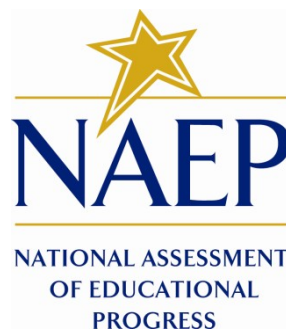*NATIONAL CENTER FOR EDUCATION STATISTICS*
NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS

Volume II
Cognitive Interviews and Tryouts Protocols

OMB# 1850-0803 v. 164

National Assessment of Educational Progress (NAEP) 2019
Science Items Pretesting

August 2016

Table of Contents

COGNITIVE INTERVIEWS (SCIENCE)

I. INTRODUCTION TO STUDY SCRIPT

The interviewer should not read the script word-for-word, but should be familiar enough with its contents to conduct the interview in a natural and conversational manner, paraphrasing, or giving further explanation as appropriate. For example, facilitators should be attentive to the language comprehension of younger students when delivering scripts. Text placed in brackets is generic text that should be tailored to suit the particular set of items/task being studied. In general, protocols will be tweaked and customized in light of specific item/task content and greater knowledge of delivery devices.

Introduction:
Hello, my name is _____ and I work for [indicate ETS or EurekaFacts]. *I am here with my colleagues* [introduce colleagues]. *It's nice to meet you, and thank you very much for helping us out today.*

Create small talk to build rapport with the student by asking a question, such as:
- *What is your favorite subject in school?*

When the student responds, follow up with two or three questions to get the student used to talking, such as:
- *That's interesting—why do you enjoy [subject] so much?*
- *What are you studying in [subject] at the moment?*
- *And what's the best thing you have studied in [subject] so far?*

Good. Well, I think you'll enjoy what we are going to be doing today. First, let me begin by explaining why I am here and what you are going to be doing. You are taking part in a special study looking at a new type of activity to find out what students know in science. It is part of something called the National Assessment of Educational Progress, or NAEP for short, which is conducted by the National Center for Education Statistics, within the U.S. Department of Education. NAEP is a test given to students in grades 4, 8, and 12 in the United States. You will help us develop better tests for other students. Overall, this session should take about [indicate correct length] *minutes.*

It's okay if you don't know how to do any parts of the [item/task]. I will not be grading your work today, and no one will know that it was you who did the [item/task]. My goal is to learn how you react to the [item/task], so please try to do your best.

If at any time you decide you don't want to go on, that is your choice, and you may stop.

This new test is on the tablet. The instructions about how to do the test are also on the tablet.

This interview is being recorded with video and audio so we can review it later. We will also be able to capture what you tap on and where you move your fingers. What you say will not be told to anyone. It will be used only for research purposes, to improve test questions, and will not be disclosed or used, in identifiable form, for any other purpose except as required by law [if needed: Education Sciences Reform Act of 2002 (ESRA 2002) 20 U.S.C., § 9573]. *We will look at what you say later, but only so that we can understand how our test is working and how we can make it better.*

We will work together on [specify number of items/tasks].

Do you have any questions?
After answering any questions and giving further explanation, continue with the think-aloud training. If the

student is no longer interested in participating, thank the student for his/her time and end the interview.

Okay, let's move on. Before we look at the real [set of items/tasks], I want to make sure you have a good idea of what we're going to be doing. So I am going to give you some practice questions. The practice questions should help you get used to what we will be doing during the real [set of items/tasks]. They should help you understand how we want you to respond. Do you have any other questions before we start?

NOTE: Check the study schedule to establish whether the student should undergo the assigned set of items/tasks with a concurrent or retrospective verbal protocol (think-aloud) procedure. If concurrent, the student will think aloud while he or she is doing the set of items/task; in those cases, follow the steps described in Section II. If retrospective, the student will describe his or her thinking after he or she has completed the set of items/task, while watching a recording of the set of items/task that was made as they proceeded through it; in those cases, follow the steps described in Section III.

II. CONCURRENT THINK-ALOUD

II a. Concurrent Think-Aloud: Instructions and Modeling Script

NOTE: If the schedule indicates that the *retrospective* method is to be used, please skip this section and move to Section III.

Text written in *italics* is to be spoken aloud by the interviewer. The interviewer should not read the script word-for-word, but should be familiar enough with its contents to conduct the interview in a natural and conversational manner, paraphrasing or giving further explanation as appropriate. For example, facilitators should be attentive to the language comprehension of younger students when delivering scripts. Text placed in brackets is generic text that should be tailored to suit the particular set of items/tasks being studied.

To help us make our test better, we will ask you to complete [a set of items/some tasks]. While you are doing the [set of items/tasks], we will be recording everything that happens on the screen. The screen recording will capture all of your responses and movements on the tablet such as what you tap on and anything you put into text boxes.

I'm going to ask you to do the [set of items/items in these tasks] in a way that may be different from what you are used to. Instead of working quietly, I want you to tell me what you are thinking as you work through the questions. We call this "a think aloud," because we are asking you to say everything you are thinking out loud.

In a moment, I will give you an example of the think-aloud process. Then I will give you a chance to practice it. You won't be graded on anything you say while you are thinking aloud. There are no incorrect thoughts, and everything you think and say is important to us.

Okay, now I'm going to show you how to think out loud—this will help you see how I want you to describe what you are thinking as you are working on the [set of items/task]. When I am finished I'll ask you to try it, so you can see how it works.

Think-Aloud Demonstration:

Since we can't tell what is going on in your head, we need you to think aloud.

Let me give you an example. [Place example question in front of student.] *Look at this question. It asks me to look at the five animals and choose two that are the most similar. So I am going to do this set of items/task, and I will think aloud while I work on it.*

Question:

Which two animals below do you think are similar? Circle the two that you think are most similar.
- **A. Beetle**
- **B. Mouse**
- **C. Crab**
- **D. Dolphin**
- **E. Cow**

The interviewer should not preform the demonstration by reviewing the item and answering the question 'silently.' Instead, the interviewer will verbally think through their thought process as they read the item and consider the question.

Okay, so I am reading the question…. It says I have to decide on the two animals that are the most similar. Hmm, I am just wondering what do they mean by "similar". That could mean anything. I'm thinking I'm not sure how I'm going to make that decision. Well, let's look at the choices. So the choices are beetle, mouse, crab, dolphin, and cow. Well, as I am reading the choices I am already thinking that there are some things about them that are similar, but there are also differences. I'm thinking the beetle and crab are kind of similar, in a way—well, they both have lots of legs and they kind of move around fast. But one lives in the water and the other doesn't, so that makes them different. I guess the mouse also moves around fast, but it's not similar to either the beetle or the crab, except they are all small. Then there is the dolphin that lives in the water, too… but that's about all it has in common with the crab, so I wouldn't say they are very similar even though they're both in the sea. Hmm, so the mouse and the cow are both mammals, they both have fur and they have live babies instead of laying eggs or whatever… oh right, but dolphins are mammals too, aren't they? Yes, I think they are… but really they seem so different from mice and cows to me. I don't know… this seems like a hard question… I'm not sure what to choose. Okay, I'm going to try to make a decision…umm…okay, I think I am going to go for… mouse and cow. Because they both have fur and have four legs and they both walk around on the land. That seems weird; they are not really similar! But when I think about all of the others they seem too different from each other in really basic ways, like where they live and their kind of body and that kind of thing… so, yes, even though it was really hard to decide, that seems like the best choice to me, because they are both mammals and they both live on the land. So those things seem like they are important, and that is how I made my decision.

Can you see that as I was thinking I was saying all of my thoughts out loud? That is what I want you to try to do as you are thinking about the [set of items/tasks] today. The point of the think-aloud is to get at whatever is in your head as you are doing the [set of items/tasks]. Just say aloud the words and the thoughts that are in your head, as you are thinking about and working on the [set of items/tasks].

II b. Concurrent Think-Aloud: Student Practice Script I

Interviewers should place the practice question in front of the student so he or she can read it. Some students will be silent after reading the question. Students should be immediately encouraged to say whatever they are thinking.

It may be necessary to remind the student to talk aloud as he/she works through the questions and tasks. If necessary, interviewers should use the "think-aloud hints" given below to prompt the student, being careful not to lead the student. The interviewer needs to be familiar enough with the information to introduce the think-aloud in a natural, conversational manner.

Now you will try a think-aloud. You can use this example. Like last time, you have to pick two of these things that you think are the most similar. As you are reading the question and the choices, and as you are figuring out your decision, I want you to talk out loud to tell me all of the thoughts that are in your head at each moment.

If I don't hear you speaking, I'll ask you to keep talking. I'm telling you that now so you won't think I am criticizing the way you are working. I'll be reminding you to think aloud if you get quiet because I need to hear all of your thoughts.

Okay, now you try. Go ahead and start working on this question and remember to think aloud as you are doing it.

Which two living things below do you think are most similar? Circle the two that you think are most similar.
A. **Apple tree**
B. **Grass**
C. **Wheat**
D. **Pear tree**
E. **Cherry tree**

After the student has finished:
Now that you have practiced, how do you feel about thinking aloud while you are doing the [set of items/tasks]? What questions would you like to ask me? [If the student says he or she feels okay and doesn't have any questions, say: *Good, then let's begin our study.*] [If the student expresses concerns, says he or she has questions, or appears to be hesitant or reluctant, ask him/her to say more about the concerns or questions, and try to address the concerns or uncertainties in a supportive way. If the student indicates he/she does not wish to continue or does not feel comfortable continuing, allow him or her to stop and say:] *Alright, let's stop. Thank you for working with me today. Let me walk you out.* [Escort the student out of the session.]

II c. Concurrent Think-Aloud: Student Practice II (Optional)

NOTE: Use <u>only</u> if you feel the student would benefit from another think-aloud practice before moving on to the actual questions. It may also be beneficial to model thinking aloud again for the student rather than doing another practice [see think-aloud demonstration in IIa].

If the student struggles to think aloud, the interviewer should give the student another opportunity to practice. The interviewer should praise the student for the first attempt regardless of how good it was, for example: "*Very good—let's do another one before we start the real the [set of items/tasks]. Are you ready? Here is the next practice question. Remember to think out loud as you begin to think about this question and all the way through —tell me what you are thinking as you work through it.*" During the practice item, the interviewer should prompt the student to think out loud at any point when there are more than a few seconds of silence (see suggested prompts, below).

Which two of the following objects have the most similar properties? Circle the two that are most similar.
A. **Silver coin**
B. **Chocolate coin**
C. **Gold coin**
D. **Blue plastic coin**
E. **Brown plastic coin**

After the student has finished:
Now that you have practiced, how do you feel about thinking aloud while you are doing the [set of items/tasks]? What questions would you like to ask me? [If the student says he or she feels OK and doesn't have any questions: *Good, then let's begin our study.*] [If the student expresses concerns, says he/she has questions, or appears to be hesitant or reluctant, ask him or her to say more about the concerns or questions, and try to address his/her concerns or uncertainties in a supportive way. If the student indicates he or she does not wish to continue or does not feel comfortable continuing, allow the student to stop, and say:] *Alright, let's stop. Thank you for working with me today. Let me walk you out.* [Escort the student out of the session.]

II d. Concurrent Think-Aloud: Starting the Set of Items/Tasks

Now we will move on to the actual [set of items/task]. Remember, as you do all the activities and answer all the [questions/questions in the task], I'd like you to say aloud everything that you're thinking, and I may remind you to do that if you are quiet. This [set of items/task] should take about [indicate correct length] *minutes. Remember, you will not be graded on what you do during the [set of items/task] and there is no right or wrong way to think aloud, as long as you keep telling me your thoughts. Your thoughts will help us make the [items/tasks] better. I will also have a few questions after you have finished working on the [set of items/task].*

Do you have any questions before we go on? [Answer any questions the student may ask.]

Because the information you provide is so important to us, I am going to be taking notes while you think aloud and answer the questions.

Here is the [set of items task]. When you are ready, go ahead and start working on it.

II e. Concurrent Think-Aloud: Hints for the Interviewer

The goal of think-alouds is to capture all the student's mental processes while working through the set of items/tasks. Interviewers must strive to have the student speak aloud all of his or her thoughts while doing the set of items/tasks. If a student is continually providing short utterances or not talking, interviewers should use "continuers" to encourage students to be more descriptive, trying to get students to verbalize thoughts without putting words in students' mouths. Care should be taken not to ask questions that lead students' responses in particular directions or make them rush or change their approach. Interviewers should be as objective and unbiased as possible.

In general, if the student is silent for approximately five to 10 seconds, interviewers should use the following as a guide for encouraging the student to describe his or her thoughts, or to help the student elaborate on his or her responses.

If the student is not verbalizing enough, interviewers should offer a verbal nudge to remind the students to keep talking, such as:

- *What's going on in your head right now?*
- *I see you're looking at the [items/task] [or screen/figure/chart/text]. What are you thinking?*
- *You seem to be thinking hard—can you tell me what's in your mind right now?*
- *What are you thinking now?*
- *Any other thoughts?*

If the student says something about his or her thoughts but it is difficult to tell exactly what he or she means, or if the student begins to talk but does not say very much, interviewers can urge the student to elaborate. For example:

- *Tell me a bit more about that.*
- *That's interesting—can you say more about that?*
- *Go on….*
- *Okay, and what else are/were you thinking?*

If more clarity or a more explicit description of a student's thoughts is desirable:

- *Can you explain what you mean by that?*
- *Can you say a bit more to help me understand what you mean/are thinking/were thinking?*

It is important to be responsive and sensitive to each student's behavior. If it becomes clear that students cannot say any more about their thoughts, interviewers should not keep asking. Students should be encouraged to think aloud as much as they can, but their reactions should be closely observed and pushing them should be avoided if students seem frustrated or uncomfortable. While it is desirable that students articulate as much as they can, sometimes students will simply be unable to state what is in their mind beyond a basic reply such as "I am reading the question." Interviewers must be sensitive to nonverbal signals that may indicate students cannot say any more than they have or that they need a few extra seconds to gather their thoughts to put them into words.

In addition, during observations if it seems a student is hung up on something, interviewers should note when this has occurred.

II f. Notes on Student Actions and Behaviors during Set of Items/Tasks

As a student is proceeding through a set of items/task, a screen-capture system will record evidence of his or her actions on the set of items/task (such as where a student taps the screen, how he or she moves through the content and the questions, and any text or numbers entered into fields or boxes). During the session the interviewer should take notes regarding any of the student's expressions or behaviors that may reflect the status of the student's understanding, engagement, or use of the set of items/task. The following are examples of such behaviors for interviewers to note.

- Does the student express signs of confusion, boredom, or excitement?
- Does the student use the tools provided in the item/task by tapping on tabs or buttons to reveal additional or earlier information, digital notepads, digital calculators, or reminders of what to include or think about?
- Does the student rapidly move through the screen or take his or her time? Does the student spend a lot of time on a particular aspect?

These kinds of observations should be considered opportunities to prompt students to think aloud and to encourage them to express what is in their minds. Interviewers should also make a note of any places in the item/task that appear valuable for follow-up with some additional questions after the set of items/task is completed (see Section IV).

III. RETROSPECTIVE THINK-ALOUD

III a. Retrospective Think-Aloud: Instructions and Modeling Script

Using the retrospective (versus concurrent) think-aloud approach, students are instructed to complete a set of items/task as they would under normal testing conditions (silently, without interruption). After the set of items/task is completed, they will be asked to describe what they were thinking while reviewing the items/task

on the computer. A replay of the set of items/task (e.g., using software like Camtasia® or Morae®)[1] will help cue the student's recollection of their thought processes that occurred during the set of items/task as the student progressed through it.

Text written in *italics* is to be spoken aloud by the interviewer. The interviewer should not read the script word-for-word, but should be familiar enough with its contents to conduct the interview in a natural and conversational manner, paraphrasing, or giving further explanation as appropriate. For example, interviewers should be attentive to the language comprehension of younger students when delivering scripts. Text placed in brackets is generic text that can be tailored to suit the particular item/task being studied.

To help us make our test better, we will ask you to complete [a set of items/some tasks]. While you are doing the [set of items/tasks], we will be recording everything that happens on the screen. The screen recording will capture all of your responses and movements on the tablet, such as what you tap on. Overall, this session should take about [indicate correct length] *minutes.*

First you'll do the [set of items task], working at your own pace through all of the activities and questions you will see on the screen. Then, after you have finished, I'm going to ask you to go back over the [set of items/task] with me. As we go back over it and look at the [set of items/task] again, I will ask you to tell me what you were thinking as you were working through each of the sections. We call this thinking aloud, because we are asking you to say everything you were thinking during the [item/task] out loud. To help you remember what you were thinking as you worked on it the first time, we will look at the recording we just made of you doing the [item/task]. This way, you will be able to see all of your screen actions and all of the answers that you gave as you were doing the [item/task]. We will watch the recording, and as we are going through it, I will be asking you to tell me what you were thinking at different points. Does that make sense? Do you have any questions?

[Answer any questions and clarify the sequence of steps, if needed.]

In a moment, I will give you an example of the think-aloud process. Then I will give you a chance to practice it. You won't be graded on anything you say while you are thinking aloud. There are no incorrect thoughts, and everything you think and say is important to us.

Okay, now I'm going to show you how to think out loud—this will help you see how I want you to describe what you were thinking while you were working on the [set of items/task]. When I am finished, I'll ask you to try it, so you can see how it works.

Think-Aloud Demonstration:
Since we can't tell what is going on in your head, we need you to think aloud.

Let me give you an example. [Place example question in front of student.] *Look at this question. It asks me to choose which two animals are the most similar. I'm going to do this question just as I would for a test. After I have finished, I will try to remember what I was thinking as I was working on the question so I can tell you.*

Question:
Which two animals below do you think are similar? Circle the two that you think are most similar.
    A. Beetle
    B. Mouse
    C. Crab
    D. Dolphin

---

[1] Morae® software (by *TechSmith*) can capture a student's interactive behaviors as they happen, while one or more observers can simultaneously record comments that are time-locked to the student actions and to the video recording. Adding Morae® Observer software allows observers to be located in a remote location. This is both a convenience for observers and a potential means of reducing student stress or distraction.

E. Cow

The interviewer 'works' silently for about a minute on the question. The interviewer should enact some behaviors that suggest that he or she is thinking hard about the question and carefully considering the possible answers; for example, pointing with a pencil tip at each option in turn; moving a pencil or fingertip between answer options: returning to the question; giving nonverbal signals indicating consideration, uncertainty, etc. Finally, the interviewer circles two answers, B and E, and then begins the retrospective think-aloud.

Okay, so here I was reading the question…. It says I have to decide on the two animals that are the most similar. So at first I was wondering what do they mean by "similar." That could mean anything. And I was thinking I wasn't sure how I'm going to make that decision. So... the choices... beetle, mouse, crab, dolphin, and cow. Yeah, well, as I'm reading the choices I'm already thinking there are some things about them that are similar, but there are also differences. I was thinking the beetle and crab are kind of similar, in a way— well, they both have lots of legs and they kind of move around fast. But one lives in the water and the other doesn't, so that makes them different. And the mouse also moves around fast, but it's not similar to either the beetle or the crab, except they are all small. Oh yeah, and then there is the dolphin that lives in the water, too… and I wondered about that, but that's about all it has in common with the crab, so I couldn't say they're very similar even though they're both in the sea. So in the end I thought the mouse and the cow are both mammals, they both have fur, and they have live babies instead of laying eggs or whatever… but then I thought, dolphins are mammals too, right? I think they are… anyway they seem so different from mice and cows to me. So I wasn't sure… it seemed like a hard question… I wasn't sure what to choose, but in the end I had to make a decision, so I decided to go for mouse and cow. Because they both have fur and four legs and walk around on land. It's weird because they're really not that similar. But, when I think of all the others, they seem really different from each other like in where they live and their bodies. So even though it was really hard to decide, that seemed like the best choice to me, because they both live on land and they're both mammals. So those things seemed pretty important and that's how I made my decision.

Can you see that as I was thinking I was saying all of my thoughts out loud? That is what I want you to try to do as you are thinking about your science [items/task] today. The point of the think-aloud is to get at whatever was in your head as you were doing the [setoff items/task]. Just say aloud the words and the thoughts that were in your head, as you were thinking and working.

OK, let's have you give it a try.

III b. Retrospective Think-Aloud: Student Practice Script I

Interviewers should place the practice question in front of the student so he or she can read it. Allow the student as much time as needed to answer the question. When he or she indicates that he or she has finished, ask the student to begin thinking aloud. Some students will be silent after reading the question. Such students should be asked to say whatever they are thinking. It may be necessary to remind students to talk aloud as they work through the questions and tasks. If necessary, interviewers should use the "Think-Aloud Hints" shown below to prompt students, being careful not to lead students. The interviewer needs to be familiar enough with the information to encourage the think-aloud in a natural, conversational manner.

Now you will try a think-aloud. I will give you a question like the one I just did. You will read and answer the question and then let me know when you're done.

Once you are done answering, I will ask you to look back at the question and the answer you chose and try to say out loud the thoughts that were in your head at each moment. If I don't hear you speaking, I'll ask you to keep talking. I'm telling you that so you won't think I am criticizing the way you are thinking. I'll be reminding you to think aloud if you get quiet because I need to hear all of the thoughts you had during the [set of items/task].

Okay, now go ahead and start working on the question. Let me know when you are finished.

Which two organisms below do you think are most similar? Circle the two that you think are most similar.
      A.   **Apple tree**
      B.   **Grass**
      C.   **Wheat**
      D.   **Pear tree**
      E.   **Cherry tree**

When students indicate they are finished, make sure they have circled two answers, and then ask them to begin describing their thoughts out loud. As necessary, include the appropriate prompting questions, such as the following:

Okay, so tell me what you were thinking as you were reading and answering this question. What did you think at the beginning, when you started to read the question? … And then what were you thinking? … And what else did you think about? … Anything else? … Can you tell me more about that? … etc.

III c. Retrospective Think-Aloud: Student Practice II (Optional)

NOTE: Use <u>only</u> if you feel the student would benefit from another think-aloud practice before moving on to the actual set of items/task. It may also be beneficial to model thinking aloud again for the student rather than doing another practice [see think-aloud demonstration in IIIa].

If the student struggles to think aloud, the interviewer should give the student another opportunity to practice. The interviewer should praise the student for the first attempt regardless of how good it was, for example: "*Very good—let's do another one before we start the real [set of items/tasks]. Are you ready? Here is the next practice question.* [Place example question in front of student.] *Remember that after you have finished answering this question I will ask you to talk out loud to tell me what you were thinking all the way through—so you should tell me what you were thinking as you worked through it. So, first of all, go ahead and do the question, and let me know when you have finished.*"

As before, during the post set of items/task think-aloud phase, the interviewer should prompt the student to think out loud at any point when there are more than a few seconds of silence (see suggested prompts, section IIe).

Which two of the following objects have the most similar properties? Circle the two that are most similar
      A. Silver coin
      B. Chocolate coin
      C. Gold coin
      D. Blue plastic coin
      E. Brown plastic coin

After the think-aloud phase is finished:

Now that you have practiced, do you feel that you understand how you should talk aloud about what you were thinking while you were doing the [set of items/task]? Is this something you feel okay about doing? [If students

say yes:] *Good, then let's begin our study.*[If students say no or appear to be hesitant or reluctant, ask them to say more about any reservations they have, and try to address their concerns or uncertainties in a supportive way. If students indicate they do not wish to continue or do not feel comfortable continuing, allow them to stop, and say:] *Alright, let's stop. Thank you for working with me today. Let me walk you out.* [Escort the student out of the session.]

III d. Retrospective Think-Aloud: Starting the Set of Items/Tasks

Now we will move on to the actual [set of items/tasks]. Remember, after you have finished doing all the activities and answering all the [questions/questions on a task], I will ask you to say aloud everything that you remember thinking while you were doing the [set of items/task], and I may remind you to do that if you are quiet. This [set of items/task] should take about [indicate correct time] *minutes. Remember, you will not be graded on what you do during the [set of items/task]. There is no right or wrong way to think aloud, as long as you keep telling me your thoughts. Your thoughts will help us make the [items/tasks] better. I will also have a few questions after we have finished.*

Do you have any questions before we go on? [Answer any questions the student may ask.]

Because the information you provide is so important to us, I am going to be taking notes while you are doing the [set of items/task] and while you are thinking aloud afterwards.

Here is the first [set of items/task]. When you are ready, go ahead and start working.

III e. Retrospective Think-Aloud: Prompts and Questions after Completion of Set of Items/Task

Now I would like you to tell me what you were thinking as we review what you did for the [set of items/task]. We will be recording what you are saying as you think-aloud. Feel free to stop at any time. What you say will not be used to grade you. The information will only be used to help improve the [set of items/task]. I will play the [set of items/task] and your writing back from the beginning now, and I want you to talk about the thoughts you had as you were working. From time to time, I might pause the video, to give you enough time to explain what you were thinking at that point or if I need to ask you any extra questions. I will let you know when I am pausing the playback.

The interviewer plays and watches the recording of the items/task in real time with the student, and asks the student to describe aloud what he or she was thinking at various points in the items/task. The interviewer should pause the recording whenever more time is needed, making sure to say "*I'll just pause this for a moment*" or "*I am pausing the [set of items/task] here,*" so that the student understands that the playback has been paused.

If the student is not verbalizing enough, interviewers should offer a verbal nudge to remind the student to keep talking, such as:

- *What was going on in your head at this time?*
- *I see you were looking at the [item/task] [or screen/passage/chart/image]. What were you thinking?*
- *You seemed to be thinking hard—can you tell me what was in your mind right then?*

If the student says something about his or her thoughts but it is difficult to tell exactly what the student means, or if the student begins to talk but does not say very much, interviewers can urge the student to elaborate. For example:

- *Tell me a bit more about that.*
- *That's interesting—can you say more about that?*
- *Go on….*
- *Uh huh, okay, and what else were you thinking?*

If more clarity or a more explicit description of a student's thoughts is desirable:

- *Can you explain what you mean by that?*
- *Can you say a bit more to help me understand what you were thinking?*

III f. Notes on Student Actions and Behaviors during Set of Items/Tasks

As a student is proceeding through the set of items/task, a screen-capture system will record evidence of his or her actions on the item/task (such as where a student taps, how he or she moves through the item/task, and whether the student has entered any text into response fields). During the session, the interviewer should take notes of any of the student's expressions or behaviors that may reflect the status of his/her understanding, engagement, or reaction to the set of items/task. The following are examples of such behaviors for interviewers to note.

- Does the student express signs of confusion, boredom, or excitement?
- Does the student use the tools provided in the item/task, such as tapping on tabs or buttons to reveal additional or earlier information or digital notepads?
- Does the student rapidly move through the screen or take his or her time?
- Does the student spend a lot of time on a particular section?
- Does the student seem discouraged?

These kinds of observations should be considered opportunities to prompt students once they are done working to recall what they were thinking. In general, interviewers should make notes of any places during the course of the student's working that appear valuable for follow-up questions after the set of items/task is completed (see Section IV).

IV. POST-THINK ALOUD FOLLOW-UP QUESTIONS

After completing the think-aloud process for a set of items/a task, interviewers will follow up with a brief period of focused retrospective questioning. The post-think aloud set of items/task questions will include the following:

- One standardized post item/task question that all students will be asked following all items/tasks, which is designed to discover whether the student has prior knowledge of the content.

- Up to three additional targeted questions that are item/task specific. These will be selected for each item/task by ETS staff prior to testing. Interviewers will receive the set of up to three questions for the specific item/task they are examining in each cognitive interview.

- A set of approximately seven standardized post item/task science multiple-choice questions that all students will be asked following all items/tasks.

- Up to six survey questions that will provide information on topics such as digital resource use and/or current and prior experiences with assessments.

Standardized Question for All Tasks: Task-Specific Prior Knowledge

Have you studied anything related to this task in school, or have you learned about or come across these things in your own life? [If yes:] *Tell me about what you have learned or studied or experienced that is related to this task.*

Additional Questions: Task-Specific Issues

The purpose of the additional post-task questions is to capture more information on issues such as student actions during the task, particular aspects of science targeted in the task, and general reflections about the task. ETS staff will identify up to three questions for interviewers to ask in relation to each task. Interviewers will also be trained to generate post-task questions on the fly, for cases where they observe something that they judge to need follow-up probing. The following are some examples of questions that might be asked at this stage.

- *Did any words in the task confuse you?*

- *What ways could we change the task to make it better?*

- *Did the [images, videos, audios, etc.] for the task help you answer the questions asked?*

Additional Questions: Standardized Post Task Science Questions

We wish to also gauge the student's approximate science knowledge with a few targeted science questions. Students will answer approximately seven additional general science questions following the task, which are designed to discover the student's approximate ability in science. The set consists of approximately seven brief multiple-choice science-specific questions and takes approximately five to 10 minutes for students to complete the set. These questions will be drawn from materials already used extensively at each grade level in prior NAEP assessments. An example from NAEP released items for Grade 4 is:

Which material is the best conductor of electricity?
A. Wood
B. Metal
C. Stone
D. Plastic

Additional Questions: Survey Questions

Up to six survey questions will provide information on topics such as digital resource use and/or current and prior experiences with assessments. Examples include:

- Do you think you would be able to use a touchscreen on a computer, tablet, or smartphone?
  - Response choices: I definitely can't, I probably can't, I probably can, I definitely can.

- On a weekday, about how many hours do you use a tablet, laptop, or desktop computer for doing schoolwork, including homework?
  - Response choices: None, Less than an hour, 1 to 2 hours, 2 to 3 hours, 3 to 4 hours, More than 4 hours

- Have you ever worked on science tasks on a tablet or computer before?
  - o Response choices: Yes, No, Don't Recall

- Overall, would you say it was very easy, easy, difficult, or very difficult to complete the science tasks and questions here?

V. DEBRIEFING AND THANK YOU FOR COGNITIVE INTERVIEW

> *Before we finish, I'd like to hear any other thoughts you have about what you've been doing.*
>
> *Is there anything else you would like to tell me about working on the task?*
>
> *Is there anything you would like to ask me about what we did today?* [Answer student questions.]
>
> *Thank you for helping us to improve our test.*

Thank the student for his or her time and provide a gift card.

SMALL-SCALE TRYOUT PROTOCOL

Text written in *italics* is to be read aloud by the interviewer. The interviewer should not read the script word-for-word but should be familiar enough with its contents to conduct the interview in a natural and conversational manner, paraphrasing or giving further explanation as appropriate. For example, facilitators should be attentive to the language comprehension of younger students when delivering scripts. Text in brackets is generic text that will be tailored based on task specifics.

SESSION INFORMATION

The interviewer should complete the information from rows 1-3 prior to the beginning of the tryout session. Rows 4-5 are to be completed at the end of the tryout session.

Ref#	Preliminary Information	Data
1	Name of interviewer	
2	Date	
3	Start time of interview	
4	End time of interview	
5	Special circumstances that may have affected the tryouts session [Do not ask test taker, just record observations.]	

INTRODUCTION SCRIPT:

Hello, my name is _____ and I work for EurekaFacts. I am here with my colleagues [introduce colleagues]. *It's nice to meet you, and thank you very much for helping us out today.*

Let me begin by explaining why you're here and what you're going to be doing today. You are participating in a special study to try out new science tasks. This is part of something called the National Assessment of Educational Progress, or NAEP for short, which is conducted by the National Center for Education Statistics within the U.S. Department of Education. Today we'll be asking you to try out a task [and/or] small set of new test questions that are being developed for [4th/8th/12th] *graders all over the United States.*

If at any time you decide you do not want to go on, that is your choice and you may stop.

This tryout session is being recorded so researchers can review it later. After you complete [one task and/or set of items], we may ask you some follow-up questions. What you say will not be told to anyone. It will be used only for research purposes, to improve test questions, and will not be disclosed or used, in identifiable form, for any other purpose except as required by law [if needed: Education Sciences Reform Act of 2002 (ESRA 2002) 20 U.S.C., § 9573]. *We will look at what you say later, but only so that we can understand how our test is*

working and how we can make it better. Overall, this session should take about [indicate correct length] *minutes.*

We will work at the same time to do [one task and/or set of items].

Do you have any questions?

Interviewer: If a student is no longer interested in participating, thank the student for his or her time and end the tryout session for that one student only: continue with all others.

Task Instructions

Ok, now, I'm going to give you a [task and/or set of items] to complete.

This is a timed activity, which will last for [indicate length of activity]*, and everyone will begin at the same time.*

All of the instructions will be displayed on your computer screens.

The [task and/or set of items] you are about to do is something that students, like you, will do on the computer. However, we aren't finished making the [task and/or set of items] yet, so there may be some parts that don't work. Try to work through and complete the [task/items] as best as you can.

You will not be graded on what you do during the task, but please answer these questions as if it was a real test.

We will all work at the same time, first I would like you to read the instructions, once everyone has gone through the instructions, we will begin the [task and/or items] together. I will start the timer and I will stop you once time is up.

If you finish early, please sit back and wait until the time is up. Wait until everyone is done and then we will submit your answers together.

Okay, I will come around and open the [task/items] for each one of you, but please do not begin until I say that you may start.

Okay, now that everyone is ready, you may begin the task.

START THE TIMER NOW. STUDENTS HAVE [XX] MINUTES TO COMPLETE THE TASK AND/OR QUESTIONS. STOP STUDENTS AT [XX] MINUTES EVEN IF THEY HAVE NOT FINISHED.

Wait either for all students to complete the task and/or set of test questions OR for the full amount of time to be up.

Once students have completed the task and/or set of items, make sure that all students exit the task and submit their answers.

POST-TRYOUT FOLLOW-UP QUESTIONS

After completing the tryout tasks and/or set of items, the interface will provide some follow-up questions. The post tryout questions will include some or all of the following:

- A standardized post task question that all students will be asked following all tasks, which is designed to discover whether the student has prior knowledge of the content.

- Up to three additional targeted questions that are task specific. These will be selected for each task by ETS staff prior to testing.

- A set of approximately seven standardized science multiple-choice questions that students will be asked following the task.

- Up to six survey questions that will provide information on topics such as digital resource use and/or current and prior experiences with assessments.

Standardized Question for All Tasks: Task-Specific Prior Knowledge

Have you studied anything related to this task in school, or have you learned about or come across these things in your own life? [If yes:] *What have you learned or studied or experienced that is related to this task?*

Additional Questions: Task-Specific Issues

The purpose of the additional post-task questions is to capture more information on issues such as student actions during the task, particular aspects of science targeted in the task, and general reflections about the task. The following are some examples of questions that might be asked at this stage.

- Did any words in the task confuse you?
- What ways could we change the task to make it better?
- Did the [images, videos, audios, etc.] for the task help you answer the questions asked?

Additional Questions: Standardized Post Task Science Questions

We wish to also gauge the student's approximate science knowledge with a few targeted science questions. Students will answer approximately seven additional general science questions following the task, which are designed to discover the student's approximate ability in science. The set consists of approximately seven brief multiple-choice science-specific questions and will take approximately 5-10 minutes for students to complete the set. These questions will be drawn from materials already used extensively at each grade level in prior NAEP assessments. An example from NAEP released items for Grade 4 is:

Which material is the best conductor of electricity?
A. Wood
B. Metal
C. Stone
D. Plastic

Additional Questions: Survey Questions

Four survey questions will provide information on prior experience with digital resource use and/or current and prior experiences with assessments. Examples include:

- Do you think you would be able to use a touchscreen on a computer, tablet, or smartphone?
    - Response choices: I definitely can't, I probably can't, I probably can, I definitely can.

- On a weekday, about how many hours do you use a tablet, laptop or desktop computer for doing schoolwork, including homework?
    - Response choices: None, Less than an hour, 1 to 2 hours, 2 to 3 hours, 3 to 4 hours, More than 4 hours

- Have you ever worked on science tasks on a tablet or computer before?
    - Response choices: Yes, No, Don't Recall

- Overall, would you say it was very easy, easy, difficult, or very difficult to complete the science tasks and questions on the tablet?

POST-TRYOUT DISCUSSION SESSION

At the conclusion of some tryouts, the moderator will ask the student up to three task-specific questions. Questions may focus on targeted areas or interviewers may generate questions on the fly for cases where they observe something that they judge to need follow-up probing. The following are some examples of questions that might be asked at this stage.

- What ways could we change the task to make it better?
- Did the [images, videos, audios, etc.] for the task help you answer the questions asked?

DEBRIEFING AND THANK YOU

Before we finish, I'd like to hear what you all thought about what you've been doing.

Is there anything else any of you would like to tell me about working on the test questions?

Did you have any problems understanding [any of the questions/anything]?

Did you have any problems understanding what you were supposed to do to answer any of the questions?

Is there anything that you think could make [this/these] test question[s] clearer?

Is there anything you would like to ask me about what we did today? [Answer students' questions.]

Thank participant(s) for their time and escort them to the front desk. Provide gift card(s).