



It's all about Q

Dr. B answers 3 questions about quantum computing: What is quantum computing? How does it work? What does it mean for you and me?



Watch the show!



<https://www.youtube.com/watch?v=SO0UfjMGt-k>

Quick Questions

1. Have you ever heard of quantum computing?
2. How much do you think it costs to keep a quantum computer at -272°C ?
3. Why might a computer need to be so cold?
4. Did you know that lasers and MRIs use quantum mechanics?



Deep Dives

1. What complex world problem, question, or mystery do you hope quantum computers will one day help us to solve? Why can't we solve this problem now?
2. Gamers often buy computers with higher processing speeds than standard computers. Scientists need computers with lots of memory to solve the world's most complicated scientific problems. If you could design the perfect computer for your own use, what are three features you would want it to have? Be creative - these don't have to be features that already exist for computers. How would these features help you?
3. Dr. B outlines a number of possible problems that can be addressed through the use of quantum computers. If you were to design a study using a specialized computer, what problem might you want to study? What features might your computer need to help you achieve your goals? Think outside the box - these don't have to be features that already exist for computers.
4. The video explains that quantum computers must be kept at -272°C . This is expensive and not something that we are currently able to have in everyone's home. Some companies have built their own specialized computers. They allow researchers and companies to use those computers for their projects so that they don't have to build their own. Imagine you are in charge of deciding who gets to use the quantum computer. You're looking at 50 proposals, but your computer can only accommodate three this year. What would you take into consideration when deciding who gets to use it?

Engaging in Science Discussions



Recommended Grade Level: Middle and High School

Objective: To engage in open-ended discussions about critical science topics. While leading these discussions, it is important to ensure that everyone is heard, and everyone is treating one another with respect. There is no “right answer” during these discussions, and it’s okay to respectfully disagree.

Additional Notes: We recommend having these discussions multiple times with the same group of participants. This provides the opportunity to explore different topics and improve one’s abilities to have successful conversations about STEM topics. Quick Questions are optional and are recommended to be used as warm-up questions.

Materials: TV or projector Paper and writing utensils

TIMELINE (30 – 40 MINUTES)

5 min	10 min	5 min	10 min	10 min <i>(optional)</i>
Intro + prompts	Watch segment	Think/write time	Share with partner	Small groups

Intro (5 min) Before starting, select one Deep Dive question. Tell the group you will be asking them a question that has no right or wrong answer. After they watch the clip, they will have time to think about and write their response. They will share their response with a partner or small group. Now share the question you selected.

If participants are new to these sorts of discussions, you may want to review the following concepts:

- When you are sharing your responses, provide reasoning and evidence. Reasoning is your own thinking behind your answer. Evidence is facts that support your answer, such as historical facts or scientific facts. You may also have experiences from your own life that support your answer.
- When listening to your classmates, ask questions. The purpose of questions is to better understand their thought process, not to challenge them. Some ways to frame questions are: “I didn’t understand X.” “Could you explain Y again?” “What do you mean by Z?”
- If someone asks you questions, provide clarification. Explain your reasoning and evidence. Remember that there are no right or wrong answers.

Watch the segment (10 minutes)

Think/write time (5 minutes): Participants write down their answers

Share with a partner (10 minutes): Pair up participants. Each person has 5 minutes to share their response and answer questions from their partner. Then switch so each partner gets a turn.

(Optional) Small groups (10 minutes): Put participants in groups of 4 for share-outs and conversations.

(Optional) Homework prompts: Expand your response into a report, picture, poem, essay, short story, song, or performance. Or, write your own discussion question for the group.