UV: Use Caution

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Disclaimer: The findings and conclusions in this report are those of the author(s) and do not necessarily represent the views of the Centers for Disease Control and Prevention.
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Summary
This lesson has been developed for a general biology class to look at skin cancer risk factors and ways to reduce those risk factors. The use of tanning beds will be surveyed. Based on this information, as well as information drawn from existing materials from the Centers for Disease Control and Prevention and the Food and Drug Administration, students will compose public service announcements (PSAs) highlighting the links between artificial UV exposure and skin cancer.

Learning Outcomes
- The student will be able to identify their skin phototype.
- The student will be able to identify their risk factors for skin cancer.
- The student will be able to identify ways to protect themselves from UV rays.
- The student will be able to recognize the harmful effects of artificial UV radiation.
- The student will develop methods to educate their peers on the dangers of UV radiation exposure.

Materials
1. Photocopies of the pretest (one per student).
2. Photocopies of the Indoor Tanning Device Survey (two per student).
3. Teacher copy of Compiling Data from Graphing Data
4. Photocopies of Indoor Tanning Device Graphing Activity worksheet (one per student).
5. Photocopies of the posttest (one per student).
6. Rubric for PSA.

Total Duration
3 hours and 50 minutes

Procedures

Teacher Preparation
The teacher should make photocopies of each handout. Copies will need to be made of the following: “Pretest”, “Posttest”, and “Indoor Tanning Device Graphing Activity” (one copy of each handout for each student), and “Indoor Tanning Device Survey” (two copies for each student). The teacher should also be sure to have access to the PSA online and a copy of “Compiling Data from Graphing Data”.

For step 3, students may need a video camera, tape recorder or props to complete their PSAs. The teacher should also read over the information on tanning beds in order to be prepared to share this information with the class in step 4.

Two or three days prior to beginning this lesson, the teacher should give each student two copies of the “Indoor Tanning Device Survey”. Instruct the students to complete one of the surveys themselves and to ask a friend to complete the other. The students should be sure to
ask friends who have not already completed the survey. The teacher should tell the students that both surveys will be due at the beginning of class on the day this lesson is started.

**Introduction:**

*Duration: 30 minutes*

Begin this class by collecting the “Indoor Tanning Device Surveys” that were distributed in a previous class, and let the students know that these will be used later in the lesson. The teacher should hand out the pretest at the beginning of the lesson to assess students’ prior knowledge of ultraviolet light, tanning, and skin cancer. Allow the students enough time to complete the pretest, and then discuss the correct answers as well as any misconceptions the students might have.

**Supplemental Documents**

*Title: Indoor Tanning Device Survey*
*Description:* This survey assesses student use of indoor tanning devices. It should be completed by the students prior to beginning the lesson.

*Title: Pretest: Skin Cancer and You*
*Description:* This is the pretest that can be used to assess students’ knowledge of sun and tanning safety and skin cancer.

*Title: Pretest: Skin Cancer and You Answer Key*
*Description:* This is the pretest answer key that can be used to discuss students’ responses to the pretest.

**Step 2**

*Duration: 90 minutes*

Using the “Skin Cancer Modules” web resource, the teacher will present information to students on the skin phototypes (Module 9), what skin cancer is and looks like, as well as the ABCDs used to identify possible cancers (Module 10). Following this, the teacher can discuss some risk factors for skin cancer (Module 11). Using the phototypes and risk factors, the class should discuss which members are most at risk for skin cancer. The teacher should ensure that students do not diagnose themselves or their classmates. A true diagnosis should be done by a dermatologist. The teacher should then lead the discussion into UV radiation (Module 6) as one of the leading factors contributing to skin cancer.

To use the information learned, the teacher should put students into groups of 2-4, and ask them to brainstorm about how to protect themselves from exposure to UV rays. The teacher should write students’ ideas on the board. When the teacher has completed this activity, the class should compare the student-created list with the list presented in the Skin Cancer Modules web resource (Module 12). Discuss any similarities and differences between the lists.

**Web Resources**

*Title: Skin Cancer Modules*
*URL: http://www.cdc.gov/EXCITE/skincancer/index.htm*
*Description:* This Centers for Disease Control and Prevention website offers educational materials about skin cancer.

*Title: National Skin Cancer Prevention Program*
*URL: http://www.cdc.gov/cancer/nscpep/skinpdfs/skin96.pdf*
Description: This Centers for Disease Control and Prevention website provides background information on skin phototypes, risk factors and skin cancer.

Step 3        Duration: 40 minutes
Begin this step by asking the students to make predictions/hypotheses about differences between males and females regarding answers given on the “Indoor Tanning Device Surveys” that were collected from the students at the beginning of the lesson. Write these predictions/hypotheses on the board or overhead. Then distribute the completed surveys to the students, and ask them to sort the surveys by gender. The teacher will help the students tally the data from the surveys for males and females and compile on the “Teacher Compilation Sheet”. This information can be shared with the students on an overhead or by copying the completed sheet and distributing to the students.

The students will then graph this information on the “Indoor Tanning Device Graphing Activity” worksheet. The teacher should instruct the students to create bar graphs comparing males and females for each of the survey questions, using different colors to represent each gender. After completing the graphs, students should be instructed to answer the questions at the end of the worksheet. Responses to these questions may be discussed if time permits. [Note: No answer key is provided to assess this activity. Answers will vary according to the data collected.]

Supplemental Documents
Title: Teacher Compilation Sheet - Indoor Tanning Device Graphing Activity
Description: This sheet may be used to tally the data collected from the Indoor Tanning Device surveys.

Title: Indoor Tanning Device Graphing Activity
Description: This worksheet should be copied so that each student can graph the data collected from the Indoor Tanning Device surveys. Students should use the data summarized on the Teacher Compilation Sheet to create the graphs on this worksheet.

Step 4        Duration: 40 minutes
Using information gathered from the web resources (listed below), the teacher will inform students of the history of tanning bed use and how tanning beds work. Working as a class, the students will develop a list of specific risks that may be associated with tanning bed use, and the teacher will write these risks on the board. The teacher should ask the students to recall the information from the graphing activity, and discuss the risks people are taking by using indoor tanning devices. Responses to the questions at the end of the graphing worksheet may be discussed if not done earlier. The teacher can show students the poster PSA from CDC on skin cancer prevention and discuss talking points.

Students should be instructed to divide into groups of 4-5 people and discuss effective ways to communicate with other students about lowering their skin cancer risks while using an indoor tanning device. The teacher should tell the students their assignment is to develop a 30-second PSA addressing the risks of using indoor tanning devices.

Web Resources
Title: Teens and Tanning
Description: This website from the American Academy of Dermatology (AAD) describes their concern with teens and tanning.

Title: The Darker Side of Tanning
URL: http://www.aad.org/public/Publications/pamphlets/DarkerSideTanning.htm
Description: This website from the AAD lists general information on tanning and use of UV emitting lights.

Title: AAD-Indoor Tanning
Description: This website from the AAD lists dangers of indoor tanning.

Title: Indoor Tanning
URL: http://www.ftc.gov/bcp/conline/pubs/health/indootan.htm
Description: This website from the Federal Trade Commission (FTC) talks about how tanning beds operate and ways to protect yourself from the harmful rays.

Title: Epidemiologic Notes and Reports Injuries Associated with Ultraviolet Tanning Devices -- Wisconsin
URL: http://www.cdc.gov/mmwr/preview/mmwrhtml/00001392.htm
Description: This website from CDC gives statistics on the injuries associated with indoor tanning devices.

Title: Indoor tanning is not safe
Description: This website from the American Cancer Society gives information on the risks associated with indoor tanning.

Title: Indoor tanning
URL: http://www.ftc.gov/bcp/conline/pubs/health/indootan.htm
Description: This website from the Federal Trade Commission talks about the use of indoor tanning devices.

Title: 2006 Indoor Tanning Fact Sheet
URL: http://www.aad.org/aad/Newsroom/2006+Indoor+Tanning+Fact+Sheet.htm
Description: This website from the AAD gives facts on the use of indoor tanning devices.

Title: Choose Your Cover Poster
URL: http://www.cdc.gov/chooseyourcover/pdf/CYCPoster.pdf
Description: This website shows a poster on 5 ways to protect yourself from the sun’s UV rays from CDC.

Title: Choose Your Cover-Talking points
URL: http://www.cdc.gov/chooseyourcover/pdf/TALKING_POINTS.pdf
Description: This website provides talking point on 5 ways to protect yourself from the
Conclusion
Students will present to the class their final 30 second public service announcements on the risks of tanning bed use. These may be in video form, or acted out in front of the class. See attached rubric for grading suggestions.

Students will take “Posttest: Skin Cancer and You”. The teacher should use the “Pretest: Skin Cancer and You Answer Key” to grade the posttests.

Supplemental Documents

Title: Rubric: Public Service Announcement
Description: This sample grading rubric may be used to determine student grades on the final PSAs.

Title: Posttest: Skin Cancer and You
Description: This is the posttest that can be used to assess students' knowledge of sun and tanning safety and skin cancer after completing this lesson. To grade the posttest, the teacher may use the same answer key used to grade the pretest.

Assessment
Students will receive credit for submitting completed surveys. The students will be evaluated on the graphs and responses to questions on the Indoor Tanning Device Graphing Activity. Students will also be evaluated on their PSA using the rubric. Posttest scores will provide the final assessment scores.

Modifications

Extensions
1. Students could take their PSAs to their school’s media department to be shown on in-school television.
2. Students could evaluate the more effective PSAs.
3. Students could use this information to develop a more extensive presentation for students their own age about the use of indoor tanning devices.
4. Students could use this information to inform school boards about the risks associated and the use of “free” tanning bed certificates in the schools.
5. Lower level students could design a poster to inform others about the risks of skin cancer and the use of tanning beds.

Education Standards

National Science Education Standards
SCIENCE AS INQUIRY, CONTENT STANDARD A:

sun’s UV rays from CDC.
As a result of activities in grades 9-12, all students should develop

• Abilities necessary to do scientific inquiry
• Understandings about scientific inquiry

LIFE SCIENCE, CONTENT STANDARD C:
As a result of their activities in grades 9-12, all students should develop understanding of

• The cell
• Molecular basis of heredity
• Biological evolution
• Interdependence of organisms
• Matter, energy, and organization in living systems
• Behavior of organisms

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES, CONTENT STANDARD F:
As a result of their activities in grades 9-12, all students should develop understanding of

• Personal and community health
• Population growth
• Natural resources
• Environmental quality
• Natural and human-induced hazards
• Science and technology in local, national, and global challenges
Indoor Tanning Device Survey

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Please complete one copy of this survey and ask one other person, not in this class, to complete the other copy.

Please remember: Indoor ultraviolet (UV) tanning device is a tanning bed, booth, lamp or other machine that uses UV light to darken skin color. This does NOT include spray-on tans and lotions.

Circle your gender: Male Female

Circle your current grade: 9th 10th 11th 12th

1. Describe the appearance of the skin of a healthy young adult?

2. On average, how often do you use an indoor tanning device in a month? (Check one).

<table>
<thead>
<tr>
<th>0</th>
<th>1 time</th>
<th>2-4 times</th>
<th>5-8 times</th>
<th>9-12 times</th>
<th>13 times or more</th>
</tr>
</thead>
</table>

3. Do you think there are any health risks associated with use of an indoor tanning device?
   No Yes (if yes name one___________________________)

4. When would young adults be most likely to use tanning beds? (Check one)

<table>
<thead>
<tr>
<th>Before a dance or special event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before spring break or other vacations</td>
</tr>
<tr>
<td>Any time for personal appearance</td>
</tr>
<tr>
<td>To prevent tan lines</td>
</tr>
<tr>
<td>Never, young adults don’t use tanning beds</td>
</tr>
</tbody>
</table>
5. Who would be most likely to influence you to not use an indoor tanning device? (Check one).

<table>
<thead>
<tr>
<th>Celebrities</th>
<th>Parents</th>
<th>Peers</th>
<th>Other sources</th>
</tr>
</thead>
</table>

6. What would be the best method to inform young adults about the dangers of increased UV light exposure during indoor tanning use? (Check one).

<table>
<thead>
<tr>
<th>Magazine ads</th>
<th>Radio ads</th>
<th>TV ads</th>
<th>Billboards</th>
<th>Peers</th>
</tr>
</thead>
</table>
Pretest: Skin Cancer and You
UV: Use Caution
Barbara Behnke and Stacey Coston, 2006 Science Ambassador Program

Answer True or False for each of the statements below.
1. A tan means that skin appears healthy and does not indicate any kinds of skin damage.

2. Ultraviolet light, like UVA and UVB, is classified by wavelength.

3. Ultraviolet light is part of the visible light from the sun.

4. When using sunscreen, the minimum recommendation for SPF is 8.

5. You can see sunburn right away, and so you know when to get out of the sun.

6. UV rays cause obvious short term damage, such as sunburn, as well as long term damage that accumulates with each exposure to the sun.

7. Wearing sunscreen alone will protect you from skin cancer.

8. Tanning in a tanning bed or booth increases your exposure to dangerous UV radiation.

9. Artificial tanning, like tanning beds or lamps, is safer than sitting in the sun.

10. Tanning promotes early skin damage and premature wrinkling.

11. You can get sunburned on a cloudy day.

12. Skin cancer is the most common form of cancer in the United States today.

13. Your chances of getting melanoma (the most dangerous form of skin cancer) if you live in the United States are 1 in 5.

14. Individuals get a large portion of their lifetime UV exposure before the age of 18.
**Pretest- Skin Cancer and You ANSWER KEY**

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CDC’s 2006 Science Ambassador Program

Answer True or False to each of the statements below

1. A tan means that skin appears healthy and does not indicate any kinds of skin damage.  
   False – According to the Food and Drug Administration, a tan is NOT a healthy glow, and DOES cause skin damage.

2. Ultraviolet light, like UVA and UVB, is classified by wavelength.  
   True

3. Ultraviolet light is part of the visible light from the sun.  
   False – According to the Centers for Disease Control and Prevention, our eyes only see wavelengths of visible light from red to violet. UV rays have wavelengths shorter than visible light and are not seen by the eye.

4. When using sunscreen, the minimum recommendation for SPF is 8.  
   False – According to the Food and Drug Administration, the recommended SPF for sunscreen is 15.

5. You can see sunburn right away, and so you know when to get out of the sun.  
   False – According to the Food and Drug Administration, you cannot see sunburn until several hours after exposure.

6. UV rays cause obvious short term damage, such as sunburn, as well as long term damage that accumulates with each exposure to the sun.  
   True

7. Wearing sunscreen alone will protect you from skin cancer.  
   False – According to the Food and Drug Administration, wearing sunscreen alone WILL NOT protect you from skin cancer. Using sunscreen, a hat and sunglasses, and avoiding peak sun hours can help decrease your risk for skin cancer.

8. Tanning in a tanning bed or booth increases your exposure to dangerous UV radiation.  
   True

9. Artificial tanning, like tanning beds or lamps, is safer than sitting in the sun.  
   False – According to the Food and Drug Administration, artificial tanning is NOT safer than sitting in the sun.
10. Tanning promotes early skin damage and may cause premature wrinkling.
   True

11. You can get sunburned on a cloudy day.
   True

12. Skin cancer is the most common form of cancer in the United States today.
   True

13. Your chances of getting melanoma (the most dangerous form of skin cancer) if you live in the United States are 1 in 5.
   False – Your chances of getting melanoma (the most dangerous form of skin cancer) are 1 in 59, according to the National Cancer Institutes’ SEER database.

14. Individuals get a large portion of their lifetime UV exposure before the age of 18.
   True

References:


After the students have completed this survey, the teacher will help the students compile this data using this form. This information can then be presented on the board or the overhead. Information on males and females will be collected separately.

<table>
<thead>
<tr>
<th>Question</th>
<th>Females</th>
<th>Males</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. For question number one, count the number of students who mentioned a tan.</td>
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<tr>
<td>2. On average, how often do you use a tanning bed in a month?</td>
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<tr>
<td>13 or more</td>
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<td>3. Do you think there is health risks associated with a tan?</td>
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<td>No</td>
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<tr>
<td>Yes</td>
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<td>Total</td>
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<td>Celebrities</td>
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<tr>
<td>6. What would be the best method to inform young adults about the dangers of increased UV light exposure in tanning bed use?</td>
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</table>
Indoor Tanning Device Graphing Activity

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After the class has compiled the data from individual surveys, use this sheet to graph the class data you have obtained. Each question will be represented by a separate graph. Each graph should be a simple bar graph. Use different colors to represent the female and male data. You do not have to graph the totals.

The number of males and females who mentioned a tan
On average, how often do you use an indoor tanning device in a month? Graph the top two answers for both males and females. Be sure to use a different color for each possible answer.

Do you think there are health risks associated with use of an indoor tanning device? Graph Yes/No responses for both males and females.
When would young adults be most likely to use an indoor tanning device? Graph the top two answers for both males and females. Be sure to use a different color for each possible answer.
Who would be most likely to influence you to not use an indoor tanning device? Graph the top two answers for both males and females. Be sure to use a different color for each possible answer.
What would be the best method to inform young adults about the dangers of increased UV light exposure during indoor tanning device use? Graph the top two answers for both males and females. Be sure to use a different color for each possible answer.
After graphing the data, answer the questions below:

1. Were the class predictions/hypotheses supported or not?

2. Given this information, are males or females more at risk from their artificial UV exposure? Use evidence from the graphs to explain your answer.

3. Given this information, do young adults appear to know the risks of using an indoor tanning device? Use evidence from the graphs to explain your answer.

4. Who has the greatest influence on young adults choosing to use indoor tanning devices? Use evidence from the graphs to explain your answer.

5. What would be the best way to inform young adults of the dangers of artificial UV exposure? Use evidence from the graphs to explain your answer.

6. Other than not using an indoor tanning device, how could young adults help protect themselves from artificial UV exposure?
Rubric: Public Service Announcement

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The public service announcement (PSA) that you create will be evaluated using the following criteria.

1. Time: 30 seconds 10 pts
2. Content 50 pts.
   (Appropriate for the target age group, includes key points, uses key terms and appropriate language)
3. Clarity 30 pts
   (Understandable, aimed at the target audience, motivational)
4. Creativity 10 pts
   (Use of props or attention getting devices)

<table>
<thead>
<tr>
<th>Category</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Uses required period of time</td>
<td>Time is slightly (2 sec) under or over length required</td>
<td>Time is under required length (5 sec)</td>
<td>Time is under length (10 sec)</td>
<td>Presentation is less than 15 seconds</td>
</tr>
<tr>
<td>Content</td>
<td>Students include all 5 sun safety factors and use indoor tanning device information. Stress is on prevention of sun damage by ultraviolet radiation. All information is correct and documented</td>
<td>Students use 4 of the five sun safety factors and use indoor tanning device information. Prevention of sun damage by UV rays is mentioned but not highly stressed. Information is correct but not documented correctly or completely.</td>
<td>Students use some of the information relating to sun safety factors. Indoor tanning device information may be missing or not stressed. Information for UV sun damage is missing, poor or incomplete. Information is correct but not documented completely.</td>
<td>Information of the sun safety factors is poor. Indoor tanning device use is not mentioned, missing or incomplete. Information on the damage by UV radiation is very poor, incomplete or not stated. Information is partially correct and is not documented.</td>
<td>Presentation does not reflect the need for sun protection and the damage by UV radiation. Material is missing or incorrect. Information is not correct and not documented.</td>
</tr>
<tr>
<td>Clarity</td>
<td>Words chosen are appropriate for the age group targeted. Words are used and pronounced correctly. Words are enticing, motivating, engaging the listener and promoting sun safety and UV awareness.</td>
<td>Words chosen are somewhat appropriate for the age group targeted. Most words are pronounced and used correctly. Words are somewhat motivating and engage the listener, promote sun awareness and sun safety.</td>
<td>Words chosen are questionable for both the age group and targeted audience. Mispronunciations affect the message of the PSA. There is little motivation and the listener is not engaged. Sun safety awareness is poorly presented.</td>
<td>Words chosen are not appropriate for the targeted age group. Words are poorly pronounced and used incorrectly. Word choice is not motivational and does not engage the listener. Minimal to no sun safety awareness is mentioned.</td>
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<td>---</td>
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<td></td>
</tr>
<tr>
<td>Creativity</td>
<td>PSA grabs the attention of the targeted audience. PSA demonstrate unique ideas in the presentation of the material.</td>
<td>PSA is interesting to the targeted audience. PSA has some interesting presentation points regarding the material.</td>
<td>PSA is informative but does not grab the attention of the targeted audience.</td>
<td>PSA does not present the information in an exciting format. There is little uniqueness in the presentation format.</td>
<td>PSA is not interesting or informative.</td>
</tr>
</tbody>
</table>
Posttest: Skin Cancer and You

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Answer True or False for each of the statements below.

1. A tan means that skin appears healthy and does not indicate any kinds of skin damage.

2. Ultraviolet light, like UVA and UVB, is classified by wavelength.

3. Ultraviolet light is part of the visible light from the sun.

4. When using sunscreen, the minimum recommendation for SPF is 8.

5. You can see sunburn right away, and so you know when to get out of the sun.

6. UV rays cause obvious short term damage, such as sunburn, as well as long term damage that accumulates with each exposure to the sun.

7. Wearing sunscreen alone will protect you from skin cancer.

8. Tanning in a tanning bed or booth increases your exposure to dangerous UV radiation.

9. Artificial tanning, like tanning beds or lamps, is safer than sitting in the sun.

10. Tanning promotes early skin damage and premature wrinkling.

11. You can get sunburned on a cloudy day.

(Answer the multiple choice questions on the next page)
The following questions are multiple choice. Choose the correct answer.

12. What is the most common form of cancer in the United States today?
   A. lung cancer
   B. skin cancer
   C. pancreatic cancer
   D. liver cancer

13. What are the chances of getting melanoma (the most dangerous form of skin cancer) if you live in the United States?
   A. 1 in 8
   B. 1 in 15
   C. 1 in 59
   D. 1 in 232

14. What is the single biggest risk factor for developing the most dangerous kind of skin cancer?
   A. forgetting to wear sunscreen
   B. going to the beach
   C. multiple blistering sunburns before the age of 20
   D. exposure to self tanning lotions

15. During the first eighteen years of life, individuals receive:
   A. None of their lifetime sun exposure because children have natural protection from sun
   B. A very small portion of their lifetime sun exposure
   C. About half of their lifetime sun exposure
   D. A large portion of their lifetime sun exposure
Pretest- Skin Cancer and You ANSWER KEY

UV: Use Caution
By Barbara Behnke and Stacey Coston
CDC’s 2006 Science Ambassador Program

Answer True or False to each of the statements below

1. A tan means that skin appears healthy and does not indicate any kinds of skin damage.
   False – According to the Food and Drug Administration, a tan is NOT a healthy glow, and DOES cause skin damage.

2. Ultraviolet light, like UVA and UVB, is classified by wavelength.
   True

3. Ultraviolet light is part of the visible light from the sun.
   False – According to the Centers for Disease Control and Prevention, our eyes only see wavelengths of visible light from red to violet. UV rays have wavelengths shorter than visible light and are not seen by the eye.

4. When using sunscreen, the minimum recommendation for SPF is 8.
   False – According to the Food and Drug Administration, the recommended SPF for sunscreen is 15.

5. You can see sunburn right away, and so you know when to get out of the sun.
   False – According to the Food and Drug Administration, you cannot see sunburn until several hours after exposure.

6. UV rays cause obvious short term damage, such as sunburn, as well as long term damage that accumulates with each exposure to the sun.
   True

7. Wearing sunscreen alone will protect you from skin cancer.
   False – According to the Food and Drug Administration, wearing sunscreen alone WILL NOT protect you from skin cancer. Using sunscreen, a hat and sunglasses, and avoiding peak sun hours can help decrease your risk for skin cancer.

8. Tanning in a tanning bed or booth increases your exposure to dangerous UV radiation.
   True

9. Artificial tanning, like tanning beds or lamps, is safer than sitting in the sun.
   False – According to the Food and Drug Administration, artificial tanning is NOT safer than sitting in the sun.
10. Tanning promotes early skin damage and may cause premature wrinkling.
   - True
11. You can get sunburned on a cloudy day.
   - True
12. What is the most common form of cancer in the United States today?
   - B. skin cancer
13. What are the chances of getting skin cancer if you live in the United States?
   - C. 1 in 59
14. During the first eighteen years of life, individuals receive:
   - D. A large portion of their lifetime sun exposure

References: