Name: _____ Group: _____

THE STRUCTURED CONTROVERSY

New standards for tanning salons?

Québec City – Drawing on initiatives coming out of Belgium, France and Switzerland, the Minister of Health and Social Services plans to adopt standards for the use of tanning beds. Many Quebeckers patronize tanning salons to maintain a bronzed complexion year-round in keeping with a commonly held belief in the West that tanning is one of the criteria for physical beauty. However, many observers wonder about the health effects of tanning beds and see their popularity as cause for concern. The Minister has appointed a task force to make recommendations regarding the use of tanning beds.

Québec City, January 16, 2009

Description of mandate from the Québec Minister of Health and Social Services

Mandate
Tanning Salon Task Force

Purpose
Adopt standards for the use of tanning beds

Task force mandate
A task force is being set up to provide the Minister of Health and Social Services with recommendations and practical, effective strategies for reducing any adverse health effects caused by the use of tanning beds.

Suggested task force membership:

- two representatives from the corporation of dermatologists
- two representatives from the association of tanning salon owners

In this LES, you are to play the role of a task force member.

Notes _____

Name: _____ Group: _____

CREATING THE CONTEXT

I ask myself questions

1. In your opinion, what tans the skin?

2. In your opinion, why do some people patronize tanning salons?

3. Who are the stakeholders in the controversy?

4. What questions should the stakeholders ask themselves? Consider the medical, social and ethical issues as you formulate your questions.

I must

5. Reformulate the goal of this controversy in my own words.

I think

6. What positions do you think dermatologists and tanning salon owners will hold about this controversy?

Name: _____ Group: _____

CREATING THE CONTEXT (*continued*)

7. What is your personal opinion about tanning salons?

_____

8. Do you go to tanning salons? Do you know people who go to them?

_____

_____

What I know and what I must find out

9. Record the information you have and the information you have to find.

What I know . . .	What I must find out . . .

I prepare my work

10. Where will you find the information for your work?

_____

_____

11. List the main stages of your work in chronological order.

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Reflection

	Yes	No
Do I clearly understand what I have to do?	☐	☐

Name: _____ Group: _____

GATHERING INFORMATION

I do research

Read available documents and gather the information you need.

1. Does the Sun emit electromagnetic or mechanical waves? Justify your answer.

2. Name the principal rays that reach Earth.

3. Which of these rays have the highest frequency? Which has the longest wavelength?

4. Which of the Sun's rays can be harmful to health?

5. Describe some positive health effects of UV rays from the Sun.

6. Describe some adverse health effects of UV rays from the Sun.

Name: _____ Group: _____

GATHERING INFORMATION (*continued*)

7. What types of rays are emitted by tanning salon machines? Are those rays stronger than the Sun's rays?

_____

_____

8. What types of rays increase the dark pigment in the skin? How do they work?

_____

_____

I apply my research results

9. What are the disadvantages of tanning beds? Find at least four disadvantages. Remember to cite your sources.

Disadvantage	Source

Name: _____ Group: _____

GATHERING INFORMATION (*continued*)

10. What are the advantages of tanning beds? Give at least four of them. Remember to cite your sources.

Advantage	Source

11. What role will you play in the debate?

☐ Dermatologist ☐ Tanning salon owner

12. Looking at the information you have gathered, highlight the information that supports the position you will defend in the debate.

Reflection

	Yes	No
Have I clearly understood what waves, wavelength, frequency and electromagnetic spectrum are?	☐	☐

Name: _____ Group: _____

RESOLVING THE STRUCTURED CONTROVERSY

I make suggestions

You have debated the advantages and disadvantages of tanning beds. Considering the arguments presented during the debate, what will you recommend to the Department of Health and Social Services? Formulate at least five recommendations.

Recommendation 1 _____

Recommendation 2 _____

Recommendation 3 _____

Recommendation 4 _____

Recommendation 5 _____

Recommendation 6 _____

Recommendation 7 _____

Reflection

	Yes	No
Did you consider several possibilities before making your recommendations?	☐	☐

Name: _____ Group: _____

VALIDATING THE RECOMMENDATIONS

I justify my approach

Validate your recommendations. Justify why you are submitting each of them to the Department of Health and Social Services. Check the validity of your sources.

Recommendation 1 _____

_____

_____

Recommendation 2 _____

_____

_____

Recommendation 3 _____

_____

_____

_____

Recommendation 4 _____

_____

_____

Recommendation 5 _____

_____

_____

Recommendation 6 _____

_____

_____

Recommendation 7 _____

_____

MY REFLECTION

Did your opinion about tanning salons change during this learning and evaluation situation? Explain your answer.

_____

Name: _____ Group: _____

MY EVALUATION

Use the evaluation grid on the next page for your self-evaluation. Enter A, B, C, D or E in the appropriate space on this table.

SSC2 Makes the most of his/her knowledge of science and technology				
Criteria*	**Observable indicators**	**Me**	**Teacher**	**Comments**
1	**Creating the context** Definition of the goal and formulation of questions relating to the social, medical and ethical issues		☐ With help	
2	**Gathering information** Summary of the advantages and disadvantages of using tanning beds		☐ With help	
3	**Resolving the controversy** Formulation of recommendations		☐ With help	
4	**Validating the recommendations** Justification of each recommendation		☐ With help	

*** Evaluation criteria**

1 Formulation of appropriate questions
2 Appropriate use of scientific and technological concepts, laws, models and theories
3 Relevant explanations or solutions
4 Suitable justification of explanations, solutions, decisions or opinions

EVALUATION GRID

Name: _____ Group: _____

SSC 2 Makes the most of his/her knowledge of science and technology

Criteria*	Observable indicators	A	B	C	D	E
1	**CREATING THE CONTEXT** Definition of the goal and formulation of questions relating to the social, medical and ethical issues	The goal is very clearly stated and the questions take into account the social, medical and ethical issues.	The goal is clearly stated and the questions take into account the social, medical and ethical issues.	The goal is stated more or less clearly OR the questions more or less take into account the social, medical and ethical issues.	The goal is stated more or less clearly AND the questions more or less take into account the social, medical and ethical issues.	The work needs to be redone.
2	**GATHERING INFORMATION** Summary of the advantages and disadvantages of using tanning beds	All of the advantages and disadvantages of using tanning beds are relevant.	Most of the advantages and disadvantages of using tanning beds are relevant.	Only a few of the advantages and disadvantages of using tanning beds are relevant.	The advantages and disadvantages of using tanning beds are largely irrelevant.	The work needs to be redone.
3	**RESOLVING THE CONTROVERSY** Formulation of recommendations	All of the recommendations are very clearly formulated and are relevant.	Most of the recommendations are clearly formulated and are relevant.	A few of the recommendations are clearly formulated and are relevant.	The recommendations are poorly formulated or are irrelevant.	The work needs to be redone.
4	**VALIDATING THE RECOMMENDATIONS** Justification of each recommendation	All of the justifications are relevant.	Most of the justifications are relevant.	Some of the justifications are relevant.	The justifications are only sligtly relevant.	The work needs to be redone.

* Evaluation criteria

1 Formulation of appropriate questions
2 Appropriate use of scientific and technological concepts, laws, models and theories
3 Relevant explanations or solutions
4 Suitable justification of explanations, solutions, decisions or opinions

Name: _____ Group: _____

INFORMATION DOCUMENT 1

Ultraviolet radiation: solar radiation and human health

Too much sun is dangerous

Sunlight, an essential prerequisite for life, may be extremely dangerous to human health. Excessive exposure to the sun is known to be associated with increased risks of various skin cancers, cataracts and other eye diseases, as well as accelerated skin ageing. It may also adversely affect people's ability to resist infectious diseases and compromise the effectiveness of vaccination programs.

Sunlight is electromagnetic energy, which is propagated by electromagnetic waves. Healthwise, the most important parts of the sunlight electromagnetic spectrum are: **ultraviolet radiation** (**UV**), which is invisible to the eye; **visible light**, which allows us to see; and **infrared radiation**, which is our principal source of heat but is also invisible. Excessive exposures to any of these pose particular risks to health.

Source: World Health Organization (WHO), 1999 [pdf document] (accessed June 20, 2009).

INFORMATION DOCUMENT 2

What are the differences between UVA, UVB and UVC?

The three types of UV radiation are classified according to their wavelength. They differ in their biological activity and the extent to which they can penetrate the skin. The shorter the wavelength, the more harmful the UV radiation. However, shorter wavelength UV radiation is less able to penetrate the skin.

Short-wavelength UVC is the most damaging type of UV radiation. However, it is completely filtered by the atmosphere and does not reach the surface of Earth.

Medium-wavelength UVB is very biologically active but cannot penetrate beyond the superficial skin layers. It is responsible for delayed tanning and burning; in addition to these short-term effects, it enhances skin ageing and significantly promotes the development of skin cancer. Most solar UVB is filtered by the atmosphere.

The relatively long-wavelength UVA accounts for approximately 95 percent of the UV radiation reaching the surface of Earth. It can penetrate into the deeper layers of the skin and is responsible for the immediate tanning effect. Furthermore, it also contributes to skin ageing and wrinkling. For a long time it was thought that UVA could not cause any lasting damage. Recent studies strongly suggest that it may also enhance the development of skin cancers.

Source: World Health Organization (WHO), [pdf document] (accessed June 20, 2009).

Name: _____ Group: _____

INFORMATION DOCUMENT 3

The known health effects of UV

Do UVA and UVB affect the body in different ways?

UVA activates melanin pigment already present in the upper skin cells. It creates a tan that appears quickly but is also lost quickly. Furthermore, UVA penetrates into the deeper skin layers, where connective tissue and blood vessels are affected. As a result, the skin gradually loses its elasticity and starts to wrinkle. Therefore, large doses of UVA cause premature ageing. Furthermore, recent studies strongly suggest that it may enhance the development of skin cancers. The mechanisms of this UVA damage are not fully understood, but a popular hypothesis assumes that UVA increases oxidative stress in the cell.

UVB stimulates the production of new melanin, which leads to a heavy increase in the dark-coloured pigment within a few days. This tan may last a relatively long time. UVB also stimulates the cells to produce a thicker epidermis. Therefore, UVB is responsible both for the darkening and thickening of the outer cell layers—these reactions are the body's defence against further UV damage.

However, higher doses of UVB cause sunburn which increases your likelihood of developing cancer. The exact mechanism of how UVB initiates or promotes cancer is not yet known. In people suffering from Xeroderma pigmentosum, a rare pigmentation disease, the ability to repair DNA damage caused by exposure to UV radiation is impaired.

The much-increased rates of skin cancer in these patients suggest that direct UV damage of DNA may be the mechanism that links exposure to the development of cancer

Are there beneficial effects of UV radiation?

The sun's rays provide warmth and light that enhance your general feeling of well-being and stimulate blood circulation. Some UV radiation is essential to the body as it stimulates the production of vitamin D. Vitamin D has an important function in increasing calcium and phosphorus absorption from food and plays a crucial role in skeletal development, immune function and blood cell formation. There is no doubt that a little sunlight is good for you! But 5 to 15 minutes of casual sun exposure of hands, face and arms two to three times a week during the summer months is sufficient to keep your vitamin D levels high. Closer to the equator, where UV levels are higher, even shorter periods of exposure suffice.

Hence, for most people, vitamin D deficiency is unlikely. …

UV radiation has been used to successfully treat a number of diseases, including rickets, psoriasis, eczema and jaundice. This therapeutic use cannot eliminate the negative side-effects of UV radiation but treatment takes place under medical supervision to ensure that the benefits outweigh the risks.

Source: World Health Organization (WHO), [pdf document] (accessed June 20, 2009).

Name: _____ Group: _____

INFORMATION DOCUMENT 4

Health risks associated with tanning lamps

People who use tanning lamps are at risk of sunburn. This inflamed redness of the skin is caused by too much exposure to UV radiation, particularly to ultraviolet B (UVB) radiation. Sunburn may show up right away in severe cases, or may develop up to 24 hours later.

If you do not protect your eyes while tanning, overexposure to UV radiation can also cause temporary but painful eye conditions known as photokeratitis and photoconjunctivitis. In particular, overexposure to UVB radiation may be linked to the development of cataracts, a clouding over of the lens of the eye, which can cause blindness.

Tanning lamps can also cause longer-term health effects. Exposure to UV radiation can cause your skin to age more quickly and can increase your risk of developing squamous and basal cell skin cancer. Your risk of developing skin cancer increases with accumulated exposure to UV radiation. There is also scientific evidence that exposure to UV radiation weakens the immune system. This could affect your body's ability to defend against serious illnesses, including the more serious form of skin cancer, malignant melanoma.

Minimizing your risk

There are many factors to consider before choosing to use tanning lamps. For example, people with fair skin or a history of sunburn are at greater risk for adverse effects. Also, some medications and cosmetics can make your skin more sensitive to UV radiation. Talk to your health care professional about your personal risk factors before you decide whether to use tanning lamps.

If you decide to go ahead, the following steps will help minimize your risk:

- Read the warning labels on the sun lamp or tanning bed you are using and follow the directions carefully.
- If you go to a tanning salon, discuss your skin's sensitivity and your ability to tan with the salon operator. This should help the operator recommend the amount of time for your tanning session and how frequently you should tan.
- Do not exceed the recommended time per tanning session for your skin type.
- Allow at least 48 hours between each tanning session. This will give your skin a chance to repair damage from the UV radiation and may slow down the aging effects caused by the exposure.
- Always wear the safety eyewear that is recommended for the type of lamp you are using.
- Be sure there is a physical barrier, such as a clear sheet of acrylic, between you and the tanning lamp. This will help prevent heat burns from the lamp.
- Report any adverse reaction, such as sunburn or itchiness, to the salon operator. In cases of severe sunburn, see your health care professional.

Do not use tanning lamps more often than is necessary to maintain the colour of tan you want. Health Canada advises tanning lamp users to limit their total number of tanning sessions per year. Remember, the less ultraviolet radiation you get, the better it is for your health.

Source: Health Canada, 2005 [pdf document] (accessed June 20, 2009).

Name: _____ Group: _____

INFORMATION DOCUMENT 5

Tanning, an investment in health

Medical doctors and researchers have produced ample evidence that regular sun exposure is beneficial when common sense prevails (avoiding overexposure and the hours between noon and 4:00 PM).

Vitamin D3: a blessing for the skin

Vitamin D3, which is produced by UVB rays, helps maintain healthy levels of calcium and phosphorus, two effective preventatives against rachitism, osteoporosis and other skin conditions. Dr. Alan B. Fleisher is enthusiastic about his clinical demonstrations showing that UV-therapy or PUVA have the ability to alleviate pathologies such as psoriasis, eczema or vitiligo.

Regular, controlled sun exposure has a critically important role in preventing and inhibiting some types of cancers, such as cancer of the breast, prostate ovary, colon and blood

Vitamin D is also said to inhibit certain internal tumours (extract from *Beneficial Effects of Sun Exposure on Cancer Mortality* by Gordon Ainsleigh, Preventive Medicine, 1993).

In a more recent study, Professor Holick, who heads Boston University's General Clinical Research Center and a major research centre on vitamin D, skin and bones, emphasizes the sun's bio-positive effects.

The Sun as natural antidepressant!

Doctors now use phototherapy to treat a specific form of depression that affects mostly women about age 30, and that takes the form of increased appetite and a tendency toward hypersomnia. In explaining this antidepressive effect, scientists point out that UV rays lower the secretion of melatonin, which in excess amounts is responsible for the depressed individual's low spirits.

Tanning protects against sunburn

Skin that is well prepared by gradual, moderate sunning is better protected against sunburns (vacationing outdoors, in the snow, etc.).

Tanning

An external sign of beauty, well-being and good health that enhances the personality.

In a booth or on the beach: pros and cons

Twenty minutes in a tanning booth gives the same results as three hours of natural sun exposure. But exposure in a booth is much safer because the UVB and infrared rays are filtered, and the adverse effects from the Sun are limited.

Artificial-tanning devotees are exposed to scientifically controlled doses of UV radiation calculated to avoid any risk of erythema. Tanning machines emit UVA rays for the most part. In addition, regulations call for tanning lamps that diffuse no more than 1.5 percent UVB rays. It is a different story for exposure to natural sunlight, in which case UVB and infrared rays are not filtered.

French government order regulates exposure times for each type of tanning device

Controlled exposure is impossible outdoors owing to many variables (e.g. the changing seasons, time of day, site, geographic location, temperature, altitude, holes in ozone layer, and lack of filtration of the most harmful rays causing sunburn).

UVB rays, the culprit in sunburn

Compared to UVA rays, UVB rays require a thousand times less energy to cause sunburn, which is what can damage the skin.

Indoor tanning gets the skin ready for the Sun

Vacationers who arrive at their holiday destination already bronzed need not rush out for a fast tan. They have every reason to seek protection from the Sun's harmful rays so as not to burn.

Source: Premier Réseau Français de Centres de Bronzage, Media kit document [online] (accessed May 8, 2007). *[Translation]*

Name: _____ Group: _____

INFORMATION DOCUMENT 6

Artificial tanning sunbeds: risks and guidance

Preface

Overexposure to UV radiation from the Sun and artificial sources is of considerable public health concern. UV radiation plays an important role in the development of skin cancer, cataracts, and other eye conditions, and suppresses the immune system. Cumulative UV radiation also results in premature skin ageing.

Skin cancers

There is increasing evidence from both experimental and epidemiological data that cumulative exposure to UV radiation increases the risk of skin cancers. Therefore the added exposure from UV tanning appliances is likely to add to the well-known detrimental consequences of natural solar exposure. There is no evidence to suggest that any type of sunbed is less harmful than natural sun exposure. Precancerous actinic keratoses and Bowen's disease have also been reported in sunlight-protected but sunbed-exposed skin in fair-skinned users after just two to three years of regular sunbed use.

Skin ageing

Structural damage to human skin from exposure to UV radiation causes, in the short term, burning, fragility and scarring, and in the longer term, photo-aging. Photo-aging includes wrinkling and loss of skin elasticity. It is generally irreversible without cosmetic surgery.

Eye damage

Acute effects of UV radiation on the eye include photo-keratitis, inflammation of the cornea and the iris, and photo-conjunctivitis (an inflammation of the conjunctiva, the membrane that lines the inside of the eyelids and white of the eye). Long-term eye effects of UV radiation exposure may include the development of pterygium (white or creamy opaque growth attached to the cornea), and squamous cell cancer of the conjunctiva.

High intensity of UV radiation output

Some machines have the capacity to emit levels of UV radiation up to five times 20 stronger than the midday Australian summer sun. Such intensity in a largely unregulated industry where training of staff is not mandatory increases the health risks considerably. The risk is greater in unsupervised commercial sunbed operations and when sunbeds are used in the home, where the duration of UV radiation exposure is up to the discretion of the individual.

Limitation of certain skin types

People with skin phototype I will not tan after exposure to a sunbed. They will only burn. Unfortunately, without adequate sunbed operator training or supervised operations, the ability of the consumer to recognize their skin as not suitable for sunbed use is based on either self-diagnoses or, at worst, bad experience.

Dangers associated with childhood UV exposure

Childhood exposure to UV radiation is known to make an important contribution to the risk of developing melanoma later in life. For this reason, particular attention is required to ensure children do not use sunbeds.

Source: World Health Organization (WHO), *Artificial Tanning Sunbeds: Risks and Guidance,* 2004 [online] (accessed June 20, 2009).