The following demographic questions will be used to determine whether the sample of students who take this assessment are a representative sample of the student body at large in order to check the reliability of the data obtained.

Please fill in marks like this:

- not like this:

1. Please indicate the total number of college level credit hours that you have passed (grade C or better):
   - At HWC: 0 0 1-15 16-30 31+
   - At other colleges: 0 0 1-15 16-30 31+

2. Please indicate the total number of college level credit hours that you have passed (grade C or better):
   - At HWC: 0 1-2 3+
   - At other colleges: 0 1-2 3+

3. Given that definition, please indicate how many courses you have successfully completed in the Natural Sciences:
   - At HWC: 0 1-2 3+
   - At other colleges: 0 1-2 3+

4. Please indicate your sex:
   - Female
   - Male

5. Please indicate your race and/or ethnicity:
   - African American/Black
   - Arab/Arab American
   - Asian American/Pacific Islander
   - Asian/Asian American
   - American Indian/Alaska Native
   - White/Caucasian
   - Caucasian/White
   - Hispanic/Latino/Chicano
   - Multi-racial/Multi-Ethnic
   - Native American/Alaska Native
   - Native American
   - Native Hawaiian/Other Pacific Islander
   - Native Hawaiian
   - Other

6. Please indicate your age:
   - 25 or under
   - 26-40
   - 41-60
   - 61+

7. Please indicate your current academic status:
   - Full time (enrolled 12 credit hours or more)
   - Part time (enrolled less than 12 credit hours)

The following questions will ask you about your interests, values, and opinions related to the Natural Sciences (the life sciences: Biology, Zoology, and Botany). Use this time to think honestly about yourself.

9. Please indicate your comfort level with:
   - science
   - math
   - writing
   - reading
   - arts

10. I think studying the natural sciences:
   - has given me new ways to think about my own life
   - has given me important skills to use in other classes
   - has helped me reach my academic and/or personal goals
   - has helped me become a more rational/logical person
   - has not helped broaden my interest in scientific topics
   - is something I would have done even if there were not a science requirement
11. Compared to the time before I came to HWC, I am now more likely to:

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neutral</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>read different types of books.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b.</td>
<td>enjoy different types of science shows (i.e. Discovery Channel).</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>c.</td>
<td>read scientific articles in newspaper or magazines.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>d.</td>
<td>relate science to race or ethnicity.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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</tr>
<tr>
<td>e.</td>
<td>relate science to sex or gender.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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</tr>
<tr>
<td>f.</td>
<td>relate science to sexuality.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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</tr>
<tr>
<td>g.</td>
<td>relate science to religion.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>h.</td>
<td>relate science to society.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>i.</td>
<td>relate science to politics.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>j.</td>
<td>discuss life's big questions.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

12. Compared to the time before I came to HWC, I am now more likely to:

<table>
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<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neutral</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>search for meaning in books and articles I read.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b.</td>
<td>attend a science event.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>c.</td>
<td>visit a museum or research laboratory.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>d.</td>
<td>bring family, friends, or coworkers to a science event.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>e.</td>
<td>feel confident about understanding what I read, see, and hear.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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</tr>
<tr>
<td>f.</td>
<td>feel confident about interpreting scientific works.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>g.</td>
<td>feel confident about what I write.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>h.</td>
<td>feel confident about interpreting scientific works.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>i.</td>
<td>find value in scientific works even if I don’t understand them.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

13. Since coming to HWC, have you attended or otherwise experienced (indicate all that apply):

<table>
<thead>
<tr>
<th></th>
<th>Yes, and it was a new experience</th>
<th>Yes, but it was not new to me</th>
<th>No, but I have experienced this before</th>
<th>No, and I have never experienced this.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>the Museum of Science and Industry, Planetarium, Aquarium, or the Field Museum of Natural History.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b.</td>
<td>a science-related special event (i.e. Body Works or Science in the City).</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>c.</td>
<td>a film presentation of a science-related documentary.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>d.</td>
<td>a science-related lecture or educational presentation (non-credit).</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>e.</td>
<td>a debate on a scientific topic (i.e. climate change).</td>
<td>☐</td>
<td>☐</td>
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</tr>
</tbody>
</table>
Epistemological Beliefs Assessment for Physical Science (EBAPS)

Written by Andrew Elby, John Frederiksen, Christina Schwarz, & Barbara White at Univ. of California, Berkeley in 2001.

Part 1

**DIRECTIONS:** For each of the following items, please read the statement, and fill in the circle that describes how strongly you agree or disagree.

<table>
<thead>
<tr>
<th>A: Strongly disagree</th>
<th>B: Somewhat disagree</th>
<th>C: Neutral</th>
<th>D: Somewhat agree</th>
<th>E: Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Tamara just read something in her science textbook that seems to disagree with her own experiences. But to learn science well, Tamara shouldn’t think about her own experiences; she should just focus on what the book says.                      

2. “Problem solving” in most science courses basically means matching problems with facts or equations and then substituting values to get a number.                      

3. Learning science made me change some of my ideas about how scientific phenomena can be used to understand the world around me.                      

4. If someone is having trouble in science class, studying in a better way can make a big difference.                      

5. Knowledge in science consists of many pieces of information, each of which applies primarily to a specific situation.                      

6. Only very few specially qualified people are capable of really understanding the sciences…                      

7. “Understanding” science basically means being able to recall something you've read or been shown.                      

8. When it comes to controversial topics such as which foods cause cancer, there’s no way for scientists to evaluate which scientific studies are the best.                      

9. A teacher once said, “I don’t really understand something until I teach it.” But actually, teaching doesn’t help individuals understand the material better; it just reminds them of how much they already know.                      

10. My grade in science classes will be primarily determined by how familiar I am with the material. Insight or creativity will have little to do with it.                      

11. Science phenomena are related to the real world and it sometimes helps to think about the connection, but it is rarely essential for what I will probably be doing in my career.                      

12. Someone who doesn’t have high natural ability can still learn the material well even in a science class.                      

13. Often, a scientific principle or theory just doesn’t make sense. In those cases, you have to accept it and move on, because not everything in science is supposed to make sense.                      

14. When learning science, people can understand the material better if they relate it to their own ideas.                      

15. A significant problem in science classes will probably be memorizing all the information I need to know.                      

16. When it comes to science, most students either learn things quickly or not at all.                      

17. The main skill I expect to get out of science classes is to learn how to reason logically about the physical world.                      

18. To understand science, the formulas (equations) are really the main thing; the other material is mostly to help you decide which equations to use in which situations.                      

19. If science teachers gave really clear lectures, with plenty of real-life examples and sample problems, then most good students could learn those subjects without doing lots of sample questions and practice problems on their own.                      

20. Understanding science is really important for people who design rockets, but not important for politicians.                      

21. Given enough time, almost everybody could learn to think more scientifically, if they really wanted to.                      

22. Learning science will help me understand situations in my everyday life.                      

Part 2

**DIRECTIONS:** Multiple choice. Fill in the circle that best fits your view.

23. Some people have ‘photographic memory’, the ability to recall essentially everything they read. To what extent would photographic memory give you an advantage when learning science?

- ✔ It would be the most helpful thing that could happen to me
- Somewhat agree
- Neutral
- Somewhat disagree
- Strongly disagree

- It would help a lot.
- It would help a fair amount.
- It would help a little.
- It would hardly help at all.
24. Scientists are having trouble predicting and explaining the behavior of thunderstorms. This could be because thunderstorms behave according to a very complicated set of rules. Or, that could be because some thunderstorms don’t behave consistently according to any set of rules, no matter how complicated and complete that set of rules is.

In general, why do scientists sometimes have trouble explaining things? Please read all options before choosing one.

- The system simply doesn't obey definable rules.
- Most of the time it's because the system doesn't obey definable rules; but sometimes it's because the system follows rules that are very complex or difficult to figure out.
- About half the time it's because the system doesn't obey rules, and the other half it's because the rules are complex or difficult to figure out.
- Most of the time it's because rules are complex or difficult to figure out, but sometimes it's because the system doesn't follow definable rules.
- A natural system always follows definable rules but the rules can be very complex or difficult to figure out.

25. To be successful at most things in life...

- Hard work is much more important than inborn natural ability.
- Hard work is a little more important than natural ability.
- Natural ability and hard work are equally important.
- Natural ability is a little more important than hard work.
- Natural ability is much more important than hard work.

26. To be successful at science...

- Hard work is much more important than inborn natural ability.
- Hard work is a little more important than natural ability.
- Natural ability and hard work are equally important.
- Natural ability is a little more important than hard work.
- Natural ability is much more important than hard work.

27. Of the following test formats, which is best for measuring how well you understand the material in one of the science classes? Please read each choice before picking one.

- A large collection of short-answer or multiple choice questions, covering one specific fact or concept.
- A small number of longer questions and problems, covering several facts and concepts.
- Compromise between (a) and (b), but leaning more towards (a).
- Compromise between (a) and (b), favoring both equally.
- Compromise between (a) and (b), but leaning more towards (b).

Part 3

DIRECTIONS: In each of the following items, you will read a short discussion between two students who disagree about some issue. Then you'll indicate whether you agree with one student or the other.

28. Anna: I just read about Kay Kinoshita, the physicist. She sounds naturally brilliant.

Emily: Maybe she is. But when it comes to being good at science, hard work is more important than “natural ability.” I bet Dr. Kinoshita does well because she has worked really hard.

Anna: Well, maybe she did. But let’s face it; some people are just smarter at science than other people. Without natural ability, hard work won’t get you anywhere in science!

- I agree almost entirely with Anna.
- Although I agree more with Anna, I think Emily makes some good points.
- I agree (or disagree) equally with Anna and Emily.
- Although I agree more with Emily, I think Anna makes some good points.
- I agree almost entirely with Emily.

29. Julia: I like the way science explains the things I see in the real world.

Carla: I know that’s what we’re “supposed” to think, and it’s true for many things. But let’s face it, the science that explains things we do in lab at school can’t really explain earthquakes, for instance. Scientific laws work well in some situations but not in most situations.

Julia: I still think science applies to almost all real-world experiences. If we can’t figure out how, it’s because the stuff is very complicated, or because we don’t know enough science yet.

- I agree almost entirely with Julia.
- I agree more with Julia, but I think Carla makes some good points.
- I agree (or disagree) equally with Carla and Julia.
- I agree more with Carla, but I think Julia makes some good points.
- I agree almost entirely with Carla.
Leticia: Some scientists think the dinosaurs died out because of volcanic eruptions, and others think they died out because an asteroid hit the Earth. Why can’t the scientists agree?

Nisha: Maybe the evidence supports both theories. There’s often more than one way to interpret the facts. So we have to figure out what the facts mean.

Leticia: I’m not so sure. In stuff like personal relationships or poetry, things can be ambiguous. But in science, the facts speak for themselves.

☑️ I agree almost entirely with Leticia.
☒ I agree more with Leticia, but I think Nisha makes some good points.
☒ I agree (or disagree) equally with Nisha and Leticia.
♥️ I agree more with Nisha, but I think Leticia makes some good points.
☒ I agree almost entirely with Nisha.

31.
Jose: In my opinion, science is a little like fashion; something that’s “in” one year can be “out” the next. Scientists regularly change their theories back and forth.

Miguel: I have a different opinion. Once experiments have been done and a theory has been made to explain those experiments, the matter is pretty much settled. There’s little room for argument.

☑️ I agree almost entirely with Jose.
☒ Although I agree more with Jose, I think Miguel makes some good points.
☒ I agree (or disagree) equally with Miguel and Jose.
♥️ Although I agree more with Miguel, I think Jose makes some good points.
☒ I agree almost entirely with Miguel.

32.
Jessica and Mia are talking about their experiences in their group.

Jessica: “I feel like explaining something to other people in my group really helps me understand it better.”

Mia: “I don’t think explaining helps you understand better. It’s just that when you can explain something to someone else, then you know you really understand it.”

☑️ I agree almost entirely with Jessica.
☒ I agree more with Jessica, but I think Mia makes some good points.
☒ I agree (or disagree) equally with Mia and Jessica.
♥️ I agree more with Mia, but I think Jessica makes some good points.
☒ I agree almost entirely with Mia.