9-12 Quantum Computing Intro — Weekly Student Pack

NAME	DATE	CLASS / PERIOD
_____	_____	_____

What you'll learn this week

A five-session conceptual intro to quantum computing without calculus. Students build intuition with coin and card analogies, see superposition and entanglement on the IBM Quantum Composer, learn what kinds of problems quantum is actually expected to crack (and which it isn't), and finish able to talk about qubits without the popular-science fairy tales.

My goals for the week

- [ ] Session 1: I can explain how a classical bit differs from a qubit using a coin analogy and identify what 'superposition' actually means.
- [ ] Session 2: I can use the IBM Quantum Composer to set up a 1-qubit experiment and interpret the histogram result.
- [ ] Session 3: I can explain entanglement as 'measuring one tells you about the other' using a 2-qubit Bell state demo.
- [ ] Session 4: I can identify two problems quantum is well-suited for and two problems where classical wins.
- [ ] Session 5: I can explain quantum computing in 60 seconds at a level a smart adult who hasn't studied it can follow.

Session 1

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TODAY'S GOAL

I can explain how a classical bit differs from a qubit using a coin analogy and identify what 'superposition' actually means.

WORDS I NEED TO KNOW

Today's plan

1. Warm-up: "Flip a coin. While it's spinning in the air — what is it?" Discuss: heads, tails, both, neither?
2. Lesson: Classical bit = coin lying on the table (0 or 1). Qubit = coin in the air (a probability mix of 0 and 1)…
3. Practice together: Triads use 4 coins to model 'measurement collapses superposition' and 'two qubits = 4 possible outcomes'.
4. Practice on my own: Half-page: 'Why "a qubit is both 0 and 1 at once" is misleading — and what's more accurate.'
5. Exit ticket: Sentence stem: "A qubit isn't both — it's a ___ until ___."

MY PRACTICE — SHOW YOUR WORK

EXIT TICKET — before you leave today

Prompt: Sentence stem: "A qubit isn't both — it's a ___ until ___."

Session 2

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TODAY'S GOAL

I can use the IBM Quantum Composer to set up a 1-qubit experiment and interpret the histogram result.

WORDS I NEED TO KNOW

Today's plan

1. Warm-up: "Today you write your first quantum program. It'll be 1 line."
2. Lesson: Demo: drag a Hadamard gate onto qubit 0, add a measurement, run on the simulator. Walk through the resulting…
3. Practice together: Pairs replicate the demo; modify by stacking two Hadamards and predicting + checking the result.
4. Practice on my own: Each pair sets up one experiment of their own choice (within taught gates) and explains the histogram in 2…
5. Exit ticket: Whip-around: one prediction that matched, one that surprised you.

MY PRACTICE — SHOW YOUR WORK

EXIT TICKET — before you leave today

Prompt: Whip-around: one prediction that matched, one that surprised you.

Session 3

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TODAY'S GOAL

I can explain entanglement as 'measuring one tells you about the other' using a 2-qubit Bell state demo.

WORDS I NEED TO KNOW

Today's plan

1. Warm-up: "Here are two coins that always land showing the same face — even if they're across the room. Spooky?"
2. Lesson: Build the Bell state on the Composer (Hadamard on qubit 0, then CNOT to qubit 1). Run; show 00 + 11 only,…
3. Practice together: Pairs build the Bell state, then try to break the correlation by inserting a gate; debrief.
4. Practice on my own: One paragraph: 'What entanglement is and what science writers usually get wrong about it.'
5. Exit ticket: Add 'entanglement' to anchor chart with student-friendly definition.

MY PRACTICE — SHOW YOUR WORK

EXIT TICKET — before you leave today

Prompt: Add 'entanglement' to anchor chart with student-friendly definition.

Session 4

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TODAY'S GOAL

I can identify two problems quantum is well-suited for and two problems where classical wins.

WORDS I NEED TO KNOW

Today's plan

1. Warm-up: "Quantum will not make Netflix faster. Why not?"
2. Lesson: Quantum strengths: problems with exponential structure (factoring, simulating quantum systems, certain…
3. Practice together: Triads sort the problem cards and defend each placement.
4. Practice on my own: Pick one card and write a 3-sentence explanation of why quantum will or won't help.
5. Exit ticket: Class consensus on the two trickiest cards.

MY PRACTICE — SHOW YOUR WORK

EXIT TICKET — before you leave today

Prompt: Class consensus on the two trickiest cards.

Session 5

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TODAY'S GOAL

I can explain quantum computing in 60 seconds at a level a smart adult who hasn't studied it can follow.

WORDS I NEED TO KNOW

Today's plan

1. Warm-up: Watch a 60-second pop-science explanation that contains 2 errors. Class spots them.
2. Lesson: Pitch structure: what it is (15s), one thing it can do (20s), one thing it can't (15s), why it matters now…
3. Practice together: Pairs draft + critique with two rules: no fairy-tale phrasing ('infinite parallel universes'), every claim…
4. Practice on my own: Record (phone or Flip).
5. Exit ticket: Two volunteers play their pitch; class scores against rubric.

MY PRACTICE — SHOW YOUR WORK

EXIT TICKET — before you leave today

Prompt: Two volunteers play their pitch; class scores against rubric.

My Week — Reflection

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How did it go?

One thing I'm proud I learned this week:

One thing that was tricky for me:

A question I still have:

How I'd rate my effort this week (1–5) and why: