



**Science Grade 8
Scoring Guide for
Released Item #20
Antoine's Experiment
Fall 2006**



Use the information below to answer questions 17 through 20.

While preparing to cook some pasta, Antoine noticed that the directions on the package said to add a tablespoon of salt to the water before boiling the pasta. He wondered what effect the salt would have on the temperature at which the water boils. Antoine thought that adding salt to the water would probably cause it to boil at a higher temperature. He decided to perform an experiment to see if he was correct. Under adult supervision, Antoine used a thermometer to determine the temperature of the water in each pot. He then added 2 grams of salt to one of the pots (B) and 4 grams of salt to another pot (C). Pots B and C both stopped boiling briefly. When they came back to a boil he took the temperature of each pot again. Antoine's data are recorded in the table below.

Temperature Results

Pot	Temperature (°C) at first boil	Salt (grams)	Temperature (°C) at second boil
A	100.3	0	100.3
B	100.3	2	103.9
C	100.3	4	105.7

ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER DOCUMENT.

20 Constructed Respons
(3 points)

- What is the question being answered in this investigation?
- What is the hypothesis that Antoine formed?
- Explain how the data support the hypothesis.

NOTHING WRITTEN IN THIS TEST BOOKLET WILL BE SCORED.

Science Rubric for Antoine’s Experiment

Sample responses:

1. What effect does salt have on boiling water?
2. Adding salt water will cause it to boil at a higher temperature.
3. Each time more salt was added to the water the temperature at boiling increased.
OR Because when 2 tablespoons of salt were added the water boiled at 103.9 C and when 4 tablespoons of salt were added the water boiled at 105.7 C.

NOTE 1: THE HYPOTHESIS CANNOT BE IN THE QUESTION. THE HYPOTHESIS MUST BE AN INDEPENDENT STATEMENT.

NOTE 2: THE QUESTION MAY BE PRESENTED IN A STATEMENT FORMAT.

NOTE 3: THE HYPOTHESIS CANNOT BE IN A FORM OF QUESTION BUT A STATEMENT OR AN OPERATIONAL DECLARATIVE STATEMENT.

Scoring Guide:

- 3 points** The student correctly identifies the question and the hypothesis, and explains how the data from the chart supports the hypothesis.
(The student **must** use the data in the chart to explain. Simply stating “because its in the chart” will not receive any credit).
- 2 points** The student correctly identifies the question and the hypothesis but fails to or incorrectly explains how the data from the chart supports the hypothesis.
OR
The student correctly identifies the hypothesis and explains how the data from the chart supports the hypothesis.
OR
The student correctly identifies the question, misidentifies the hypothesis and explains how the data from the chart supports the hypothesis.
- 1 point** The student correctly identifies the question being investigated.
OR
The student correctly identifies the hypothesis that was formed.
OR
The student correctly explains the data from the chart.
- 0 points** The student fails to understand the task.

Anchor Paper 1 – Score Point 3

3 points What effect salt has on water at boiling temperature. Antoine thought when he added the salt the water would boil at a higher temperature. The temperature didn't go up from first boil to second boil when no salt was added. Then when 2g salt was added the temperature went up. Then when 4g was added the temperature went up from 100.3 to 105.7.

3

Anchor Paper 1 Score Point 3

The student correctly identifies what question is being answered in this investigation (*What effect salt has on water at boiling temperature*). As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is correct (the question may be presented in a statement format). The student correctly identifies the hypothesis that Antoine formed (*Antoine thought when he added the salt the water would boil at a higher temperature*). A correct hypothesis is an independent declarative statement that directly answers the question being investigated; "Higher temperature", "temperature increase" or "higher boiling point" with the addition of salt would be correct responses. The student correctly explains how the data in the table supports the hypothesis (*when 2 g salt was added the temperature went up. Then when 4g was added the temperature went up from 100.3 to 105.7*).

Anchor Paper 2 – Score Point 3

3 points

Will salt affect the boiling point of water, salt makes the boiling point of water higher, he tested it, and the pots with salt boiled at a higher temperature.

3

Anchor Paper 2 Score Point 3

The student correctly identifies what question is being answered in this investigation (*Will salt affect the boiling point of water*). As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is correct. The student correctly identifies the hypothesis that Antoine formed (*Salt makes the boiling point of water higher*). A correct hypothesis is an independent declarative statement that directly answers the question being investigated; “Higher temperature”, “temperature increase”, or “higher boiling point” with the addition of salt would be correct responses. The student correctly explains how the data in the table supports the hypothesis (*the pots with salt boiled at a higher temperature*). Numerical values from the table are not necessary for credit as long as the response provides a correct explanation or description of the data.

Anchor Paper 3 – Score Point 3

3 points The question being answered in this investigation is: ~~What effect will salt~~ have on the temperature at which the water boils. Antoine's hypothesis was that if you add salt, the temperature will increase. The data clearly shows that when you add ^{more} salt, the temperature will increase. The data shows the amount of salt and the effect it has on the temperature.

3

Anchor Paper 3 Score Point 3

The student correctly identifies what question is being answered in this investigation (*what effect will salt have on the temperature at which the water boils*). As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is correct. The student correctly identifies the hypothesis that Antoine formed (*If you add salt, the temperature will increase*). "Temperature" alone is acceptable. This hypothesis directly answers the question being investigated; "Higher temperature", "temperature increase", or "higher boiling point" with the addition of salt would be correct responses. The student correctly explains how the data in the table supports the hypothesis (*data clearly shows that when you add more salt, the temperature will increase*).

Anchor Paper 4 – Score Point 3

3 points

• Does salt effect the temperature at which water boils.

• Salt would cause the water to boil at a higher temperature.

• the second Boil Temperature was higher the more salt added.

3

Anchor Paper 4
Score Point 3

The student correctly identifies what question is being answered in this investigation (*Does salt effect the temperature at which water boils*). As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is correct. The student correctly identifies the hypothesis that Antoine formed (*Salt would cause the water to boil at a higher temperature*). This hypothesis answers the question being investigated; “Higher temperature”, “temperature increase”, or “higher boiling point” with the addition of salt would be correct responses. The student correctly explains how the data in the table supports the hypothesis (*second Boil Temperature was higher the more salt added*).

Anchor Paper 5 – Score Point 3

3 points The question that's being answered in this investigation is what effect does salt have on the temperature of the boiling water. The hypothesis that Antoine formed was by adding salt it would make the water boil at a higher temperature. The data supports this hypothesis correctly. The data said that the more salt you add into the water the higher the temperature will be.

Anchor Paper 5 Score Point 3

The student correctly identifies what question is being answered in this investigation (*what effect does salt have on the temperature of the boiling water*). As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is correct. The student correctly identifies the hypothesis that Antoine formed (*by adding salt it would make the water boil at a higher temperature*). This hypothesis answers the question being investigated; “Higher temperature”, “temperature increase”, or “higher boiling point” with the addition of salt would be correct responses. The student correctly explains how the data in the table supports the hypothesis (*The data said that the more salt you add into the water the higher the temperature will be*).

Anchor Paper 6 – Score Point 3

3 points The question being answered is "does salt change the boiling point of water." Antoine's hypothesis was "that salt would cause water to boil at a higher temperature." The data supported his hypothesis because the pots that had salt in them boiled at a higher temperature the second time.

**Anchor Paper 6
Score Point 3**

The student correctly identifies what question is being answered in this investigation ("does salt change the boiling point of water"). "Change" = "effect". As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is correct. The student correctly identifies the hypothesis that Antoine formed (*Antoine's hypothesis was that salt would cause water to boil at a higher temperature*). This hypothesis answers the question being investigated; "Higher temperature", "temperature increase", or "higher boiling point" with the addition of salt would be correct responses. The student correctly explains how the data in the table supports the hypothesis (*the pots that had salt in them boiled at a higher temperature the second time*).

Anchor Paper 7 – Score Point 2

3 points

The question being answered in this investigation is if you put more salt into a boiling pot of water will it make it hotter. Antoine's hypothesis that he formed was to take three pots and add salt in three of them and no salt of one of them. He added more salt in pot C, a little less salt in pot B and no salt in pot A. The data that supports the hypothesis is that in pot C there is the most salt and it is the highest temp. and in pot A there is no salt and it's at the same temp. from the being.

3

Anchor Paper 7
Score Point 2

The student correctly identifies what question is being answered in this investigation (*If you put more salt into a boiling pot of water will it make it hotter*), "it" first referring to salt and then to boiling water. "Make it hotter" is acceptable for "increase the temperature". As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is correct. The student does not correctly identify the hypothesis that Antoine formed (*Antoine's hypothesis that he formed was to take thee pots and add salt in three of them and no salt of one of them. He added more salt in Pot C, a little less salt in Pot B and no salt in Pot A*). This response does not state a hypothesis or answer the question being investigated; it simply describes procedural steps in the experiment itself, so no credit is given. The student correctly explains how the data in the table supports the hypothesis (*The data that supports the hypothesis is that in Pot C there is the most salt and it is the highest temp*).

Anchor Paper 8 – Score Point 2

3 points The question being answered in this investigation is "If you add an amount of salt to water, will the water boil at a higher temperature?" Antoine's hypothesis was "Adding salt to water will cause the water to boil at a higher temperature. The data supported the hypothesis because as she heated the pots, the ones with more salt took longer to boil."

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**Anchor Paper 8
Score Point 2**

The student correctly identifies what question is being answered in this investigation ("If you add an amount of salt to water, will the water boil at a higher temperature?"). As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is correct. The student correctly identifies the hypothesis that Antoine formed ("Adding salt to water will cause the water to boil at a higher temperature"). This hypothesis directly answers the question being investigated; "Higher temperature", "temperature increase", or "higher boiling point" with the addition of salt would be correct responses. The student incorrectly explains how the data in the table supports the hypothesis (*as she heated the pots, the ones with more salt took longer to boil*). "Longer", "slower", "faster", "quicker" are unacceptable responses. The table contains no time data, so length of time to boil is not relevant to this investigation. The response does not address data demonstrating the effect of salt on boiling point temperature and receives no credit.

Anchor Paper 9 – Score Point 2

3 points

If salt has an effect on the boiling point of water

He thought it would make the boiling point higher

3

Anchor Paper 9 Score Point 2

The student correctly identifies what question is being answered in this investigation (*If salt has an effect on the boiling Point of water*). As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is correct. The student correctly identifies the hypothesis that Antoine formed (*It would make the boiling point higher*). This hypothesis answers the question being investigated; “Higher temperature”, “temperature increase”, or “higher boiling point” with the addition of salt would be correct responses. The student does not explain how the data in the table supports the hypothesis, so receives no credit for Part 3.

Anchor Paper 10 – Score Point 1

3 points

The question being answered is 'does adding salt to water increase its boiling temperature.'

The hypothesis Antoine formed was that adding salt to the water would probably cause it to boil at a higher temperature.

The data didn't support his hypothesis because the first boil came at 100.3° on all three pots.

Anchor Paper 10
Score Point 1

The student correctly identifies what question is being answered in this investigation (*does adding salt to water increase its boiling temperature*). As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is correct. The student incorrectly states the hypothesis that Antoine formed (*adding salt to the water would probably cause it to boil at a higher temperature*). Even though this hypothesis is correct and directly answers the question being investigated, it is not written as a declarative statement. "Probably", "maybe" or "might" are unacceptable in a hypothesis statement. The student does not correctly explain how the data in the table supports the hypothesis (*The data didn't support his hypothesis because the first boil came at 100.3° on all three pots*). This response does not address higher temperature data from the second boil with salt; no credit is given.

Anchor Paper 11 – Score Point 1

3 points Does salt make the temperature of boiling water go up or down. His hypothesis was does salt change the temperature of boiling wather higher.

The Data supported the hypothes;is because he was right.

3

Anchor Paper 11 Score Point 1

The student correctly identifies what question is being answered in this investigation (*Does salt make the temperature of boiling water go up or down*). “Make the temperature go up or down” means “make the temperature increase or decrease”, implying a “change”, or an “effect” on the temperature (see Anchor Paper 6). As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is acceptable. The student incorrectly states the hypothesis that Antoine formed (*His hypothesis was does salt change the temperature of boiling wather higher*). Even though this hypothesis is correct and directly answers the question being investigated, it is written as a question rather than a declarative statement and is not given credit. The student does not correctly explain how the data in the table supports the hypothesis (*The data supported the hypothesis because he was right*). The response is vague and does not address data supporting higher boiling temperatures with salt.

Anchor Paper 12 – Score Point 1

3 points The question is will salt effect the temperature Salt boils in. The hypothesis that he formed was that if you add salt the boiling temperature will change. The data supports this by the more salt he added the boiling temperature went up.

Anchor Paper 12 Score Point 1

The student incorrectly identifies what question is being answered in this investigation (*will salt effect the temperature salt boils in*). “The temperature salt boils” is not acceptable – salt does not boil. This experiment is investigating what effect salt has on temperature or the boiling point of water rather than the temperature or boiling point of salt. The student incorrectly identifies the hypothesis that Antoine formed (*if you add salt the boiling temperature will change*). “Boiling temperature will change” is not specific enough for a hypothesis in this investigation. The response should state that the boiling point will be higher with salt. Note: “Change the temperature” is acceptable as “effect the temperature” for the question in Part 1 (see Anchor Paper 6), but is too vague to receive credit for the hypothesis in Part 2. The student correctly explains how the data in the table supports the hypothesis (*the more salt he added the boiling temperature went up*).

Anchor Paper 13 – Score Point 1

3 points To see if salt would boil at the same temperature, or a higher temperature.

Antoine's hypothesis was that it would take a little bit longer to boil. The data states that for about every 2 grams, 2 or 3 degrees higher is the boiling point.

3

Anchor Paper 13 Score Point 1

The student incorrectly identifies what question is being answered in this investigation (*To see if salt would boil at the same temperature or a higher temperature*). "If salt would boil at the same or higher temperature" is not acceptable – salt does not boil. This experiment is investigating what effect salt has on temperature or the boiling point of water rather than the temperature or boiling point of salt. The student incorrectly identifies the hypothesis that Antoine formed (*it would take a little bit longer to boil*). "Longer to boil", "slower", "faster", "quicker" are unacceptable responses. The table contains no time data, so length of time to boil is not relevant to this investigation. The response does not address "higher temperature", "temperature increase", or "higher boiling point" with the addition of salt and receives no credit. The student correctly explains how the data in the table supports the hypothesis (*The data states that for about every 2 grams, 2 or 3 degrees higher is the boiling point*), "grams" referring to grams of salt.

Anchor Paper 14 – Score Point 1

3 points • Will salt effect the boiling of water?

• Yes, I (Antoine) thinks that salt will effect the boiling of the water.

• It does because, it works with all the information that the Meap gave us.

3

Anchor Paper 14
Score Point 1

The student correctly identifies what question is being answered in this investigation (*Will salt effect the boiling of water?*). As this experiment is investigating what effect salt has on temperature or the boiling point of water, this response is correct. The student incorrectly identifies the hypothesis that Antoine formed (*Antoine thinks that salt will effect the boiling of the water*). “Effect” is too vague; the response does not state how the salt will effect the boiling of the water. It does not address “higher temperature”, “temperature increase”, or “higher boiling point” with the addition of salt, so no credit is given. The student does not correctly explain how the data in the table supports the hypothesis (*It does, because, it works with all the information that the MEAP gave us*). The response is vague and does not address data supporting higher boiling temperatures with salt.

Anchor Paper 15 – Score Point 1

3 points ~~The question that is being answered is~~ what effect does salt have on the temperature in which the salt is being boiled.

The hypothesis that is formed by Antoine is that the more salt added the higher the temperature.

Because it list the temperatures and how much salt is being added.

3

Anchor Paper 15
Score Point 1

The student incorrectly identifies what question is being answered in this investigation (*what effect does salt have on the temperature in which the salt is being boiled*). “Temperature in which salt is being boiled” is not acceptable – salt does not boil. This experiment is investigating what effect salt has on temperature or the boiling point of water rather than the temperature or boiling point of salt. The student correctly identifies the hypothesis that Antoine formed (*the more salt added the higher the temperature*). “Higher temperature”, “temperature increase”, or “higher boiling point” with the addition of salt would be correct responses. The student incorrectly explains how the data in the table supports the hypothesis (*it list the temperatures and how much salt is being added*), The response is vague; it does not state that boiling temperature increased each time more salt was added to the water.

Anchor Paper 16 – Score Point 0

3 points

• Does salt make the water boil slower or faster?

• That salt & sugar produce the same effects on boiling water.

• The data shows that the more salt you add to the water, the longer it takes to boil.

3

**Anchor Paper 16
Score Point 0**

The student incorrectly identifies what question is being answered in this investigation (*Does salt make the water boil slower or faster?*). "Boil slower", "faster", "longer", "quicker" are unacceptable responses. The table contains no time data, so the length of time it takes to boil is not relevant to this investigation. (This experiment is investigating what effect salt has on temperature or the boiling point of water rather than the time it takes to boil). The student incorrectly identifies the hypothesis that Antoine formed (*salt & sugar produce the same effects on boiling water*). "Sugar" is not relevant to this investigation and is not an acceptable response. The student incorrectly explains how the data in the table supports the hypothesis (*the more salt you add to the water, the longer it takes to boil*). Again, "the longer it takes to boil" is an unacceptable response, as time is irrelevant to this investigation. The response does not state that each time more salt was added to the water the temperature at boiling increased.

Anchor Paper 17 – Score Point 0

3 points

The question being answered is: Does the amount of salt you put in a pot affect how much it boils?

Hypothesis:

Antoine thought maybe if the effect of salt would have on the temperature at which it boils.

The data supported the hypothesis because as the amount of salt put in the pot increased, the amount of boiling did also.

**Anchor Paper 17
Score Point 0**

The student incorrectly identifies what question is being answered in this investigation (*Does the amount of salt you put in a pot affect how much it boils?*). “How much it boils” does not ask the correct question “how hot it boils”. This experiment is investigating what effect salt has on the temperature at the boiling point of water rather than how much it is boiling). The student incorrectly identifies the hypothesis that Antoine formed (*Antoine thought maybe if the effect of salt would have on the temperature at which it boils*). This response is not written as a declarative statement and does not take a stand. “Maybe”, “probably” or “might” are unacceptable in a hypothesis statement. It also does not state that the addition of salt would result in “higher temperature”, “temperature increase”, or “higher boiling point”. The student incorrectly explains how the data in the table supports the hypothesis (*as the amount of salt put in the pot increased, the amount of boiling did also*). Again, “the amount of boiling” does not state how hot it boiled, or the boiling point. The response does not state that each time more salt was added to the water the temperature at boiling increased.

Anchor Paper 19 – Score Point 0

3 points *The question being answered in the first investigation is how fast will water boil with salt in it? His hypothesis is that it will not boil as well with salt. It would better with out salt.*

Anchor Paper 19 Score Point 0

The student incorrectly identifies what question is being answered in this investigation (*how fast will water boil with salt in it?*). “How fast”, “slow”, “long”, “quick” are unacceptable responses. The table contains no time data, so the length of time it takes to boil is not relevant to this investigation. (This experiment is investigating what effect salt has on temperature or the boiling point of water rather than the time it takes to boil). The student incorrectly identifies the hypothesis that Antoine formed (*His hypothesis is that it will not boil as well with salt*). This hypothesis does not answer the question being investigated and is not acceptable. “Boil as well” is too vague and doesn’t state that adding salt would result in “higher boiling point” or “higher temperature”. The student incorrectly explains how the data in the table supports the hypothesis (*It boiled beter with out salt*). This response does not state that each time more salt was added to the water the temperature at boiling increased.

Anchor Paper 20 – Score Point 0

3 points

How would The wieght effect the boiling point? water with salt takes longer to boil.

3

Anchor Paper 20 Score Point 0

The student incorrectly identifies what question is being answered in this investigation (*How would The wieght effect the boiling point?*). “Weight” is not relevant to this investigation. This experiment is investigating what effect salt has on temperature or the boiling point of water. The student incorrectly identifies the hypothesis that Antoine formed (*water with salt takes longer to boil*). “Longer to boil”, “quicker”, “faster”, “slower” are unacceptable responses. The length of time it takes to boil is not relevant to this investigation. The response doesn’t state that adding salt would result in “higher boiling point” or “higher temperature”. The student does not explain how the data in the table supports the hypothesis, so no credit is given for Part 3.