Smarter Science Better Buildings
Western Development Museum - Yorkton

Workstation Guiding Questions – Pages 1 - 6

Heating and Cooling

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. What factors make ***cellulose insulation*** an environmentally beneficial insulation choice?

2. ***Heat Pumps*** use electrical energy to move heat energy from one location to another. Compare the size of the blue “electrical energy coming in” arrow, to the size of the red “heat energy coming out” arrow. What does that tell you about the efficiency of the heating system?

3. Name three things ***Beardy’s and Okemasis’ Cree Nation*** wanted to accomplish with their new homes.

4. In ***How Heat Moves***, which home would be warmer and less drafty in winter? Which home uses the least amount of energy?

5. Set the ***thermostats*** in the display to 15ºC. If you set the thermostat in your home back to 15ºC at night, how would it help you to save energy?

Net Zero Home

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. List the things that make up the ***building envelope***. Why is it important for the envelope to be airtight and have good insulation?

2. ***Canada's National Energy Code:*** How much more energy efficient is tier 4 than the current Saskatchewan code? List three actions that would increase a home's energy efficiency.

1. _____
2. _____
3. _____

3. What is **thermal bridging** and how does the double wall construction reduce it?

4.

$$Q = \frac{A \times \triangle T}{R}$$

When you "turned down" the thermostat (△T), what happened to the power (Q), consumption of the house? Why?

5. What is the connection between the energy our homes use and ***climate change***?

Lighting and Appliances

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. The ***Innovative Design:*** How does the reflective material bring natural light into the interior of the buildings?

2. The ***average Saskatchewan home*** uses a lot more electricity than the NET ZERO home. Name three ways the NET ZERO home uses less.

3. Look at the circle graph of **household electricity use**. Check (✓) ways you think you and your family could make changes to save electricity.

Use LED lights	Turn out lights that aren't needed	Dry clothes on a clothesline
Use timers for lights and vehicle block heaters	Use a power bar to turn off phantom load	Unplug electronics not in use
Buy ENERGY STAR® appliances	Reduce Air Conditioner use by setting the thermostat to 24ºC or higher	Other:

4. Look at the **light display**. Excluding the exit lamp, which light uses the least amount of power?

5. ***Energy = Power x Time.*** If your lamp has two, 15watt bulbs, and you have them on for five hours, how much energy do they use?
   Energy (watt hours) _____ *= 2(15w) x 5hrs*
   Explain how reducing power (w) and time (hrs) can reduce overall energy use?

Water

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. How does the **drain water heat recovery Powerpipe** use **conduction** to save energy? Look at the large copper pipe on the left side of the display.

2. Explain how a **rainwater system** described here makes use of rainwater.

3. What role do wetlands play in the ***Logan Green Water Management System***?

4. Check (✓) ways you could **save water** in your home and at school.

Turn off the tap while brushing your teeth	Replace your old dishwasher with an ENERGY STAR® dishwasher	Take a shorter shower
Fix a leaking toilet	Turn off the tap after washing your hands	Install a low-flow showerhead
Collect rainwater to water your lawn/garden	Grow drought tolerant plants	Other:

5. ***Shorter showers:*** If a showerhead has a flow of 6 litres/minute, calculate the amount of water used for a five minute shower compared to a 20 minute shower.

   6L/min x 5min = _____ L 6L/min x 20min = _____ L

   How much water do you save by shortening your shower this much?

Solar

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. What parts of Canada have the highest ***annual photovoltaic potential***? What part of Saskatchewan has the highest potential?

2. Try the ***solar panel*** display. What difference do the clouds make to how bright the lights are? Why?

3. ***Innovative designs:***
   - LightLeaf panels – where would you use these panels?
   - Mitrex building integrated panels – what makes these solar panels innovative?

4. The ***Pesâkâstêw Solar Project*** powers 2,500 homes and eliminates more than 15,000tCO2e/year. List the benefits of this project for the two First Nations involved.

5. If your home uses 7,500 kWh/yr and the average solar panel produces 400 kWh/yr, how many panels will you need to produce enough electricity for your home? If you live in Saskatoon, check MyHEAT Solar to see the solar potential of your address.

Retrofits

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. Compare the ***EnerGuide® ratings*** of the historical and modern houses. What factors helped the older homes use less energy? What factors help the modern homes use less energy?

2. Put your hands on the ***window display***. Which type of glass allows more heat to escape? Which window keeps more heat in? Explain how the window's design and construction contribute to heat loss or retention.

3. Try out the home retrofit samples like ***weather stripping, pipe and wall plate insulation***. Which would be useful in your home and where would you use them?

4. What are some of the benefits the Prairie South School Division achieved by putting new windows and lighting in these Moose Jaw ***heritage schools***?

5. ***Real Retrofit:*** The 2018 Energy Retrofits of the **1970s Split-Level** home will reduce the home's energy use by about 40% or 70GJ/year. Calculate the reduction in greenhouse gas emissions from making this retrofit to the home. Use this calculation:

   70GJ/year x 50kgCO2/GJ = _____kgCO2/year reduction.

Smarter Science Better Buildings

WDM Yorkton Exhibits Visit Guiding Questions – Pages 7 - 17

You and your classmates will work your way through the Museum building and exhibits, answering questions provided and discussing what you see. You will explore the Settler's Cabin and Showcase Room exhibits as the *100 Years of Saskatchewan History* exhibit.

Use the map found on page 17 to locate the artifacts and exhibits.

Enter the Museum Exhibit Galleries

Stop as you enter the Museum galleries and look up and around, past the exhibits at the Museum building to examine the roof, doors, lights and walls. Do you notice what a big space it is?

The WDM Yorkton was originally housed in an airplane hangar at the airport. This building opened in 1972. The Museum was built to provide lots of space for exhibits and visitors.

Think about the size of the building.

Why might it be harder for businesses and museums to be energy efficient, compared to a home?

_____

_____

_____

_____

Do you have any suggestions that would help make it easier to heat (or cool) a large building?

_____

_____

_____

_____

_____

_____

Move to the *Yorkton Local History* Exhibit

1. As you move through the Museum, keep an eye out for different building materials and how they have been used in constructing local buildings. Make a list below.

Material	Building(s)
Bricks	Original flour mill (1883, Local History)

BONUS QUESTION: What year did air-conditioned banking come to Yorkton? _____

HINT - Find the newspaper in the Local History Exhibit.

Move to the Settler's Cabin

14 sq. metres (152 sq. feet) ERS Rating: 54 Energy Consumption: 185 GJ

Over 120 years ago, trees were cut to make this home near Theodore. It was moved into the Museum in 2003.

1. List the materials that were used to build this home. Where would local builders get these materials?

_____

_____

_____

_____

2. What technique was used to make the original roof? _____

VOCABULARY: What is thatching? A thatched roof is made of many layers of rye (grain) stalks. The stalks of rye are tied into bundles. The bundles are laid onto each other to create layers just like today's shingles. The thick bundles and layering keep the rain from coming through. A well-thatched roof lasts about 30 years, is waterproof and provides excellent insulation.

3. Estimate the area (length x width) of this home in meters squared (m^2):

_____ (length in meters)

x _____ (width in meters)

= _____ m^2

a. How does this compare to your home today? _____

_____

_____

b. How does the size of a home impact the amount of energy required to heat or cool it?

_____

_____

_____

4. Estimate the thickness of this building's walls in cm:

_____

5. Notice the wall hangings along the back wall. They are called kylyms. How might they add energy efficiency to this home?

_____

_____

_____

6. What was used to heat this building?

_____

VOCABULARY: What is a piche (pronounced peach) oven? Originally, Ukrainian *piche* ovens would have been made with a base platform of poplar logs, over which coarse gravel or small stones were laid, and then covered with a several coats of clay. Supple green willow stalks were bent to form the frame. Clay mixed with straw or grass was plastered over the willow frame, followed by several more layers of clay.

7. Can you find the 'hidden' bed? What benefits are there to the bed's placement in the home?

_____

_____

8. What provided light for this building? _____

_____

9. How many windows are there? _____

10. How many panes of glass thick are the windows? _____

Move to the British Showcase Room

This parlour represents the story of immigration from the British Isles. Many people from Scotland, Ireland, England and Wales moved to Canada to escape economic hardship and poverty.

1. What provides light in this room?

_____

2. How is this different than the way we light our homes today?

_____

_____

_____

_____

Vocabulary: What is kerosene?
A flammable chemical distilled from petroleum. It is used in heating, fueling vehicles and in home lanterns.

3. How might these differences have changed how we view and use light in our homes?

_____

_____

4. What heats this room? _____

5. Notice the gramophone and pump organ. What provides power for these musical instruments?

_____

Move to the German Showcase Room

This dining room represents the cultural heritage of German settlers. Germans have a long history of settlement in Eastern Canada. By the early 1900s, German-speaking groups were attracted to the Canadian West, mostly for its agricultural potential.

1. Notice the record player in the corner. It uses electricity. Why might a family whose home has electricity choose to continue to use kerosene lamps?

_____

_____

Move to the American Showcase Room

Many Americans came to the Canadian west at the beginning of the 1900s. American settlers sold their small corn or wheat farms and came north, with money and knowledge of dryland farming techniques.

1. What provides the power for the sewing machine in this room?

_____

2. Notice the water pitcher on the stand in the corner. What might this tell you about this family's home?

_____

_____

Move to the Ukrainian Showcase Room

Ukrainian settlers brought traditional cultural beliefs to Canada. In this room is the wheat which symbolized the spirits of fields and soil, embroidery work and pysanka which is decorated eggs.

1. What provided the heat for this room? _____

2. What might be a downside to using the oven in the hot summer months?

_____

_____

3. Does your family change how they cook in the summer to avoid adding extra heat to the house? If so, what do you do differently?

_____

_____

_____

VOCABULARY: What is a summer kitchen?
Sometimes settlers would build a small building near their house where cooking was done in hot weather. This was called a summer kitchen.

Move to the 100 Years of Saskatchewan History Timeline

1911 – Saskatchewan's first electric railways began operation in which two cities?

_____ & _____

1916 – An unusual experiment. In the space below, draw the vehicle tested by the University of Saskatchewan in this year. What provided the fuel for this vehicle?

1929 – Lighting up Saskatchewan. Regina had electric lights as early as _____.

How many electricity generating stations were in operation in Saskatchewan by 1929?

_____

Did you know that electricity came to Yorkton in 1911?

1949 – What Act was passed that led to Saskatchewan Power Corporation extending power lines to thousands of farms?

_____

What two things does the farm woman quoted look forward to no longer having to do with her coal oil lamps?

1. _____
2. _____

1951 – Which three cities used natural gas for heating in 1950?

1. _____
2. _____
3. _____

1959 – Two new generating stations opened this year. Where are they, what are their names and what fuels do they use?

Location	**Name**	**Fuel**

1959 – South Saskatchewan River Dam Project gets underway. Where are the dams?

1. _____
2. _____

1960 – What convenience made its way to rural homes through assistance from the Family Farm Improvements program beginning in 1960?

_____

1963 – A new generating station opened this year. Where is it, what is its name and what fuel does it use?

Location	Name	Fuel

1977 – Canada's first _____ was built in Regina.

1981 – A new generating station opened this year. Where is it, what is its name and what fuel does it use?

Location	Name	Fuel

1989 – How many hydro plants make up the Athabasca Hydro System? _____

1992 – A new generating station opened this year. Where is it, what is its name and what fuel does it use?

Location	Name	Fuel

What is the extra heat generated by this power station used for?

_____

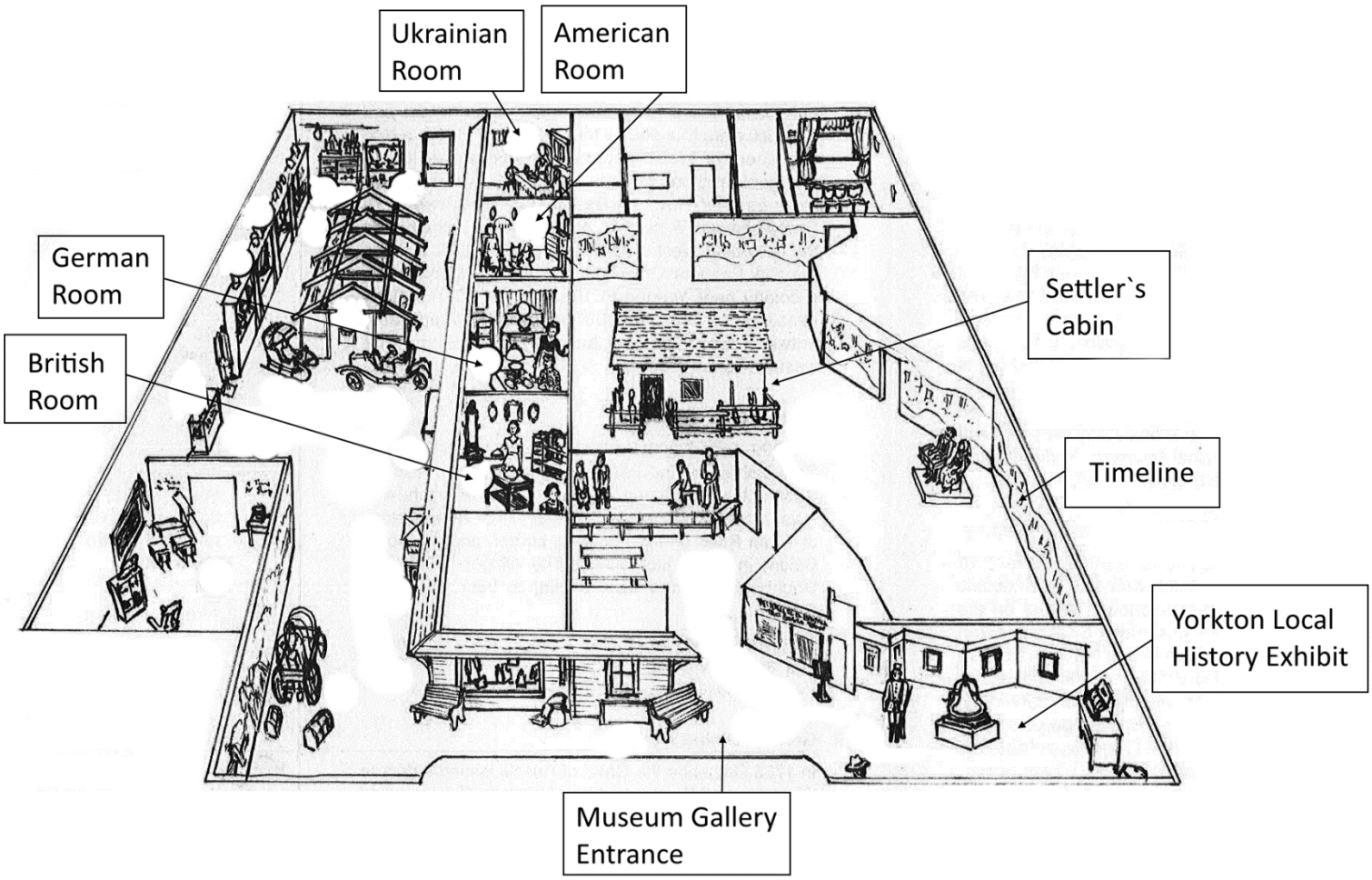
_____

2002 – What innovative new use for canola oil (a renewable resource) did the city of Saskatoon first test in 2002?

_____

2002 – What renewable power source was first harnessed by SaskPower in 2002?

_____


Ukrainian Room
American Room
German Room
British Room
Settler`s Cabin
Timeline
Yorkton Local History Exhibit
Museum Gallery Entrance