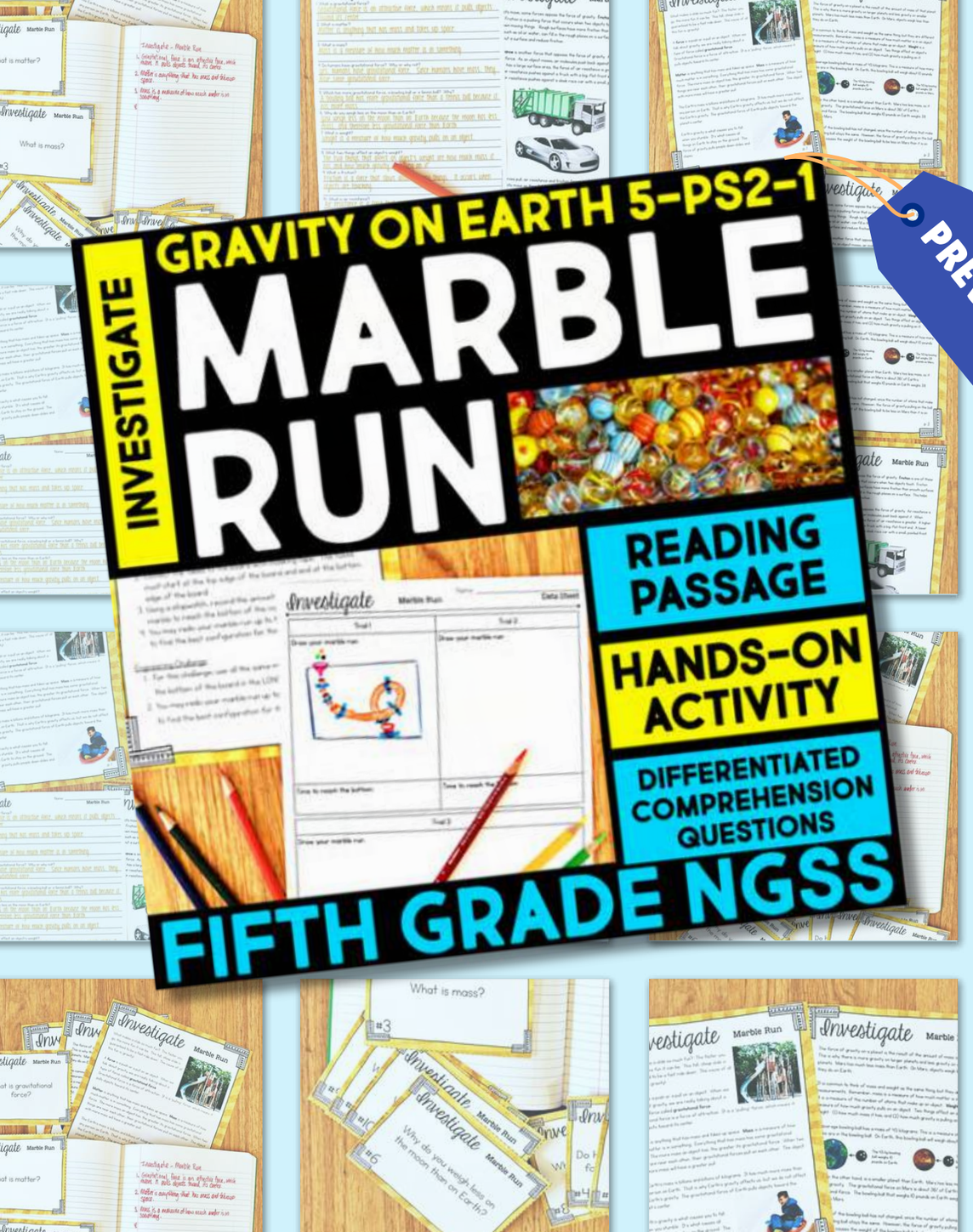


Turn Gravity into a Hands-On STEM Challenge!

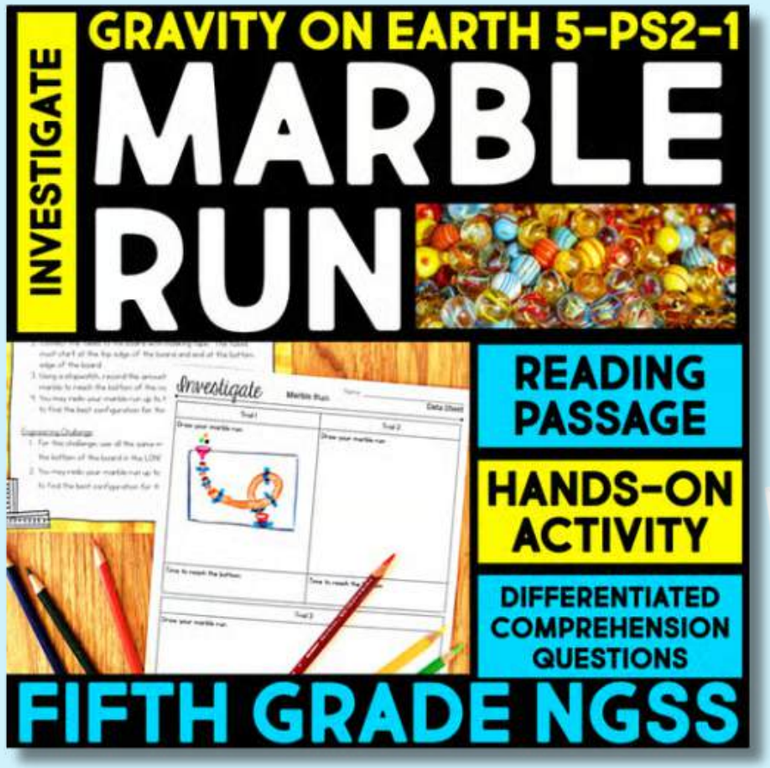
5TH GRADE

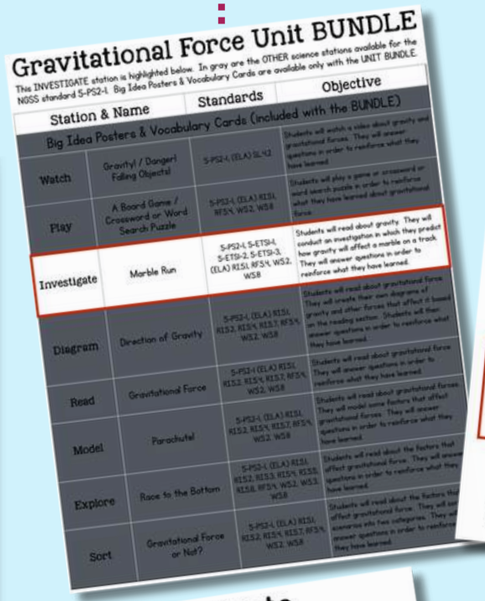
INVESTIGATE MARBLE RUN

GRAVITY ON EARTH

KEEP SCROLLING TO SEE WHAT'S INSIDE!

ACTIVITY OVERVIEW

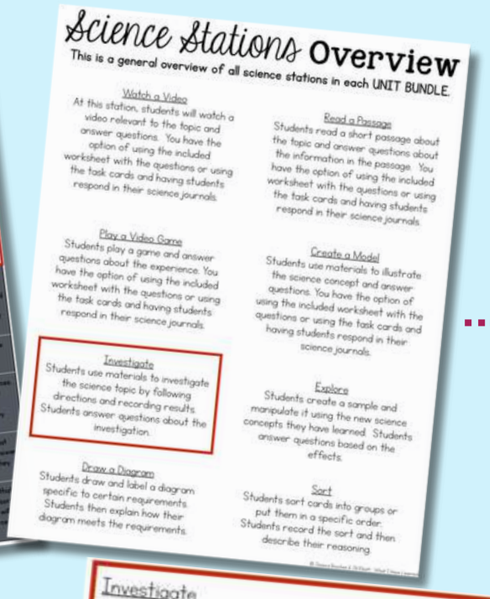




Gravitational Force Unit BUNDLE

This INVESTIGATE station is highlighted below. In gray are the OTHER science stations available for the NGSS standard 5-PS2-1. Big Idea Posters & Vocabulary Cards are available only with the UNIT BUNDLE.

Station & Name		Standards	Objective
Big Idea Posters & Vocabulary Cards (included with the BUNDLE)			
Watch	Gravity! / Danger! Falling Objects!	5-PS2-1, (ELA) SL.1.2	Students will watch a video about gravity and gravitational forces. They will answer questions in order to reinforce what they have learned.
Play	A Board Game / Crossword or Word Search Puzzle	5-PS2-1, (ELA) RI.1.1, RF.1.4, W.1.2, W.1.8	Students will play a game or crossword or word search puzzle in order to reinforce what they have learned about gravitational force.
Investigate	Marble Run	5-PS2-1, 5-ETS1-1, 5-ETS1-2, 5-ETS1-3, (ELA) RI.1.1, RF.1.4, W.1.2, W.1.8	Students will read about gravity. They will conduct an investigation in which they predict how gravity will affect a marble on a track. They will answer questions in order to reinforce what they have learned.
Diagram	Direction of Gravity	5-PS2-1, (ELA) RI.1.1, RI.1.2, RI.1.4, RI.1.7, RF.1.4, W.1.2, W.1.8	Students will read about gravitational force. They will create their own diagrams of gravity and other forces that affect it based on the reading section. Students will then answer questions in order to reinforce what they have learned.
Read	Gravitational Force	5-PS2-1 (ELA) RI.1.1, RI.1.2, RI.1.4, RI.1.7, RF.1.4, W.1.2, W.1.8	Students will read about gravitational force. They will answer questions in order to reinforce what they have learned.
Model	Parachute!	5-PS2-1, (ELA) RI.1.1, RI.1.2, RI.1.4, RI.1.7, RF.1.4, W.1.2, W.1.8	Students will read about gravitational forces. They will model some factors that affect gravitational forces. They will answer questions in order to reinforce what they have learned.
Explore	Race to the Bottom	5-PS2-1, (ELA) RI.1.1, RI.1.2, RI.1.3, RI.1.4, RI.1.5, RI.1.8, RF.1.4, W.1.2, W.1.3, W.1.8	Students will read about the factors that affect gravitational force. They will answer questions in order to reinforce what they have learned.
Sort	Gravitational Force or Not?	5-PS2-1, (ELA) RI.1.1, RI.1.2, RI.1.4, RI.1.7, RF.1.4, W.1.2, W.1.8	Students will read about the factors that affect gravitational force. They will sort answers into two categories. They will answer questions in order to reinforce what they have learned.



Science Stations Overview

This is a general overview of all science stations in each UNIT BUNDLE.

Watch a Video
At this station, students will watch a video relevant to the topic and answer questions. You have the option of using the included worksheet with the questions or using the task cards and having students respond in their science journals.

Play a Video Game
Students play a game and answer questions about the experience. You have the option of using the included worksheet with the questions or using the task cards and having students respond in their science journals.

Investigate
Students use materials to investigate the science topic by following directions and recording results. Students answer questions about the investigation.

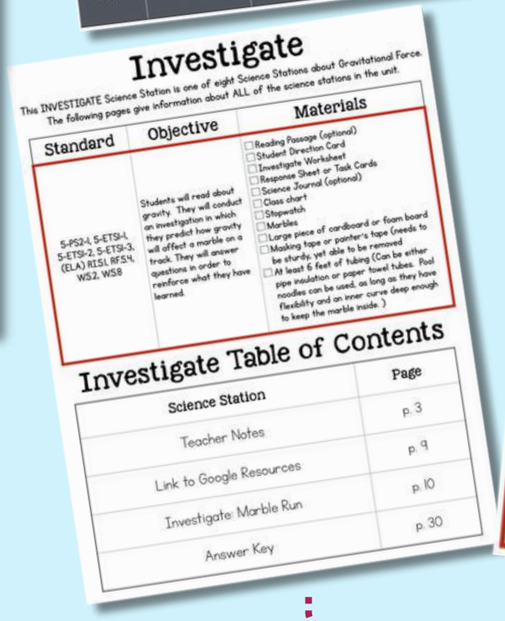
Draw a Diagram
Students draw and label a diagram specific to certain requirements. Students then explain how their diagram meets the requirements.

Read a Passage
Students read a short passage about the topic and answer questions about the information in the passage. You have the option of using the included worksheet with the questions or using the task cards and having students respond in their science journals.

Create a Model
Students use materials to illustrate the science concept and answer questions. You have the option of using the included worksheet with the questions or using the task cards and having students respond in their science journals.

Explore
Students create a sample and manipulate it using the new science concepts they have learned. Students answer questions based on the effects.

Sort
Students sort cards into groups or put them in a specific order. Students record the sort and then describe their reasoning.



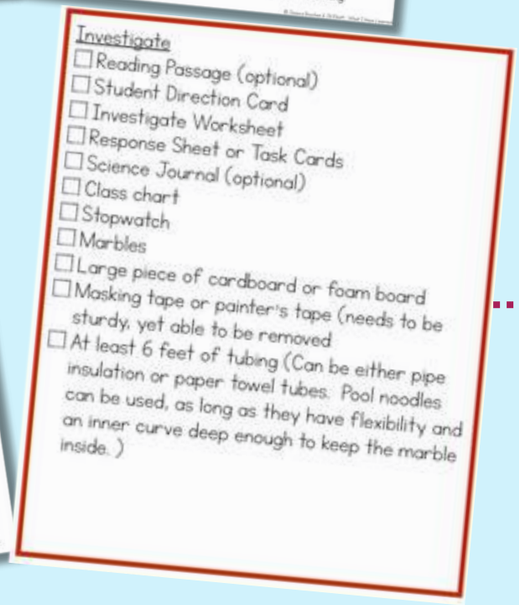
Investigate

This INVESTIGATE Science Station is one of eight Science Stations about Gravitational Force. The following pages give information about ALL of the science stations in the unit.

Standard	Objective	Materials
5-PS2-1, 5-ETS1-1, 5-ETS1-2, 5-ETS1-3, (ELA) RI.1.1, RF.1.4, W.1.2, W.1.8	Students will read about gravity. They will conduct an investigation in which they predict how gravity will affect a marble on a track. They will answer questions in order to reinforce what they have learned.	☐ Reading Passage (optional) ☐ Student Direction Card ☐ Investigate Worksheet ☐ Response Sheet or Task Cards ☐ Science Journal (optional) ☐ Class chart ☐ Stopwatch ☐ Marbles ☐ Large piece of cardboard or foam board ☐ Masking tape or painter's tape (needs to be sturdy, yet able to be removed) ☐ At least 6 feet of tubing (Can be either pipe insulation or paper towel tubes. Pool noodles can be used, as long as they have flexibility and an inner curve deep enough to keep the marble inside.)

Investigate Table of Contents

Science Station	Page
Teacher Notes	p. 3
Link to Google Resources	p. 9
Investigate: Marble Run	p. 10
Answer Key	p. 30



Investigate

- ☐ Reading Passage (optional)
- ☐ Student Direction Card
- ☐ Investigate Worksheet
- ☐ Response Sheet or Task Cards
- ☐ Science Journal (optional)
- ☐ Class chart
- ☐ Stopwatch
- ☐ Marbles
- ☐ Large piece of cardboard or foam board
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- ☐ At least 6 feet of tubing (Can be either pipe insulation or paper towel tubes. Pool noodles can be used, as long as they have flexibility and an inner curve deep enough to keep the marble inside.)

Table of Contents

Science Station Overview

Materials Checklist

Teacher Notes & Table of Contents

WHAT'S INCLUDED
INVESTIGATE SCIENCE STATION

- Teacher Notes
- **Student Text** in two formats
- Student **Instructions**
- **Activity Sheets** for observation
- Differentiated **Questions**
- Answer Key
- Google Form
- Google Slides



INVESTIGATE: READING PASSAGE

Investigate Marble Run
Teacher Notes

Materials
- Class chart
- Stopwatch
- Marbles
- Large piece of cardboard or foam board
- Masking tape or painter's tape (needs to be sturdy, yet able to be removed)
- At least 6 feet of tubing (Can be either pipe insulation or paper towel tubes. Pool noodles can be used, as long as they have flexibility and an inner curve deep enough to keep the marble inside.)

Make sure that each group has materials of the same size(s). All groups need to have the same size boards and the same amount of tubing.

Consider posting the Class Chart on your white board or s... in and track data. As an extension, have students create t...

This activity meets the NGSS Engineering Design standar...

For fifth grade, students will:
5-ETSI-1 Define a simple design problem reflecting a n... specified criteria for success and constraints on mat...

Students meet this standard as they consider wi... design for their marble run, considering the con...

5-ETSI-2 Generate and compare multiple possible... well each is likely to meet the criteria and constr...

Students meet this standard as they modify... objective of the activity.

5-ETSI-3 Plan and carry out fair tests in wh... are considered to identify aspects of a mod...

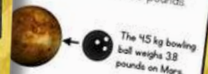
Students meet this standard as they m... objective of the activity.

Investigate Marble Run

The force of gravity on a planet is the result of the amount of mass of that planet. This is why there is more gravity on larger planets and less gravity on smaller planets. Mars has much less mass than Earth. On Mars, objects weigh less than they do on Earth.

It is common to think of mass and weight as the same thing, but they are different measurements. Remember, mass is a measure of how much matter is in an object. It is a measure of the number of atoms that make up an object. **Weight** is a measure of how much gravity pulls on an object. Two things affect an object's weight: (1) how much mass it has; and (2) how much gravity is pulling on it.

An average bowling ball has a mass of 4.5 kilograms. This is a measure of how many atoms are in the bowling ball. On Earth, a ball will weigh about 10 pounds.


The 4.5 kg bowling ball weighs 3.8 pounds on Mars.

...th. Mars has less mass, so it ...bout 38% of Earth's ...unds on Earth weighs 3.8

...number of atoms that make ... of gravity pulling on the ball ...ess on Mars than it is on

p. 2

Investigate Marble Run

What makes a slide so much fun? The faster you go, the more fun it can be. This tall, steep slide is guaranteed to be a fast ride down. The cause of all this fun is...gravity!



A **force** is a push or a pull on an object. When we talk about gravity, we are really talking about a type of force called **gravitational force**.

Gravitational force is a force of attraction. It is a "pulling" force, which means it pulls objects toward its center.

Matter is anything that has mass and takes up space. **Mass** is a measure of how much matter is in something. Everything that has mass has some gravitational force. The more mass an object has, the greater its gravitational force. When two things are near each other, their gravitational forces pull on each other. The object with more mass will have a greater pull.

The Earth's mass is billions and billions of kilograms. It has much more mass than any person on Earth. That is why Earth's gravity affects us, but we do not affect the Earth's gravity. The gravitational force of Earth pulls objects toward the planet's center.

...rth's gravity is what ca... ...you stumble. It's wh... ...things on Earth to stay on ... force of gravity pulls peo... slopes.

Investigate Marble Run

Name: _____

What makes a slide so much fun? The faster you go, the more fun it can be. This tall, steep slide is guaranteed to be a fast ride down. The cause of all this fun is...gravity!





Earth's gravity is what causes you to fall when you stumble. It's what causes all things on Earth to stay on the ground. The force of gravity pulls people down slides and slopes.

The force of gravity on a planet ... the result of the amount of mass of that P... is why there is more gravity on ... and less gravity on smaller plan... much less mass than Earth. O... weigh less than they do on Ea...

It is common to think of ma... the same thing, but they a... measurements. Remembe... measure of how much m... It is a measure of the n... make up an object. We... how much gravity pull... things affect an objec... much mass it has; ar... is pulling on it.

An average bowlir... kilograms. This is ... atoms are in th... bowling ball will ...

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Investigate Marble Run

Name: _____


The 4.5 kg bowling ball weighs 3.8 pounds on Mars.

Mars, on the other hand, is a smaller planet than Earth. Mars has less mass, so it has less gravity. The gravitational on Mars is about 38% of Earth's gravitational force. The bowling ball that weighs 10 pounds on Earth weighs 3.8 pounds on Mars.

The mass of the bowling ball has not changed, since the number of atoms that make up the bowling ball stays the same. However, the force of gravity pulling on the ball is less. This causes the weight of the bowling ball to be less on Mars than it is on Earth.

As objects move, some forces oppose the force of gravity. **Friction** is one of these forces. Friction is a pushing force that occurs when two objects touch. Friction slows down moving things. Rough surfaces have more friction than smooth surfaces. Liquids, such as oil or water, can fill in the rough places on a surface. This helps smooth out a surface and reduce friction.

Air resistance is another force that opposes the force of gravity. Air resistance is a pushing force. As an object moves, air molecules push back against it. When something has a large surface area, th...

force of air resistance is greater. A higher force of air resistance pushes against a truck with a big, flat front end. A lower force of air resistance pushes against a sleek race car with a small, pointed front end.





Gravitational forces pull, air resistance and friction forces push back. These forces affect how objects move as they fall t... Earth.

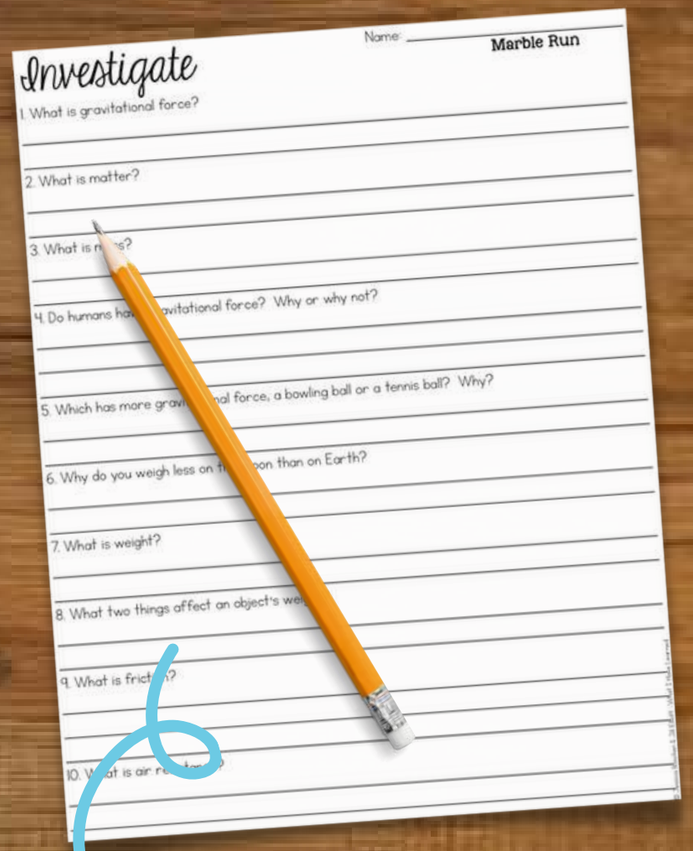


READING PASSAGE IN TWO FORMATS

ENGAGING ACTIVITY & WORKSHEETS



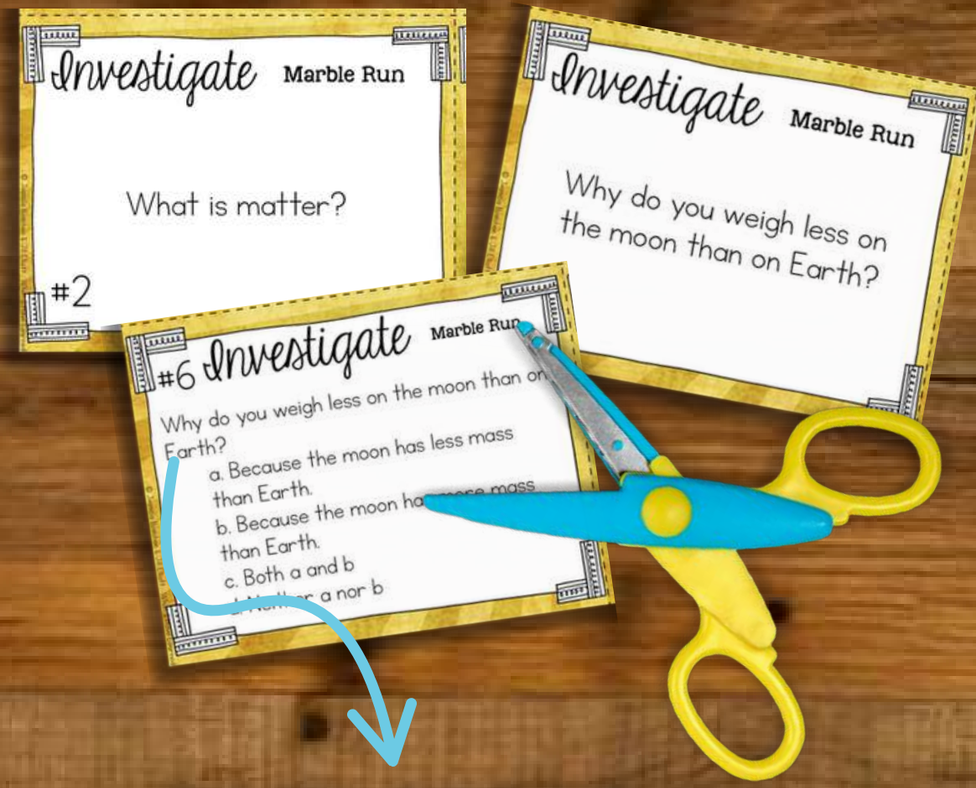
DIFFERENTIATED QUESTIONS



SHORT ANSWER



FILL-IN-THE BLANK



TASK CARDS: SHORT ANSWER & MULTIPLE CHOICE

Investigate

Marble Run



What makes a slide so much fun? The faster you go, the more fun it can be. This tall, steep slide is guaranteed to be a fast ride down. The cause of all this fun is...gravity!

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The Earth's mass is billi... any person on Earth. ... the Earth's gravity. ... planet's center.

Earth's gravity is ... when you stumble ... things on Earth ... force of gravit... slopes.

Investigate

Marble Run

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The 4.5 kg bowling ball weighs 10 pounds on Earth.



The 4.5 kg bowling ball weighs 3.8 pounds on Mars.

Mars, on the other hand, is a smaller planet than Earth. Mars has less mass, so it has less gravity. The gravitational force on M... Earth's ...hs 3.8 ...at make ...the ball ...it is on

Investigate

Name: _____

Marble Run

1. What is gravitational force?
Gravitational force is an attractive force, which means it pulls objects toward its center.

2. What is matter?
Matter is anything that has mass and takes up space.

3. What is mass?
Mass is a measure of how much matter is in something.

4. Do humans have gravitational force? Why or why not?
Yes, humans have gravit... Since humans have mass, they have some gravitational force.

5. Which has mo... tennis ball? Why?
A bowling ball h... ball because it has more mass.

6. Why do you weigh le...
You weigh less on the ... the moon has less mass, and therefore less gravitational force tha...

7. What is weight?
Weight is a measure of how ... object.

8. What two things affect an object's we...
The two things that affect an object's ... uch mass it has and how much gravity is pulling on it.

9. What is friction?
Friction is a force that slows down movi... s when objects are touching.

10. What is air resistance?
Air resistance is a force that occurs as an ... molecules push back against it.

#2 Investigate — Marble Run

What is true about matter?
a. Has mass and takes up space
b. Has no mass and takes up no space
c. Has mass but takes up no space
d. Has no mas... but it takes up space

Investigate — Marble Run

What is air resistance?

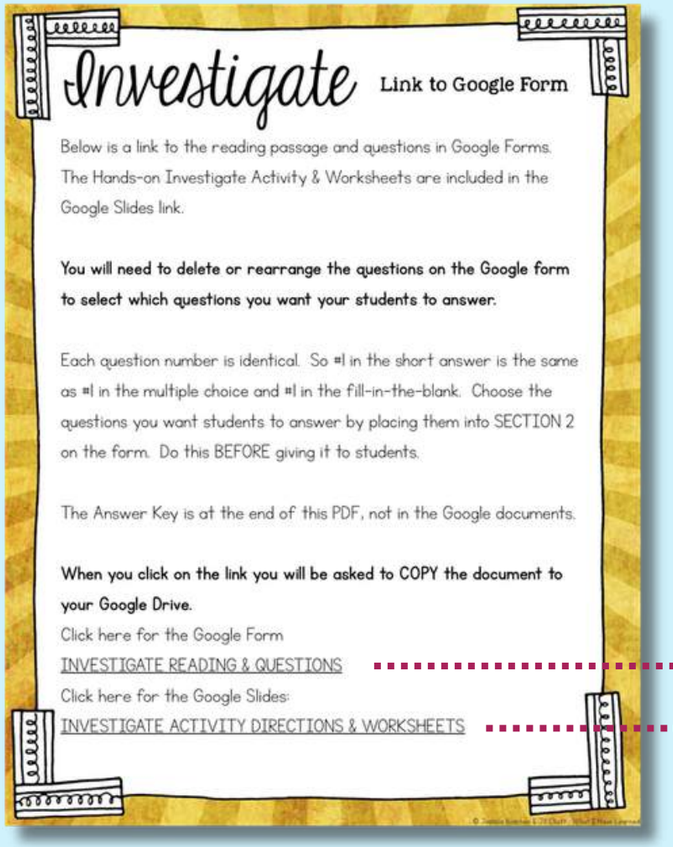
#10

#6 Investigate — Marble Run

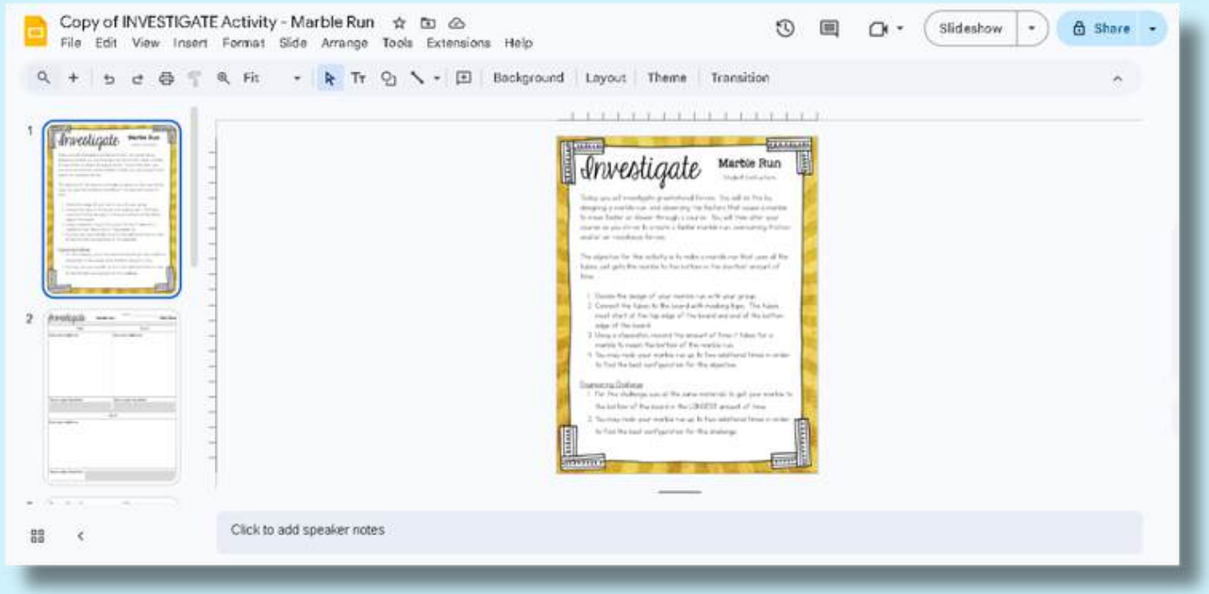
Why do you weigh less on the moon than on Earth?
a. Because the moon has less mass than Earth.
b. Because the moon has more mass than Earth.
c. Both a and b
d. Neither a nor b

ADD TO CART

DIGITAL VERSIONS







DIGITAL VERSIONS

- ✔ Google Sheet with Activity & Directions
- ✔ Google Form with Reading & Questions

Answer keys provided

YOU WILL LOVE THIS BECAUSE



Hands-On Discovery

Students actively measure and test instead of just reading about the concept.



Multiple Response Formats

Differentiated questions (short answer, blanks, task cards, multiple-choice) ensure every student can access and demonstrate understanding effectively.



Teacher-Friendly Design

Includes teacher notes, answer keys, and ready-to-use materials—minimizing prep time while maximizing instructional impact in your classroom.

TEACHERS LOVE IT!

These worksheets were great supplemental activities to use during the unit.

Mrs Katie Learning

My students were so engaged and learned so much, I'm doing this every year!

Dawn D.





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My passion is making learning accessible to all students.
I love scaffolding learning, breaking down the concepts and building them up so that students can see the connections.
I love figuring out the small components that build up to the big ideas and helping students see it all.



teach MATH | teach SCIENCE | teach READING | teach WRITING

What I have LEARNED