Name: _____ Group: _____

THE PROJECT

Dear colleague journalists,

Our website is becoming increasingly popular with the public. This is why *Atom Editions* will soon launch a popular science journal. The first issue of our electronic journal will focus on biotechnology. In recent months, readers have sent us numerous emails indicating their interest in the subject. Biotechnology is both a source of fascination and concern for them. Here are the most commonly raised issues in their emails:

– vaccination

– pasteurization

– assisted reproduction

For this special issue, newsroom journalists must submit an article on a topic in biotechnology of their choice. The article must explain the chosen biotechnology to our readers and identify its associated benefits and concerns. It must be no more than 420 words in length and be accompanied by a photo or illustration that illustrates its content. You are to choose your own title and develop a page layout in order to show the graphic designer your preferred presentation.

The editorial team thanks you for contributing to the success of this *Atom Editions* project.

I look forward to reading your work,

Justine Lafrance
Editor-in-chief

In this learning and evaluation situation, you will assume the role of one of the newsroom journalists at *Atom Editions*. You must submit an article that meets the expectations of the editorial team.

Name: _____ Group: _____

CREATING THE CONTEXT

I ask myself questions

1. What is an electronic journal?

2. What is biotechnology?

3. What is a vaccine?

4. What is assisted reproduction?

5. What is pasteurization?

6. Who are the players in this project?

Name: _____ Group: _____

CREATING THE CONTEXT *(continued)*

7. For whom is this electronic journal intended?

8. What questions would be useful for gathering information?

I must

9. Restate the project's goal.

I think

10. Why do you think biotechnology is used?

Name: _____ Group: _____

CREATING THE CONTEXT *(continued)*

What I know and what I must find out

11. Write down the information you have and the information you have to research.

What I know…	What I must find out…

I prepare my work

12. Where will you find the information you need to write your article?

Name: _____ Group: _____

CREATING THE CONTEXT *(continued)*

13. Define, in chronological order, the main steps of your work.

Reflection

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

Name: _____ Group: _____

GATHERING INFORMATION

I do research

1. What is a cell?

2. Name the components of the cell.

3. What is mitosis?

4. What is a cell culture?

Name: _____ Group: _____

GATHERING INFORMATION *(continued)*

Vaccination

Answer the questions below to better understand the topic.

5. What is a vaccination?

6. Who developed this procedure? How?

7. Name some diseases for which vaccines exist.

8. The body produces antibodies to protect itself. How long does it take the immune system to produce antibodies after being exposed to an infectious agent?

9. What happens in the event of a second exposure to the same infectious agent?

10. Explain how vaccines work on the body.

Name: _____ Group: _____

GATHERING INFORMATION *(continued)*

Pasteurization

Answer the questions below to better understand the topic.

5. What is the pasteurization of food?

6. Who developed this procedure? To answer what need?

7. In what year did the pasteurization of milk become mandatory in Québec?

8. Why do we pasteurize food?

9. What diseases might have been spread through the consumption of non-pasteurized food before pasteurization became mandatory?

10. What were the consequences of these diseases on children?

Name: _____ Group: _____

GATHERING INFORMATION *(continued)*

Assisted reproduction

Answer the questions below to better understand the topic.

5. What is assisted reproduction?

6. What techniques are used to treat infertility?

7. Explain these techniques.

8. What is cell division?

9. What is genetic diversity?

10. What is meiosis?

Name: _____ Group: _____

GATHERING INFORMATION *(continued)*

Subject: _____

11. What concerns are associated with this biotechnology? Read the information documents at your disposal. Don't forget to consult your student book! List the extracted information in the table. Record your sources.

Concerns	Sources

Name: _____ Group: _____

GATHERING INFORMATION *(continued)*

Subject: _____

12. What are the benefits of this biotechnology? Read the information documents at your disposal. Don't forget to consult your student book! List the extracted information in the table. Record your sources.

Concerns	Sources

Name: _____ Group: _____

GATHERING INFORMATION *(continued)*

I apply my research results

13. Organize the information you gathered. Create the outline of your article. Summarize the key points of each paragraph.

14. What will be the title of your article?

15. What illustration will you use?

Reflection

	Yes	No
Do I understand the scientific concepts relating to my topic?	☐	☐

Name: _____ Group: _____

COMPLETING THE PROJECT

I make suggestions

Write your article and create the page layout on the computer. Don't forget to describe the illustration to your readers with a caption.

Reflection

	Yes	No
Have I considered other ways of presenting the information?	☐	☐

Name: _____ Group: _____

VALIDATING THE PROJECT

I justify my approach

1. Your information comes from various sources. Correctly cite these sources.

2. Is your article a maximum of 420 words in length?

Name: _____ Group: _____

VALIDATING THE PROJECT *(continued)*

3. Do you think your article allows readers to understand the biotechnological procedure you chose? Justify your answer.

4. Does your article specify the benefits of the biotechnology you chose and the concerns it raises? Justify your answer.

Name: _____ Group: _____

MY EVALUATION

Use the evaluation grid on the next page to do a self-evaluation. Write A, B, C, D or E in the appropriate space.

SSC 2 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 for information gathering		☐ With help	
2	**Gathering information** Relevance of information retained and presentation of ideas		☐ With help	
3	**Completing the project** Formulation of information contained in the article		☐ With help	
4	**Validating the project** Justification of information used and citation of sources		☐ With help	

*** Evaluation criteria**

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

EVALUATION GRID

Name: _____

Group: _____

SSC2 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 for information gathering	The questions guiding the information gathering are relevant. The goal of the project is very clear.	The questions guiding the information gathering are relevant. The goal of the project is clear.	The questions guiding the information gathering are more or less relevant OR the goal of the project is more or less clear.	The questions guiding the information gathering are more or less relevant AND the goal of the project is more or less clear.	The work needs to be redone.
2	**GATHERING INFORMATION** Relevance of information retained and presentation of ideas	All the information retained is very relevant. The order in which ideas are presented promotes comprehension of the topic.	The information retained is relevant. The order in which ideas are presented promotes comprehension of the topic.	The information retained is more or less relevant OR the order in which ideas are presented does not promote comprehension of the topic.	The information retained is more or less relevant AND the order in which ideas are presented does not promote comprehension of the topic.	The work needs to be redone.
3	**COMPLETING THE PROJECT** Formulation of information contained in the article	The information is well reported and very clearly presented.	The information is well reported and clearly presented.	The information is more or less well reported.	The information is not well reported.	The work needs to be redone.
4	**VALIDATING THE PROJECT** Justification of information used and citation of sources	The benefits and concerns regarding the chosen biotechnology are relevant and very clearly stated. The sources are cited correctly.	The benefits and concerns regarding the chosen biotechnology are relevant and clearly stated. The sources are cited correctly.	The benefits and concerns regarding the chosen biotechnology are more or less relevant OR the sources are not cited correctly.	The benefits and concerns regarding the chosen biotechnology are more or less relevant AND the sources are not cited correctly.	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, solutions or actions
4 Suitable justification of explanations, solutions or actions

Name: _____ Group: _____

INFORMATION DOCUMENTS

Vaccination

Immunization against diseases of public health importance

The benefits of immunization

Vaccines—which protect against disease by inducing immunity—are widely and routinely administered around the world based on the common-sense principle that it is better to keep people from falling ill than to treat them once they are ill. Suffering, disability and death are avoided. Immunization averted about two million deaths in 2002. In addition, contagion is reduced, strain on health-care systems is eased, and money is frequently saved that can be used for other health services.

Immunization is a proven tool for controlling and even eradicating disease. An immunization campaign carried out by the World Health Organization (WHO) from 1967 to 1977 eradicated the natural occurrence of smallpox. When the programme began, the disease still threatened 60% of the world's population and killed every fourth victim. Eradication of poliomyelitis is within reach. Since the launch by WHO and its partners of the Global Polio Eradication Initiative in 1988, infections have fallen by 99%, and some five million people have escaped paralysis. Between 1999 and 2003, measles deaths dropped worldwide by almost 40%, and some regions have set a target of eliminating the disease. Maternal and neonatal tetanus will soon be eliminated in 14 of 57 high-risk countries.

. . .

An estimated 2.1 million people around the world died in 2002 of diseases preventable by widely used vaccines. This toll included 1.4 million children under the age of five. Among these childhood deaths, over 500 000 were caused by measles; nearly 400 000 by Hib; nearly 300 000 by pertussis; and 180 000 by neonatal tetanus.

. . .

Effectiveness and safety

All vaccines used for routine immunization are very effective in preventing disease, although no vaccine attains 100% effectiveness. More than one dose of a vaccine is generally given to increase the chance of developing immunity.

Vaccines are very safe, and side effects are minor—especially when compared to the diseases they are designed to prevent. Serious complications occur rarely. For example, severe allergic reactions result at a rate of one for every 100 000 doses of measles vaccine. Two to four cases of vaccine-associated paralytic polio have been reported for every one million children receiving oral polio vaccine.

The cost-effectiveness of immunization

Immunization is considered among the most cost-effective of health investments. . . .

A recent study estimated that a one-week “supplemental immunization activity” against measles carried out in Kenya in 2002—in which 12.8 million children were vaccinated—would result in a net saving in health costs of US$ 12 million over the following ten years; during that time it would prevent 3 850 000 cases of measles and 125 000 deaths. In the United States, cost-benefit analysis indicate that every dollar invested in a vaccine dose saves US$ 2 to US$ 27 in health expenses.

. . .

The World Health Organization. *Immunization against diseases of public health importance* [Fact Sheet No. 288, online document], March 2005 (accessed July 13, 2009).

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Vaccination *(continued)*

Autism: why the debate rages

With the first autism case now being heard in federal vaccine court in Washington D.C., it makes sense to ask: Why is anyone even still debating the possibility of a link between vaccines and autism? After all, for years, many government health officials, advisors and vaccine manufacturers have said there's no association.

Here are a number of reasons why the question remains open:

1. While public health officials, government scientists, advisors and pharmaceutical companies have been responsible for innumerable lifesaving and life-improving medical advances, they are not infallible.

 For many years, public health officials thought it was safe to use X-ray machines in shoe stores and allowed mercury in medicines. Doctors prescribed Thalidomide—a drug marketed as a sleep aid—to pregnant women to treat morning sickness. In the case of Thalidomide, it came with no warning against use by pregnant women and the drug maker apparently did not predict it could cause fetuses the devastating damage that it did. . . . The medical establishment assured us Vioxx and Duract were safe painkillers, prescribed Rezulin for diabetics and then denied any of them were responsible for patient deaths. . . .

 When it comes to vaccines, the same group failed to predict that the 1990s' rotavirus (diarrhea) vaccine would have to be pulled from the market after infant deaths. They encouraged use of the oral polio vaccine (eventually discontinued after it gave too many children polio). And they allowed the use of a mercury neurotoxin preservative in childhood vaccines, only to admit later that they hadn't thought to calculate the cumulative amount kids were getting as more and more vaccines were added to the childhood immunization schedule.

 Recent history demonstrates that too often, government health officials, mainstream doctors and pharmaceutical companies aren't on the leading edge of alerting us to health risks; they're bringing up the rear. Patients feel left to fend for themselves, seeking independent research and opinions on their own. They and their dogged, relentless determination have often been the catalyst that eventually brings medical dangers to the forefront.

2. Government scientists, advisors and vaccine manufacturers often take an all-or-nothing approach to vaccinations.

. . .

3. Government officials and mainstream scientists who dispel any vaccine/autism/ADD link have ties to vaccine makers.

 There's so much overlap among pharmaceutical companies, government scientists and advisors that the information they provide at least has the appearance of a conflict of interest. . . .

President of the International Federation of the Pharmaceutical Manufacturers' Association. . . .

4. Non-profits which dispel any vaccine/autism/ADD link have ties to vaccine makers.

. . .

 Another example of a non-profit tied to the industry is "The Vaccine Fund." Its President from 2000-2005 was Jacques-François Martin, formerly CEO of vaccine maker Sanofi-Pasteur, CEO of vaccine maker Chiron, and President of the International Federation of the Pharmaceutical Manufacturers' Association. . . .

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Vaccination *(continued)*

Autism: why the debate rages

5. The dual role of the CDC undermines the appearance of fairness.

 There is a perceived, if not real, conflict of interest with the government's Centers for Disease Control (CDC) heavily promoting vaccines, but also responsible for monitoring adverse events. At least two respected medical journals, *The American Journal of Public Health* and *Pediatrics* have published letters or articles recommending "greater independence in vaccine safety assessments" apart from "the highly successful program to promote immunizations." In short, the CDC's bread and butter is achieving high vaccination rates. . . .

6. There is no definitive research proving a link between vaccines and autism or ADD, but there is also no definitive research ruling it out.

 Something rarely reported is that while there's no definitive study linking vaccines to autism or ADD, there is also no study definitively disproving a link. And there's a substantial body of peer-reviewed, published science from places like Columbia, Yale and Northeastern suggesting a link, or pointing to the need for further study.

 Many credible voices deny a link. But many other credible voices support the idea of a link. One example of the latter is George Wayne Lucier, formerly a senior official at the National Institutes of Health in Environmental Toxicology, an NIH advisor, member of the National Academy of Sciences Committee on Toxicity Testing and a scientific advisor for EPA who concludes ". . . it is highly probably that use of thimerosal as a preservative has caused developmental disorders, including autism, in some children." . . .

7. Those who say autism and ADD are not linked to vaccines do not know what is causing the epidemics.

 The most frightening part of the autism/ADD epidemics is that if, indeed, they're unrelated to vaccinations, that our best, brightest public health experts still have no idea what is causing it. Excluding ADD, one out of every 150 American children are now being diagnosed with autism.

. . .

CBS News.com. Attkisson, Sharyl. *Autism: why the debate rages* [blog entry], June 15, 2007 (accessed July 19, 2009).

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Vaccination *(continued)*

Vaccinations and public health

. . .

In 2002, more than 2 million of the world's children could have been saved if they had been vaccinated (figures from WHO). The 2 principal diseases which could have been addressed by a wide scale vaccination campaign are measles and viral hepatitis B (nearly 300 000 child deaths for each disease).

	Mortality Rates per million persons source: INSERM				
	Diphtheria	**Tetanus**	**Poliomyelitis**	**Tuberculosis**	**Pertussis**
In 1950	50 – 100	20 – 50	5 – 10	300 – 1000	20 – 50
After 1990	0	0.25 – 0.5	0	13	0.1

Nevertheless, there is still more to be done in the field. For example, vaccination campaigns for influenza, hepatitis B and tetanus are now falling short.

The role of vaccination is less clear than for other medical issues: if we look at the regression of tuberculosis since the 19th century (a proven fact in many countries), it is proven fact that the disease has been waning since before the discovery of anti-tubercular drugs or vaccination. Epidemiologists claim that in fact it is the amelioration of living conditions; in particular hygiene and nutrition that are responsible for the declining death rates. Based on large studies commissioned by the World Health Organization (WHO) some researchers believe that the effects of Bacillus Calmette-Guérin (BCG) vaccination are minimal: in a study done on 260 000 persons in India, where the disease is prevalent, the authors could not find a significant difference between the group who had received the BCG and the group who had not. Another study also done in India on 366 625 persons showed that the BCG had no preventative effect on the adult form of pulmonary tuberculosis.

Actually, the effectiveness of vaccination against cholera is not yet proven either: in a clinical study to test its effectiveness on 60 000 persons in Indonesia, in the context of a low incidence of cholera, no significant prevention could be discerned.

Side effects and risks according to vaccines

Side effects can be very frequent (post-vaccination fever) but are most often mild. Serious accidents remain rare, though they have occurred.

. . .

The first mass vaccination campaign was against poliomyelitis in the 1950s. The campaign was marred by a faulty batch of the vaccine (the live virus had not been attenuated) which resulted in the infection of nearly 220 000 persons, of which 70 000 became ill, 164 were severely paralyzed and 10 died.

. . .

Wikipédia. *Vaccins et santé publique* [online document], July 2009 (accessed July 14, 2009). *[Translation]*

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Vaccination *(continued)*

Vaccine safety. Frequently asked questions

1. Do vaccines work?

Answer: Yes, vaccines work very well. We know that in countries where vaccination rates are high, disease rates are low. We also know that the opposite is true. In countries where vaccination rates are low, disease rates are high.

2. Are vaccines safe?

Answer: Yes. Vaccines are among the safest tools of modern medicine. Serious side effects are rare. . . . In Canada, this kind of reaction has occurred less than once in every 1 million doses of vaccine, and there are effective treatments for this condition. The dangers of vaccine-preventable diseases are many times greater than the risks of a serious adverse reaction to the vaccine.

3. How are vaccines made and licensed in Canada?

Answer: . . . Like all medicines, vaccines must undergo several stages of rigorous testing before they are approved for use.

4. What would happen if we stopped immunizing?

Answer: Experience from other countries shows that diseases quickly return when fewer people are immunized:

Ireland saw measles soar to more than 1200 cases in the year 2000, as compared with just 148 the previous year, because immunization rates fell to around 76%. Several children died in this outbreak. . . .

5. Why do we still need vaccines if the diseases they prevent have disappeared from our part of the world?

Answer: It is important to continue vaccine programs for four basic reasons:

- First, unless a disease has completely disappeared, there is a real risk that small outbreaks can turn into large epidemics if most of the community is not protected. . . .
- Second, no vaccine is 100% effective. There will always be some people who are not immune, even though they have had their shots. This small minority will be protected as long as people around them are immunized.
- Third, there are a small number of people who cannot receive vaccines. These may be people who have previously had a severe allergic reaction to a component of the vaccine, or they have a medical condition that makes receiving vaccines too risky for them. These people are not protected from disease, and for some diseases it is very important that people around them are immune and cannot pass disease along to them. . . .
- And fourth, most vaccine-preventable diseases are still common in other parts of the world. Travellers can carry them from country to country. If we are not protected by immunization, these diseases will quickly spread. . . .

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Vaccination *(continued)*

Vaccine safety. Frequently asked questions

6. Do vaccines contain toxic ingredients?

Answer: The main ingredient in most vaccines is the killed or weakened germ (virus or bacterium), which stimulates our immune system to recognize and prevent future disease. . . .

A preservative called thimerosal received attention in the U.S. in 1999 because it contains mercury and it is used in some vaccines for children. As a precaution, U.S. authorities recommended that the use of vaccines containing thimerosal be reduced or eliminated. . . . In Canada, the only routine vaccine for children that contained thimerosal was the hepatitis B vaccine. Canadian infants were never subject to the same level of mercury exposure from vaccines as U.S. infants. A new formula for hepatitis B vaccine, with no thimerosal, is now available. . . .

7. Can vaccines transmit animal disease to people?

Answer: Because vaccines are a natural product, they sometimes require the use of animal cells during production. This process is strictly controlled so that it does not pose a risk to people. No brain cells are used in manufacturing vaccines in Canada. During the manufacturing process, the vaccines are purified, and all animal cells are removed. However, each batch of vaccine is tested to ensure that it is free from infectious agents. . . .

8. Do vaccines weaken the immune system?

Answer: No. Vaccines strengthen the immune system to protect children and adults from specific diseases. This is true even for newborn infants. Infants and children are exposed to many kinds of germs every day, through normal eating, drinking and playing. Scientists estimate the immune system can recognize and respond to hundreds of thousands, if not millions, of different organisms. The vaccines recommended for children and adults use only a small portion of the immune system's "memory". . . .

9. I've heard that MMR can cause autism. Is that true?

Answer: Medical researchers and scientists around the world have studied information collected over many years to see whether there is a link between measles vaccine and autism, a lifelong developmental disorder. They have not found any evidence of a link. . . . The symptoms of autism include problems with social interaction, behaviour and communication. Doctors don't know exactly what causes this developmental disorder. The symptoms usually appear during the first three years of life—when most children are receiving their vaccines. The idea that the MMR vaccine is linked to autism began in 1998, when one study claimed that the measles vaccine could lead to the development of autism. The study, which involved a very small number of children, was flawed in many ways from a scientific point of view, and numerous studies on this topic since then have not found any evidence of such a link.

Public Health Agency of Canada. *Vaccine Safety. Frequently Asked Questions* [online document], July 2008 (accessed July 14, 2009).

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Pasteurization

Legalization of the sale of unpasteurized milk from the farm

by Carol Vachon, PHD Biology, Post doctorate in Medicine, who is the founder of the Québec Coalition for Unpasteurized Milk Cheeses in 1996. . . .

. . . In the countryside, we know that unpasteurized milk is healthy milk, but the authorities continue to ignore this for many reasons. This is unwise because the heavily processed milk sold in grocery stores . . . is increasingly criticized. . . .

What are the fundamental issues which are never discussed?

Science demonstrates more and more clearly that unpasteurized milk is truly healthy. A study on several hundred children indicates that those who consumed unpasteurized milk suffer considerably less from asthma, allergies and hay fever. (*Readers Digest*, May 2002, p. 22). Many studies show that if breast-fed infants are more vigorous and resistant to illness, it is largely because the milk is unpasteurized. All raw milk, whether human or bovine, etc., has anti-bacterial properties, which are due to a multitude of natural factors.

. . .

Grocery store milk; pasteurized, homogenized, skimmed, enriched, processed, contaminated by different chemical residues and whatnot, has little to do with good traditional milk. And science is clear: a food so heavily processed is suspect and may even become harmful. It is a brazen distortion of the facts to continue to claim that milk processed in this way retains all its nutritional properties. . . .

. . .

Is unpasteurized milk really dangerous?

More than a half a million Quebeckers regularly consume unpasteurized milk: among them the 10 000 dairy farmers and 10 000 other types of farmers who own dairy cattle, their families, friends and neighbours.

As you can see unpasteurized milk is consumed by almost 100% of a population composed of farmers, in spite of the fact that it has been declared to be dangerous and is illegal as well. . . . Would farmers take unnecessary risks with their health in this way? . . .

In any case, there is no such a thing as a “zero” risk. The “Hamburger Disease,” caused by the bacterium *E. coli* in ground beef, has regularly resulted in deaths in Québec. According to a report in November 1999, 73 000 people are poisoned annually in the U.S., resulting in 600 deaths. Do we ban beef? . . .

On the other hand, the direct sale of raw milk from the farm (as is done in almost every country in the world) is the best guarantee of quality because it is based on a relationship of trust: the direct contact between the producer and the consumers: the customer is the best inspector because he knows where the milk came from.

. . .

Another promising advantage for the future; unpasteurized milk is protected against the effects of globalization, since it must be distributed locally. On the other hand, there are rumours that large Québec processors import milk from the United States. The more unpasteurized milk is consumed, the greater the proportion of our milk that will be protected from the effects of globalization

Vachon, Carole. *Légalisation de la vente de lait cru à la ferme* [PDF document] (accessed July 14, 2009). *[Translation]*

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Pasteurization *(continued)*

Pasteurization and its effect on the vitamin content of milk

Pasteurization and sterilization have an influence on the presence of certain water soluble vitamins (vitamins B6, B12, B9 and C), which are affected by heat.

The fat soluble vitamins (A and D) and certain water soluble vitamins (B1, B2, B5, B8 and P) remain stable during the pasteurization and sterilization processes.

Because the quality of hygienic techniques has progressively improved . . . and with the technological advances in equipment, heating methods have become less and less destructive compared with those used 50 years ago; as well, many milks are vitamin enriched.

Vitamin content of milk according to heat treatments

100 g Milk	Whole raw milk	Whole pasteurized milk	Sterilized whole milk	UHT whole milk
Vitamin C (mg)	1.4	2	traces	1
Vitamin B6 (mg)	0.05	0.03	0.02	0.02
Vitamin B9 (µg)	5	4	1	3
Vitamin B12 (µg)	0.43	0.4	0.14	0.2
Vitamin B2 (µg)	0.17	0.17	0.17	0.17
Retinol (µg) (or Vitamin A)	41	40	38	40
Vitamin D (µg)	0.055	0.05	0.05	0.03
Vitamin B1 (mg)	0.04	0.05	0.04	0.05

Source: Translated from: Table de composition, REGAL Produits Laitiers (2002 edition).

Les produits laitiers. *Influence des traitements thermiques sur les vitamines du lait* [online document], 2002 (accessed July 15, 2009). *[Translation]*

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Pasteurization *(continued)*

Health Canada reminds Canadians about the risks of drinking raw milk

OTTAWA - Health Canada would like to remind Canadians not to drink raw (unpasteurized) milk because it could contain bacteria that can make you seriously ill.

Several different kinds of bacteria that could be found in raw milk, such as Salmonella, E. coli and Listeria, have been linked to food-borne illness. These bacteria can lead to very serious health conditions ranging from fever, vomiting and diarrhea to life-threatening kidney failure, miscarriage and death. Children, pregnant women, the elderly and individuals with compromised immune systems are particularly at risk.

Because of these health concerns, Food and Drug Regulations require that all milk available for sale in Canada be pasteurized. Pasteurization kills the organisms that cause disease while keeping the nutritional properties of milk intact. Raw milk has not been treated to make it safe, but instead has been refrigerated at the farm where it was collected.

Milk is an important food and contains many nutrients essential for good health, especially calcium and vitamin D.

Unpasteurized milk has historically been linked to many serious diseases. However, the number of food-borne diseases from milk has dramatically decreased since pasteurization was introduced in the early 1900s.

The sale of raw milk has been strictly prohibited under the Food and Drug Regulations since 1991. Raw milk cheese is allowed for sale and considered safe because the manufacturing process for cheese helps to eliminate many pathogens found in raw milk.

Although raw milk is not allowed to be sold in Canada, people have become ill after drinking raw milk when visiting farms. Some dairy farmers are also consuming milk from their own animals. While pasteurized milk is now the standard, there are some Canadians who continue to prefer raw milk because of perceived health benefits. However, any possible benefits are far outweighed by the serious risk of illness from drinking raw milk.

Health Canada. *Health Canada Reminds Canadians about the Risks of Drinking Raw Milk* [online document], August 2006 (accessed July 15, 2009).

Food safety in sustainable development

When milk pasteurization was introduced about 100 years ago in North America, Europe, and other parts of the world, the transmission of bovine tuberculosis, brucellosis and other milkborne diseases was widespread. In spite of its health benefits, this technology was not immediately adopted as some consumers still preferred raw milk. As an illustrative example of the importance of pasteurization, milk-borne salmonellosis was a particular health problem in Scotland during the period from 1970 to 1982 when more than 3500 people fell ill and 12 died. After the introduction of milk pasteurization in Scotland in 1983, milk-borne salmonellosis virtually disappeared and can now only be found among those in the farming community who continue to drink raw milk. Today, pasteurization of milk is almost universally accepted as an essential public health technology that enjoys the confidence and support of the consuming public.

World Health Organization. *Food Safety in Sustainable Development* [PDF document], 1999 (accessed July 16, 2009).

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Pasteurization *(continued)*

Why we should consume raw milk

. . . This phobia of germs that could be found in raw milk has no basis, neither empirical nor scientific. There have been no clinical tests conducted on people who drink raw milk containing the bacteria which are so frightening, thereby either proving or disproving the theory that the bacteria consumed with the raw milk can cause harmful effects to the health of those who drink it.

Pasteurization involves heating milk to 150°F for at least 15 seconds. It became very popular because farmers didn't have the technology in the past, that was needed for the production, packaging and delivery of raw milk. The only justification for pasteurization is that it extends the shelf life of milk in stores and in the refrigerators of consumers. . . . Not only does pasteurization destroy most of the vitamins, enzymes and factors necessary for health, but it eventually provokes changes of certain nutrients in the milk . . . Pasteurization reduces the quantity of biological antibodies and enzymes present in the milk, constituents which are necessary for a good digestion and the proper assimilation of its nutrients, some of which have a preventive effect against a range of diseases, including cancer.

. . .

Action pour la défense du lait cru et les produits laitiers au lait cru. *Pourquoi il faut consommer du lait cru* [online document], March 2005 (accessed July 15, 2009). *[Translation]*

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*
Assisted reproduction

Choosing the sex of one's baby

Last September, Dr. Frank Comhaire [of] the University of Ghent (Belgium), announced that he had a method allowing a couple to choose the sex of their child . . . This month, he announced the first birth of a child born using this technique. The birth took place in February in southern Europe. . . .

The sorting of chromosomes

Developed some 10 years ago by the U.S. Department of Agriculture to select animals based on their gender, this technique has been called "MicroSort." It has been adapted to [humans] in 1998 by researchers working for the Institute of Genetics and In Vitro Fertilization, in Virginia. The technique then underwent clinical trials under the supervision of the Food and Drug Administration, with the collaboration of numerous American, Canadian and Belgian physicians.

The method consists of sorting sperm by identifying those carrying the X chromosome (female) and those bearing the Y chromosome (male). The team uses a laser that is able to differentiate between these two types of chromosomes so that they can be sorted into two tubes. Then, the sperm obtained is "enriched" and inseminated in the womb of the mother or is used for in vitro fertilization.

A technique for testing

The method is limited in its effectiveness because it is a particularly difficult process to eradicate the unwanted sperm. The technique has been tested on a thousand couples in the United States and resulted in the birth of 400 children. The rates of success were 88% for girls and 73% for a boy. . . .

Movement towards a balanced family?

In France, selecting the sex of an embryo is admissible in order to avoid a serious genetic disorder. . . .

The bioethics laws of 1994 prohibit the selection of a child's sex for other reasons. Similarly in Belgium, Article 5 of the law on research done on embryos in vitro prohibits research or procedures that allow the selection of an embryo except to avoid a serious genetic disorder. But Professor Comhaire does not consider what he does to be illegal. . . . "We are selecting sperm before any creation of embryos even occurs." . . .

The Belgian bioethics committee is divided on the issue of the selection of embryos by their sex. Some members are not opposed to the "family-balancing" aspect: i.e. giving a couple the option to choose the sex of their child in order to balance the number of girls or boys in the family. . . .

Gènéthique. *Commander le sexe de son bébé* [online document], May 2003 (accessed July 16, 2009). *[Translation]*

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Assisted reproduction *(continued)*

Risks of AHR (Assisted Human Reproduction) and purpose of AHR counselling

Broadly, AHR involves the use of medical and scientific technologies to facilitate reproduction. The most commonly known procedures are artificial insemination (or intrauterine insemination) and in vitro fertilization, although the fast pace of scientific developments are constantly increasing possibilities for achieving pregnancies. These AHR procedures can be done with a person or couple's own gametes, or with gametes donated by another person (also referred to as gametes donated for third-party use). During the course of a particular treatment, patients may be faced with a wide range of options and decisions, such as how many in vitro embryos to transfer, . . . whether to freeze unused gametes or in vitro embryos, whether to donate unused in vitro embryos to someone else or to research, etc.

AHR procedures can present physical risks to patients, women in particular, as well as to the children born. . . . However, there are psychological risks to individuals, including children. . . .

. . . These challenges may vary and can include: feelings of guilt, anger, shame and depression regarding infertility; coping with grief and loss; learning how to manage the stress of treatment, and in some cases treatment failure; deciding whether and how to disclose AHR procedures to others, including children, family members and friends; learning how to accept a non genetically-related child. . . .

Health Canada. *Risks of AHR and Purpose of AHR Counselling* [online document], February 2007 (accessed July 16, 2009).

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Assisted reproduction *(continued)*

Couples are choosing the sex of their child

Thousands of couples around the world hoping to choose the sex of their future child come to the United States, where access to this controversial cutting-edge technology is possible. Most countries prohibit the procedure on ethical grounds and cite the danger of eugenics. However, at a cost of approximately $19 000, a handful of U.S. clinics offer a "Preimplantation Genetic Diagnosis" (PGD) which is deemed to be 99% reliable.

. . . "Balancing the family" is the argument that comes up most often among the 2000 couples seeking the help of Dr. Jeffrey Steinberg, one of the pioneers of this procedure. "In general, these couples have four or five children of the same sex and want at any cost, to have one of the other sex," says Director Steinberg of the Fertility Institute in Los Angeles, . . .

The technique, made possible by the decoding of the human genome, consists of having the mother undergo fertility treatments so that she will produce several ovules, which are then fertilized in vitro. DNA analysis shows which eggs will produce a boy or a girl. They are then implanted into the mother's uterus.

Caveats

Specialists in bioethics have warned against the risk of demographic imbalances that this method could produce and the possible tendency toward the choice of physical characteristics in children. In China and India, where parents prefer boys, abortions of female fetuses and even infanticide have resulted in a shortfall of girls. "In some countries, if the parents could determine the sex of their child, the results would be striking," says David Magnus, professor of bioethics at Stanford University (California), while stressing the fact that the current price of the procedure limits the scope of PGD, even in rich countries. But nevertheless, there remains a risk of "a world in which only the poor will be fat or bald," he warns. The technique is also challenged by the influential American religious right, which believes that life begins with the formation of the embryo.

Doctor Steinberg dismisses these criticisms, emphasizing that his customers choose to retain the majority of their eggs in the bank of fertilized ova, rather than discarding them. As well, the practitioner says, not all his clients prefer boys. . . .

Maman pour la vie. *Commander le sexe de son bébé* [online document], May 2006 (accessed July 16, 2009). *[Translation]*

Name: _____ Group: _____

INFORMATION DOCUMENTS *(continued)*

Assisted reproduction *(continued)*

Thinking about sex selection

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But if the central importance of the baby's sex and our desire to choose one sex over the other is not new, the techniques for making our desires come true are new. Today, it is possible, at a price, to guarantee the sex of our children. The principal means for doing so are: prenatal diagnosis (either through a sonogram or amniocentesis) followed by abortion of fetuses having the unwanted sex; preimplantation genetic diagnosis (PGD) followed by selective implantation based on sex; and (a less certain technique) prefertilization separation of sperm into X- and Y-bearing ones followed by selective transfer. The first two techniques select postconception; the last seeks to determine sex at the time of conception.

PGD is a relatively new medical technique, introduced about 10 years ago for the purpose of screening early IVF embryos for genetic diseases. However, as with other medical technologies, many other uses for PGD were quickly discovered and put into practice, including sex selection for nonmedical purposes. PGD is expensive, costing on average $3 000 for the test and upwards of $20 000 for the subsequent in vitro fertilization.

The newer and less tested sperm-sorting technology was originally a creation of the U.S. government, invented by a Department of Agriculture scientist in the 1980s for the purposes of selecting sex in livestock. The Genetics and IVF Institute in Fairfax, Virginia developed the technology for humans and currently has an exclusive license on it—the technology is known as "MicroSort." The Genetics and IVF Institute charges about $2300 per try and currently boasts a 90 percent success rate for girls and 73 percent success rate for boys. It offers this service only for the end of "family balancing."

It is difficult to determine how widely either of these methods would be used were they to gain moral acceptance and to become affordable. Of course, we know that sex ratios have already been affected in such countries as China and India as a result of aggressive sex selection. What would happen in the United States, where cultural preferences are quite different and the desire for sons is possibly not as pronounced, is perhaps unknowable in advance. Of course, the effect on the sex ratio is only one of the issues at stake. Here's how *Fortune* magazine recently summed up at least the potential market for MicroSort alone: "Each year, some 3.9 million babies are born in the U.S. In surveys, a consistent 25 percent to 35 percent of parents and prospective parents say they would use sex selection if it were available. If just 2 percent of the 25 percent were to use MicroSort, that's 20 000 customers . . . [and] a $200-million-a-year business in the U.S. alone."

. . .

In 1999, the ASRM issued a report that criticized the use of PGD exclusively for sex selection. . . . The ASRM noted in its 1999 report that there is little cause for concern when sex selection is used to prevent the transmission of sex-linked genetic disorders such as certain types of hemophilia, muscular dystrophy, and Hunter syndrome. The report examined several possible objections to PGD for sex selection, including whether it would lead to imbalances in society's sex ratio, or become a gateway to other forms of selection (say for eye colour or intelligence), or whether it might raise matters of economic inequality and the misallocation of scarce medical resources. . . . Instead, the report placed most of the weight of its ethical analysis on the problem of how PGD for sex selection would "contribute to a society's gender stereotyping and overall gender discrimination." . . .

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Assisted reproduction *(continued)*

Thinking about sex selection

Many questions might be taken up in reference to sex selection for nonmedical reasons, in particular:

1. What are the current and future techniques of sex selection, as well as their effectiveness, cost and prevalence?
2. What is the ethical basis or defence of sex selection for nonmedical purposes? (. . . the burden of proof should lie with those who are proposing the new technique, not those who oppose it.)
3. Nonetheless, it is still useful for opponents to think through the grounds of their objection to sex selection. What are the human goods being defended? Is there a concern about sexism? About the effect on society's natural sex ratio? About the new relation developed between parent (as chooser) and child (as product)? About a slippery slope to other forms of selection, and thus eventually to a world of eugenics? About the destruction of embryos (in the case of PGD)? Moreover, where lies the preponderance of our ethical objection to sex selection: Is it with the means of selection, or its effects on parents, children, and parent-child relationships, or its likely societal impact both in terms of the sex-ratio and established norms, or as a gateway to other types of selection and enhancement?
4. If it is decided that sex selection for nonmedical reasons is unacceptable, what are the remedies? Legislative bans? Regulation of the IVF industry? Self-regulation by IVF practitioners and bodies like the ASRM?
5. What role do for-profit fertility clinics and consumer demand play in the progress of sex-selection therapies?
6. In light of its objections to sex selection by PGD in its 1999 report, which centred on gender bias, why exactly did the ASRM approve of sex selection by sperm sorting in its 2001 report?

United States Government, The President's Council on Bioethics. *Thinking About Sex Selection* [online document], October 2002 (accessed July 18, 2009).