

ADAPTING HIGH SCHOOL PHET ACTIVITIES FOR MIDDLE SCHOOL

The PhET website (phet.colorado.edu) has many lessons written for high school students that can easily be adapted to use in lower grades if the activity follows the PhET Inquiry-based Guidelines. Tips to adapt high school lessons include the following:

1. Use directions that are qualitative rather than quantitative.

Make the lesson conceptual by encouraging students to notice cause-and-effect relationships. Allow students to use descriptive terms such as “increased” and “decreased” or “faster” and “slower” rather than requiring them to write down specific numbers. Pictures and graphs can also be helpful. Look at teacher notes; they often contain concept questions or clicker questions that may be conceptual.

2. Allow students the opportunity to discover relationships among variables.

Students should be allowed to discover relationships through experimentation with the sims. Encourage students to make conjectures about their observations and give them time to test them out. Avoid giving students formulas at the start of the lesson.

3. Allow students the opportunity to explore.

Students will be curious about the different features contained in the sims. Allow students the opportunity to explore the different features of the sim to help them accomplish the learning goals for the lesson. Incorporate them into your lesson by asking students to come up with their own questions using the additional features

4. Promote self-driven exploration, avoid step-by-step instruction.

Free exploration can often be done in the context of the learning goals and help students test and extend their knowledge.

5. Check for understanding as needed.

Even though the lessons are inquiry-based, lessons can be guided by the teacher depending on the students' background knowledge and ability. Guide lessons with teacher-led and group discussions during various parts of the lessons to check on student understanding.

6. Shorten lessons to include only specific standards or learning goals.

Sometime the only adaptation that needs to be made is to delete questions that are not relevant to your learning goal.

7. Allow students time to collaborate.

Give students time to share with each other before sharing with the entire class. This allows students a time to “practice” their explanations in a non-threatening forum.

8. Revise the connections to real world experiences.

Examples given in the lesson might not be appropriate for lower grades. Revise them specific to your students' needs and prior knowledge.

9. Use existing data charts and diagrams.

Incorporate relevant pictures, data charts, diagrams, and/or graphs from lessons in the database into your lessons. Data charts and graphs can be modified as needed.

ADAPTING HIGH SCHOOL PHET ACTIVITIES FOR MIDDLE SCHOOL

Reflection highlights

- Learning goals should have measurable action verb at beginning.
- The lesson should have students: Reflect on prior understanding through prediction, then test using sim, then correct or verify thinking before adding new knowledge.
- Use conversational language whenever possible instead of technical jargon.
- Use monosyllabic words for young readers.
- Be stingy with prepositions and pronouns
- Don't use yes or no questions

PhET 10/14/07