**Expectations for Students**

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Pd:\_\_\_\_\_\_\_ Hr:\_\_\_\_\_\_\_**

This Journal is a daily collection of all the activities covered in the Engineering Design Class. This journal should be a complete log of everything done during the class and kept in the class bin outside of class time. If this journal is found by any student or teacher it should be returned to the person whose name is on the cover or the Technology & Engineering Education Classroom!

Engineering Journal

Technology & Engineering

8th Grade

1. You are expected to report to class on time and report to your assigned seat immediately
2. If you report to class late, you must bring a written excuse. A yellow slip or, if continual, detention will be provided.
3. Be prepared for class – BRING A PENCIL
4. Your are responsible for any work you miss when absent from class
5. It is the responsibility of ALL students to help with clean-up duties
6. Safety rules and regulations must be followed at all times. Violations of safety rules and regulations will result in:
	1. **Warning**
	2. **Parental Contact**
	3. **Yellow Slip**
	4. **One Hour Detention/ Office Referral**
7. Students will be dismissed by the teacher at the end of the period. Wait at your assigned seat to be dismissed
8. Guest/Substitute teachers will be treated with the same respect as the regular classroom teacher. Violations will result in a one hour detention and parental contact.
9. Students will show respect for: themselves, other students, and the school.
10. Students are expected to do their best work at all times

**Grading**

Your class grades will be based on:

1. Test and quizzes
2. Written Assignments
3. Final Projects & Presentations

**All work must be turned in on time, except where students have received advanced permission from the teacher**

**Technology & Engineering General Student Safety**

This is to certify that I, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, have been instructed in and understand the following safety components of the Technology & Engineering classrooms.

**Safety Rules:**

1. \_\_\_\_\_\_ Use lab only when directed by the teacher.

2. \_\_\_\_\_\_ Report any accident, incident, or unsafe situation to the teacher.

3. \_\_\_\_\_\_ Secure long hair and loose clothing whenever working with equipment.

4. \_\_\_\_\_\_ Clean up after yourself.

5. \_\_\_\_\_\_ Use tools / equipment after instruction and receiving passing quiz score.

6. \_\_\_\_\_\_ Use eye protection when using hand and /or power tools.

7. \_\_\_\_\_\_ No running or “playtime”, nor throwing of any materials allowed

**Location and use of the following safety equipment:**

8. \_\_\_\_\_\_ Fire extinguisher/ alarm locations

9. \_\_\_\_\_\_ Safety glasses

10. \_\_\_\_\_\_ Emergency shut-offs for electricity

11. \_\_\_\_\_\_ First-aid kit

12. \_\_\_\_\_\_ Electrical circuit breaker panels

13. \_\_\_\_\_\_ Emergency telephone listing & location

**Safety procedures for the following situations:**

14. \_\_\_\_\_\_ Fire

15. \_\_\_\_\_\_ Intruder Alert

16. \_\_\_\_\_\_ Weather Alert

**Use of Power Tools and Safety Infractions:**

17. \_\_\_\_\_\_ You must receive a passing Safety Test score to use each power tool

18. \_\_\_\_\_\_ Safety infractions will be dealt with by requiring student to retrain themselves through safety handout.

**I agree to observe all safety rules and procedures for safe tool use/ operation and conduct in the Technology & Engineering Labs.**

Student Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_

**Engineering Design Process- Notes**

**What is the Engineering Design Process?**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 1- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

What \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_are you trying to \_\_\_\_\_\_\_\_\_\_\_\_\_\_?

**Step 2- \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Criteria = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Constraints = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What restrictions will you have? (your project criteria & constraints)

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**Step 3- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Solutions**

Generate \_\_\_\_\_\_\_\_\_\_\_\_solutions.

 Rough Sketch –

 Final Sketch -

**Gather Research**

Research several possibilities that could solve the problem.

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**Step 4- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a Solution**

Based on the rough sketches and ideas you develop, choose the \_\_\_\_\_\_\_\_ solution you think has the most potential to solve the problem.

**Step 5 -\_\_\_\_\_\_\_\_\_\_\_\_\_the solution**

\_\_\_\_\_\_\_\_\_\_ it!

 A prototype is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 6 - \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the solution**

Why is testing and evaluation important?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**\_**

**Step 7- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Look at the data you collected while evaluating.

Make any necessary \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that will make the solution better next time it is tested or go back and choose a different solution to solve the problem

**Step 8- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Results**

\_\_\_\_\_\_\_\_\_\_\_\_\_ you findings with the intended audience

What are some ways to communicate?

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**Simple Machines- Notes**

**What is a *Simple Machine*?**

Simple Machines are \_\_\_\_\_\_\_\_\_\_\_\_\_\_ parts of complex \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that perform different types of work using \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy.

**What is a Complex Machine?**

**What are the 6 different Simple Machines?**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Define each of the following Terms:***

**Inclined Plane:**

A Simple Machine that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Screw:**

A Simple Machine \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a very long \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ wrapped around a \_\_\_\_\_\_\_\_\_\_\_.

**Wedge:**

An object \_\_\_\_\_\_\_\_\_\_\_\_ at least \_\_\_\_\_\_\_\_\_\_ slanting side \_\_\_\_\_\_\_\_\_\_\_\_\_ in a sharp \_\_\_\_\_\_\_\_\_\_\_, which \_\_\_\_\_ materials apart.

**Wheel and Axle:**

A \_\_\_\_\_\_\_\_\_\_\_\_diameter wheel and its \_\_\_\_\_\_\_\_\_\_\_\_ diameter \_\_\_\_\_\_\_\_ are attached to each other to \_\_\_\_\_\_\_\_\_\_\_\_\_ as \_\_\_\_\_\_\_\_\_\_\_ unit.

**Pulley:**

 A \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ that rotates around a center \_\_\_\_\_\_.

It usually has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ around the \_\_\_\_\_\_\_\_\_\_\_\_\_ edge that allows \_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to easily \_\_\_\_\_\_\_\_ around them.

**Lever:**

A Simple Machine that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

***Define the Following Terms:***

**Fulcrum:**

**Load:**

**Effort:**

**A First Class Lever is…**

A lever that has the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ positioned between the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**A Second Class Lever is…**

A lever that has the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ positioned between the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**A Third Class Lever is…**

A lever that has the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ positioned between the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

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**The Challenge**

Olympic Sporting Event: Basketball

Catapult Basketball will be our class Olympic event. You will design a device that will launch a small rubber ball and land in a designated target (Basketball Net). At the conclusion of this unit, you and your partner will compete against your classmates to see who can get the best record of getting the ball through the net in 3 tries.

Good Luck!

**1.Define the Problem**

In your own words, describe the problem that needs to be solved.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2. Identify Criteria & Constraints**

What restrictions will you have?

∙ The rubber ball may not be thrown

∙ Your body (arms, legs, etc.) may NOT be used as a power source

 The device cannot be larger than a 2’ x 2’ area

∙ The base of the device needs to be placed firmly in the specified location

∙ You must use at least one Simple Machine in your design

 Time- How long do you have to solve the problem?

**Due Date:** Your project must be completed by **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

What materials/tools are available for you to use?

 **Materials:** **Tools/Machines:**

Wood from Labeled Bin Any teacher approved tools in Tool Cabinet

Multiple Screws/Nails Scroll Saw

String Band Saw

Rubber Bands (Max. 5) Belt Sander

Paper Clips Drill Press

Sheet Metal Box & Pan Brake

Rivets Spot Welder

**You may bring in objects from home to use on your project. These items must be approved by the instructor prior to bringing them in the building**.

Please list any objects you used to build your project that are **in addition** to the items listed above:

 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What Simple Machine(s) will you use in your device? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. **Brainstorm Multiple Solutions** - Draw any ideas you think will work in the spaces provided below



**Rough Sketch #1**

**Rough Sketch #1**



**Rough Sketch #2**

**Teacher Check:\_\_\_\_\_\_\_\_\_**

**4. Select a Solution**

**Final Sketch** - This sketch can be copied from one rough sketch, or can combine several rough sketches to formulate one idea.

**Materials Listing:**

**Teacher Check:\_\_\_\_\_\_\_\_\_**

**5. Prototype Your Solution!** Remember to follow all safety rule! Don’t forget the **Due Date:** Your project must be completed by **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**6. Test and Evaluate the Solution**

Did your solution work like it was intended to?

|  |  |  |
| --- | --- | --- |
| Test Trial | In Hoop | Observations |
| #1 | Yes / No |  |
| #2 | Yes / No |  |
| #3 | Yes / No |  |
| #4 | Yes / No |  |
| #5 | Yes / No |  |

**7. Iterate**

Did your solution work like it was intended to?

|  |  |
| --- | --- |
| ThinThings you did well: | ThinThings you need to work on: |
|  |  |

Did you have to go back and make any design changes?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Does the solution solve the problem? Why or why not?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**8. Communicate Results**

Prepare for the presentation of your findings and final solution. Be sure to retrieve a rubric and create a presentation to share all of your findings!

**Unit Test Review**

1. Know the parts of a lever.

- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Know the three different types of levers & examples
	1. First Class Lever-
	2. Second Class Lever-
	3. Third Class Lever-
2. How do simple machines allow us to accomplish work with less force?

1. Identify the six Simple Machines

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

1. Know the following terms:
	1. Prototype-
	2. Criteria-
	3. Constraints-
	4. Iterate-
2. List the following steps in the Engineering Design Process in the correct order (Starting with the first step).

1.\_\_\_\_\_\_\_\_\_ A. Define the Problem

2.\_\_\_\_\_\_\_\_\_ B. Prototype the Solution

3.\_\_\_\_\_\_\_\_\_ C. Iterate

4.\_\_\_\_\_\_\_\_\_ D. Communicate Results

5.\_\_\_\_\_\_\_\_\_ E. Test & Evaluate

6.\_\_\_\_\_\_\_\_\_ F. Brainstorm Multiple Solutions

7.\_\_\_\_\_\_\_\_\_ G. Select a Solution

8.\_\_\_\_\_\_\_\_\_ H. Identify Criteria & Constraints

1. Know the difference between a simple machine and compound/complex machine.
2. Explain a few safety rules about different machines in the lab.

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9. What are the two options for fastening our wood together?

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**Ink Zone**

 Please use this section to write any ideas or extra notes (Don’t forget to add the date)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_