Grade 7 Science – Heat **Keeping it Comfortable in Canada**

Name: _____ Class:___

Answer the following Questions:

What is the Average Body Temperature of Human (in Celcius)? _____37^{0}C_____

What is the Average Room temperature (in Celsius)? _____20^{0}C _____

What is the Average Temperature outside during winter (in Celsius)? _____-1^{0}C __

What is the Average Temperature outside during summer (in Celsius)? __27^{0}C _____

We have learned (and already probably knew), heat travels from an area of high heat to one of low heat. How do we keep our homes at a comfortable temperature with the temperature outside being very different?

Insulation on exterior walls. Heat source in winter (furnace (natural gas or electric) or a wood stove). In summer, we cool our homes with an air conditioner.

What are the different methods that people use to prevent the loss of a comfortable temperature of homes?

Insulation and vapour barrier in exterior walls (Plywood, Tyvek, Exterior finish, Fiberglass batting, plastic vapour barrier, and drywall) sealed windows (caulking, sometimes gas-filled double or triple paned), doors are insulated and sealed. Any openings are carefully constructed and installed to prevent heat loss. Newer homes have heat exchangers that heat the air that comes into the home in the winter with air that is going out that is warm.

Looking at page 104 and 105 in the Nelson textbook, what are the sources of heat loss and the remedies?

Sources of Heat Loss	Remedies
Walls and roofs	Increase the amount of insulation in the basement walls, the roof and the exterior walls
Air Leakage	Use a sealed air/vapour barrier to reduce air leakage and the buildup of moisture. The barrier is made of plastic and is placed inside of the insulated walls.
Windows and basement walls	Install windows that are either double or triple glazed or use storm windows. Use doors that are made of good insulating materials or use double doors. Ensure that all windows and doors have tight weather seals.
Lack of exposure to sunlight	When possible, face the home toward the sun. and use special designs to take advantage of solar energy. Use a screen of evergreens to protect the north side of the home from cold winds. Use a screen of deciduous trees to shade the south-facing windows in the summer.

In building material/construction, what is **R-Value**?

The capacity of an insulating material to resist heat flow. The higher the R-value, the greater the insulating power.

What are some good materials that are used to increase the R-value?

Insulation Material	Price / sq. ft.	R-Value / in	Environmentally friendly?	Flammable?	Notes
Polyurethane Foam	$$$	R-6.3	No	Yes	Makes a great sound insulator
Mineral Wool	$$	R-3.1	Yes	No	Does not melt or support combustion
Cellulose	$$	R-3.7	Yes	Yes	Contains the highest amount of recycled content
Fiberglass	$	R-3.1	Yes	No	Does not absorb water
Polystyrene (EPS)	$	R-4	No	Yes	Difficult to use around imperfections

What are some materials and things that have been used together to increase R-value of an exterior house wall?

See previous answer on other page.

What are some problems that occur when your R-value is very high – R2000 homes?

Sometimes, moisture is a problem.

https://natural-resources.canada.ca/sites/nrcan/files/multimedia/R-2000-eng-mp4.mp4

After watching the NRCan video on R-2000 homes, what are some standards that create a certified R-2000 home?

- High insulation levels in walls, ceilings and basements
- High-efficiency windows and doors
- High-efficiency heating and cooling systems
- A balanced, whole-house mechanical ventilation system
- Water-conserving toilets, showers, and faucets
- Many R-2000 home builders also use building materials that are less toxic and have less of an impact on the environment.

When you are older and buy a house, how important is it for you to have a R-2000 certified house? Explain.

You save money and it is better for the environment so that you do not waste energy (which costs money too).