

**Cross-Curricular Discussion: Q**

**Directions:** The following list of discussion questions is provided to help you take notes, brainstorm ideas and test your thinking in order to be more actively engaged in class discussions related to this article. All questions in this section are related to topics covered in "[Stephen Hawking's legacy will live on.](#)"

**PHYSICAL SCIENCES****Discussion questions:**

1. What are quantum fluctuations?

2. What is Hawking radiation?

3. What is a mini black hole?

4. What are multiverses?

### **Extension prompts:**

**5. How might you experimentally observe and confirm the existence of Hawking radiation?**

**6. How can the production of particle-antiparticle pairs be observed?**

**7. What is a gravitational singularity?**

## **BIOLOGICAL SCIENCES**

### **Discussion questions:**

**1. Stephen Hawking was diagnosed with amyotrophic lateral sclerosis (ALS) when he was 21. What is ALS?**

### **Extension prompts:**

**2. What are some potential causes of ALS?**

**3. What are some current and potential treatments for ALS?**

## **ENGINEERING AND EXPERIMENTAL DESIGN**

### **Discussion questions:**

**1. In what ways can engineering be used to assist ALS patients?**

### **Extension prompts:**

**2. Stephen Hawking believed that it was important to establish human colonies in space. He expressed that human life on Earth could be eliminated by a virus, war, asteroid or some other catastrophe. How could humans establish colonies in space?**

**3. What do you think is the likelihood that human life on Earth will be wiped out by an infectious disease, war, environmental change, an asteroid or other factors? Explain your reasoning.**

**4. Do you agree with Stephen Hawking that there is a moral imperative for humankind to spread to other parts of space to avoid extinction? Would the universe be better off if humans remain on Earth? Or do you have other ideas?**