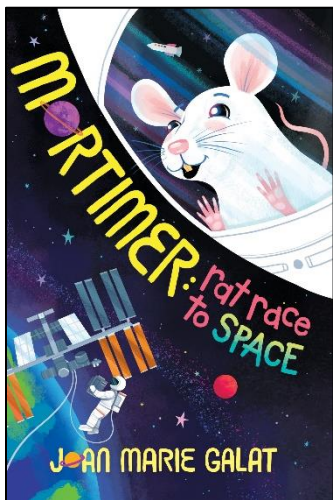




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***Mortimer: Rat Race to Space* by Joan Marie Galat** **Teacher's Guide**

Created by Joan Marie Galat with support from the Cormorant Books team



A spot on the International Space Station (ISS) has opened up, and Mortimer, is not about to miss his chance to become an intergalactic space rat. Mortimer sets out to expose the impracticality of human astronauts by conducting experiments and recording the evidence for YouTube. As far as he's concerned, pellet-eating rats are much easier to feed than fussy humans, and just think of all the unwashed underthings floating around the galaxy — especially when compared to the versatile rattail!

But when Mortimer's schemes go awry, he is forced to face new truths about dreams, friendship, and choosing the right thing to do. Maybe not everything is a rat race.

Themes

Some of the key ideas and themes you will encounter in this book include:

- Courage and perseverance
- Friendship and cooperation
- Space exploration
- Living in space
- Science, technology, engineering, math, arts (STEM and STEAM)
- Journal writing
- Misinformation and disinformation

Curriculum Connections

Topics discussed in *Mortimer* correspond to various Canadian science curricula for grades 4–8 about the natural world, Earth systems, space and the Solar System, scientific method and science communication, energy, and motion, light, and space exploration and technology.

Mortimer and this teachers' guide can be used in language arts and literature classes for grades 4–8 to address story forms and structure, audience and perspective, literary devices, creative writing, research skills and ethical use of information, making inferences and summarizing, and explicit and implicit information, among other topics.

Themes in *Mortimer* align with the American National Science Education Standards for grades 4–8 about the Earth, Solar System, forces, and science as a human endeavor. *Mortimer* and this guide connect to the American Common Core Literacy Standards in Science for grades 6–7.

For more in-depth curriculum connections, please see the document available for download at www.dcbyoungreaders.com/mortimer.

Pre-reading Discussion

- Would you like to live on a space station? What are the pros and cons?
- Imagine a situation where proving a point feels important. How can you change the minds of those who disagree with you?
- Should you follow your dreams at any cost? What are reasons for letting dreams go?

Discussion Questions

1. Mortimer loves to observe humans. What differences does he notice between rats and people? How does his view change throughout the story?
2. What are the novel's settings? Use a world map to locate the places Mortimer visits. Examine photographs and diagrams of the International Space Station.
3. Mortimer sets out to use scientific experiments to prove rats are better suited than humans when it comes to colonizing Mars. How is science used to prove and disprove theories? Is it an effective tool for Mortimer?
4. Both Boris and Mortimer have worries, which they keep private. What do they fear? What consequences do they face for hiding their worries?
5. The author uses humor to tell Mortimer's story. Often the unexpected is what makes us laugh. Identify surprising scenes or events from the book that you found funny.
6. Mortimer observes cooperation between countries on the International Space Station. What does he learn?

7. Boris and Mortimer don't always agree. When one of Mortimer's video monologues starts to sound one-sided, Boris pushes him to tell all the facts—not just the one's that support his point. Who is right? Define *misinformation*, *disinformation*, and *fake news*. Why are they problems?
8. Mortimer keeps a journal. He uses it to organize his thoughts and sort out his feelings. How else does writing help Mortimer? Does writing help you?
9. Celeste and Mortimer use a secret code to communicate. How does it work? What role does it play in the story's outcome?
10. What is surface tension? How do we see astronauts use it? How does it affect Freckles during his spacewalk?
11. Why is space exploration important?
12. What did the author accomplish with this book? Would you recommend it to others?

Chapter Questions

Chapters 1–5

1. How does Mortimer spend his days at the space center? What would you do if you lived in a lab like Mortimer?
2. Mortimer outlines a lot of misconceptions humans have about rats. Can you think of another animal humans cast in a bad light? Do some research and list three positive traits about that species that you think people should know.
3. Why does Mortimer want to see rats on Mars? What does he hope to accomplish?
4. Mortimer thinks about using social media like Twitter to spread his ideas. Do you think social media is a useful tool for sharing information? Why or why not?
5. The lab rats in Houston compete in a maze to win a spot on the International Space Station. What reasons do some rats give for preferring life on Earth?
6. The lab rats in Houston accuse Mortimer of breaking the rat code. Did he do something wrong or was his behavior excusable?
7. What happens to astronauts underwater? Why is it important that they train this way?
8. Describe Mortimer's Grand Plan. Do you think it will work? How would you change it?

Chapters 6–11

1. What strategies does Mortimer use to distract or evade humans?
2. Describe Mortimer's experience travelling to the International Space Station in your own words.
3. What is Mortimer's first impression of the space station?

4. On page 57, Mortimer decides to master the art of floating in his enclosure for the first time. Do you think he's nervous to try? Justify your answer with information from the text.
5. Imagine you are experiencing microgravity for the first time. Describe how it feels and whether or not you enjoy it.
6. How is living on the International Space Station unlike living on Earth? List three ways things are different for Mortimer and the human astronauts.
7. Do you think Mortimer's first experiment on the human astronauts is cruel? Why or why not?
8. Share one new science fact you learned.

Chapters 12–17

1. Explain Mortimer's first impression of Boris the cosmorat. How does his opinion change throughout these chapters?
2. Why are the rats on board the ISS?
3. How has being born in space and only living there affected Boris?
4. How do astronauts use water in the ISS galley? Is there a special function for it there?
5. What is Boris afraid of? How can you tell?
6. Think about Mortimer's second experiment on the human astronauts. What is one thing you wouldn't be able to live without?
7. Draw the view Mortimer and Boris observe from the Cupola. Use the description in the text as a guide.
8. Mortimer comments on the issue of light pollution. When is light a problem? What can be done to restore dark skies?

Chapters 18–22

1. How does seeing the "alien" give Mortimer an idea for a video? What fact about rats does he point out?
2. One of the astronauts on board the ISS is an astrobiologist. Research other roles astronauts may hold in space.
3. Mortimer realizes he will need help to measure the dimensions of the ISS. What other tasks do you think would take two people to do in space that might just take one on Earth?
4. On page 133, Mortimer calls his video series *RatTV*. Can you think of another name for his YouTube channel? What catchy title and blurb would you add to encourage viewers to watch your favorite video?
5. What does Mortimer begin to realize about the usefulness of humans when it comes to executing his Grand Plan?
6. What do you think Boris is looking up on the Internet?
7. What happens to used clothing and other garbage accumulated aboard the ISS?
8. Do you think Mortimer has been unfair in some of his video reporting? If so, what do you think he should have included so far?

Chapters 23–27

1. Do you think Mortimer should have looked at Boris’s Internet history? Why or why not?
2. Boris was born on the space station and has never been to Earth so things like soda are completely alien to him. What are some things you would show him, and experiences you think he should have, as an introduction to Earth?
3. What happens to Mortimer’s evidence?
4. Mortimer must face the other rats in the lab when he returns to Houston. How does he deal with his friendship problems?
5. How does Boris feel about living on Earth? What does he wish?
6. How does living in space affect Mortimer? How do his relationships with his fellow lab rats change?
7. What does Mortimer ultimately decide about his Grand Plan and humans?
8. The author does not reveal what “T” stands for in Mortimer T. Flightdeck. What do you think would make a good middle name?

Writing Activities

- Imagine Celeste or Gorgonzola were selected for a space mission and describe their experiences living without gravity. What do they love about being in space? What do they miss about Earth?
- Begin a short story with one of these sentences:
 - The asteroid will strike the space station by this time tomorrow.
 - I don’t feel ready for my first spacewalk, but the airlock is already opening.
 - In a little while, everyone will know my secret. I’m not really an astronaut.
- You’ve been chosen to live on the first Mars base! Write a series of journal entries about your experience on the Red Planet. Describe what you see and feel, and how life is different from home. Who are you with? How do you spend free time? What worries you?
- Imagine you have been away from Earth for 20 years. Write a series of journal entries describing all the changes you discover once you are back on your home planet.
- Make a poster or brochure encouraging people to move to a base on the Moon or Mars. Use words and images to highlight the benefits of living beyond Earth’s atmosphere.
- Think of your favorite scene from *Mortimer: Rat Race to Space*. Design a new cover for the book based on this scene and write a new description for the back cover.

Try the Science

Follow the instructions below to demonstrate scientific principles raised in *Mortimer*.

For each experiment:

- Make a prediction (a hypothesis) about what will happen during the experiment. Look at the steps to help you make your guess.
- Write down your observations (data) in as much detail as you can.
- Look at your observation notes and draw a conclusion about your experiment. Relate it back to your hypothesis. What can you conclude? Why do you think the result happens?

Surface Tension: Sink or Float

The principle of surface tension arises more than once in the novel. On page 98, Mortimer talks about an experiment that Iceberg Hands did to show school tours how it works. You can replicate it.

You'll need a:

- Glass of water
- Paperclip

What to do:

- Fill a glass with water.
- Drop a paperclip into the water.
- Observe what happens.
- Remove the paperclip and instead, gently lay it on top of the water.
- Observe what happens.

Angular Momentum: Spin or Stop

Mortimer twirls like a figure skater in space. Have you ever noticed that figure skaters use their arms to control their speed? If you have ice skates and a skating rink, try it yourself! If not, you can try to get the same effect with this experiment. *Note:* Make sure you have space around you and adult supervision for this experiment.

You'll need:

- A chair that spins
- Two heavy books

What to do:

- Sit on a spinning chair while holding two heavy books in your hands.
- Start spinning with your arms (and books) tucked in close to you.
- Extend your arms directly out from your body.

- Observe what happens.
- Spin again, this time starting with your arms out.
- Bring your arms (and the books) out to the full length of your arms.
- Obverse what happens.

Vestibular System: What Gets Blurry?

Did you know that your ears do a lot more than just hear? They also control your sense of balance and awareness of the space around you. Test your vestibular system with this simple experiment.

You'll need: Your hands and eyes

What to do:

- Hold your hand out in front of your face, about 8 cm (3 inches) away.
- Shake your hand quickly, left to right.
- Observe what you see.
- Hold out your hand again.
- This time, shake your head instead of your hand.
- Observe what you see.

Invisible Forces

Gravity is a force that causes all objects to fall at the same speed, whether they are large or small. Did you know that the weight of an object doesn't change how fast it descends? Try the next set of experiments to see gravity and other forces in action.

Make an Object Float

You'll need a:

- Shoebox
- Strong magnet
- Piece of thread
- Paperclip
- Piece of tape

What to do:

- Stand a shoebox vertically.
- Place a strong magnet on top.
- Tie the end of a thread to a small paperclip.
- Holding the paperclip just below the magnet, tape the other end of the thread to the bottom of the box.

- Raise the paperclip toward the magnet.
- Observe what happens.

Explore Gravity

You'll need:

- Two empty plastic water bottles
- Some water

What do to:

- Hold both water bottles at the exact same height.
- Drop them at the same time.
- Observe how they hit the ground.
- Now, fill one water bottle with water up to half.
- Hold both water bottles again at the exact same height.
- Drop them at the same time.
- Observe what happens.

Although objects accelerate at the same speed, some things do affect their pace. Air around Earth creates resistance, called drag, which can make one object slower than another. You can see how air affects speed by dropping a feather and tennis ball at the same time. In a vacuum, they would both land at the same time. On Earth, air slows the feather more than the tennis ball.

Experience the Power of Air

You can *feel* the impact of air resistance with another experiment.

You'll need:

- A bicycle
- Your finger

What to do:

- Pedal your bicycle fast enough to sense a breeze.
- While keeping your eyes on where you're going, carefully stretch a finger out from the handlebar.
- Next, curl your finger.
- Observe what happens.

This experiment can also be replicated by carefully sticking your fingers outside the window of a moving car. Ask the driver for permission first and ensure it's safe before you begin.

About the Author

Joan Marie Galat was first published as a newspaper columnist at age twelve. Today she is the author of more than twenty-five books for children and adults, with translations in seven languages. She is best known for her science books for children, especially her astronomy titles, and her interest in everything outer space. Her books have won and been nominated for numerous awards including the Crystal Kite, Skipping Stones, Rocky Mountain, Red Cedar, Hackmatack, Moonbeam, and Green Prize for Sustainable Literature, among others. She is the 2018 recipient of the Martha Weston Grant, awarded annually to one worldwide member of the Society of Children's Book Writers and Illustrators. Galat lives in Alberta, near Edmonton. Visit www.joangalat.com to arrange literacy-building science and engineering presentations at your school.



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