

# WORMLY

## Moon Exploration Edition

Classroom Implementation Guide & Mini Lesson Plans

Science of Reading Aligned | Grades K–5

### This Month™ Educational Resources

*ELA | Phonics | Morphology | Vocabulary | K–5 Differentiated*

## GAME OVERVIEW

Wormly: Moon Exploration Edition is a differentiated, Science of Reading-aligned spelling game for grades K–5. Students guide Wormly — an animated worm explorer — across the lunar surface to collect glowing letters, then drag and place those letters to spell mission words.

The Moon Edition is built on a 90-word database (30 per grade band) drawn from real NASA Artemis mission vocabulary, Physics Friday classroom science content, and SoR-aligned phonics and morphology progressions. Every word is tagged with its SoR pattern, focus area, difficulty tier, category, and morpheme notes — making this edition a curriculum-ready tool, not just a game.

### What makes this a Science of Reading tool?

Every word is chosen to illuminate a specific phonics pattern or morphological structure — not just to be space-themed.

Letter boxes use letter morphology: tall boxes for ascenders (b, d, f, h, k, l, t), hanging boxes for descenders (g, j, p, q, y), and standard boxes for mid-height letters.

The three-tier vocabulary design (Tier 1 = decodable, Tier 2 = instructional, Tier 3 = stretch) mirrors the lexical tiers used in SoR frameworks.

The word list spirals: orbit, trajectory, velocity, spacecraft, astronaut, reentry, and splashdown appear in multiple grade bands with increasing morphological depth.

## HOW TO USE IN THE CLASSROOM

### Setup

Open the Wormly Moon Exploration Edition HTML file in any modern browser. The game works on tablets, Chromebooks, laptops, and desktop computers. For whole-class use, project on a smartboard. For small groups or centers, one device per 1–2 students works well.

### Grade Band Selection

Use the grade selector (K-1st / 2nd-3rd / 4th-5th) at the top of the screen to choose the appropriate word list. Students can switch bands mid-session — this is ideal for differentiated small groups working from the same device queue.

## Gameplay

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- Students guide Wormly using arrow keys, mouse click-and-drag, or finger touch (touchscreen).
- Glowing blue letters appear across the lunar surface — Wormly must navigate to collect them.
- Once collected, letters appear in the tray at the bottom of the screen.
- Students drag and drop collected letters into the letter boxes above to spell the target word.
- Correct placements glow blue; incorrect attempts trigger a shake animation and error sound.
- After 5 words, a Mission Report screen summarizes performance with time, attempts, and errors per word.

## The Activity Record (Formative Assessment Export)

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Click “Download Activity Record” on the results screen to export a plain-text report for each session. The report includes:

- Grade level and date
- Accuracy rate and total errors across all 5 words
- Per-word breakdown: time spent, number of attempts, number of errors, and which letters were confused
- Learning Insights: auto-generated SoR-aligned notes based on performance patterns

These records can be filed in a student portfolio, used for anecdotal notes, or shared with families. They do not contain student names (FERPA-safe) — add a student token or name manually before filing.

## SOR FRAMEWORK & WORD SELECTION RATIONALE

The Moon Edition word database was built using the Science of Reading framework as its organizing structure. The following principles guided every word selection decision:

### K–1: Systematic Phonics First

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All 30 K–1 words target phonics patterns from a standard systematic scope and sequence: short vowels (CVC), vowel teams (oo, ea, oa, ow, ew, ue), r-controlled vowels (ar, or, er), consonant blends (bl-, cr-, dr-, fl-, gl-, sk-, sl-, sp-, st-, tr-), and digraphs (sh-, th-, -ck, -nch). Every word is fully decodable within a standard K–1 phonics sequence.

### Grades 2–3: Morphology Foundations

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The 2–3 list shifts the primary instructional lever from phonics to morphology. Most words in this band carry a Tier 2 classification and feature a high-utility suffix (–tion, –ure, –ty, –ion, –er, –al, –ic) or a productive prefix (re–, pro–, dis–). Three words (velocity, propulsion, trajectory) are intentional Tier 3 “stretch” words — introduced here with morpheme scaffolding and then deepened in the 4–5 band.

### Grades 4–5: Morpheme Chains & Etymology

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The 4–5 list is almost entirely Tier 3 and almost entirely Morphology-focused. Words like geosynchronous (four morphemes: geo + syn + chron + ous), interplanetary (inter- + planet + -ary), and acceleration (ad- + celer + -ation) are selected because they reward morpheme analysis and connect to word families students already know. The list includes deliberate Greek–Latin contrast pairs: astronaut vs. cosmonaut (astro- vs. kosmos-, same -naut suffix).

## The Spiral Design

Seven words appear in more than one grade band: orbit, trajectory, velocity, astronaut, spacecraft, reentry, and splashdown. This is intentional. In K–1, orbit is a phonics word (r-controlled or). In 2–3, it is a fluency and automaticity target. In 4–5, it is a morpheme analysis anchor (Latin orbita, a track or course). The game’s grade selector makes this spiral visible and actionable for teachers.

### MINI LESSON PLAN: K–1

**SoR Focus:** Systematic Phonics — Vowel Teams, Blends, Digraphs, R-Controlled Vowels |

*Duration: 25–30 minutes*

Time	Phase	Teacher Does	Students Do
5 min	Launch	Show students the moon photo on the screen. Ask: "What do you see? What would it feel like to walk on the moon?" Say: "Today we are going on a moon mission — but first, we need to learn our mission words!"	Share observations about the moon image. Turn and talk with a partner: "One thing I notice is..."
5 min	Word Wall Preview	Display 5 target words on the board: moon, star, blast, crew, orbit. Tap each phoneme as you say the word aloud (e.g., /m/ /oo/ /n/). Point out the oo vowel team in moon and the blend in blast.	Echo-read each word after the teacher. Tap phonemes on fingers. Identify the "tricky part" in each word.
5 min	Letter Box Preview	Use a whiteboard to draw letter boxes for BLAST (5 boxes). Explain how tall letters (b, l, t) stand up, and short letters (a, s) sit in the middle. Point out the boxes change size to match the letter shape — this is the letter box morphology feature in Wormly.	Trace letter shapes in the air. Tell a partner: "Which letters are tall? Which are short?"
10 min	Play	Open Wormly Moon Exploration Edition on K-1 mode. Model one word: guide the worm, collect letters, drag to boxes. Release students to play independently or in pairs.	Guide Wormly with mouse, finger, or arrow keys. Collect glowing letters from the lunar surface. Drag and drop letters into the correct boxes.
5 min	Debrief	Ask: "Which word was hardest? Why?" Revisit one word — write it on the board and segment phonemes together. Download the Activity Record to review student attempt data.	Share one word they spelled and how they figured it out. Practice writing their hardest word in their notebook.

## K–1 Differentiation

- Below grade: Pre-teach 3 words before play. Use only short CVC words (sun, rock, spin, fast, push, pull, drop) for first session.
- On grade: Standard gameplay. Encourage whisper-reading before dragging letters.
- Above grade: After finishing K–1 words, switch to 2–3 mode. Ask them to identify the suffix in each word.

### MINI LESSON PLAN: GRADES 2–3

**SoR Focus:** Morphology — Suffixes (-tion, -ure, -ty, -ion, -er, -al, -ic), Compound Words, Syllable Types | *Duration: 30 minutes*

Time	Phase	Teacher Does	Students Do
5 min	Activate	Write GRAVITY on the board. Ask: "Has anyone heard this word? Where?" Underline -ty. "This ending changes a describing word into a noun. What's the base word?" Preview today's focus: suffixes -tion, -ty, -ion and how they build science vocabulary.	Brainstorm where they've heard the word gravity. Identify the base word (grave is not it — closer to Latin gravis, heavy). Make a prediction about what -tion does to a word.
5 min	Morpheme Sort	Write pairs on the board: rotate / rotation, press / pressure, mission / emit. Ask students to identify the shared suffix and what it does to meaning. Introduce the concept: suffixes can turn verbs into nouns (nominalizers).	Sort word pairs by suffix type (-tion, -ure, -ion). Write one sentence using a base word and one using the derived form.
3 min	Preview	Preview 5 game words from 2-3 list: gravity, rotation, liftoff, astronaut, lunar. For astronaut: "astro- means star, -naut means sailor. Astronaut = star sailor. Isn't that cool?" For lunar: "Luna is Latin for moon. Where else do you see luna?"	Repeat each word, clapping syllables. Write the morpheme breakdown in their word journal: astro + naut.
12 min	Play	Open Wormly in 2nd-3rd Grade mode. Circulate and prompt: "How many syllables? Where does it break?" For longer words, encourage students to whisper-read before dragging letters.	Play through 5 words. After each word, write the word and circle any prefix or suffix they recognize.
5 min	Transfer	Exit ticket: Write two mission words and break them into morphemes.	Complete exit ticket independently. Share one word family chain with a partner.

Time	Phase	Teacher Does	Students Do
		Share out one word family connection (e.g., rotate, rotation, rotational).	

### Grades 2–3 Differentiation

- Support: Provide a printed suffix anchor chart (common suffixes, their meanings, examples). Allow students to use the chart during gameplay.
- On grade: Require students to write one morpheme note per word after spelling it.
- Extend: Ask students to generate a word family for each game word (e.g., rotate → rotation → rotational → rotating).

## MINI LESSON PLAN: GRADES 4–5

**SoR Focus:** Morphology — Greek & Latin Roots, Derivational Suffixes, Morpheme Chains, Etymology  
 | *Duration: 30–35 minutes*

Time	Phase	Teacher Does	Students Do
5 min	Word Detectives	Write GEOSYNCHRONOUS on the board without spaces. Say: "Before I tell you what this means, let's crack it like a code." Draw boxes around: geo   syn   chron   ous and ask what each part might mean.	Work in groups to hypothesize meaning of each morpheme. Use known words: geography, synchronize, -ous (full of) as context clues.
5 min	Morpheme Mapping	Introduce the morpheme map concept: root word in center, derivations branching out. Model with ACCELERATE: Latin celer (swift) -> accelerate, acceleration, decelerate, celerity. Ask: "What happens to the word's job when we add -ation? (-ation turns verbs to nouns)"	In pairs, create a morpheme map for one word from today's game list. Try: velocity, navigation, or telemetry.
3 min	Preview	Preview 5 target words from 4-5 list: inertia, momentum, telemetry, celestial, cosmonaut. Contrast astronaut vs. cosmonaut: same -naut suffix, different prefix (astro- vs. kosmos-). Note: apogee is an actual term used in NASA orbital data — the farthest point from Earth.	Sketch a quick diagram showing apogee vs. perigee (closest point). Predict one other word that might use the tele- prefix.
12 min	Play	Open Wormly in 4th-5th Grade mode. Challenge extension: after each word, write a morpheme breakdown before moving on.	Play through 5 words. After each: write the morpheme chain (e.g., inter- + planet + -ary). Identify at least two related words for each completed word.

Time	Phase	Teacher Does	Students Do
		For the longest words (interplanetary, geosynchronous), prompt: "How many morphemes? What does each mean?"	
5 min	Synthesis	Ask: "Which word had the most morphemes? What does that tell us about its meaning?" Discuss: Why do scientists use Latin and Greek roots for space terms? Preview: Next session, students will write a mission log using 5 words from today's game.	Share the most complex word they decoded and explain how they broke it apart. Vote on their favorite new word and explain why.

### Grades 4–5 Differentiation

- Support: Provide a Greek/Latin root reference card (geo-, tele-, circum-, inter-, astro-, -naut, -ation, -ical). Allow use during gameplay.
- On grade: Full lesson as written. Require morpheme chain notation for each word.
- Extend: Assign a "Morpheme Mission Log" — a short writing piece using at least 5 game words with correct morpheme analysis annotations.

## WORD LISTS WITH SOR TAGS

### K–1 Word List (30 words) — Phonics Focus

Primary SoR focus: Phonics. All words are decodable within a standard K–1 scope and sequence. Tier 1 = fully decodable, Tier 2 = contains a pattern that merits explicit instruction.

Word	SoR Pattern	Focus	Tier	Category	Morpheme / Notes
moon	CVVC — oo digraph	Phonics	Tier 1	Space	oo vowel team; high-frequency space anchor word
sun	CVC — short-u	Phonics	Tier 1	Space	Fully decodable foundational CVC
star	CCVC — r-controlled ar	Phonics	Tier 1	Space	st- blend + ar r-controlled vowel
space	sp-blend + CVCe long-a	Phonics	Tier 1	Space	sp- blend; VCe long vowel pattern
rock	CVC + -ck ending	Phonics	Tier 1	Space	-ck spelling rule after short vowel
sky	sk-blend + long-i (y)	Phonics	Tier 1	Space	sk-blend; y as long-i at word end
glow	gl-blend + ow vowel team	Phonics	Tier 1	Space	gl-blend; ow = long-o vowel team
earth	ear r-controlled + -th digraph	Phonics	Tier 2	Space	Complex r-controlled; -th digraph
ship	CCVC — sh digraph, short-i	Phonics	Tier 1	Vehicle	sh digraph; short-i closed syllable

Word	SoR Pattern	Focus	Tier	Category	Morpheme / Notes
rocket	2-syl: rock·et	Phonics	Tier 2	Vehicle	-ck; two closed syllables; schwa in -et
flame	fl-blend + CVCe long-a	Phonics	Tier 1	Mission	fl-blend; VCe long-a pattern
blast	CCVCC — bl-blend, -st	Phonics	Tier 1	Mission	Initial bl- and final -st blends
launch	au diphthong + -nch	Phonics	Tier 2	Mission	au vowel team; -nch trigraph
land	CVCC — short-a, final -nd	Phonics	Tier 1	Mission	Final -nd blend; short-a
trip	CCVC — tr-blend, short-i	Phonics	Tier 1	Mission	tr-blend; short-i closed syllable
crew	cr-blend + ew vowel team	Phonics	Tier 1	People	cr-blend; ew = long-u vowel team
float	fl-blend + oa vowel team	Phonics	Tier 1	Physics	fl-blend; oa = long-o vowel team
spin	CCVC — sp-blend, short-i	Phonics	Tier 1	Physics	sp-blend; short-i closed syllable
crash	CCVCC — cr-blend, -sh digraph	Phonics	Tier 1	Physics	cr-blend; -sh digraph; final blends
speed	CVVC — ee vowel team	Phonics	Tier 1	Physics	ee = long-e vowel team
orbit	2-syl: or·bit	Phonics	Tier 2	Physics	or r-controlled + closed -bit; 2-syllable

## Grades 2–3 Word List (30 words) — Morphology Focus

Primary SoR focus: Morphology, with phonics reinforcement. Most words carry a Tier 2 vocabulary rating; three stretch words (velocity, propulsion, trajectory) are Tier 3.

Word	SoR Pattern	Focus	Tier	Category	Morpheme / Notes
orbit	2-syl: or-bit	Phonics	Tier 1	Physics	Spiral from K-1; fluency focus
gravity	grav-i-ty — -ty suffix	Morphology	Tier 2	Physics	-ty suffix; schwa in final syllable
friction	fric-tion — -tion suffix	Morphology	Tier 2	Physics	-tion suffix producing /shun/
rotation	ro-ta-tion	Morphology	Tier 2	Physics	Base rotate + -ion; long-o open syllable
pressure	pres-sure — -ure suffix	Morphology	Tier 2	Physics	-ss spelling; -ure suffix
velocity	ve-loc-i-ty — -ity suffix	Morphology	Tier 3	Physics	Stretch word; -ity nominalizer suffix
propulsion	pro-pul-sion	Morphology	Tier 3	Physics	pro- prefix; -ion suffix; stretch word
trajectory	tra-jec-to-ry — -ory suffix	Morphology	Tier 3	Physics	Stretch word; -ory suffix
liftoff	compound: lift + off	Phonics	Tier 1	Mission	Compound word; double-f spelling
reentry	re- prefix + entry	Morphology	Tier 2	Mission	re- = again; prefix meaning explicit
mission	mis-sion — -ion suffix	Morphology	Tier 2	Mission	-ss; -ion suffix
historic	his-tor-ic — -ic suffix	Morphology	Tier 2	Mission	-ic suffix; connects to history
signal	sig-nal — -al suffix	Morphology	Tier 2	Tech	-al suffix; hard g before -nal
sensor	sen-sor — -or suffix	Morphology	Tier 2	Tech	-or agent suffix; connects to sense, sensory
capsule	cap-sule — consonant-le	Phonics	Tier 2	Vehicle	-sule; consonant-le syllable type
spacecraft	compound: space + craft	Phonics	Tier 2	Vehicle	Compound word; CCVC craft
booster	boost-er — oo + -er	Morphology	Tier 1	Vehicle	oo vowel team; -er suffix
shield	CCVVCC — ie vowel team + -ld	Phonics	Tier 1	Vehicle	ie vowel team; -ld ending
astronaut	as-tro-naut — Greek morphemes	Morphology	Tier 2	People	astro- (star) + -naut (sailor)
lunar	lu-nar — Latin luna	Morphology	Tier 2	Space	Long-u open syllable; Latin root luna (moon)
solar	so-lar — Latin sol	Morphology	Tier 2	Space	Long-o open syllable; Latin root sol (sun)
craters	cra-ters — cr-blend + -ers	Phonics	Tier 1	Space	cr-blend; CVCe base; -ers plural

## Grades 4–5 Word List (30 words) — Morpheme Chain Focus

Primary SoR focus: Morphology — Greek/Latin roots, derivational morphology, and word family analysis. Nearly all words are Tier 3.

Word	SoR Pattern	Focus	Tier	Category	Morpheme / Notes
trajectory	Latin traicere; -ory suffix	Morphology	Tier 3	Physics	Spiral from 2-3; morpheme depth focus
velocity	Latin velocitas; -ity nominalizer	Morphology	Tier 3	Physics	Connect to velocipede, velo-
acceleration	ad- + celer + -ation; 5-syl	Morphology	Tier 3	Physics	Prefix + root + suffix chain; celerity
inertia	Latin iners: in- + ars (skill)	Morphology	Tier 3	Physics	in- negation prefix; r-controlled ia ending
momentum	Latin movere; -um Latinate noun	Morphology	Tier 3	Physics	Connects to move, motion, motor
gravitational	gravity + -ation + -al chain	Morphology	Tier 3	Physics	Full derivational morpheme chain
thermal	Greek therme (heat) + -al	Morphology	Tier 3	Physics	Connects to thermometer, thermostat
atmospheric	Greek atmos + sphaira + -ic	Morphology	Tier 3	Physics	Compound Greek morphemes + -ic suffix
elliptical	Greek elleipsis + -ical	Morphology	Tier 3	Physics	Double-l; -ical suffix; connects to ellipse
combustion	Latin comburere + -ion; com-	Morphology	Tier 3	Physics	com- prefix; connects to combust, combustible
telemetry	Greek tele- + metron (measure)	Morphology	Tier 3	Tech	tele- prefix; connects to telephone, telescope
navigation	Latin navis (ship) + -ation	Morphology	Tier 3	Tech	Connects to naval, navy, navigate
simulation	Latin simulare + -ation	Morphology	Tier 3	Tech	Connects to similar, simultaneous
geosynchronous	geo + syn + chronos + -ous; 5-syl	Morphology	Tier 3	Tech	Four morphemes; geography, synchronize
verification	Latin verus + -ify + -ation; 5-syl	Morphology	Tier 3	Mission	Connects to verify, verifiable, verity
sequential	Latin sequi + -ential	Morphology	Tier 3	Mission	Connects to sequence, consequence
celestial	Latin caelum + -ial	Morphology	Tier 3	Space	Connects to ceiling (same root)
circumlunar	circum- + luna + -ar; 4-syl	Morphology	Tier 3	Space	circum- prefix family; three morphemes
interplanetary	inter- + planeta + -ary; 6-syl	Morphology	Tier 3	Space	6-syl morpheme powerhouse; inter- family
apogee	Greek apo- (away from) + ge (Earth)	Morphology	Tier 3	Space	apo- prefix; live space data term
astronaut	Greek astron (star) + nautes	Morphology	Tier 2	People	Spiral; morpheme depth: compare cosmonaut

Word	SoR Pattern	Focus	Tier	Category	Morpheme / Notes
cosmonaut	Greek kosmos + nautes (sailor)	Morphology	<b>Tier 3</b>	People	Pair with astronaut — same -naut suffix

## FORMATIVE ASSESSMENT GUIDE

The Wormly Activity Record provides four data points per word: time on task, total attempts, number of errors, and a breakdown of which letters were confused. Use the table below to interpret common patterns and identify next instructional steps.

Activity Record Signal	What It May Indicate	Recommended Next Step	SoR Connection
0 errors per word	Strong orthographic mapping	Introduce stretch words from next grade band	Orthographic mapping / phoneme-grapheme correspondence
1-2 errors per word	Decoding with some uncertainty	Review the specific phoneme/morpheme flagged in the error log	Orthographic mapping / phoneme-grapheme correspondence
3+ errors per word	Pattern not yet secured	Pre-teach the SoR Pattern before replay; consider prior grade band	Orthographic mapping / phoneme-grapheme correspondence
Long time + low errors	Effortful but accurate decoding	Fluency practice with the word in context sentences	Orthographic mapping / phoneme-grapheme correspondence
Short time + high errors	Guessing without attending to letters	Return to letter-by-letter phoneme mapping activities	Orthographic mapping / phoneme-grapheme correspondence

### Using the Activity Record with Student Tokens

The Activity Record does not capture student names (FERPA-compliant). To connect records to individual students, assign each student a short token (e.g., initials + birth month: JM03) and have them write it on the printed record or in the Teacher Notes field before filing.

For digital portfolios, rename the downloaded .txt file with the student token before saving: e.g., JM03-moon-edition-2025-04-09.txt.

## STANDARDS ALIGNMENT

Wormly: Moon Exploration Edition is designed to support explicit instruction aligned to the Reading Foundations (RF) and Language (L) strands of the Common Core State Standards, as well as the Simple View of Reading continuum (word recognition — specifically orthographic mapping and phonics/morphological knowledge).

Standard	Strand	Connection to Wormly Moon Edition
<b>RF.K.3 / RF.1.3</b>	Phonics & Word Recognition	K-1 word list targets vowel teams (oo, ea, oa, ow), r-controlled vowels, consonant blends, and digraphs — all directly mapped in the SoR Pattern column.
<b>RF.2.3 / RF.3.3</b>	Phonics & Word Recognition	2-3 list applies multisyllabic decoding strategies, open/closed syllable types, and consonant-le patterns in high-interest science vocabulary.
<b>L.K.2 / L.1.2</b>	Language: Spelling	Game mechanic requires accurate letter placement, reinforcing orthographic mapping through immediate corrective feedback.
<b>L.2.4 / L.3.4</b>	Language: Vocabulary	2-3 suffixes (-tion, -ure, -ty, -ion, -er, -al) are explicitly tagged in the word database and surfaced during gameplay and debrief.
<b>L.4.4 / L.5.4</b>	Language: Vocabulary	4-5 list targets Greek and Latin roots (astro-, tele-, geo-, circum-, inter-, -naut, -ation, -ical) for morpheme-level analysis.
<b>L.3.4b-d</b>	Language: Morphology	The spiral design (orbit appears in K-1 and 2-3; trajectory, velocity, astronaut appear in 2-3 and 4-5) supports morpheme deepening across grades.

## IMPLEMENTATION TIPS

### For Whole-Class Use

- Project the game on a smartboard. Use a student volunteer to control Wormly while the class whisper-reads and coaches.
- Before play, display the 5 words on a whiteboard. Have students segment phonemes or identify morphemes as a class before the game reveals them.
- After play, return to any words with errors on the whole-class record and do a brief phoneme-grapheme mapping on the whiteboard.

### For Small Groups / Centers

- Assign one device per group of 2. Students alternate: one controls Wormly, one identifies the next letter needed.
- Use a recording sheet at the center: students write each word they spell and circle any prefix, suffix, or root they notice.
- For the highest readers, switch to the next grade band mid-session for a challenge.

### For Independent Practice

- Students play one session (5 words) independently and download their Activity Record.
- At the end of the week, students select their hardest word and write 3 related words (word family) in their vocabulary journal.

#### Music & Sensory Considerations

The game includes background music that plays during active gameplay. A Music On/Off toggle is available in the upper right corner of the game screen.

For students with sensory sensitivities or during silent work periods, mute the music before distributing devices. The game is fully functional without sound.  
Success sounds (ascending tones) and error sounds (descending buzz) play regardless of the music toggle. To mute all audio, use device volume controls.