



11th – 12th grade • English Level 3

LEARNING PACKET #2



Theme: Space

International Consortium for Multilingual Excellence in Education



August 15th, 2020

Dear District/School Personnel:

We are a consortium of researchers, teacher educators, and teachers who believe in and strive to foster multilingual excellence. Therefore, during this time of crisis and difficulty, we are eager to put our expertise and passions to use to try to be of assistance. We initially designed 21 immediate-response packets for K-5, as soon as the pandemic forced schools to shut down. We then applied for and received a grant that has allowed us to create more than 100 full activity packets, ranging from Levels 1-3 of English proficiency, and grades K-12.

The breakdown of packets is as follows:

Level 1 – Entry into English

Emphasis on developmentally appropriate interesting/challenging tasks

- K-2
- 3-5
- 6-8 with a literacy background
- 9-12 with a literacy background
- 6-8 without literacy background
- 9-12 without literacy background

Level 2 – Building Background

- K-1
- 2-3
- 4-5
- 6-8
- 9-10
- 11-12

Level 3 – Interdisciplinary Inquiry

- K-1
- 2-3
- 4-5
- 6
- 7-8
- 9-10
- 11-12

With this letter, is an “Activity Packet” that can be used freely with any group of students or families as you see fit. Each packet includes interdisciplinary activities designed to be completed within a week. Teachers from around the country have designed, developed, and created these packets, each focusing on the topics of their choice. Because learning academic content can happen within any thematic context, these packets are designed to be diverse, dynamic, and engaging for students of all backgrounds. The topics covered in these units range from cultures, animals, natural disasters, inventions, and much more. You will see each teacher’s personality reflected strongly in these packets, and our hope is that this will capture students in a way similar to that of a rich and immersive classroom environment.

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Our hope is that these materials can provide some meaningful learning supports to students and families who may not have access to online learning opportunities. However, we can also imagine a variety of ways that these packets can provide learning opportunities outside of our original intent and purpose. Please use these activity packets in any way you see fit for your students and families. We will be so pleased to learn of how they might be useful, particularly for your multilingual students and their families. We think it might be particularly helpful for you to print packets and mail them to families, but we also see opportunities to work with local agencies, leave printed-out packets for pick-ups at schools, etc.

We designed these activities based around several big ideas:

- Productive play and inquiry
- Grade level and English Language Development standards/curriculum
- Fostering multilingual language development
- Providing opportunity for all four language domains (reading, writing, speaking and listening)

These packets are self-contained. Everything a child will need to be successful with the activities is provided in the packet. Students will only need a writing utensil. Additional tools like crayons or scissors are optional.

We have also included a letter to parents. We hope this will help parents understand what students will be doing with the packet and that we encourage the use of all language resources available to the student. The packets are in English for the students, but the students can write, talk and engage with family members regarding the packet activities in any language they would like. We have translated the parent letter into Spanish, and we encourage districts to translate the letter into any other language that would be helpful for your local families.

Designing Activity Packets is a new initiative for us, though we have been designing professional learning opportunities (eWorkshops) for teachers of multilingual learners since 2011. Like our Activity Packets, those learning opportunities for teachers are free. To learn more about them and us, please visit our website at: <https://cehs.unl.edu/icmee/>

We are eager to be a helpful, collaborative partner in all learning needs related to multilingual students and their teachers, so please, do not hesitate to reach out to us with questions, ideas, concerns, feedback, etc. We are available at icmee@unl.edu.

Sincerely,

Kara Mitchell Viesca, PhD
Associate Professor of Language Education
University of Nebraska Lincoln
Teaching, Learning and Teacher Education
PI: International Consortium for Multilingual Excellence in Education

This packet was designed and created by **Katie Loughrist**
in collaboration with Lauren Gatti and Alexa Yunes.

The Standards that Informed the Development of this Packet are:

Math

- **CCSS.MATH.CONTENT.HSA.SSE.A.1.A**
Interpret parts of an expression, such as terms, factors, and coefficients.
- **CCSS.MATH.CONTENT.HSA.REI.A.1**
Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

English Language Arts

- **CCSS.ELA-LITERACY.L.11-12.1**
Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- **CCSS.ELA-LITERACY.L.11-12.4.B**
Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., *conceive*, *conception*, *conceivable*)
- **CCSS.ELA-LITERACY.L.11-12.6**
Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
- **CCSS.ELA-LITERACY.RI.11-12.5**
Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.
- **CCSS.ELA-LITERACY.SL.11-12.6**
Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate.
- **CCSS.ELA-LITERACY.RL.11-12.6**
Analyze a case in which grasping a point of view requires distinguishing what is directly stated in a text from what is really meant (e.g., satire, sarcasm, irony, or understatement)
- **CCSS.ELA-LITERACY.W.11-12.4**
Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Science & Technical Subjects (ELA)

- **CCSS.ELA-LITERACY.RST.11-12.2**
Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- **CCSS.ELA-LITERACY.RST.11-12.9**
Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon or concept, resolving conflicting information when possible.

Art

- **FA 12.2.4.d**
Connect images, objects, and a personal work of art to convey a story, familiar experience, or connection to the world.

Physical Education (Nebraska Standards)

- **PE.HS.1.1b**
Demonstrates proficiency in multiple skills in a variety of health-related activities (e.g., running core exercises, yoga, resistance training)
- **PE.HS.1.2b**
Analyzes and improves performance of self and/or others in a selected skill using movement concepts and principles (e.g., force, motion rotation).
- **PE.HS.5.2b**
Identifies and uses the major muscle groups in specific exercises

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August 15th, 2020

Dear Families:

During the COVID-19 pandemic, it became necessary for students to learn at home. Many students have limited access to technology, others struggle with online learning, and some simply want more to do while they are at home. With these things in mind, we have created an extensive resource of learning materials that we hope will be helpful for your children to engage with. These Activity Packets were designed with your students in mind and are aligned with each of their grade level content. Each activity in the packets will help students continue with their schooling as well as continue to grow their multilingualism. We encourage you to talk to your student about what they are doing and let your child ask you about the topics they are learning about. The packet is in English, but we encourage you and your children to speak and think together in any language you would like to. We strongly encourage you to use the language you feel most comfortable using with your student. Supporting their learning in all the languages they know is helpful—even for developing their English! So, please encourage your student to do the work in the packet in any language they would like.

We know that families are dealing with a lot of stress and uncertainty right now, so we encourage you to play the role you would like to play with your student and their Activity Packet based on what works best for you. We recommend reading the information about the packet and activities and then discussing with your student how the packet works and how they can work through it. We believe that with that introduction, your student can do a lot, if not all, of the work themselves. However, if you are available to work more closely with your student (or for a sibling or other family member to do so), we encourage that as well. Please know, this is not intended to be something that adds stress and work to your family during this demanding time. We hope that this is a helpful resource so your student can continue growing academically while in unusual situations.

We also hope you will find these packets interesting and fun. We have integrated activities from all of the grade level content standards: English Language Arts, Mathematics, Social Studies, Science, Physical Education and Art. We have also developed different packets for the different levels of English proficiency, so your child should feel challenged but also capable of largely understanding the content in front of them.

6th-12th grade students are encouraged to talk about their learning as much as possible, even if it is not to one person in particular. Some packets will include activities where students can “use a cell phone” to record voice messages and post on social media, which we hope might be ways in which they can be encouraged to speak in English or in any language they prefer.

In this packet, you will find:

1. **Table of Contents:** This will provide you with a general pacing guide to help your student stay on track.
2. **Topic Warm-Up SPACE:** Your student will brainstorm to determine what they already know about the topic. They will use the information they collect to guide them in their learning as they are exposed to new content.
3. **Topic Vocabulary & Story Writing:** This activity includes a glossary with many of the terms they will encounter in the packet. It includes the word, definition, an instructional image, and a space for them to write how they will remember the word. Students will then use the new vocabulary to write a short story in keeping with the theme of space. Ask them to share it with you when they are finished!

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4. **PE: Get Some Space!** This activity first teaches your student several exercises including cardio, strength training, and yoga. Included in this section is a template to create a paper die to cut and tape together. Your student can then roll the die to determine which exercise they will do. This should keep them engaged as they repeat this activity each day. The exercise instructions are only listed in one place, but please encourage your student to engage in the exercises each and every day. They are only beneficial when they are done repeatedly on a daily schedule.
5. **Scientific Article: Measuring Distances to Galaxies** This activity exposes your student to an academic scientific text related to the packet topic. Your student will work to understand the details of the text, make inferences, and apply what they have learned in an imaginative, hypothetical scenario.
6. **Algebra: X = Space:** This activity explains in simplified English how to simplify an expression using PEMDAS, an algebraic term that helps students remember the order they should do the steps in. The language of math can sometimes be difficult, so this activity is designed to help your student understand the terminology involved in equations and how to solve the math problems themselves. Additionally, they will use the answers to determine the lengths between planets. They will use a paper ruler and planet cards to measure the distances between planets. This activity should be fun and interactive!.
7. **Language Arts: Lonely as a Cloud:** This activity focuses on a classic English poem by William Wordsworth called “I Wandered Lonely as a Cloud.” Students will be introduced to advanced vocabulary with images to help them understand the poem. They will practice reading it aloud and determining meaning and mood based on the symbolism and figurative language found in the poem. They will then create their own piece of artwork inspired by the poem. *Includes 1 BLANK PAGE at the end for your student to draw their artwork on.*
Reflection: This activity asks your student to reflect on everything they have learned in the packet and apply it to their own lives. This would be a great opportunity for you to sit with your student and ask them to go through each activity of the packet with you and explain what they learned and how it has changed their opinions or perceptions.

NOTE: Answer sheets are at the **end of the packet**, so your student will have easy access.

If you do not want your student to have answer sheets, remove them from the packet before giving it to them.

We hope that these activities will enhance your child’s learning while we work through these very unusual circumstances. We also hope that they will give your child opportunities for productive play. If you have any questions or concerns about these packets, feel free to reach out to our project at icmee@unl.edu or by calling the Teaching, Learning and Teacher Education department at 402-472-2231.

Sincerely,

Kara Mitchell Viesca, PhD
Associate Professor of Language Education
University of Nebraska Lincoln
Teaching, Learning and Teacher Education
PI: International Consortium for Multilingual Excellence in Education

This packet was designed and created by **Katie Loughrist** in collaboration with Lauren Gatti and Alexa Yunes.

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15 de agosto del 2020

Estimadas familias:

Durante la pandemia del COVID-19, ha sido necesario que los estudiantes aprendan en casa. Muchos de los estudiantes tienen acceso limitado a la tecnología, otros tienen dificultad para aprender en línea y algunos simplemente quieren tener algo más que hacer mientras están en casa. Pensando en estas razones, hemos creado un recurso con una gran extensión de materiales de aprendizaje que esperamos serán útiles para que sus hijos participen activamente. Estos paquetes de aprendizaje fueron diseñados teniendo en mente a sus niños y están alineados a los contenidos de cada nivel de grado. Cada actividad en estos paquetes los ayudará a continuar con su escolarización, así como a seguir aumentando su multilingüismo. Lo alentamos a que hable con su estudiante sobre lo que está haciendo y deje que le pregunte sobre los temas que le interesan. El paquete está en inglés, pero le recomendamos a usted y a su estudiante que hablen y piensen juntos en el idioma que deseen. Le recomendamos encarecidamente que use el idioma con el que se sienta más cómodo al comunicarse con su estudiante, ya que respaldar su aprendizaje en todos los idiomas que sabe es útil, ¡incluso para su inglés! Por lo tanto, anime a su estudiante a hacer el trabajo en el paquete en cualquier idioma que desee.

Sabemos que las familias están lidiando con mucho estrés e incertidumbre en este momento, por lo que lo alentamos a que desempeñe el papel que le gustaría desempeñar con su estudiante y su paquete de actividades según lo que funcione mejor para usted. Le recomendamos leer la información sobre el paquete y las actividades que contiene y luego discutir con su estudiante cómo funciona el paquete y cómo pueden trabajar en él. Creemos que, con esa introducción, su estudiante puede hacer mucho, si no todo, el trabajo por sí mismo. Sin embargo, si usted está disponible para trabajar más estrechamente con su estudiante (o un hermano u otro miembro de la familia), también lo recomendamos. Por favor, tenga en cuenta que esto no pretende ser algo que agregue estrés y trabajo a su familia durante este momento tan desgastante. Por el contrario, esperamos que este sea un recurso útil para que su estudiante pueda continuar desarrollándose académicamente durante esta situación tan inusual.

También esperamos que ustedes encontrarán estos paquetes interesantes y divertidos. Hemos integrado actividades de todos los estándares de contenido de nivel de grado: Artes del Lenguaje en inglés, Matemáticas, Estudios Sociales, Ciencias, Educación Física y Arte. También hemos desarrollado diferentes paquetes para los diferentes niveles de dominio del inglés, de esta manera su hijo podrá sentir el desafío y también será capaz de comprender en gran medida el contenido que se les presenta.

Los estudiantes de 6to a 12avo grado son motivados a hablar sobre su aprendizaje tanto como sea posible, aun cuando no sea a una persona en particular. Algunos paquetes incluirán actividades en donde los estudiantes pueden “usar un teléfono celular” para grabar mensajes de voz y subirlos a las redes sociales; esperamos que estas sean formas que los animarán a hablar en inglés o en el idioma de su preferencia.

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En este paquete, encontrará:

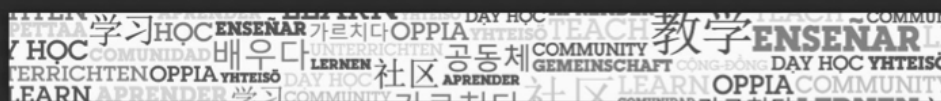
- **Tabla de contenido:** Esto le proporcionará una guía general para ayudar a su estudiante a planificar su tiempo.
- **Preparación para el tema:** Su estudiante hará una lluvia de ideas para determinar lo que ya sabe sobre el tema. Utilizarán la información que recopilan para guiarlos en su aprendizaje a medida que se exponen a nuevos contenidos.
- **Vocabulario temático y escritura de historias:** esta actividad incluye un glosario con muchos de los términos que encontrarán en el paquete. Incluye la palabra, definición, una imagen de instrucción y un espacio para que escriban cómo recordarán la palabra. Luego, los estudiantes usarán el nuevo vocabulario para escribir una historia corta de acuerdo con el tema del espacio. ¡Pídeles que lo compartan con usted cuando hayan terminado!
- **Educación física:** ¡Consigue algo de espacio! Esta actividad primero le enseña a su estudiante varios ejercicios que incluyen cardio, entrenamiento de fuerza y yoga. En esta sección se incluye una plantilla para cortar, pegar y crear un dado de papel. Su estudiante puede tirar el dado para determinar qué ejercicio harán. Esto debería mantenerlos enfocados mientras repiten esta actividad todos los días. Las instrucciones de los ejercicios solo se enumeran en un lugar, pero aliente a su estudiante a participar en los ejercicios todos los días. Solo son beneficiosos cuando se hacen repetidamente en un horario diario.
- **Artículo científico:** Medición de distancias a las galaxias. Esta actividad expone a su estudiante a un texto científico académico relacionado con el tema del paquete. Su estudiante trabajará para comprender los detalles del texto, hacer inferencias y aplicar lo que ha aprendido en un escenario imaginativo e hipotético.
- **Álgebra:** $X = \text{Espacio}$. Esta actividad explica en inglés simplificado cómo simplificar una expresión usando PEMDAS, un término algebraico que ayuda a los estudiantes a recordar el orden en el que deben hacer los pasos. El lenguaje de las matemáticas a veces puede ser difícil, por lo que esta actividad está diseñada para ayudar a su estudiante a comprender la terminología involucrada en las ecuaciones y cómo resolver los problemas matemáticos por sí mismo. Además, usarán las respuestas para determinar las longitudes entre los planetas. Usarán una regla de papel y tarjetas de planetas para medir las distancias entre planetas. ¡Esta actividad debe ser divertida e interactiva!
- **Artes del lenguaje:** Solitario como una nube. Esta actividad se centra en un poema clásico en inglés de William Wordsworth llamado "I Wandered Lonely as a Cloud". Los estudiantes serán introducidos al vocabulario avanzado con imágenes para ayudarlos a comprender el poema. Practicarán la lectura en voz alta y determinarán el significado y el estado de ánimo basados en el simbolismo y el lenguaje figurativo que se encuentra en el poema. Luego crearán su propia obra de arte inspirada en el poema.
Incluye 1 PÁGINA EN BLANCO al final de la actividad para que su estudiante dibuje su obra de arte.
- **Reflexión:** Esta actividad le pide a su estudiante que reflexione sobre todo lo que ha aprendido en el paquete y lo aplique a sus propias vidas. Esta sería una gran oportunidad para que se sienta con su estudiante y les pida que repasen cada actividad del paquete con usted y le expliquen lo que aprendieron y cómo ha cambiado sus opiniones o percepciones.

NOTA: Las hojas de respuestas se encuentran al final del paquete, por lo que su estudiante tendrá fácil acceso. Si no desea que su estudiante tenga hojas de respuestas, retírelas del paquete antes de dárselas.

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Esperamos que estas actividades mejoren el aprendizaje de su hijo mientras trabajamos juntos para atravesar estas circunstancias tan inusuales. También esperamos que le darán a su hijo oportunidades de juego productivo. Si tiene alguna pregunta o inquietud acerca de estos paquetes, siéntase en libertad de comunicarse con nuestro proyecto a icmee@unl.edu o llamando al departamento de Enseñanza, Aprendizaje y Educación para maestras (Teaching, Learning, and Teacher Education) al 402-472-2231.

Sinceramente,

Kara Mitchell Viesca, PhD
Associate Professor of Language Education
University of Nebraska Lincoln
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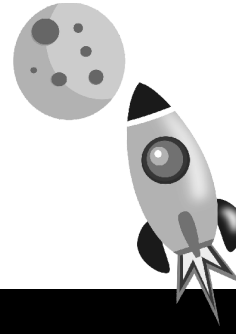
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Packet 2: Space

Table of Contents

What will you find in this packet?



Suggested Schedule


	Lesson	Activities	Description
1 Week	Lesson 1	Accessing Prior Knowledge	What do you already know about the topic? Brainstorm and write your ideas; this gets your brain ready to learn new info!
		Vocabulary Preview & Story	Learn the key (important) vocabulary you will see throughout the packet. Write a short story using all the vocabulary words.
	Lesson 2	PE: Get Some Space!	Learn specific exercises that will keep you healthy <i>and</i> help you get some “space.”
	Lesson 3	Measuring Distances to Galaxies	Read the scientific text and share what you have learned by talking about it. Improve your reading and speaking skills, and see the vocabulary used in context.
		PE: Get Some Space!	Exercise break! Refer back to the PE section and complete the next activities.
	Lesson 4	X = Space	Simplify the algebra expressions to determine the distance between planets.
		PE: Get Some Space!	Exercise break! Refer back to the PE section and complete the next activities.
	Lesson 5	Lonely as a Cloud	Read a classic English poem and analyze its symbolism and meaning. Create your own art inspired by the poem!
		PE: Get Some Space!	Exercise break! Refer back to the PE section and complete the next activities.
		Reflection	Think back to what you've learned. Make meaningful connections in your mind. Write to learn!

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Lesson 1

Space

Outer Space and Inner Space

Accessing Prior Knowledge

What do you **already** know?

This week you will be learning about space. When you see the word “space,” what do you think of? You probably think about the night sky, the moon, spaceships, and the stars. You have probably already learned a great deal (a lot) about the solar system and all of the planets in it, either in English or in your home language.



However, you may not have thought about the other meaning for the word “space.” When someone wants to be alone, they may say, “I need to get some space for a little while.” In other words, they want **solitude** or time without any other people or distractions.

Some people crave (want) solitude, while others avoid it **at all costs!** People who get their energy from being with other people are called “**extroverts**,” while people who are recharged by alone-time are called “**introverts**.” It’s important to understand how you get your energy in order to take good care of your body and mind.

Think about the following questions. Talk to a family member or friend to get your ideas flowing. Write your answers to help put your thoughts into words. *You may write in English or another language.*

1. What do you already know about outer space, our solar system, the planets, etc? How big is our planet compared to other planets? How far away are we from the sun? From Jupiter? Write anything you know about space.

2. Imagine this **scenario**: You are given the opportunity to live in outer space for one year. It will be a free trip, and you will have the freedom to travel anywhere you want to go. You will be able to walk on the moon or explore Mars on foot. However, you will be completely alone, and you will be unable to communicate with anyone on Earth until you return. Would you take this once-in-a-lifetime opportunity to live in space? Why or why not?

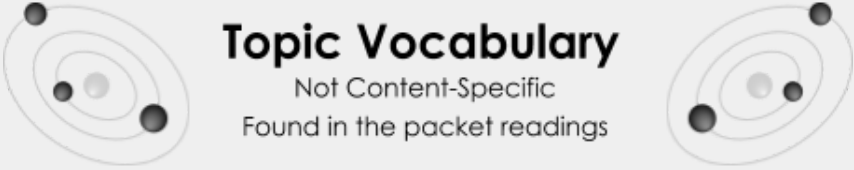

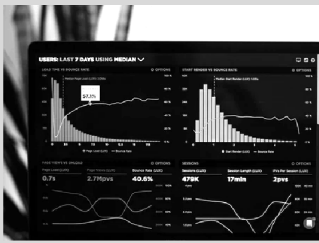


3. People who want alone-time will sometimes find a quiet room to go to or take a walk alone in a park. Others will put on their headphones and close their eyes. What do you do when you need to “get some space?” Is it sufficient (good enough), or do you wish you could improve your solitude?


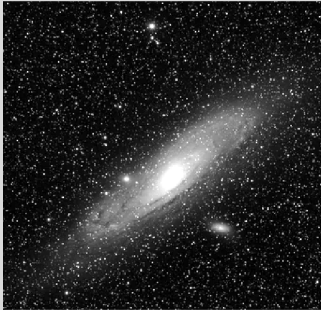



4. Think about what it means to be an extrovert or an introvert. Some people say they are somewhere in the middle, half extroverted and half introverted. Do you think you are an extrovert or an introvert? Do you get your energy from being around people or being alone? Or a mixture of the two? Give examples to support your answer.



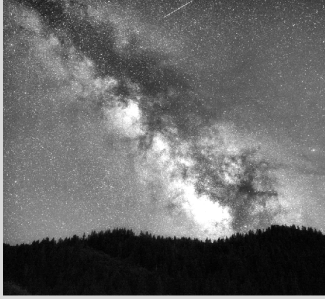


Photo by NASA on Unsplash

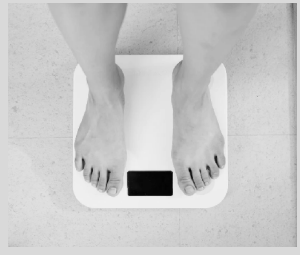





Packet 2 Vocabulary

Directions: Study the vocabulary notes for Packet 2. Then, write a way you will remember the word (home language, connection, drawing). You will then use the new vocabulary to write a short story about space!

 <p style="text-align: center;">Topic Vocabulary Not Content-Specific Found in the packet readings</p>			
Word	Definition <i>Example Sentence</i>	Visual	How I Remember This Word
at all costs	no matter the price or the energy required <i>He tries to win at all costs, even if that means fighting.</i>		
data	facts or information used usually to calculate, analyze, or plan something <i>The scientists reviewed all of the data before writing about what they learned from the experiment.</i>		
extrovert	a friendly person who prefers being around people to being alone <i>My friend is an extrovert, so he's a great public speaker.</i>		
fluctuation	a frequent change in level, strength, or value <i>We saw a large fluctuation in gas prices throughout the year.</i>		

<p>flutter</p>	<p>to move with quick, light movements</p> <p><i>The strong wind caused the leaves to flutter to the ground.</i></p>		
<p>galaxy</p>	<p>any one of the very large groups of stars that make up the universe</p> <p><i>There are more planets in our galaxy than just those found in our solar system.</i></p>		
<p>gaze</p>	<p>to look at someone or something in a steady way and usually for a long time</p> <p><i>She gazed out the window at the beautiful sunset over the mountains.</i></p>		
<p>introvert</p>	<p>a quiet person who prefers being alone to being around other people</p> <p><i>He's an introvert, so he doesn't mind working alone in his office all day.</i></p>		
<p>margin</p>	<p>the edge of something (a paper or land feature)</p> <p><i>My father always writes in the margins of his books.</i></p> <p><i>We drove to the margin of the private property.</i></p>		

<p>medium</p>	<p>the materials or strategies used by an artist</p> <p><i>Her preferred medium is watercolor, while her husband prefers sculpture.</i></p>		
<p>method</p>	<p>a way of doing something</p> <p><i>My husband taught me how to use a French press, which is now my preferred method for brewing coffee.</i></p>		
<p>Milky Way</p>	<p>a strip of light that can be seen in the night sky and that is caused by the light of many faint stars: the galaxy in which we live</p> <p><i>On a clear night, you can see the Milky Way from her backyard.</i></p>		
<p>precise</p>	<p>very accurate and exact</p> <p><i>Make sure your measurements are precise before you begin sawing the wood.</i></p>		
<p>rhythm</p>	<p>a regular, repeated pattern of sounds or movements</p> <p><i>The rhythm of the drum helped him march in time with everyone else.</i></p>		

<p>rounded (to)</p>	<p>to increase or decrease a number to the nearest whole or partial number</p> <p><i>I rounded 9.8 up to 10 and 5.3 down to 5.</i></p>		
<p>(to) scale</p>	<p>the size or level of something especially in comparison to something else</p> <p><i>A good map must be drawn to scale because you need to be sure that every distance on the map equals a certain distance in real life.</i></p>		
<p>scenario</p>	<p>a description of what could possibly happen</p> <p><i>A possible scenario would be that we retire early and move to California.</i></p>		
<p>solitude</p>	<p>a situation in which you are alone, usually because you want to be</p> <p><i>She enjoyed the peace, quiet, and solitude of life on a farm.</i></p>		
<p>surface</p>	<p>an outside part of layer of something</p> <p><i>The table has a shiny surface that reflects light.</i></p>		
<p>vacant</p>	<p>not filled, used, or lived in: not full of thoughts or ideas</p> <p><i>The old house sat vacant for over a year until someone finally bought it.</i></p>		

Lesson 2

Get Some Space!

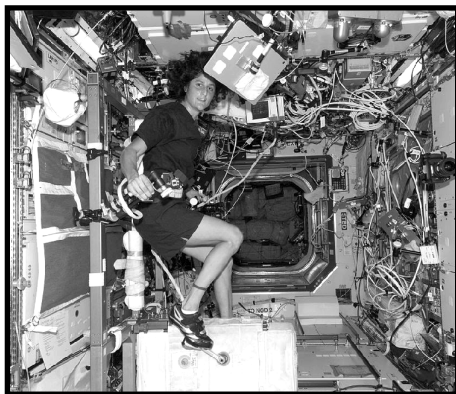
Strengthen Your Body & Clear Your Mind

By now you've thought about the different meanings of the word "space," both outer space (planets and galaxies) and inner space (alone time and **solitude**). This week, you'll be doing exercises that relate to space in more ways than one.



Exercising in Space

Everyone knows that it's important to exercise to stay in shape—on Earth, that is. But when you're in orbit, exercise is absolutely vital! Physical activity is the most effective way to counteract the adverse effects of weightlessness on the human body. Exercise is therefore a crucial part of the daily routine on board the International Space Station (ISS). Over the course of a long-duration mission, astronauts must exercise approximately two hours per day!



On Earth, each time we move, gravity provides resistance to the muscles and bones of our body. It's like we're exercising without even realizing it! That way, our body stays strong enough to support our weight. In microgravity, however, bones and muscles no longer have to support the weight of astronauts' bodies. What's more, the cardiovascular system becomes lazy because the heart doesn't have to work as hard as it does on Earth to counteract gravity and pump blood up to the head.

If astronauts didn't exercise while they were in space, their bodies would experience major loss in muscle mass, bone density, and cardiovascular health. In order to maintain cardiovascular health (heart and blood vessels), astronauts use a special low-gravity *stationary bicycle* to get their heart rate going. And when astronauts need to maintain their muscle strength and bone density, they target major muscle groups by performing *heel lifts* and *squats* (with a special machine that provides the resistance we get here on Earth.)



Get Some Space!

Strengthen Your Body & Clear Your Mind

How to Get Some Headspace

If you're feeling stressed or overwhelmed, it's important to take time to get some "headspace." One way to make some room in your mind is to try out some calming yoga moves and relaxing breathing exercises. First, try to find a quiet place to practice. Sit with your legs crossed like the woman in the picture. Close your eyes, keep your back straight, and your face forward.



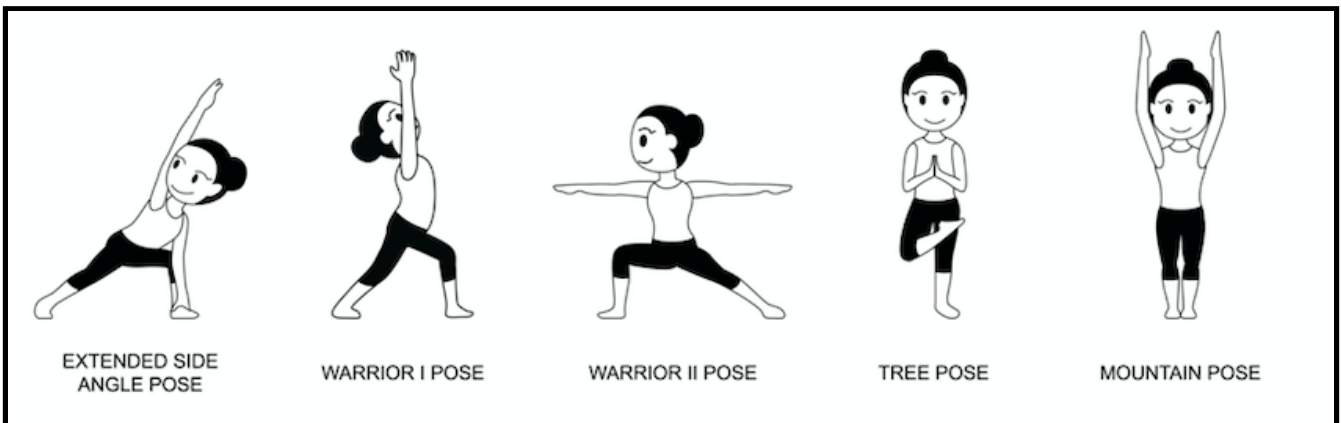
4 + 7 + 8 Breathing Technique

The numbers in this exercise represent the number of seconds you will hold each part of the breath.

1. Exhale all of the breath out of your mouth. This should make a "whoosh" sound, like wind through a tunnel.
2. Then close your mouth and inhale softly through your nose for 4 seconds.
3. Hold your breath as you count to 7.
4. Then exhale completely again through your mouth for a count of 8.
5. Repeat this breathing cycle 10 times.

Make Some Space with Yoga!

The following yoga poses require a little bit of space, so be sure to spread out. Also, continue to focus on your breathing as you practice the following poses. They are harder than they look, so be patient with yourself. Yoga is all about focusing on your body, your breath, and how you feel.



-Adapted from "Physical Activity in Space" *Canadian Space Agency*, Public Domain

-Meditation images by Dingzeyu Li and Le Minh Phuong on Unsplash

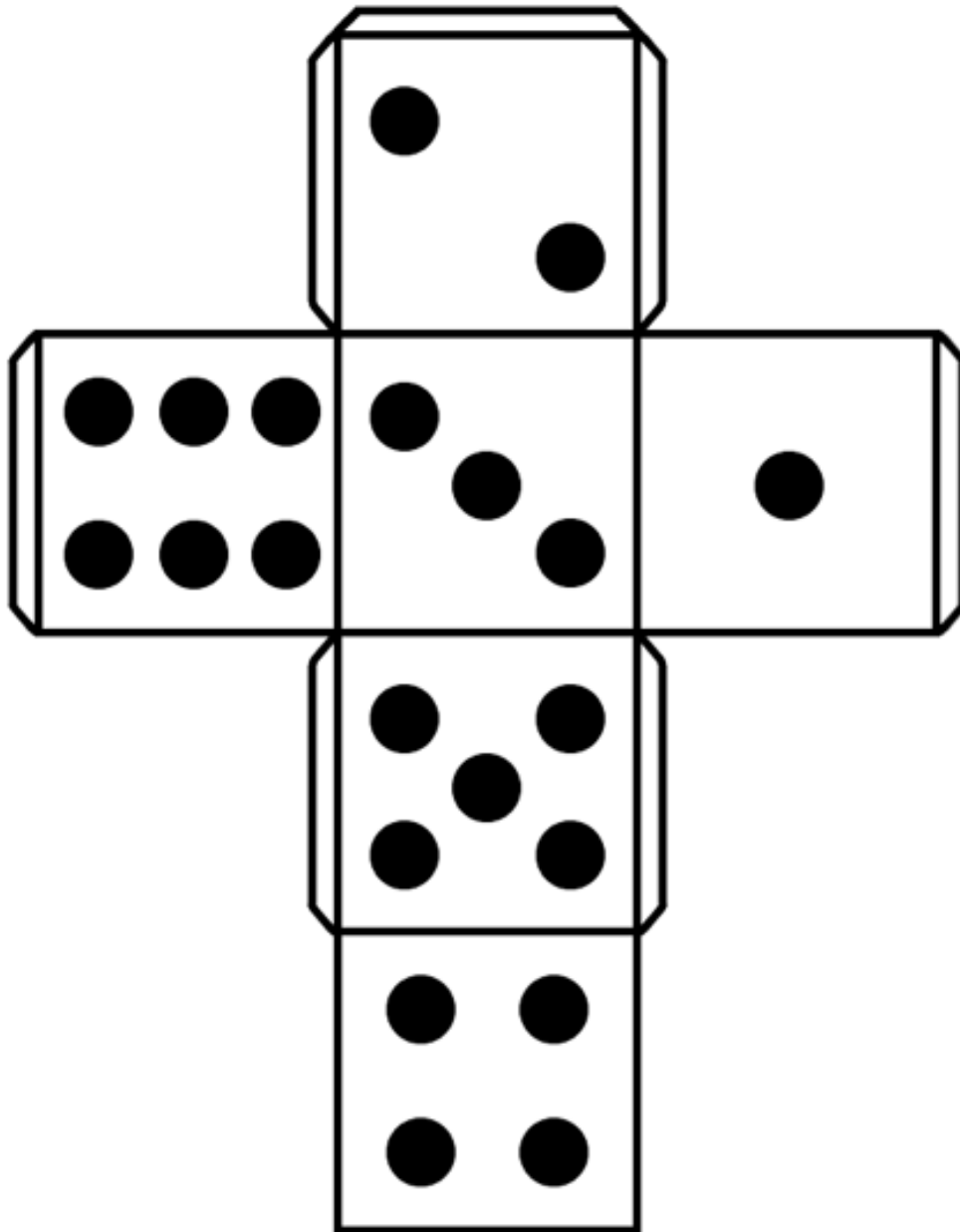
Get Some Space!


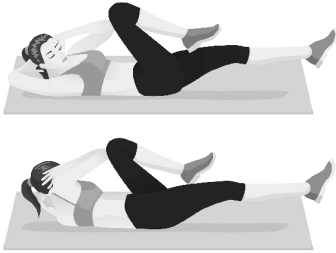

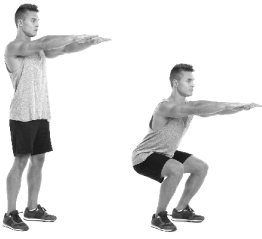












Strengthen Your Body & Clear Your Mind

Cut out this graphic and tape it together to make a die. (1 die, many dice)

Roll the die to determine which exercise you will do first. (Exercises on next page)

Use this die for your "Get Some Space" exercise breaks each day.



			
			
	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  WARRIOR II POSE </div> <div style="text-align: center;">  TREE POSE </div> <div style="text-align: center;">  MOUNTAIN POSE </div> </div>		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  EXTENDED SIDE ANGLE POSE </div> <div style="text-align: center;">  WARRIOR I POSE </div> <div style="text-align: center;">  WARRIOR II POSE </div> </div>



Lesson 3

Measuring Distances to Galaxies

by Jonathan D. Davis

SPACE IS BIG

Pretend you are in a Ferrari, zooming at 300 kph (186 mph). If you did not have to stop, you could go around the earth in about 133 h, or 5.5 days. Now imagine if your Ferrari suddenly could travel to the sun. It would take nearly 4,000 times longer to get to the sun than to drive around the earth! That is ~22,000 days in the Ferrari!



Our closest star is called Alpha Centauri. To get there, it would be like driving to the sun almost 300,000 times! The closest **galaxy**, Andromeda, is nearly 600,000 times farther than Alpha Centauri! And the farthest galaxies measured are over 100 times farther than Andromeda, and to get to the end of the visible universe, go 150 times farther than that!

Measuring Space With Parsecs

Because space is so big, astronomers do not like to use miles or kilometers because of all the zeros! Instead, they use a measurement called a parsec. Alpha Centauri is 1.347 parsecs, or 41,560,000,000,000 (or 41.56 trillion) kilometers away.

BUMPY GALAXIES

How do we know how big space really is? One **method** astronomers use is called **surface brightness fluctuations (SBF)**. Think about a phone screen. If it's close to your face, you will see the *pixels*, the tiny lights that make up the image. When you back away from the screen, you are no longer able to see the pixels. Your phone screen is nothing more than pixels, so that's why you can see them so well up close. Similarly, galaxies are just a bunch of stars clumped together. When a galaxy is close to us, we see bigger bumps created by its stars. When it is farther away, all the stars blend together, and the galaxy will look really smooth, just like a screen looks from further away.

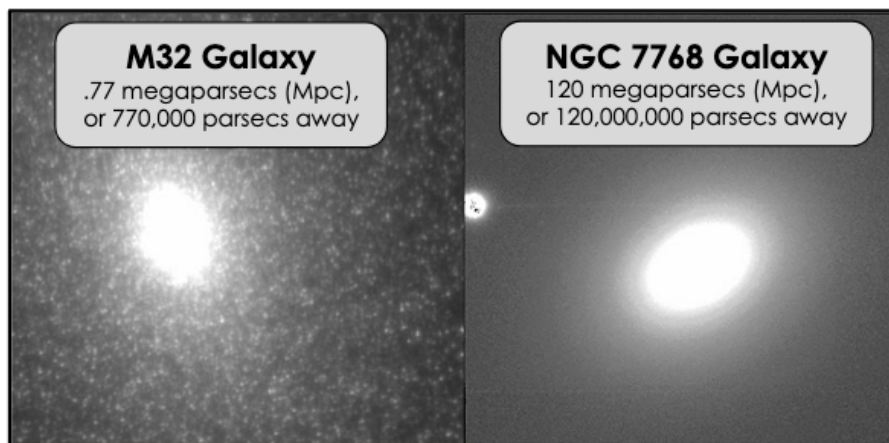
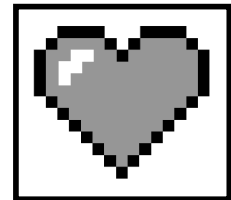


Figure 1 - M32 looks much bumpier than NGC 7768 because it is closer to us.

Measuring Bumps

To measure the size of the bumps in a far-away galaxy, we use a computer to remove parts of the picture, leaving only the bumps. We then compare the number of big bumps to small bumps. If there are a lot of detailed, sharp bumps, that could mean the galaxy is closer to us. If the same galaxy is farther away, we will see only less-detailed, smoother bumps. If you know the color of that galaxy and how many stars it has, you can then figure out how much light you should see if it is a certain distance away.

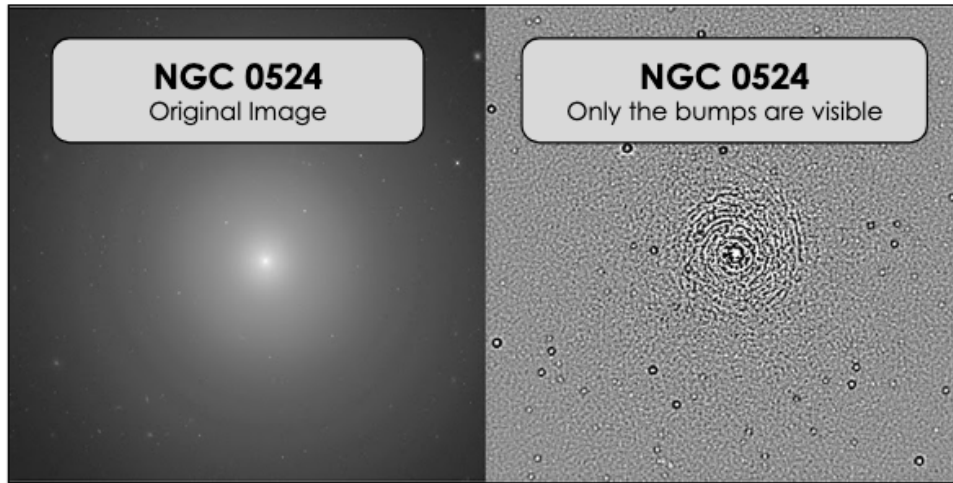


Figure 2 -The size of the bumps depend on the galaxy's distance and its temperature.

COLORFUL GALAXIES

Have you ever wondered why some parts of a fire are red, orange, yellow, or white? This is because cooler parts of the fire look red, hotter parts look orange, even hotter parts look yellow, and the hottest are white. If you could get the fire hot enough, it would even start to look blue. Just like fire, colder-star galaxies look red and hotter-star galaxies look bluer. When we know the color of a galaxy, we know how hot the stars are. From the galaxy's color, we learn how hot the stars are and how much light they are creating. We can then figure out how bright the galaxy should be at a certain distance.



Color and Bumps Together Can Give Distance

Imagine you are right next to a fire; you can feel its warmth, and you might even have enough light to read a book. But imagine that you start walking away from the fire. You will quickly feel colder, and soon it will be too dark to read. The fire will also look like it is just one color, instead of a bunch of colors. That is not because the fire is going out, or because it is now a single color, but because you are farther away from the fire. If you carefully compared the way the fire looks when you are next to it with the way it looks from far away, you could calculate how far you walked. Just like with a campfire, we see less light and detail from galaxies the farther away they are.



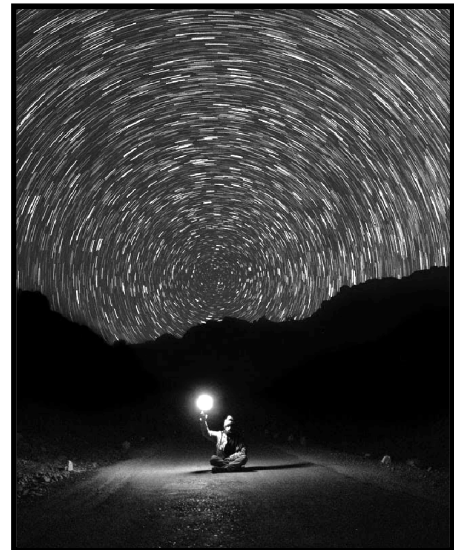
Figure 3 - The fire on the left is close enough that you could see different colors and feel its heat. On the right, the fire is dimmer because it is farther away. You would not be able to feel its heat.

Once we know how hot the stars are and the size of the galaxy's bumps, we know how many stars there are in that galaxy and how much light the galaxy is creating. We can finally calculate the distance the galaxy is from Earth, just like measuring how far you walked by comparing the light coming from the fire.

WHY IS THIS IMPORTANT?

Over 300 years ago, Sir Isaac Newton figured out how the planets orbit around the sun. That itself was a great discovery, but what most people do not realize is that he was also developing calculus, a type of math that has helped people invent things like satellites, computers, phones, the internet, and tools for doctors to save lives! Even the food you eat and the clothes you wear are there because scientists made huge discoveries about how our universe works.

But why is SBF important to use? If you remember how big space is, and how everything is super far away, it is really difficult to measure the distances to far-away galaxies. We know how far away some galaxies are, but generally, the ones we know about are really close to Earth. If we want to measure the distance to a galaxy that is farther away, we can compare its color and bumpiness to those qualities of galaxies that are closer, and then make a distance measurement from those **data**. So, SBF can give us the distance to a galaxy that we otherwise would not have been able to measure.



SO, WHAT IS NEXT?

Because it takes a lot of work, SBF has only been performed on some galaxies. There will be many new telescopes in the future, taking lots of pictures, so we will have many more pictures than we have now. Scientists are working on computer programs that will make it much faster to analyze these pictures and make distance measurements, so that we can measure distances to as many galaxies as possible!

Measuring Distances to Galaxies

Critical Thinking & Speaking



You just read a scientific article about *how* astronomers measure the distances between galaxies and *why* it's important. It's now time to process this new information. One great way to remember what we've learned is to **talk about it to someone else**.

You have **two options** to practice speaking about what you've learned:



Talk to someone!

Find a family member, friend, neighbor....it doesn't matter who! Just find someone who you can talk to! Help them understand the article you just read. Summarize the main points and explain all of the complex ideas. *You may speak in any language, but try to incorporate (include) some of the English vocabulary you have learned.*

OR

“Record” a message to another astronomer.

Pretend you are an astronomer, and you have discovered a new galaxy. This is a very exciting discovery! You must immediately record your findings (the interesting new info you found) by speaking into a recording device. Explain what you have found and why it's significant. *You do not really need a recording device like a phone or a microphone. Just pretend you are telling someone every detail of your discovery.*



Consider the following questions before you begin your conversation:

-How do astronomers determine the distance to another galaxy?


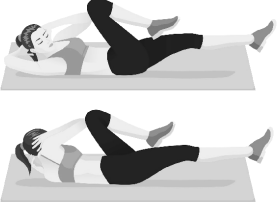

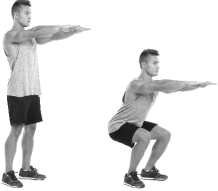





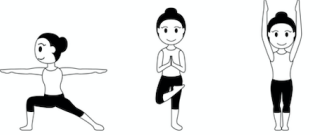


- *What is their process?
- *What do they do first?
- *What tools and technology do they need?

-What have you observed (seen) about your imaginary galaxy?

- *Does it have bumps? *What color is it?
- *What can you learn using the SBF method?

Adapted from “Measuring Distances to Galaxies” *Frontiers for Young Minds*, licensed CC-BY
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Photos by Joshua Rawson-Harris, Leon Contreras, Yash Raut, Alexander Andrews, Shawnee D on Unsplash

PE: Get Some Space!

			
			
	 <p>WARRIOR II POSE TREE POSE MOUNTAIN POSE</p>		 <p>EXTENDED SIDE ANGLE POSE WARRIOR I POSE WARRIOR II POSE</p>

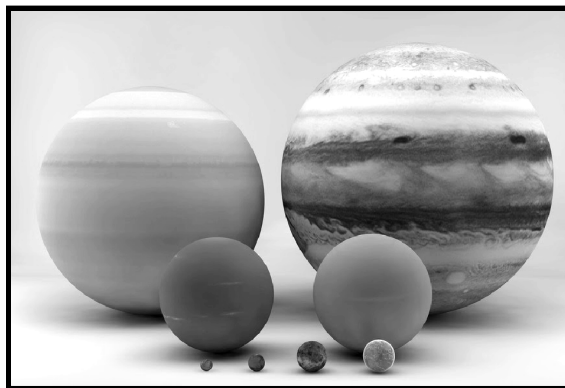


Lesson 4

X = Space

Using Algebra to Study the Solar System

As you now know, astronomers use **surface brightness fluctuations (SBF)** to determine the distances between **galaxies**. And Sir Issac Newton used calculus to help him learn how the planets orbit the sun. But *you* won't be using either of those **methods** today. In this activity, you will determine the distance between the planets in our solar system by using Algebra!



Just simplify the expressions using the correct Order of Operations (PEMDAS). And *voila!* You'll have the answer, which in this case, represents the distance between the planets!

First, a Quick Review:

<p><u>Order of Operations PEMDAS</u></p> <p>Parentheses (Grouping)</p> <p>Exponents</p> <p>Multiply and Divide (Left to Right)</p> <p>Add and Subtract (Left to Right)</p>	<p>$2 + 3(9-4)^2$ Parentheses first!</p> <p>$2 + 3(5)^2$ Exponents</p> <p>$2 + 3(25)$ Multiply</p> <p>$2 + 75$ Add</p> <p>77 SOLUTION</p>
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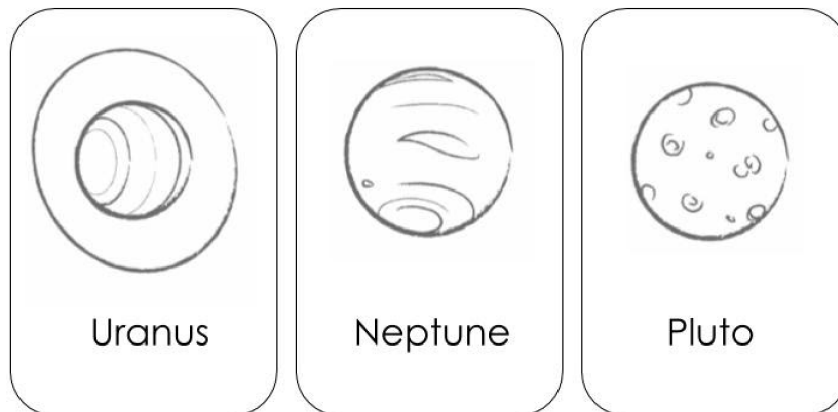
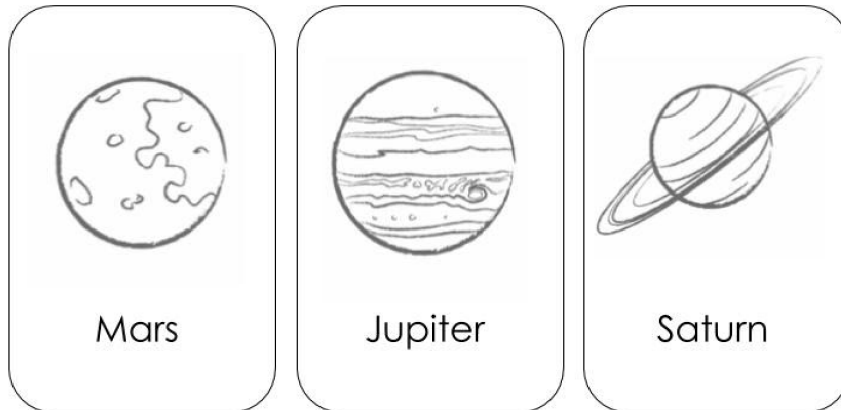
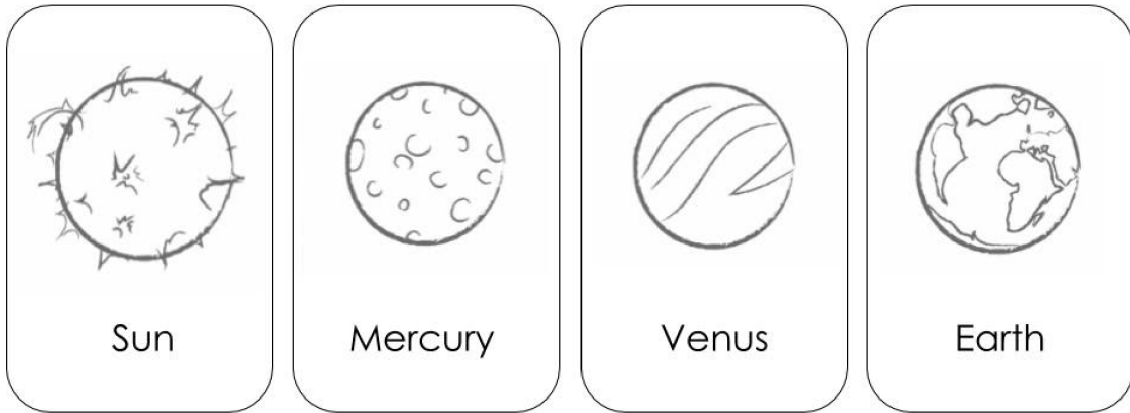
How to complete this activity:

1. Cut out the planet cards.
*Note: They are not to **scale**. The picture at the top of this page shows a better representation of the size of the planets.*
2. Cut out the AU Ruler.
3. Simplify the expressions to determine the distances between planets.
4. Use the answers to lay out the planet cards at the appropriate distances.
Use the AU Ruler as a measuring tool.



Step 1: Cut out the planet (and sun) cards

You'll lay these on the floor to show their distances from each other.

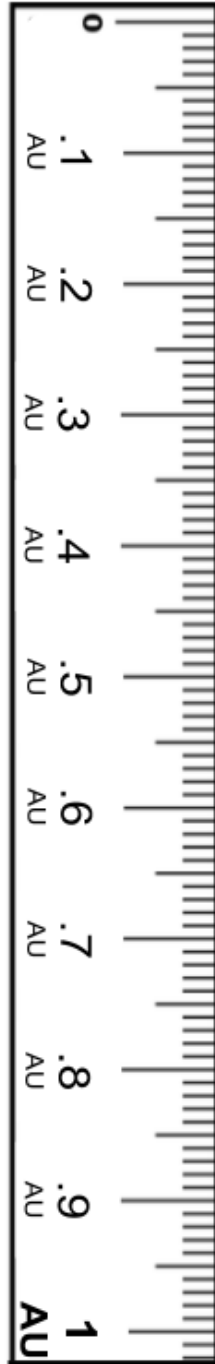




Step 2: Cut out the AU Ruler

You'll use this to help you measure the distance between the planet cards.

You learned about Parsecs in the scientific text "Measuring Distances to Galaxies." You'll now learn another unit of measurement called an AU (Astronomical Unit). An AU is much, *much* smaller than a Parsec. For this activity, you will measure the distances between planets using AUs. [1 Parsec = 206,265 AU]





Step 3: Use PEMDAS to Simplify the Expressions

Use the answers to determine the distance between the planet cards.
Distances are not **precise**. Numbers are **rounded** to the nearest hundredth AU.

Order of Operations **PEMDAS**

- Parentheses (Grouping)
- Exponents
- Multiply and Divide (Left to Right)
- Add and Subtract (Left to Right)

Sun to Venus

7 AU


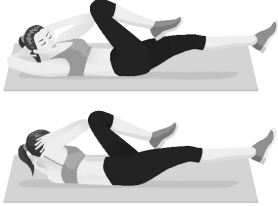

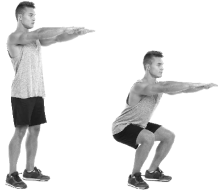





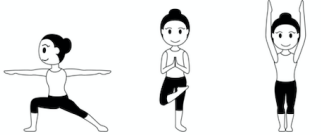


$$(60-5) \div 5 - 2^2$$

$$55 \div 5 - 2^2$$

$$11 - 4 = 7$$

1.	<p>Sun to Mercury · ___ AU</p> $(52 - 12) \div 5 - 2^2$	6.	<p>Jupiter to Saturn ___ · ___ AU</p> $(8 + 8^2) \cdot (2 + 2^2)$
2.	<p>Mercury to Venus · ___ AU</p> $6 \cdot (1 + 4) + 2^2$	7.	<p>Saturn to Uranus ___ · ___ AU</p> $(158 + 6^2) \div (3^2 - 7)$
3.	<p>Venus to Earth · ___ AU</p> $(8 - 3)^2 + (15 \div 5)$	8.	<p>Uranus to Neptune ___ · ___ AU</p> $(6 \cdot 12 + 8^2) \cdot 8$
4.	<p>Earth to Mars · ___ AU</p> $(88 + 48) \div 2 - 4^2$	9.	<p>Neptune to Pluto ___ · ___ AU</p> $(8 - 2)^2 - (24 \div 2)$
5.	<p>Mars to Jupiter ___ · ___ AU</p> $(9 \cdot 9 + 9^2) + (31 \cdot 5 + 7^2) + 2$	10.	<p>Sun to Pluto ___ · ___ AU</p> $5 \cdot (10 + 3^2) \cdot 2^2 + (5 \cdot 3)$

PE: Get Some Space!

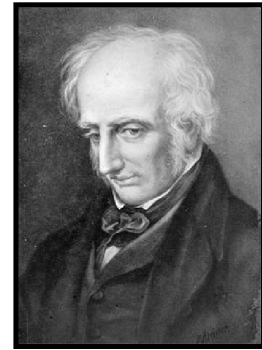
			
			
	 <p>WARRIOR II POSE TREE POSE MOUNTAIN POSE</p>		 <p>EXTENDED SIDE ANGLE POSE WARRIOR I POSE WARRIOR II POSE</p>



Lesson 5

Lonely as a Cloud

Poetry Inspiring Art



In this activity, you will read “I Wandered Lonely as a Cloud” by William Wordsworth, a poet who helped develop Romanticism in English literature. (*Romanticism was an artistic movement that originated in Europe.*) He was born in 1770 and died in 1850, but scholars still read his poems today!

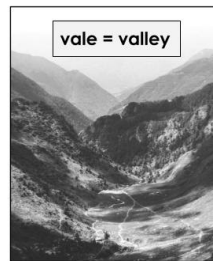
Some of the words will be new or unfamiliar to you. They are also unfamiliar to many native English speakers. English has changed somewhat in the last 200 years! You will recognize many of the difficult words from your packet vocabulary list. The other difficult words have been defined for you.

Poetry is meant to be read aloud, so feel the **rhythm** of the words as you read it to yourself!

“I Wandered Lonely as a Cloud”

BY WILLIAM WORDSWORTH

I wandered lonely as a cloud
That floats on high o'er **vales** and hills,
When all at once I saw a crowd,
A **host**, of golden **daffodils**;
Beside the lake, beneath the trees,
Fluttering and dancing in the breeze.



A “**host**” is a large number of people or things.

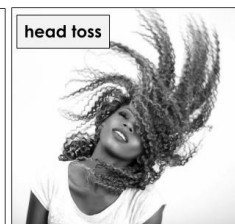
If there is a “host of” something, there is a lot of it.



Continuous as the stars that shine
And twinkle on the **milky way**,
They stretched in never-ending line
Along the **margin** of a **bay**:
Ten thousand saw I at a glance,
*Tossing their heads in **sprightly** dance.*



“**Sprightly**” means lively, or full of energy



The waves beside them danced; but they
Out-did the sparkling waves in glee:
A poet could not but be **gay**,
In such a **jocund** company:
I **gazed**—and **gazed**—but little thought
What wealth the show to me had brought:

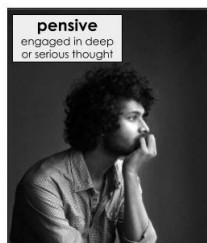


The word “**gay**” originally meant “lighthearted, carefree, and happy.”

It is used in this way in the poem.



For **oft**, when on my couch I lie
In **vacant** or in **pensive** mood,
They flash upon that inward eye
Which is the **bliss** of **solitude**;
And then my heart with pleasure fills,
And dances with the daffodils.



“**Oft**” is an old-fashioned word for “often.” It is generally used in older poems or literature.



Poetry Inspiring Art

It's time to let the poetry inspire your own artistic talents!
But before you begin, consider the following questions:



1. Did you read the poem several times out loud?

It's always a good idea to read a text more than once, but with poetry, it is even more important to do so! A poem carries a lot of hidden meaning, so you may need to read it multiple times to understand all of the hints and artistic clues.

2. Did you stop after each line/stanza to picture the poetic images in your mind?

Poems are separated by "lines" and "stanzas." A "stanza" is like a little paragraph in a poem. In order to picture what is happening in a poem, it's a good idea to stop after each line or each stanza and make sure you understand what you have just read.

3. Do you have a general idea of the mood of the poem?

A poem can have a mood, just like a person can! Is the poem expressing happiness, sadness, fear, anger? If you're not sure, pay attention to the words the poet uses and the scene they are describing.

4. Could you talk to someone else about this poem and discuss its meaning?

Poetry, like all art, is experienced differently by different people. What was your experience? How would you describe the poem if you were to talk about it with someone else?

Collect Your Thoughts

Before you begin creating your art, you may want to stop to think about how the poem made you feel. What pops into your mind when you think about the poem and the images you pictured in your mind? What does the poem have to do with space, alone time, and **solitude**? Can you relate to the feelings the poet shared? But don't think too much! Sometimes the best art is created without much thought at all.

Choose Your Medium

Now it's time to choose which kind of art you would like to create.

This is called your "**medium**." You could:

- write a poem, short story, or comic strip
- draw a picture
- write a song
- create a dance

The next page has been left blank for you. Use it to create your art or take notes of your ideas. Whatever you decide to do, be sure to share it with someone else and tell them about what you learned from the poem and how it inspired your artistic process.

Images by Yoksel Zok, Fabrizio Conti, Vincenzo Malagoli, Kelly Sikkema, Jorge Gonzalez, Antonino Visalli, Kazi Mizan, Allef Vinicius, and Ebi Zandi on Unsplash

Reflection

A Focus on Space

You have now learned a lot about space. You began by thinking about what you already knew about **space** in terms of galaxies and the solar system, as well as **alone time**, **introversion** and **extroversion**, and a relaxed mind. You were introduced to new **vocabulary**, practiced it, and used it throughout the activities. You learned how **astronomers** measure the distances between **galaxies** and why it's important to the development of **future technology**. You learned the distances between planets by using **algebra** to simplify expressions. You exercised your body using techniques that help you get in shape and get some **headspace**. You learned about **poetry** from the Romantic era and how the English language has changed. You allowed poetry to inspire your own **artistic expression**, either in **writing**, **music**, **drawing**, or **dance**. Now it is time to **reflect** (think back on) all that you have learned.



If you are struggling to begin, first try answering the following questions:

You are not required to write these; just think about them to help you get started.

- Did the activities in this packet challenge you socially, culturally, emotionally, or in some other way? If so, which activity? How? Why did it catch your attention?
- Have the activities changed your way of thinking? Did they conflict with beliefs you held previously, and what evidence did it provide you with in order to change your thought process on the topic?
- Did the activities leave you with any questions? Were these questions ones you had previously or ones you developed only after finishing?
- How do the ideas presented in this packet mesh (fit in) with your own experiences?

-Adapted from "How to Write a Reflection Paper" via *Wikihow* licensed under CC-BY-NC-SA 3.0

-Photo by Noah Silliman on Unsplash

Reference Sheet

LENGTH

Metric	Customary
1 kilometer = 1000 meters	1 mile = 1760 yards
1 meter = 100 centimeters	1 mile = 5280 feet
1 centimeter = 10 millimeters	1 yard = 3 feet
	1 foot = 12 inches

CAPACITY AND VOLUME

Metric	Customary
1 liter = 1000 milliliters	1 gallon = 4 quarts
	1 gallon = 128 ounces
	1 quart = 2 pints
	1 pint = 2 cups
	1 cup = 8 ounces

MASS AND WEIGHT

Metric	Customary
1 kilogram = 1000 grams	1 ton = 2000 pounds
1 gram = 1000 milligrams	1 pound = 16 ounces

TIME

1 year = 365 days
1 year = 12 months
1 year = 52 weeks
1 week = 7 days
1 day = 24 hours
1 hour = 60 minutes
1 minute = 60 seconds



ICMEE is housed within:

ANSWER KEYS

X = Space ★ANSWER KEY★

Using Algebra to Study the Solar System

1.	Sun to Mercury = <u>.4</u> AU $(52 - 12) \div 5 - 2^2$ $40 \div 5 - 2^2$ $40 \div 5 - 4$ $8 - 4$ 4	6.	Jupiter to Saturn = <u>4.32</u> AU $(8 + 8^2) \cdot (2 + 2^2)$ $(8 + 64) \cdot (2 + 4)$ $72 \cdot 6$ 432
2.	Mercury to Venus = <u>.34</u> AU $6 \cdot (1 + 4) + 2^2$ $6 \cdot 5 + 2^2$ $6 \cdot 5 + 4$ $30 + 4$ 34	7.	Saturn to Uranus = <u>9.7</u> AU $(158 + 6^2) \div (3^2 - 7)$ $(158 + 36) \div (9 - 7)$ $194 \div 2$ 97
3.	Venus to Earth = <u>.28</u> AU $(8 - 3)^2 + (15 \div 5)$ $5^2 + 3$ $25 + 3$ 28	8.	Uranus to Neptune = <u>10.88</u> AU $(6 \cdot 12 + 8^2) \cdot 8$ $(6 \cdot 12 + 64) \cdot 8$ $(72 + 64) \cdot 8$ $136 \cdot 8$ 1088
4.	Earth to Mars = <u>.52</u> AU $(88 + 48) \div 2 - 4^2$ $136 \div 2 - 4^2$ $136 \div 2 - 16$ $68 - 16$ 52	9.	Neptune to Pluto = <u>2.4</u> AU $(8 - 2)^2 - (24 \div 2)$ $6^2 - 12$ $36 - 12$ 24
5.	Mars to Jupiter = <u>3.68</u> AU $(9 \cdot 9 + 9^2) + (31 \cdot 5 + 7^2) + 2$ $(9 \cdot 9 + 81) + (31 \cdot 5 + 49) + 2$ $(81 + 81) + (155 + 49) + 2$ $162 + 204 + 2$ 368	10.	Sun to Pluto = <u>39.5</u> AU $5 \cdot (10 + 3^2) \cdot 2^2 + (5 \cdot 3)$ $5 \cdot (10 + 3^2) \cdot 2^2 + (15)$ $5 \cdot (10 + 9) \cdot 4 + 15$ $5 \cdot 19 \cdot 4 + 15$ $95 \cdot 4 + 15$ $380 + 15$ 395