

# Hello TAME Club Leaders

WELCOME TO  
THE TAME  
ENGINEERING  
EXPERIENCE  
WE ARE SO HAPPY  
YOU CHOSE TO JOIN  
US THIS YEAR!

Get ready for an incredible journey through 10 exciting lessons and hands-on activities this year. From an introductory lesson on the United Nations Sustainable Development Goals (SDGs) to 8 focused on each SDG, and even a hands-on math lesson, there's something for everyone. Speaking of "something for everyone", the lessons in the 2023-24 Digital Learning Guide are comprised of about 50% materials-based engineering design activities and 50% web-based digital activities.

You can tackle the lessons in any order you prefer. And hey, here's a hot tip: the 2024 TAME Competitions will shine the spotlight on SDG #7 - Solar Energy! The Engineering Design Challenge at the 2024 TAME Regional Competition will be a direct extension of your learning in Lesson 7. As for SDGs 9 through 17, don't worry, they'll be covered in the 2024-25 TAME Club curriculum. Plus, all your seniors can keep the excitement going as they can still access the online curriculum at [tame.org](http://tame.org) even after they graduate.



You can access the Digital  
Learning Guide at  
[tame.org/learningguide](http://tame.org/learningguide)

# TAME COMMUNITY HUB

The TAME Community Hub is a dynamic space designed to connect TAME Club Leaders, TAME Engineers and their families with a thoughtful collection of shared resources to complement the TAME Engineering Experience. The entire TAME Community can access information and resources, including high school STEM endorsement course sequencing, engineering college & career readiness, and scholarships & financial aid.

Whether you're a curious student, a dedicated STEM club leader, or a supportive family member, the TAME Community Hub is your gateway to collaborative exploration, ensuring that the journey through our engineering curriculum is exciting, enriching, and collectively rewarding.

**To access the TAME Community Hub, visit [tame.org/hub](https://tame.org/hub).**

Be sure to check your emails from TAME to receive updates when new content is added to the TAME Community Hub. We also encourage you to actively participate by suggesting resources that could enhance the hub's offerings; simply reach out to us at [programs@tame.org](mailto:programs@tame.org) with your valuable suggestions. Together, let's inspire the next generation of engineers and innovators!

**Need more help planning? Find all the necessary information such as suggested pacing and materials prep in the “2023-24 Curriculum Quick Guide”. We recommend reviewing this planning document at least a few days before you plan to run the activities with your TAME Club. This will make sure you are ready to go with all materials and resources without having to read through the entire Digital Learning Guide—leave that part up to the TAME Engineers!**

# 2023-24 TAME Toolkit Contents

## TAME Toolkit Gift Cards

Since 2020, The Boeing Company has sponsored these gift cards. They are intended to offset the costs that TAME Club Leaders incur when implementing a TAME Club. Please use these gift cards to buy extra materials, supplies, and healthy snacks to support your TAME Club this year!

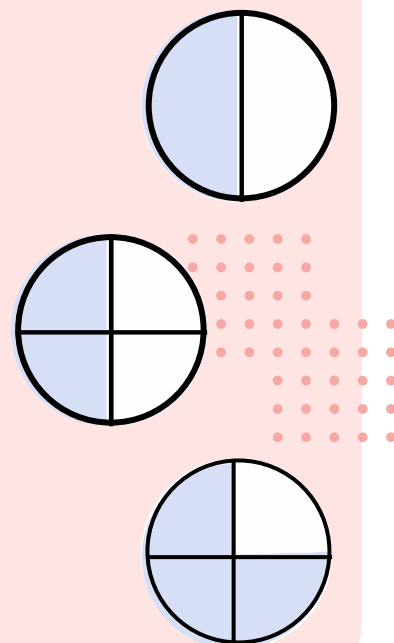


## TAME T - Shirts

TAME Club t-shirts play a significant role in nurturing a "sense of belonging" in engineering by visually uniting TAME Engineers. Wearing these shirts can help them feel connected and part of a community, promoting camaraderie and confidence in their pursuit of engineering careers.

## TAME Tactile Math Support

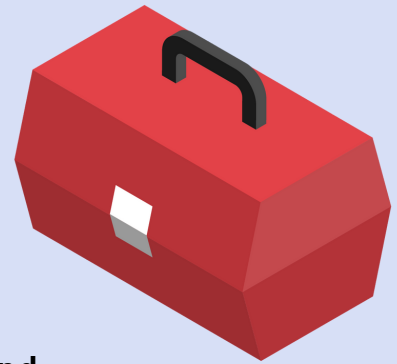
Fraction circle math manipulatives are a new addition to the TAME Toolkit. These provide a tangible and visual way for TAME Engineers to grasp abstract concepts of fractions and decimals. These manipulatives are meant to be shared to encourage active engagement and exploration. We introduced one math lesson in the 2023-24 Digital Learning Guide that is intended for all TAME Engineers. We are aiming to add more hands-on math activities as we continue to update and improve the TAME Curriculum, however we are looking forward to hearing from you in the TAME Club Leader surveys in the Spring to help us determine if this is something you want to see more of.



## TAME Tacklebox

Almost all the materials needed are included in the TAME Tackle Box provided with the 2023-24 TAME toolkit. The contents can be used in multiple lessons, so be mindful and intentional about how you use the materials. It also contains biodegradable and reusable items. As we learned about the SDGs, we started to think about the little things we can do to have a positive impact.

There are also a few materials that are not included in the TAME Tackle Box. These items can be referenced in the Curriculum Quick Guide, but most of them are general classroom materials such as pencils, colored pencils, markers, scissors and student computers. Additionally, the Hurricane Towers lesson requires the use of an electric fan to simulate wind. If you don't have any of these items on hand, we encourage you to use your Amazon/Walmart Gift Card to purchase them.



## TAME Notebook & Stickers

The TAME Notebook is where TAME Engineers will record their ideas, designs, calculations, and more. It can also serve as a portfolio of their engineering journey that can be shared with others. TAME Notebooks are to be used in 100% of the lessons in the 2023-24 Digital Learning Guide! We recommend introducing the TAME Notebooks as soon as you receive your TAME Toolkit and allow them time to customize their notebooks using the TAME Stickers and other art materials you may have on hand. This is also a great time to introduce (or reintroduce) TAME Engineers to TAME's Approach to Engineering Education.



# TAME'S APPROACH TO ENGINEERING EDUCATION

At the heart of TAME's curriculum is our approach to engineering education. This content has been carefully curated and created to remain consistent year after year, serving as the steady foundation upon which engineering learning experiences will be built. These unchanging elements will help your TAME Engineers develop a deep understanding of the core tenets of engineering allowing them to navigate challenges with confidence and creativity.

## **TAME's Definition of Engineering**

**You are an engineer because you make observations and use your awareness, passion, and unique qualities to improve your community.**

Engineers invent, innovate, and design thoughtful solutions to advance the world around us.

Engineering is the creative application of science, math, and technology to develop anything from your school lunch to your favorite app, to ocean clean-up, to deep space exploration, and beyond.

## TAME's 5 Cs of Engineering

TAME's 5 Cs of Engineering are a set of foundational attributes that empower aspiring engineers with a holistic skill set for success. By fostering curiosity, students are driven to question and explore, while cultivating creativity encourages them to envision innovative solutions. Through collaborative teamwork, students learn to harness diverse perspectives, and their commitment and contribution ensure that they not only excel in engineering projects, but also positively impact their communities and the world at large.



**CURIOUS**



**CREATIVE**



**COLLABORATIVE**



**COMMITTED**

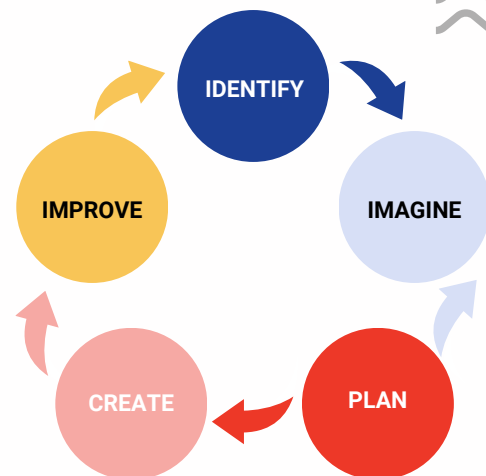


**CONTRIBUTIVE**

## TEA's Engineering Design Process

The Texas Education Agency's Engineering Design Process is a structured framework that empowers students to tackle complex challenges with creativity and precision. Guiding students from ideation to innovation, this process involves identifying problems, brainstorming solutions, designing prototypes, testing and refining their ideas, and finally, presenting their solutions. By engaging in this iterative and hands-on approach, students develop critical thinking, teamwork, and problem-solving skills that are essential for success in both the classroom and the real world.

### THE ENGINEERING DESIGN PROCESS



These materials are a derivative work of the Texas STEM Toolkit, which is used with permission from the Texas Education Agency.

# TAME Competitions

Every spring semester, TAME hosts TAME Regional and State Competitions. These are events built around an engineering design challenge to enhance TAME Club experiences and connect TAME engineers to like-minded peers.

TAME Regional Competitions will take place between January and February 2024. You can read more about the program at [tame.org/competitions](https://tame.org/competitions).

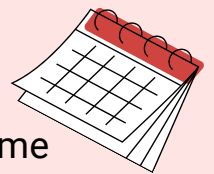
**All TAME Engineers must be registered and RSVP'd by December 15, 2023.**

The 2024 Regional TAME Competitions will include an Engineering Design Challenge that extends primarily on the knowledge and skills that TAME Engineers gain in Lesson 7 about solar energy. We will be sharing more information throughout the Fall on how to utilize the 2023-24 Digital Learning Guide to best prepare your TAME Club for the TAME Competitions.

Recognizing how important the TAME State Competition is to students, TAME hopes to bring back the TAME State Competition in 2024. We are not certain we have the resources to do so but will provide an update to the TAME community by September.

## 2023-14 Important Dates

- **August 7:** TAME Club and student registration opens;
- TAME SDG Digital Learning Guide and recruitment materials become available
- **September 1:** Deadline for Regional Leaders to determine 2024 TAME Competition dates and locations
- **September 12:** Last day to register students for early shipment of toolkits
- **October 12:** Last day to register students for toolkits
- **October 20:** Final shipment of toolkits
- **December 15:** Deadline to register & RSVP for TAME Regional Competitions
- **January 12 – March 2:** TAME Regional Competitions held



**Go to [tame.org/calendar](https://tame.org/calendar) to view the full 2023-24 TAME Programs Calendar.**

# 2023-24 Curriculum Quick Guide

LESSON & GOAL NUMBER	PACING TIP	GROUP SIZE	IN THIS HANDS-ON ACTIVITY, YOU ARE A...	TACKLE BOX & TOOLKIT MATERIALS <b>TAME PROVIDED</b>	OTHER MATERIALS (ON-HAND) <b>NOT TAME PROVIDED</b>	HELPFUL SOFTWARE INFO!
<b>TAME'S APPROACH TO ENGINEERING EDUCATION</b> <a href="http://tame.org/engineering">tame.org/engineering</a>	1	1	<b>TAME Engineer!</b> You are an engineer because you make observations and use your awareness, passion, and unique qualities to improve your community.	TAME Notebook, TAME Sticker Sheet	N/A	You can find TAME's Approach to Engineering in pages 7 – 11 of the Digital Learning Guide
<b>L0: INTRO TO THE UN SUSTAINABLE DEVELOPMENT GOALS</b> <a href="http://tame.org/lesson0">tame.org/lesson0</a>	1 –2	2	<b>TAME Engineer!</b> Lesson 0 will teach you how to navigate the United Nations Sustainable Development Goals website to learn the significance of each goal number, its targets, and its indicators.	N/A	Computer with access to the <a href="http://sdgs.un.org">sdgs.un.org</a> website, upcycled stuff	N/A
<b>LM: WHY FRACTIONS?</b> <a href="http://tame.org/whyfractions">tame.org/whyfractions</a>	1	1 to 2	<b>lifelong math learner!</b> You will fill out the chart and explore equivalent fractions using hands-on fraction pieces.	Chart of Equivalent Fractions Printout, Fraction Circles	Pencils, colored pencils, markers	N/A
<b>L1, GOAL 1: NO POVERTY</b> <a href="http://tame.org/lesson1">tame.org/lesson1</a>	1-2	3	<b>structural engineer</b> who designs buildings for hurricane-prone areas.	Index Cards, Straws, Craft Sticks, Twist-Ties, Tape, String, Spray Bottle, Tennis Ball	pencil, scissors, ruler, large fan	N/A
<b>L2, GOAL 2: ZERO HUNGER</b> <a href="http://tame.org/lesson2">tame.org/lesson2</a>	2	3	<b>precision agricultural engineer.</b> You will design, build, and test a model of a Variable Rate Irrigation System	Styrofoam Cups, Plastic Cups, Assorted Straw Sizes, Paper Clips, Rubber Bands	Scissors, a water source such as a faucet or drinking fountain	N/A
<b>L3, GOAL 3: GOOD HEALTH &amp; WELLBEING</b> <a href="http://tame.org/lesson3">tame.org/lesson3</a>	2 +	2	<b>software engineer.</b> You will create an app focused on mental health using MIT's App Inventor.	N/A	Computer with access to MIT's App Inventor, pencils, colored pencils, or markers	<a href="#">Intro to App Inventor</a>



LESSON & GOAL NUMBER	PACING TIP	GROUP SIZE	IN THIS HANDS-ON ACTIVITY, YOU ARE A...	TACKLE BOX & TOOLKIT MATERIALS <b>TAME PROVIDED</b>	OTHER MATERIALS (ON-HAND) <b>NOT TAME PROVIDED</b>	HELPFUL SOFTWARE INFO!
<b>L4, GOAL 4: QUALITY EDUCATION PART 1</b> <a href="https://tame.org/lesson4">tame.org/lesson4</a>	2+	2	<b>network engineer.</b> You will explore the world of computer networks and how they make communication – and educational and economic opportunities – possible.	Ethernet Cables, RJ-45 Cable Connectors, Wire Crimper	Computers or Laptops (at least 2), Ethernet switch or hub, Scissors	N/A
<b>L4, GOAL 4: QUALITY EDUCATION PART 2</b> <a href="https://tame.org/lesson4/part2">tame.org/lesson4/part2</a>	2+	Club Game	<b>network engineer.</b> You will explore the world of computer networks and how they make communication – and educational and economic opportunities – possible.	Index Cards	Computer with access to <a href="#">Get Site IP</a>	N/A
<b>L5, GOAL 5: GENDER EQUALITY</b> <a href="https://tame.org/lesson5">tame.org/lesson5</a>	1-2	2	<b>machine learning engineer.</b> You will create a simple AI model that detects and categorizes different images of humans.	Computer with access to <a href="#">Teachable Machine</a>	N/A	N/A
<b>L6, GOAL 6: CLEAN WATER &amp; SANITATION</b> <a href="https://tame.org/lesson6">tame.org/lesson6</a>	1-2	3	<b>water resources engineer.</b> You will design ways to either clean a water source or find a new water source for a family in need.	Water Scenario Cards	Scissors, pencils, colored pencils, markers	N/A
<b>L7, GOAL 7: AFFORDABLE &amp; CLEAN ENERGY</b> <a href="https://tame.org/lesson7">tame.org/lesson7</a>	2	1 or 2	<b>renewable energy engineer.</b> You will investigate and plan for an innovative solar energy solution.	N/A	Computer with Internet Access	Educators Guides for Tinkercad Circuits and Tinkercad Classrooms <a href="https://tame.org/tinkercad_classrooms">tame.org/tinkercad_classrooms</a> <a href="https://tame.org/tinkercad_circuits">tame.org/tinkercad_circuits</a>
<b>L8, GOAL 8: DECENT WORK &amp; ECONOMIC GROWTH</b> <a href="https://tame.org/lesson8">tame.org/lesson8</a>	2	3	<b>civil engineer.</b> You will design, construct and models of heat resistant buildings.	Tape, Glue, White Paint Markers	Upcycled building materials such as cardboard scraps, tissue paper rolls, empty and cleaned milk cartons, soda bottles, and water bottles	N/A



Texas Alliance  
for Minorities  
in Engineering

# Chart of Equivalent Fractions

## Club Leader Exemplar

$\frac{2}{2}$	$\frac{3}{3}$	$\frac{4}{4}$	$\frac{5}{5}$	$\frac{6}{6}$	$\frac{7}{7}$	$\frac{8}{8}$	$\frac{9}{9}$	$\frac{10}{10}$	$\frac{11}{11}$	$\frac{12}{12}$	$\frac{13}{13}$	$\frac{14}{14}$	$\frac{15}{15}$	$\frac{16}{16}$	$\frac{17}{17}$	$\frac{18}{18}$	$\frac{19}{19}$	$\frac{20}{20}$	$\frac{21}{21}$	$\frac{22}{22}$	$\frac{23}{23}$	$\frac{24}{24}$
$\frac{1}{2}$		$\frac{2}{4}$		$\frac{3}{6}$		$\frac{4}{8}$		$\frac{5}{10}$		$\frac{6}{12}$		$\frac{7}{14}$		$\frac{8}{16}$		$\frac{9}{18}$		$\frac{10}{20}$		$\frac{11}{22}$		$\frac{12}{24}$
	$\frac{1}{3}$			$\frac{2}{6}$			$\frac{3}{9}$			$\frac{4}{12}$			$\frac{5}{15}$		$\frac{6}{18}$				$\frac{7}{21}$			$\frac{8}{24}$
		$\frac{1}{4}$				$\frac{2}{8}$				$\frac{3}{12}$				$\frac{4}{16}$				$\frac{5}{20}$				$\frac{6}{24}$
			$\frac{1}{5}$					$\frac{2}{10}$					$\frac{3}{15}$					$\frac{4}{20}$				
				$\frac{1}{6}$						$\frac{2}{12}$					$\frac{3}{18}$							$\frac{4}{24}$
					$\frac{1}{7}$							$\frac{2}{14}$							$\frac{3}{21}$			
						$\frac{1}{8}$								$\frac{2}{16}$								$\frac{3}{24}$
							$\frac{1}{9}$									$\frac{2}{18}$						
								$\frac{1}{10}$										$\frac{2}{20}$				
									$\frac{1}{11}$											$\frac{2}{22}$		
										$\frac{1}{12}$												$\frac{2}{24}$

1) Blue squares represent whole fractions & pink squares represent unit fractions

2) How many thirds are equivalent to  $\frac{1}{2}$ ? When you place the  $\frac{1}{3}$  or  $\frac{2}{3}$  fraction pieces on top of the  $\frac{1}{2}$  fraction piece, you can see that they are not equivalent. That means you leave the square where  $\frac{1}{3}$  and  $\frac{1}{2}$  meet blank.

3) How many fourths are equivalent to  $\frac{1}{2}$ ? When we place the  $\frac{1}{4}$  fraction pieces on top of the  $\frac{1}{2}$  fraction piece, you can see that  $\frac{2}{4}$  is equivalent to  $\frac{1}{2}$ ! That means you color in the square where  $\frac{2}{4}$  and  $\frac{1}{2}$  meet.

4) Repeat this until you complete the entire row for  $\frac{1}{2}$ .

5) Once you complete the first row, continue using the same method to complete the rest of the rows using fraction pieces to help you!

Remember, this is not a test or a race! Even if you know you can fill it out by doing the math in your head, take some time with the fraction pieces. Visual math skills help engineers to conceptualize designs and analyze data to solve problems more effectively.