

## **Elective 7: Reading and Writing in Science with the Common Core State Standards for ELA Reading and Writing in Science and Technical Subjects**

The following science reading and writing activity about black holes is designed for middle school students focusing on forces and making detailed observations.

### **NASA Themed Resources:**

- [What Is a Black Hole?](#)
  - Learning Support/ELL Students: [What is a Black Hole? Video](#)
- [NASA's Guide To Black Hole Safety](#)
- [Black Holes: By the Numbers Slideshow](#)

### **Writing Prompt:**

You have been selected for mission impossible! NASA has developed the technology to allow YOU to be the first person to visit a black hole! As the first visitor, you must write a scientific field report detailing all of the information you learn from your journey.

Your scientific field report must include:

- Free body diagrams representing the forces acting on your body on Earth and at the black hole
- Detailed observations or data collected while on location at the black hole
  - Remember observations involve ALL of your senses
- Sketches of your observations
- Recommendations for future black hole voyages

Use the resources provided for your report. Cite specific examples from the resources to support your diagrams, observations, sketches, and/or recommendations.

## Connection to Standards:

Standards	Connection to Activity
<b><u>Science Standards</u></b>	
<p><b><u>NGSS Science Standards:</u></b></p> <ul style="list-style-type: none"> <li>• <a href="#">PS2.B: Types of Interactions:</a> Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun. (MS-PS2-4)</li> </ul>	<p>From the provided resources, students will learn that black holes have a very large mass and thus a very strong gravitational force.</p>
<p><b><u>PA Science Standards:</u></b></p> <ul style="list-style-type: none"> <li>• <b>S8.C.3.1.1</b> Describe forces acting on objects (e.g., friction, gravity, balanced versus unbalanced).</li> </ul>	<p>Students will use their prior knowledge of forces and information from the readings to draw free body diagrams of the forces acting on their body on Earth and at a black hole.</p>
<b><u>CCSS ELA Reading &amp; Writing Standards:</u></b>	
<p><a href="#">CCSS.ELA-Literacy.RST.6-8.1</a> Cite specific textual evidence to support analysis of science and technical texts.</p>	<p>Students will cite direct evidence (using quotes) from the articles or image slideshow to support their observations, sketches, and/or recommendations.</p>
<p><a href="#">CCSS.ELA-Literacy.RST.6-8.4</a> Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 6-8 texts and topics</i>.</p>	<p>Students will encounter new vocabulary terms that they must use the context clues of the passage to determine the meaning. Some new key terms include: Stellar, Supermassive, Accretion disk, Planetary nebula, Red giant star, White dwarf star, etc.</p>
<p><a href="#">CCSS.ELA-Literacy.RST.6-8.7</a> Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</p>	<p>Students will use the information from the text to express the strong force of gravity of a black hole in a free body diagram. Students can also use the information to make sketches of what they would potentially observe at a black hole.</p>
<p><a href="#">CCSS.ELA-Literacy.RST.6-8.9</a> Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p>	<p>The resources provided include two reading passages and an image slideshow. There is also a video resource for learning support or ELL students instead of a reading passage. Students must compare all of the information provided in each resource in order to synthesize their understanding of black holes.</p>
<p><a href="#">CCSS.ELA-Literacy.RST.6-8.10</a> By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.</p>	<p>Students will read articles specifically designed for students in the 5 – 8 grade levels.</p>