Lesson 9

Stage 1 – Desired Results

Established Goals:
8-4-07 Describe features of the North American drainage system. Include: local and regional watersheds, direction of water flow, continental divide. GLO: D3, D5, E2

Understandings:	**Essential Questions:**
Students will understand that… Bodies of water are the end product of drainage from watersheds.	How does the North American drainage system function? How do we learn about water from a sustainability focus?
Students will know… The student will see the end results of polluting within a watershed and how it impacts bodies of water.	**Students will be able to…** Predict where the water and pollutants will flow.

Stage 2- Assessment Evidence

Performance Tasks:	**Other Evidence:**
Students will work together to predict, create and record information about their watershed. Students will use peer and self assessment (BLM #1).	Students will observe the watershed in action and record observations.

Materials Required

(for each group)

One container at least 22 cm wide, 33 cm long, and 6 cm deep. A metal baking pan will work fine	One sheet of thin plastic (saran wrap) at least 20 cm larger in all dimensions than the container or plastic bags (i.e. “Safeway” style)
Two sheets of newspaper or aluminum foil	One spray bottle
One book	Baby powder (or some very fine soil will also work)
Blue food coloring	

Stage 3 – Learning Plan

Watershed modeling

Procedure

1. Divide students into groups of three or four. Each group will need a container, two sheets of newspaper, one sheet of plastic, one book, some baby powder (or soil) and one spray bottle filled with water and a few drops of blue food coloring. It is also helpful to provide students with a guide (BLM 9.4).
2. Crumple each sheet of newspaper or foil separately and place them next to each other at one end of the container. Try to vary the shape of the two. Place the sheet of plastic or plastic bag over the crumpled newspaper (or aluminum foil), causing it to form hills over the high places, and streams and rivers in the low places. Put a book under the end of the container with the newspaper, which will allow water to flow down the streams and rivers and collect in the lake at the front of the container. The sides of the plastic sheet should be placed down into the container or the land formations can be covered by a bag.
3. The plastic sheet represents the ground surface covering the watershed. Looking at the watershed model, try to guess where the main rivers will flow. Now, it's time to put the model to the test. Spray several pumps of water from the spray bottle on the model. Notice that each stream has its own watershed (the area that drains into it) and that the entire model is a larger watershed because all the water eventually flows into the pool at the bottom of the container. Count the number of small watersheds.
4. The model now represents a clean watershed. Let’s add some pollutants. Sprinkle a little baby powder over the model. The baby powder represents a variety of pollutants, including oil, road salt, animal manure, excess fertilizers, pesticides, tiny particles of soil and other harmful materials. Rapidly spray nine pumps of water over the upper portion of the watershed. Observe the way in which the pollutants are carried by the water and the end condition of the lake. Repeat if necessary.

Questions (to be put on overhead see BLM #2)

To be done in a think, pair, share method before discussing with the class.

1. Describe the relationship between small and large watersheds.

2. What are some possible solutions to keep bodies of water clean?
3. Who pollutes watersheds?
4. Think about the watershed(s) in which you live. What is the name of our watershed? Where does our water flow? What possible pollutants exist there?
5. How can you link our watershed to the three aspects of sustainable development?
Using the watershed map, allow students to come up to review the local watershed.
On their own map (BLM #3*) get the students to include the Red River, the Assiniboine River, the direction of water flow and discuss the continental divide.

North America Watershed Map Source: Manitoba Education and Training. *Grades 5 to 8 Science: A Foundation for Implementation*. Winnipeg, MB: Manitoba Education and Training, 2000. Reproduced by permission. All rights reserved.

Extension Learning Activities

BLM 9.4 for a Water Quiz.

Homework Learning Activities

Students to continue working on 50% reduction of water consumption

Peer and Self Assessment (9.1)

All scored on a scale of 0-2
0 – below expectations **1** – adequate **2** – exceeds expectations

Activity	Self name _____	Student name _____	Student name _____	Student name _____
Participated fully in activity				
Supplied ideas/thoughts to the group				
Worked well with others				
Total	/6	/6	/6	/6

Comments: _____

Peer and Self Assessment

All scored on a scale of 0-2
0 – below expectations **1** – adequate **2** – exceeds expectations

Activity	Self name _____	Student name _____	Student name _____	Student name _____
Participated fully in activity				
Supplied ideas/thoughts to the group				
Worked well with others				
Total	/6	/6	/6	/6

Comments: _____

Auto-évaluation et par les pairs (9.1)

Tous notés sur l'échelle de 0-2
0 – en bas des attentes **1** – satisfaisant **2** – au-delà des attentes

Activité	Son nom à soi _____	Nom de l'élève _____	Nom de l'élève _____	Nom de l'élève _____
A participé à fond dans l'activité				
A fourni des idées/pensées au groupe				
A bien travaillé avec les autres				
Total	/6	/6	/6	/6

Commentaires :

_____

_____

Auto-évaluation et par les pairs (9.1)

Tous notés sur l'échelle de 0-2
0 – en bas des attentes **1** – satisfaisant **2** – au-delà des attentes

Activité	Son nom à soi _____	Nom de l'élève _____	Nom de l'élève _____	Nom de l'élève _____
A participé à fond dans l'activité				
A fourni des idées/pensées au groupe				
A bien travaillé avec les autres				
Total	/6	/6	/6	/6

Commentaires : _____

_____

Watershed Questions (9.2)

Please record your answers in point form first, then turn to your partner to share your thoughts

1. Describe the relationship between small and large watersheds.
2. What are some possible solutions to keep bodies of water clean?
3. Who pollutes watersheds?
4. What did you notice happened to the pollutants?
5. Think about the watershed(s) in which you live. What is the name of our watershed? Where does our water flow? What possible pollutants exist here?
6. How can you link our watersheds to the three aspects of Sustainable Development?

Questions sur le bassin hydrographique (9.2)

D'abord, veuillez inscrire vos réponses sous forme de points, puis partagez vos idées avec votre partenaire.

1.Décrivez la relation qui existe entre les petits et les grands bassins hydrographiques.

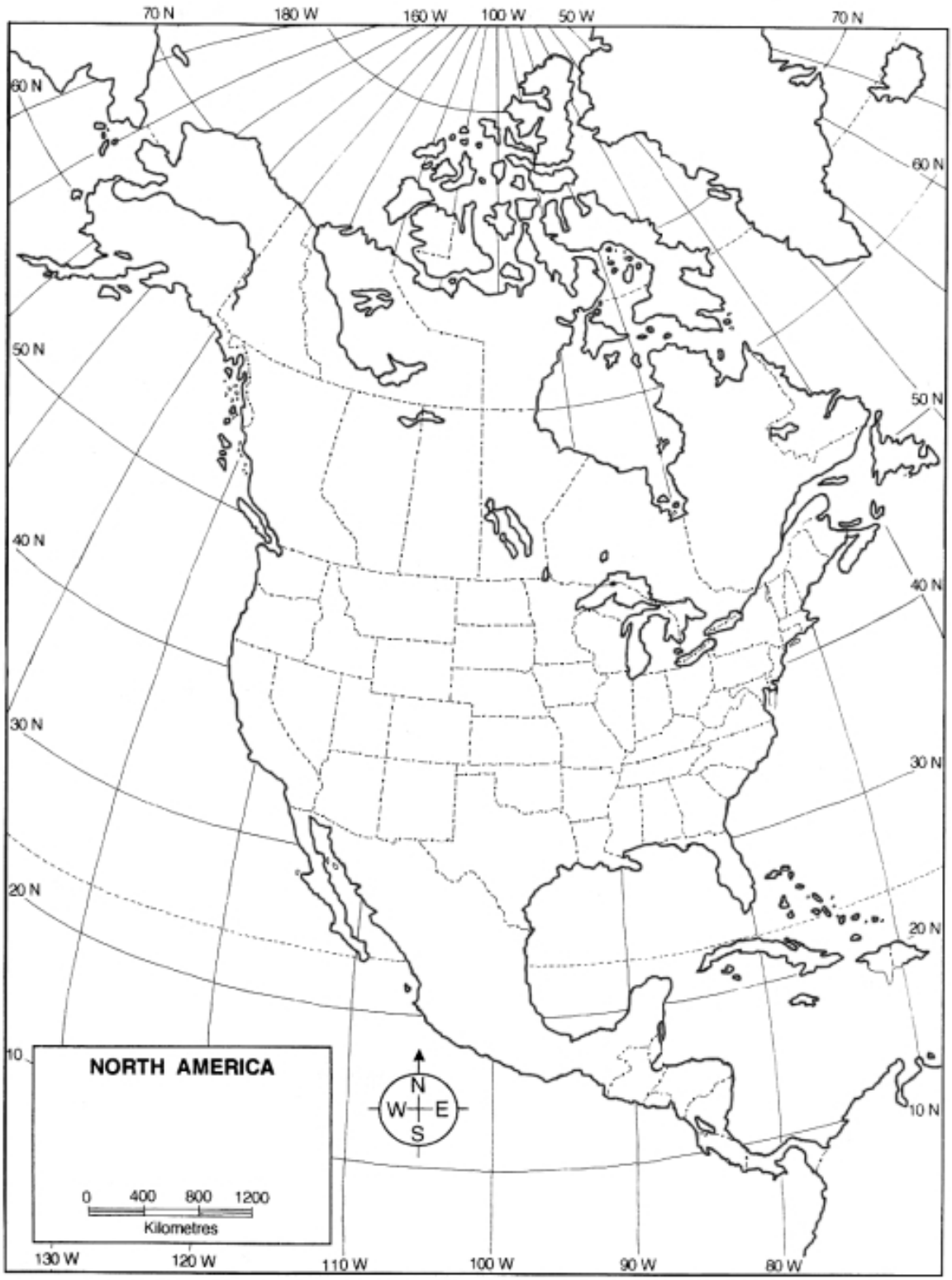
2. Quelles solutions possibles y a-t-il pour garder nos cours d'eau propres?

3. Qui pollue les bassins hydrographiques?

4. Pensez au bassin hydrographique où vous vivez. Comment s'appelle notre bassin hydrographique? Où coule notre eau? Quels sont les polluants possibles qui existent ici?

5. Comment pouvez-vous rattacher nos bassins hydrographiques aux trois aspects du développement soutenable?

Student Name _____



Name _____ Date _____ Room _____

Watersheds BLM 9.4

1. Prepare the model. Design it so that there will be 2 “rivers”. In this box draw a quick sketch of where you think the following will be: the “rivers”, at least 3 small “streams”, the final watersheds (collection point).

2. Spray the blue water. In this box draw a quick sketch of what **REALLY** happened. Was your prediction close?
   _____.
   What surprised you?

_____

   Count how many little watersheds there are. _____

3. In the real world sometimes pollutants are added to our waterways. Discuss with your group what these could be. On the space below, list as many pollutants as you can.

_____

_____

_____

Add the pollutant to the top of the model. Quickly spray 9 pumps of water. Carefully watch how and where it travels. Wait. Pump another 6 times. Draw a quick sketch of what happens.

Describe the path of the pollutant._____

_____

____

_____

____

Where did the pollutant finish? _____

_____

_____

⇨ CLEAN UP YOUR STATION. RETURN ALL SUPPLIES

Did you help clean? Is everything in its proper space?

⇨

Now it is time to quietly answer these questions.

1. Describe the relationship between small and large watersheds.
   _____

_____

___

_____

___

2. What are some possible solutions to keeping watersheds clean?
   _____

_____

___

_____

___

3. Who pollutes watersheds?

_____

4. Think about the watershed in which we live. What is it called?
   _____

Where does our water flow?

_____

What possible pollutants exist here?

_____

_____

__

_____

__

5. How can you link our watershed to 3 aspects of sustainable development?
   _____

_____

___

_____

____

_____

____

QU’EST-CE QUI EST ARRIVÉ AUX POLLUANTS, SELON VOUS?

Nom : _____ Date : _____ Salle : _____

BASSINS HYDROGRAPHIQUES MLN 9,4

1. Préparez la maquette. Dessinez-la pour qu’il y ait 2 «rivières». Dans cette boîte, dessinez un croquis rapide où vous *croyez* que seront les objets suivants : les «rivières», au moins 3 petits «ruisseaux», les bassins hydrographiques ultimes (points de collection).

2. Arrosez avec l’eau bleue. Dans cette boîte, dessinez un croquis rapide de ce qui s’est VRAIMENT passé. Votre prédiction était-elle proche? _____
3. _____

Qu’est-ce qui vous a surpris? _____

Comptez combien il y a de bassins hydrographiques. _____

Dans le vrai monde, on ajoute quelquefois des polluants à nos cours d’eau. Discutez avec votre groupe ce que cela pourrait être. Dans l’espace ci-dessous, faites une liste d’autant de polluants que vous le pouvez.

_____

_____

_____

Ajoutez un polluant au plus haut point de votre maquette. Vaporisez rapidement 9 coups de pompe d'eau. Surveillez précisément comment et où elle voyage. Attendez. Encore 6 coups de pompe. Dessinez un croquis rapide de ce qui arrive.

Décrivez la course du polluant.

_____

_____

_____

Où s'est arrêté le polluant? _____

NETTOYEZ VOTRE STATION. RETOURNEZ TOUT LE MATÉRIEL.

Avez-vous aidé au nettoyage? Est-ce que tout est à sa place?

Maintenant il est temps de répondre à ces questions en silence.

1. Décrivez la relation entre les petits et les grands bassins hydrographiques.

_____

_____

_____

2. Quelles sont des solutions possibles pour garder nos bassins hydrographiques propres?

_____

_____

_____

3. Qui pollue les bassins hydrographiques?

_____

4. Réfléchissez au bassin hydrographique où nous vivons. Comment s'appelle-t-il?
_____

Où s'écoule notre eau? _____

_____

Quels polluants possibles existent ici?_____

_____

_____

5. Comment pouvez-vous relier notre bassin hydrographique à 3 aspects du développement soutenable?_____

_____

_____

Name: _____ Room: _____ Date: _____

Parent/Guardian Signature: _____ Total: ____/12

Water Quiz #1 BLM 9.5

Part 1
True or False (10 marks)

1. **_____ The Coriolis Effect causes wind and ocean currents to be deflected.**
2. **_____ The movement of oceans has no effect on world climate.**
3. **_____Surface ocean water gets warm around the tropics. It then moves towards the poles where it becomes cold, denser and sinks.**
4. **_____ Upwelling is the term that describes huge powerful waves that crash into coastal areas.**
5. **_____ Saltwater is less dense that tap water and therefore boils at a lower temperature.**
6. **_____ Ocean currents are affected by bottom topography and salinity.**
7. **_____ The cold bottom layer of the oceans takes about 1 000 years to circulate completely through the Earth's waters.**
8. **_____ The Gulf Stream can affect weather in Europe.**
9. **_____ The Antarctic Circumpolar current in the Southern Ocean is the world's largest ocean current. It is not blocked by land.**
10. **_____ Upwelling supports about 50% of the world's fisheries.**

Part B. (2 marks)
Please draw a diagram of the Coriolis effect in the northern and southern hemisphere.

Marked by: _____

Nom : _____ Salle : _____ Date : _____

Signature d'un parent/gardien : _____ Total : _____/12

Quiz sur l'eau No. 1 MLN 95

Première partie

Vrai ou Faux (10 points)

1. _____ L'effet Coriolis cause une déflection du vent et des courants océaniques.
2. _____ Le mouvement du vent n'a aucun effet sur le climat mondial.
3. _____ L'eau de mer en surface se réchauffe autour des tropiques. Puis elle se dirige vers les pôles où elle refroidit, devient plus dense et s'enfonce.
4. _____ La remontée de l'eau de mer froide est une expression qui décrit d'énormes vagues puissantes qui s'écrasent sur les régions côtières.
5. _____ L'eau salée est moins dense que l'eau du robinet et donc elle bout à une température plus basse.
6. _____ Les courants océaniques sont affectés par la topographie du fond et par la salinité.
7. _____ La couche froide au fond des océans prend environ mille ans pour circuler complètement à travers les eaux de la Terre.
8. _____ Le courant du Golfe peut affecter le temps en Europe.
9. _____ Le courant circumpolaire antarctique dans l'océan du Sud est le plus grand courant océanique au monde. Il n'est pas bloqué par des masses de terre.
10. _____ La remontée de l'eau de mer froide fait vivre environ 50% des pêcheries du monde.

Partie B (2 points)

Veuillez dessiner un schéma de l'effet Coriolis dans l'hémisphère du Nord et celle du Sud.

Noté par : _____

Name: _____ Room: _____ Date: _____

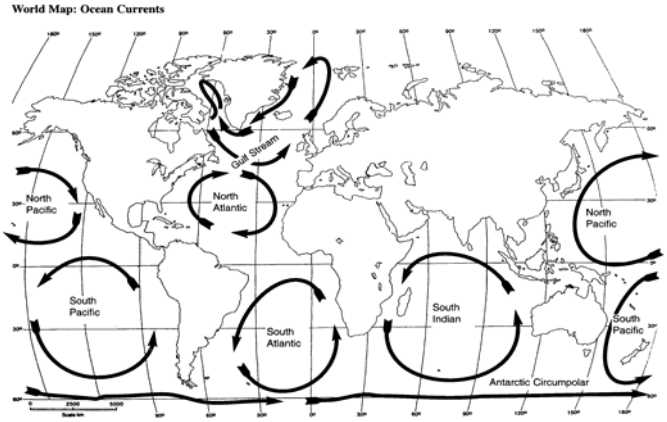
Parent/Guardian Signature: _____ Total: ____/12

Water Quiz #1 BLM 9.6 KEY

Part 1
True or False (10 marks)

1. **_T___ The Coriolis Effect causes wind and ocean currents to be deflected.**
2. **_F___ The movement of oceans has no effect on world climate.**
3. **_ T___ Surface ocean water gets warm around the tropics. It then moves towards the poles where it becomes cold, denser and sinks.**
4. **__F__ Upwelling is the term that describes huge powerful waves that crash into coastal areas.**
5. **__F__ Saltwater is less dense that tap water and therefore boils at a lower temperature.**
6. **___T__ Ocean currents are affected by bottom topography and salinity.**
7. **___T__ The cold bottom layer of the oceans takes about 1 000 years to circulate completely through the Earth's waters.**
8. **___T_ The Gulf Stream can affect weather in Europe.**
9. **___T__ The Antarctic Circumpolar current in the Southern Ocean is the world's largest ocean current. It is not blocked by land.**
10. **___T__ Upwelling supports about 50% of the world's fisheries.**

Part B. (2 marks)
Please draw a diagram of the Coriolis Effect in the northern and southern hemisphere.



Marked by:
_____