



Lesson 5: Culminating Activities

Student Materials

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Consumer Choice Project: Student Instructions

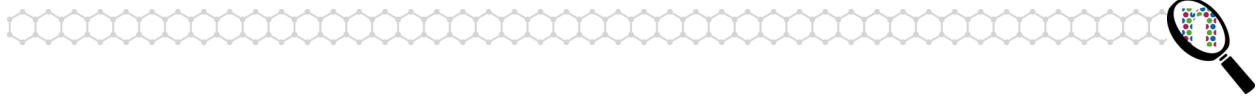
Introduction

SmartShopper, the consumer advocacy group, has heard a lot in the media about the new clear sunscreens with nanoparticulate ingredients coming out on the market. Consumers have been contacting them lately to ask them if these new products are better than traditional sunscreens, if they are safe to use, and how to know if a sunscreen uses nanoparticulate ingredients. To help consumers decide whether these products are right for them, SmartShopper has decided to produce a pamphlet that tells consumers all they need to know about these new products. SmartShopper also will need to take a position on whether or not they endorse the use of the sunscreens and justify this position based on a comparison of the benefits and risks backed up with science. They turn to you and your team to create this pamphlet.

Requirements

SmartShopper asks that your pamphlet makes full use of both sides of an 8.5 x 11 piece of paper folded into thirds for easy distribution (see “How to Make a Pamphlet”) and contains:

- A brief overview of what nanoparticulate sunscreen ingredients are and how they are similar and how they are different from other active sunscreen ingredients.
- A list of common nanoparticulate active sunscreen ingredients and how to know if your sunscreen contains them.
- An explanation of how sunscreens with nanoparticulate ingredients work to block UV light from reaching the skin and the benefits of using them (including advantages over other sunscreen ingredients).
- An explanation of why nanoparticulate sunscreen ingredients are clear and a diagram that illustrates the science principles involved.
- A transmission versus wavelength graph that supports this explanation.
- An explanation of the possible downsides / dangers of using sunscreens with nanoparticulate ingredients.
- SmartShopper’s position on the use of sunscreens nanoparticulate ingredients (do you endorse their use?) with justification of this position based on a comparison of the benefits and risks involved.



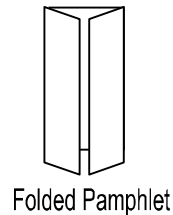
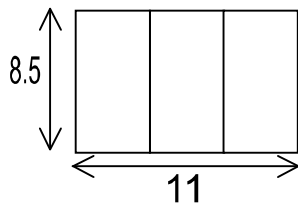
How to Make a Pamphlet

By Hand:

Take a regular piece of 8.5 x 11 paper turn it sideways. Fold the paper into thirds and crease it firmly. This is what the pamphlet will look like when it's done. When you unfold the paper, you can use the creases as column guides. It is good to make the front and back of your pamphlet on different pieces of paper and use a copying machine to make the pamphlet double sided in case you decide to make changes along the way.

With a Computer:

Open a new document in Microsoft Word. Go to File>Page Setup to choose a Landscape Orientation and make all of the margins 0.5 inches. Go to Format>Columns to choose 3 columns and click the check box for Line Between. You will need to either use a printer that will print double-sided or print the two sides of your pamphlet separately and use a copying machine to make them double sided.



Evaluation

SmartShopper will evaluate the pamphlets based on the following criteria:

- All required information is present and correct
- Scientific explanations are used to back up pamphlets claims
- Effective use of diagram and graph to enhance explanation of why nanoparticulate sunscreen ingredients are clear
- Convincing argument weighing all the relevant information for position taken on nanoparticulate sunscreen use
- All team member contributed and worked together to produce the animations



Name _____ Date _____ Period _____

Consumer Choice Project: Peer Feedback Form

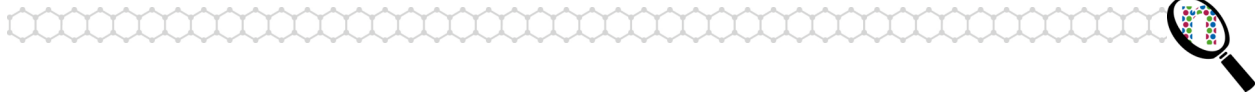
1. What are the name(s) of the student team who developed the pamphlet you are evaluating?

2. Is all of the required information present and correct?

Not at all _____ Completely

Overview of nanoparticulate sunscreen ingredients and similarities/differences from other active ingredients.	1	2	3	4	5
List of common nanoparticulate active sunscreen ingredients and how to know if your sunscreen contains them.	1	2	3	4	5
Explanation of how nanoparticulate sunscreens block UV light from reaching the skin and benefits of using them.	1	2	3	4	5
Scientific explanation and diagram of why nanoparticulate sunscreen ingredients are clear.	1	2	3	4	5
Transmission versus wavelength graph that supports the explanation.	1	2	3	4	5
Explanation of possible downsides / dangers of using sunscreens with nanoparticulate ingredients.	1	2	3	4	5
SmartShopper's position on the use of sunscreens nanoparticulate ingredients with justification.	1	2	3	4	5

3. List any information that you think is missing or incorrect here:



4. Was the information in the pamphlet presented clearly and communicated in an appropriate way?

Not at all	A little	Somewhat	A lot	Completely
1	2	3	4	5

5. If not, please identify the area(s) of confusion here:

6. To what degree are scientific explanations used to back up pamphlets claims?

Not at all	A little	Somewhat	A lot	Completely
1	2	3	4	5

7. To what degree do the diagram and graph enhance the explanation of why nanoparticulate sunscreen ingredients are clear?

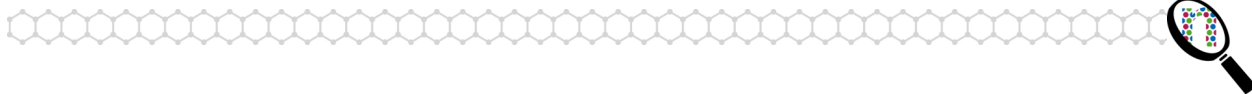
Not at all	A little	Somewhat	A lot	Completely
1	2	3	4	5

8. To what degree is a convincing argument made—one that weighs all of the relevant information for the position taken on nanoparticulate sunscreen use?

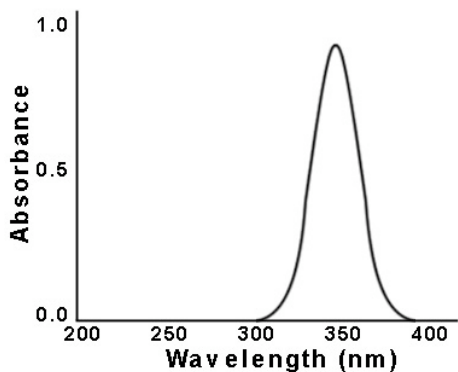
Not at all	A little	Somewhat	A lot	Completely
1	2	3	4	5

9. Describe one thing that you think the pamphlet did very well:

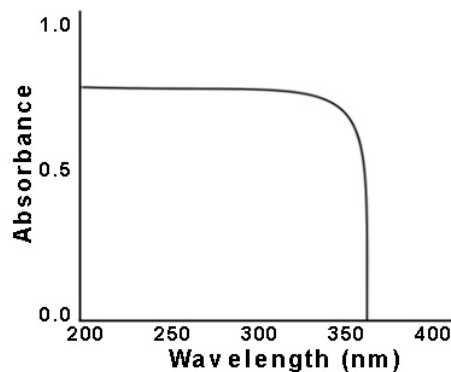
10. Give at least one suggestion for improving the pamphlet:



6. For each of the following absorption graphs, circle the correct answers for a) what kind(s) of light are strongly absorbed and b) whether it is an organic or inorganic sunscreen. (4 points)



- a) UVA UVB
b) Organic Inorganic



- a) UVA UVB
b) Organic Inorganic

7. Why do sunscreens that use nano-sized TiO_2 clusters appear clear on our skin while sunscreens that use traditional sized TiO_2 clusters appear white? (5 points)

8. How do you know if a sunscreen has “nano” ingredients? (2 points)

9. Briefly describe one benefit and one drawback of using a sunscreen that contains “nano” ingredients: (1 point each, a total of 2 points)



10. In what ways are “nano” sunscreen ingredients similar and different from other ingredients currently used in sunscreens? For each of the four categories below, indicate whether “nano” sunscreen ingredients are “similar” or “different” to organic and inorganic ingredients and explain how. (1 point each, total of 8 points)

	Organic Ingredients (e.g. PABA)	Inorganic Ingredients (e.g. Classic Zinc Oxide used by lifeguards)
Chemical Structure	<p>Similar or Different</p> <p>How: Nano ingredients are small ionic clusters while organic ingredients are molecules.</p>	<p>Similar or Different</p> <p>How: Nano ingredients are a kind of inorganic ingredients. Both are ionic clusters but the nano clusters are smaller.</p>
Kinds of Light Blocked	<p>Similar or Different</p> <p>How: Organic ingredients each block a small part of the UV spectrum (generally UVB) while nano ingredients block almost the whole thing,</p>	<p>Similar or Different</p> <p>How: Both nano ingredients and traditional inorganic ingredients block almost the whole UV spectrum.</p>
Way Light is Blocked	<p>Similar or Different</p> <p>How: Both nano and organic ingredients block UV light via absorption. (The specific absorption mechanism is different, but students are not expected to report this)</p>	<p>Similar or Different</p> <p>How: Both nano and inorganic ingredients block UV light via absorption.</p>
Appearance on the Skin	<p>Similar or Different</p> <p>How: Both nano and organic ingredients appear clear on the skin.</p>	<p>Similar or Different</p> <p>How: Traditional inorganic ingredients appear white on the skin while nano ingredients appear clear.</p>



Clear Sunscreen Final Reflections: Student Worksheet

Now that you have come to the end of the unit, go back and look at the reflection forms you filled out after each activity and try to answer the guiding questions below. Write down answers each question below and then evaluate how confident you feel that each idea is true.

1. What are the most important factors to consider in choosing a sunscreen?	How sure are you that this is true?		
	Not So Sure	Kind-of Sure	Very Sure
2. How do you know if a sunscreen has “nano” ingredients?	How sure are you that this is true?		
	Not So Sure	Kind-of Sure	Very Sure
3. How do “nano” sunscreen ingredients differ from most other ingredients currently used in sunscreens?	How sure are you that this is true?		
	Not So Sure	Kind-of Sure	Very Sure



Now go back to the worksheet you filled out with your initial ideas at the beginning of the unit and mark each idea with a \checkmark if you still believe it is true, an X if you don't think that it is true and a ? if you are still unsure. Then answer the following questions.

1. What ideas do you have now that are the same as when you started?

2. What ideas are different and how?

3. What things are you still unsure about?