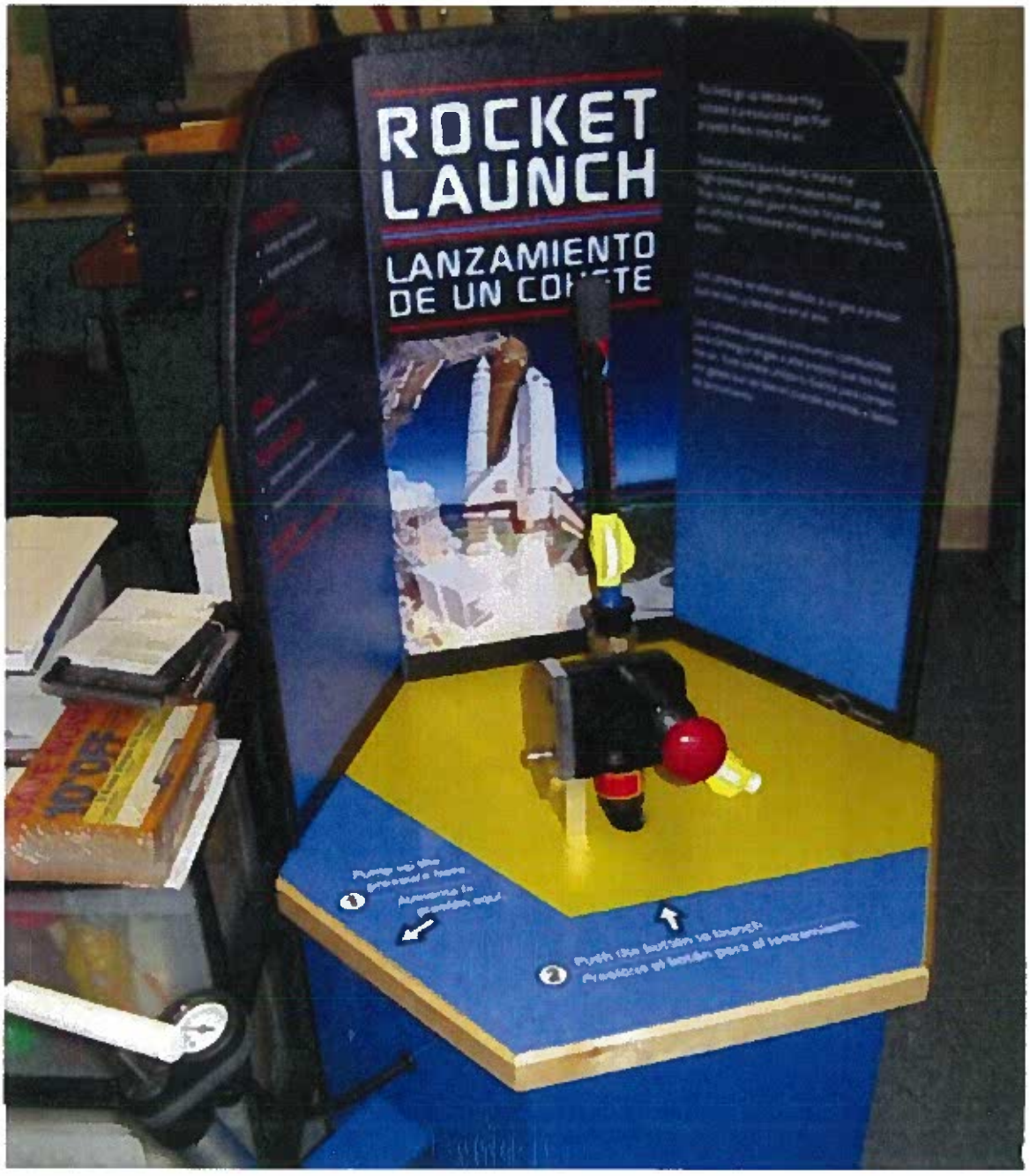
EXHIBIT DESCRIPTIONS, GOAL & OBJECTIVES

Rocket Launch

Objective: Students will learn that force is needed to lift objects against Earth's gravity.
How To use: Use the air pump to store air pressure to lift the cardboard rocket. (The needle only goes to ~20.) Push the red button to release the air pressure, which then pushes the rocket up; gravity pulls it back down.
Explanation: Gravity is constantly pulling things down to Earth. A tremendous amount of energy is needed to life something away from Earth, as with a rocket. The energy is stored and then released all at once in order to accelerate the rocket away from Earth.
Concepts: energy, launch, rocket, gravity



83

Watch the video titled "Rocket Launch" (1:50).
Riding a rocket into space is an exciting experience. The initial part of the launch can be a bit jolting, but once the rocket reaches space, or orbit around the Earth, microgravity makes the ride very calm.

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Rocket Launch

Illinois Assessment Framework Grade 4

12.4.25 Define a **force** as a push or a pull that tends to move an object. Understand that forces may be balanced or unbalanced. Know that when the forces applied to an object are balanced, the motion or rest of that object does not change.
12.4.26 Identify the basic forces, such as friction, magnetism, and **gravity**. Identify which force is operative in a simple scenario.
13.4.09 Understand the **impact of different scientific discoveries** on society.
13.4.11 Identify ways that science and technology affect people's lives (e.g., in **transportation**, medicine, agriculture, communication) and careers.

Directions:
1) Pump up the pressure here.
2) Push the button to launch.

Information:
Rockets go up because they release a pressurized gas that propels them into the air.

Space rockets burn fuel to make the high-pressure gas that makes them go up. This rocket uses your muscle to pressurize air, which is released when you push the launch button.

Scale:

0-160	BAR
0-11	100xkPa
	psi

85

Rocket Launch

Illinois Assessment Framework Grade 7

12.7.63	Understand the concept of **force** as any influence that tends to accelerate an object. Know that a force, for example, can speed up an object, or slow it down, or change its direction. Understand that forces can be measured in various ways. Understand how to calculate the **acceleration** of an object.
12.7.64	Identify and understand **Newton's laws of motion**. The first law of motion states that things at rest or in motion tend to stay at rest or continue in motion unless some force is applied to them. Newton's second law of motion (force = mass × acceleration) shows how force, mass, and acceleration are related. The third law states that for every action there is an equal and opposite reaction.

Directions:

1) Pump up the pressure here.
2) Push the button to launch.

Information:

Rockets go up because they release a pressurized gas that propels them into the air.

Space rockets burn fuel to make the high-pressure gas that makes them go up. This rocket uses your muscle to pressurize air, which is released when you push the launch button.

Scale:

0-160	BAR
0-11	100xkPa
	psi

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Lakeview Museum

located in Peoria, Illinois, offers you exciting new exhibits on space and space exploration as part of a collaboration with the National Science Foundation. We hope you explore the exhibits and then use this activity booklet to have more fun at home!

For additional activities, learning links and resources, visit *www.outreachtospace.org.* We've even included a free family admission coupon on the back of this booklet so you can visit Lakeview Museum to learn more about space and the world of science.

Lakeview Museum, an arts and science museum, offers traveling exhibitions, a hands-on Discovery Center for children, a full dome planetarium, a museum preschool and a museum school with a variety of classes for all ages.

Galleries & Museum Store Hours:
10 a.m.–4 p.m. Tue.–Sat.; Noon–4 p.m. Sun.; Closed Mondays
Museum Offices: Mon.–Fri. 9 a.m.–5 p.m.
Planetarium: Schedule available at Museum reception desk or visit *www. lakeview-museum.org*

Admission:
Museum Members Free; Adults: $6 Gallery only; $4 Planetarium only; $8 Gallery/Planetarium
Seniors Age 60+: $5 Gallery only; $3.50 Planetarium only; $6.50 Gallery AND Planetarium
Youth Ages 3-17: $4 Gallery only; $3.50 Planetarium only; $6 Gallery AND Planetarium

MISSION I: Flip Book

BUILD IT!

You'll need:


scissors


stapler

1  Cut out the flip book pages on the dotted lines and stack them in order. (1 at the bottom, 12 on top.)	2  Staple the stack together at the top, over the numbers.	3 Flip the pages to see the pictures move!

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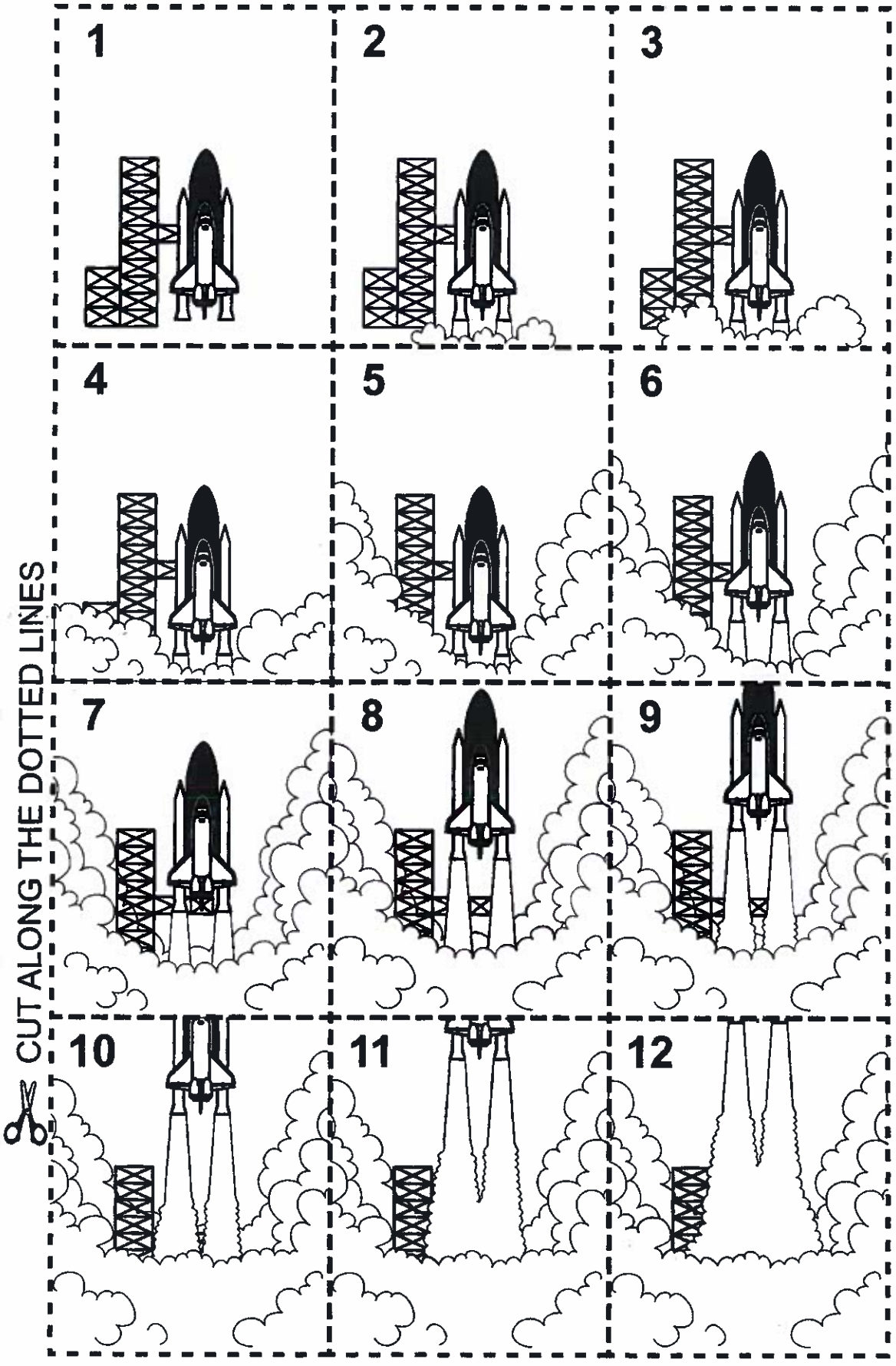

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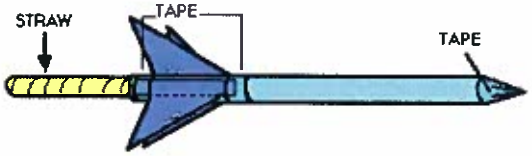
Rocket Launch

Ask the students to think about gravity, thrust, lift, and drag while they are using their paper rockets. How is the paper rocket affected by each one? What would happen if one of those forces weren't present? For example, if the rocket didn't have thrust, and you simply threw it, the rocket would become a glider (the thrust makes it s flyer).

Activity - Paper Rocket



Materials needed:
- Paper
- Cellophane tape
- Scissors
- Sharpened fat pencil (or regular pencil)
- Milkshake straw (slightly smaller than the pencil)

Steps:
1. Cut a narrow strip of paper about 5 inches long and roll it tightly around the fat pencil. Tape the cylinder and remove it from the pencil.
2. Cut crown points into one end of the cylinder and slip it back onto the pencil.
3. Slide the crown points to the pencil tip and squeeze the points together and tape them together to seal the end to form a nose cone (the pencil point provides support for taping). An alternative to the crown points is to just fold over one end of the tube and seal it with tape.
4. Remove the cylinder from the pencil and gently blow into the open end to check for leaks. If air easily escapes, use more tape to seal the leaks.
5. Cut out two sets of fins using the pattern and fold according to instructions. Tape the fins near the open end of the cylinder. The tabs make taping easy.

FLYING THE PAPER ROCKET:

Slip the straw into the rocket's opening. Point the rocket towards a safe direction, sharply blow through the straw. The rocket will shoot away. Be careful not to aim the rocket towards anyone because the rocket could poke an eye.

DISCUSSION: Paper rockets demonstrate how rockets fly through the atmosphere and the importance of having fins for control. For experimental purposes, try building a rocket with no fins and one with the fins in the front to see how they will fly. Practice flying the rockets on a ballistic trajectory towards a target. Also try making a rocket with wings so that it will glide.

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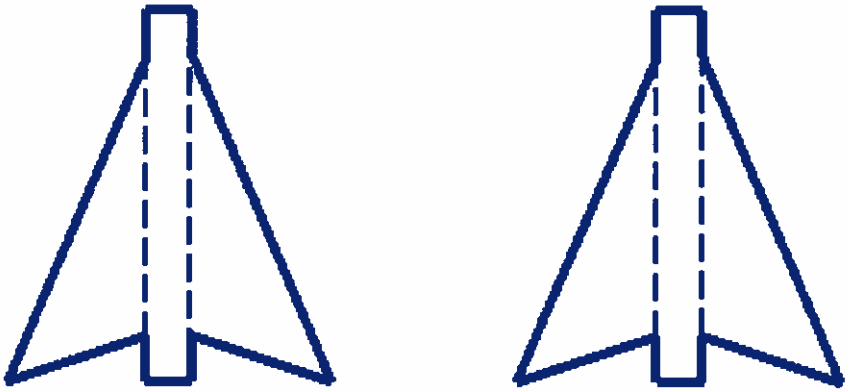
Cut along Solid Lines



Fold towards you on Dashed Lines

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EXHIBIT DESCRIPTIONS, GOAL & OBJECTIVES

Space Colony

Objective: Students will learn that space is a place for humans to explore.
How To use: Use the Legos to build a model of a space colony, either on the Moon or Mars or on an even more distant world. You can follow printed designs or develop your own.
Explanation: Earth is a mere speck in a nearly endless sea of space. Human curiosity and people's sense of adventure have led them to initial explorations in outer space, and the future looks to be very promising. However, much planning is required for such expensive and dangerous exploration, which could result one day in permanent human settlements on other worlds.
Concepts: space, colonization, engineering

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Watch the video titled "Space Colony" (2:02).
Someday, humans will live in space. Someday, they will return to the Moon, maybe even arrive at Mars for the first time. The journey begins will a single countdown. Maybe you will someday drive a rover across the red sands of Mars.

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Space Colony

(Legos)

Illinois Assessment Framework Grade 4

12.4.04	Identify the **basic needs of living things**: animals need air, water, food, and shelter; plants need air, water, nutrients, and light.
12.4.29	Understand that **Earth's basic materials** are land, water, and air.
12.4.41	Understand that **weather** is described using measurements of temperature, wind direction and speed, amounts of precipitation, humidity, and air pressure.
13.4.09	Understand the impact of different **scientific discoveries** on society.
13.4.11	Identify ways that science and **technology** affect people's lives (e.g., in transportation, medicine, agriculture, communication) and careers
13.4.12	Identify ways that **technology** has changed local, national, or global environments.

Here are 3 building areas, one each for: Space Colony Mars
Space Colony Moon
Space Colony Outer Space

Mission: Build a space habitat! People need: food, water, air, and protection from radiation & temperature extremes. What else do you think they need?

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Space Colony

(Legos)

Illinois Assessment Framework Grade 7

12.7.31 Understand that **animals have parts well suited to the places they** live in and their needs.
13.7.07 Compare the **knowledge, skills, and methods of early and modern scientists.**

Here are 3 building areas, one each for: Space Colony Mars
Space Colony Moon
Space Colony Outer Space

Mission: Build a space habitat! People need: food, water, air, and protection from radiation & temperature extremes. What else do you think they need?

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Space Colony

Ask the students: - What planets or moons could we potentially live on?

- Answers will vary; Mercury, Venus, Mars, Earth's Moon - What are some of the conditions of the planets or moons they chose?
- Answers will vary; think about temperature, Sun exposure, its rotation around the Sun, what the terrain is like, whether or not it has gravity, and the elements it has or doesn't have (water, oxygen, carbon dioxide, etc.),
- Why can't we live on all of them?
- Jupiter, Saturn, Uranus, and Neptune are gas planets with no solid surface

Activity:
Materials needed:
- Paper
- Pencil
- Tape
- Markers or paint
- Straws (optional)
- Dowel rods (optional)
- Aluminum foil (optional)
- Glue (optional)
- Styrofoam (optional)
- Other materials (optional)

In pairs or groups assign the students a planet or moon, and have them construct a house or building for their planet (or a whole city!) Have them discuss the idea with their partner or group ahead of time and map out an idea. It might be helpful to have them draw out their ideas, too. Then construct!

Think about:
- What would the houses be like?
- How would they be similar or different to houses here on Earth?
- Would you be able to open the windows on Mars?
- Would you have ropes or closed in sidewalks to go from building to building? Would you have tunnels and get from place to place under ground?
- What would schools look like? (And where would you go on a field trip?)
- What would automobiles be like?
- Would a whole city be in a huge glass case or underground?
- What does the planet or moon not have that we need to survive? How would we get it?

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