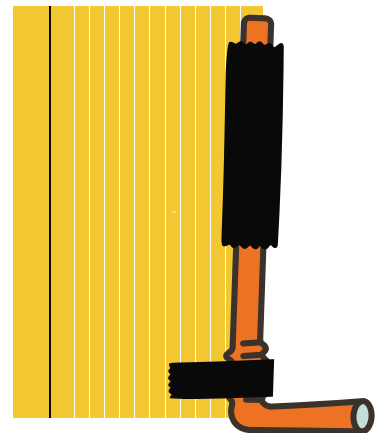
Posts stand upright.
Beams are necessary to keep them stable and connected.



REMEMBER

MAKE CHANGES AS NEEDED!

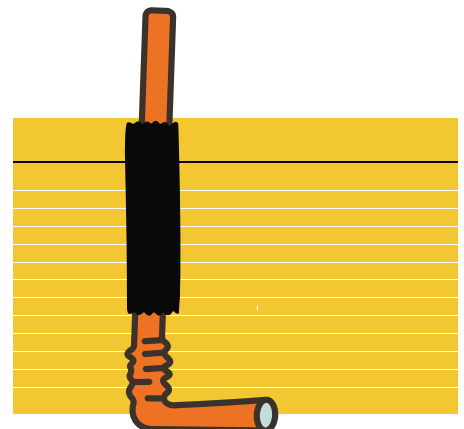
These are just prototypes;
adapt to challenges.



REMEMBER

KEEP JOINTS STRONG!

Joints happen where two materials meet. Tape along the joints, not just over them.



S.T.E.A.M

Think like a STEAMer!

Engineering Process

STEP #1: Ask

STEP #2: Imagine

STEP #3: Analyze

STEP #4: Plan

STEP #5: Create

STEP #6: Adapt

STEP #7: Evaluate

STEP #8: Share

Engineering Learning Targets

Be presented with a big question
and try and solve it.

Use our schema and new
information to create prototypes
that solve the problem.

Persevere when a challenge
gets hard.



STEAM ENGINEERING



STEAM ENGINEERING



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