

**Intermediate Science 7**  
**STSE- Heat Pumps**



Student Name: \_\_\_\_\_

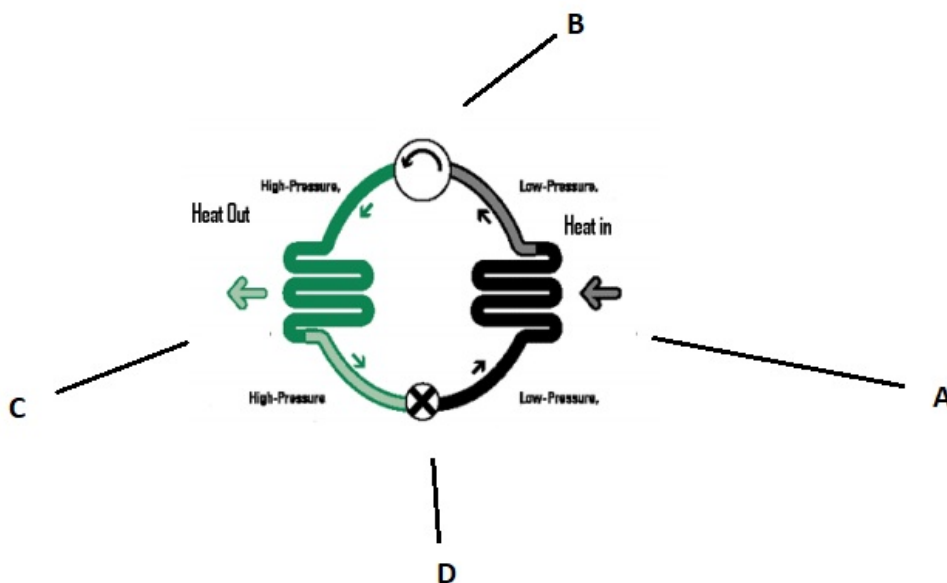
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**PART A: MULTIPLE CHOICE:** Place the correct answer in the space provided on the answer sheet.

1. Which of the following is not a main source of heat for Newfoundland and Labrador?
  - (A) Electricity
  - (B) Ocean
  - (C) Oil
  - (D) Wood
  
2. What questions should you consider when installing a heat source for a new home?
  - (A) How expensive will it be in the future
  - (B) What environmental damage results from its production
  - (C) Will there be enough in the future
  - (D) All the above are correct
  
3. Why is it difficult to change a heat source in an older home?
  - I It may be costly
  - II Amount of time for installation
  - III The construction of house
  - (A) I and II
  - (B) I and III
  - (C) I, II and III
  - (D) II and III
  
4. What is a “heat pump”?
  - (A) Electrical device that moves heat from one source, “concentrates” it, and transfers it to another location.
  - (B) Electrical device that moves heat from one source, “dilutes” it, and transfers it to another location.
  - (C) Nuclear device that moves heat from one source, “concentrate” it, and transfers it to another location
  - (D) Nuclear device that moves heat from one source, “dilutes” it, and transfers it to another location
  
5. What is the technology in a heat pump similar too?
  - (A) Air conditioners and refrigerator
  - (B) Furnace and wood stove
  - (C) Tire pump and air compressors
  - (D) Oven and heaters

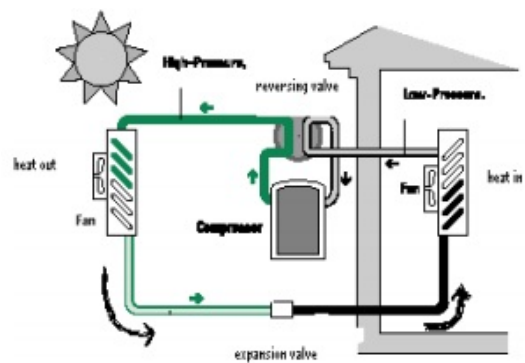
6. What scientific principles is a heat pump based on?
- I When a liquid is heated, it will expand and if a liquid is cooled, it will contract.
  - II Changes in pressure can make a liquid evaporate, or gases condense, more easily. If the pressure on a liquid is reduced, the liquid will evaporate more easily.
  - III When a liquid is heated it will evaporate (becomes a gas) and when a gas condenses (becomes a liquid), it gives off heat
- (A) I and II
  - (B) I and III
  - (C) I, II and III
  - (D) II and III
7. What is the name for the liquid used in a heat pump?
- (A) Aqueous
  - (B) Heatant
  - (C) Refrigerant
  - (D) Solution
8. What is the boiling point of liquid used in a heat pump?
- (A) 0 °C
  - (B) 10 °C
  - (C) 100 °C
  - (D) 273 °C

Use the diagram below to answer questions 9 and 10:



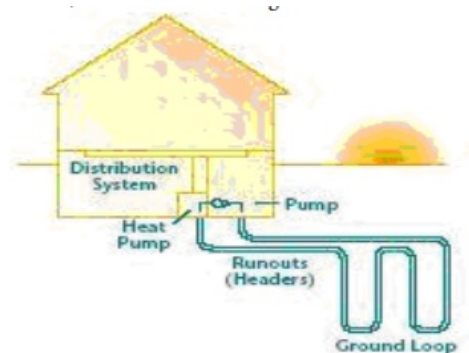
9. What does D represent?
- (A) Compressor
  - (B) Condenser
  - (C) Expansion Valve
  - (D) Evaporator
10. Which letter represents the compressor?
- (A) A
  - (B) B
  - (C) C
  - (D) D

11. What is another advantage of an heat pump?
- (A) It is 100% efficient
  - (B) It can be reversed to act as an air conditioner
  - (C) It is very cheap to install
  - (D) It will never break once installed
12. At which temperature does matter not contain energy?
- (A) 0 °C
  - (B) 10 °C
  - (C) 100 °C
  - (D) 273 °C (absolute zero)
13. Where does a heat pump get its energy?
- (A) Air
  - (B) Ground
  - (C) Water
  - (D) A and B are correct
14. At which temperature is an air source pump most efficient ?
- (A) Above -9 °C
  - (B) Below -9 °C
  - (C) At 9°C
  - (D) The same for any temperature
15. What type of heat pump is shown below?



16. What type of heat pump is shown below?

- (A) Air source heat pump
- (B) Ground source heat pump
- (C) Plasma source heat pump
- (D) Water source heat pump



17. What questions should you ask when installing a heat pump?
- I Which type, air source or ground source is best for me?
  - II How much will it cost to install a heat pump?
  - III Will it save me money on my heating bill?
- (A) I and II
  - (B) II and III
  - (C) I and III
  - (D) I, II and III
18. What is the biggest factor that will determine if you will install an air source heat pump or a ground source heat pump?
- (A) Range of Temperatures
  - (B) Type of Soil
  - (C) Size of House
  - (D) Distance from supplier

**MATCHING : PART B**

Instruction: Match each Term on the left with the best Descriptor on the right. Each Descriptor may be used only once. Place your answers on the scantron

TERM	DESCRIPTOR
11. ____ Absolute Zero 12. ____ Refrigerant 13. ____ Heat Pump 14. ____ Ground Source Heat Pump 15. ____ Air Source Heat Pump	(A) This type of heat pump removes heat from the air  (B) Liquid used in a heat pump  (C) Electrical device that moves heat from one source, “concentrates” it, and transfers it to another location.  (D) heat pump takes heat energy from the ground outside the house  (E) A temperature of $-273^{\circ}\text{C}$ , where the average kinetic energy of the particles is zero

**PART C: WRITTEN RESPONSE**

1. What are the advantages of using a heat pump to heat your home?

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2. What are the disadvantages of using a heat pump to heat your home?

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3. Use the words below to complete the diagram below. Note, you may use the term more than one.

Heat In

Heat Out

Compressor

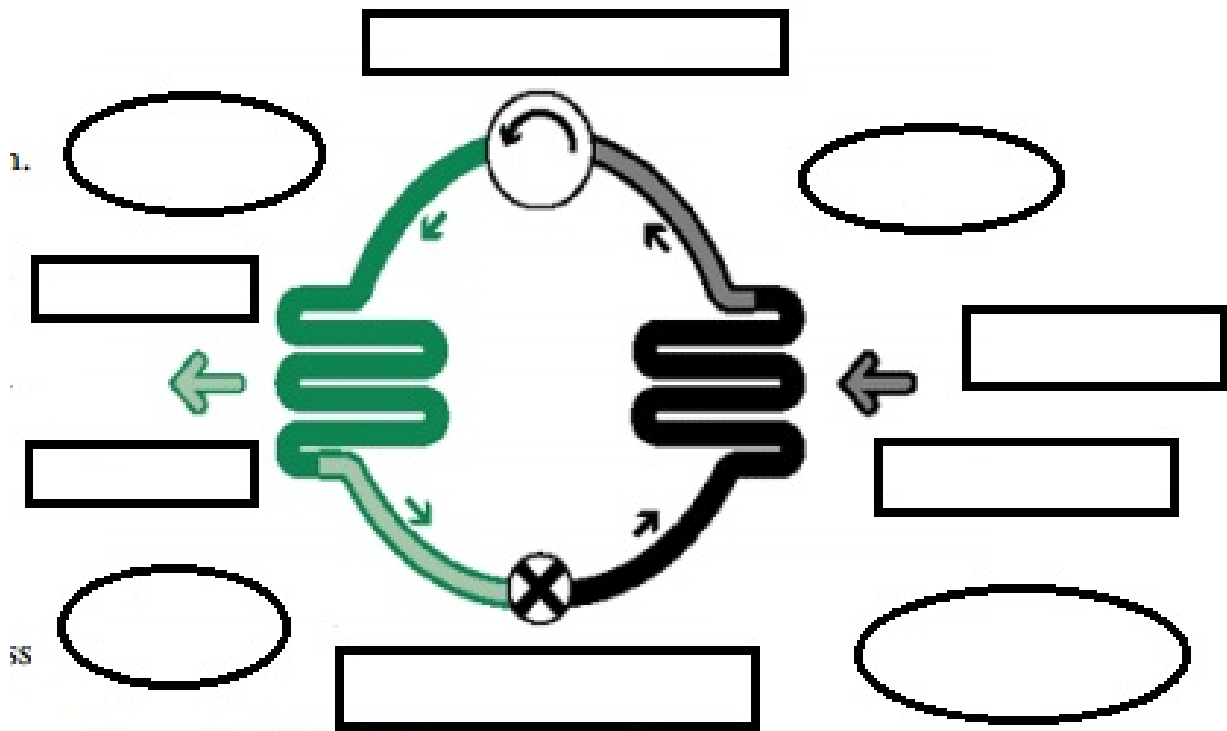
High Pressure

Low Pressure

Expansion Valve

Evaporator

Condenser



4. Explain how a heat pump functions to cool a building rather than heat it?

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5. How does an air source heat pump work to heat a home when the temperature of the air outside is  $-10^{\circ}\text{C}$ ?

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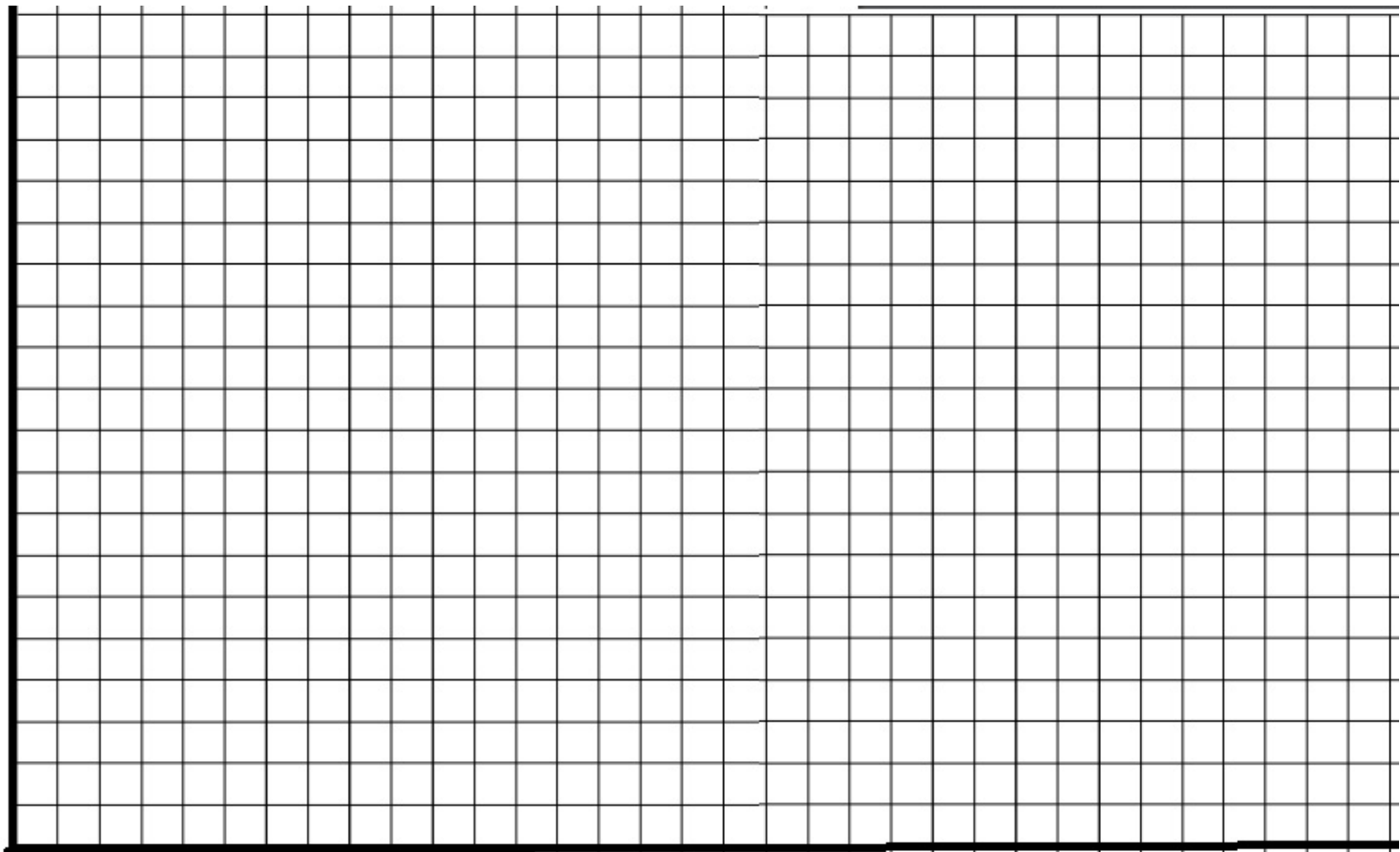


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5. Use Figure 5 “Cost Comparison For Various Heat Source” on page 173 to create a double bar graph of “Installation cost” and “Cost in 10 Y ears”



6. Using the table above, explain how using a ground source heat pump can actually save you money.

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