

MULTIPLE CHOICE

1. ____ science is the study of the interaction of building systems and components, occupants, and the surrounding environment, focusing on the flows of heat, air and moisture.
- a. Material
 - b. Architecture
 - c. Construction
 - d. Building

ANS: D PTS: 1 REF: Building Science

2. The ____ approach to design and construction provides contractors and future homeowners with a comprehensive methodology for creating healthy, comfortable, and durable homes.
- a. Total System
 - b. Total House System
 - c. House as a System
 - d. Systematic Housing

ANS: C PTS: 1 REF: Building Science

3. One calorie is equal to ____ joules.
- a. 4.184
 - b. 14.487
 - c. 32.19
 - d. 49.28

ANS: A PTS: 1 REF: Principles of Energy

4. ____ days can be seen as the average difference between inside and outside temperatures over the course of a day.
- a. Average temperature
 - b. Heating degree
 - c. Average degree
 - d. Cooling degree

ANS: B PTS: 1 REF: Principles of Energy

5. Heat moves into and out of buildings by three different routes: conduction, ____, and radiation.
- a. induction
 - b. convection
 - c. expression
 - d. equilibrium

ANS: B PTS: 1 REF: Heat Flow

6. Conduction is the movement of heat through a ____.
- a. solid
 - b. liquid
 - c. metal
 - d. fiber

ANS: A PTS: 1 REF: Heat Flow

7. Perhaps the most common product to be labeled with an R-value is ____.
- a. a pipe
 - b. copper wiring
 - c. water
 - d. insulation

ANS: D PTS: 1 REF: Heat Flow

8. Windows are labeled with a ____, which is the thermal transmission or conductance rather than the resistance of a material.
- a. T-value
 - b. U-value
 - c. W-value
 - d. Y-value

ANS: B PTS: 1 REF: Heat Flow

9. A wall measures $8' \times 12'$ and is insulated with R-13. Treat the wall as having continuous insulation (no studs). The temperature inside the home is 72°F , and the outside air temperature is 89°F . What is the conductive heat flow through this wall?
- a. 113.08 Btu/hr
 - b. 125.66 Btu/hr
 - c. 1190.11 Btu/hr
 - d. 2121.60 Btu/hr

ANS: B PTS: 1 REF: Heat Flow

10. A home's seasonal heating losses can be calculated using the HDD and the ____.
- a. U_{average}
 - b. R_{average}
 - c. U-value
 - d. R-value

ANS: A PTS: 1 REF: Heat Flow

11. ____ occur when air (or another medium) continuously circulates around in an enclosed space as it is heated and cooled.
- a. Circulars
 - b. Convective loops
 - c. Enclosed loops
 - d. Circular trails

ANS: B PTS: 1 REF: Heat Flow

12. All the solar energy that hits an object is either reflected, absorbed, or ____, depending on its particular characteristics.
- a. increased
 - b. rejected
 - c. transmitted
 - d. stored

ANS: C PTS: 1 REF: Heat Flow

13. ____ is one of the most important forces that can affect building performance.
- a. Outside temperature
 - b. Air direction
 - c. Moisture flow
 - d. Air flow

ANS: D PTS: 1 REF: Air Flow

14. ____ is a critical element in green building, and understanding how to manage its movement into and out of homes is a key piece of the green building puzzle.
- a. Air
 - b. Moisture
 - c. Heat
 - d. Energy

ANS: B PTS: 1 REF: Moisture Flow

15. Most homes built before the 1930s ____.
- a. had little or no insulation and leaked badly
 - b. were over-insulated and never leaked
 - c. were unable to "breathe"
 - d. could not dry out easily if they got wet

ANS: A PTS: 1 REF: Moisture Flow

16. While we want to keep all ____ moisture out of our buildings, the proper level of water vapor helps keep a house comfortable.
- a. latent
 - b. external
 - c. bulk
 - d. accumulated

ANS: C PTS: 1 REF: Moisture Flow

17. The amount of water vapor that diffuses through a building assembly is affected by the following factors: the chemical composition of the building materials, the thickness of the building materials, and the ____ on each side of the building assembly.
- a. bulk moisture
 - b. ventilation
 - c. absolute humidity
 - d. heat index

ANS: C PTS: 1 REF: Moisture Flow

18. Materials can be separated into four general classes on the basis of their permeance. One class, vapor semi-permeable, means ____.
- a. 0.1 perm or less
 - b. greater than 0.1 perm and less than 1.0 perm
 - c. greater than 1.0 perm and less than 10.0 perms
 - d. greater than 10.0 perm

ANS: C PTS: 1 REF: Moisture Flow

19. VDRs are often recommended ____.
- a. on the interior in warm humid climates
 - b. on the interior in cold climates
 - c. in most mixed climates
 - d. on the exterior in cold climates

ANS: B PTS: 1 REF: Moisture Flow

20. Relative humidity is the percentage of the ____ that the air can hold at a specific temperature.
- a. vapor
 - b. maximum moisture
 - c. bulk moisture
 - d. minimum moisture

ANS: B PTS: 1 REF: Moisture Flow

21. All air has a dew point, the ____ at which vapor condenses into water droplets.
- a. temperature
 - b. humidity level
 - c. energy level
 - d. moisture level

ANS: A PTS: 1 REF: Condensation and the Dew Point

22. Dry-bulb temperature is the temperature of air indicated on a(n) ____ and does not account for the effects of humidity.
- a. sling thermometer
 - b. aspirating psychrometer
 - c. ordinary thermometer
 - d. dry thermometer

ANS: C PTS: 1 REF: Condensation and the Dew Point

23. A grain is a small unit of weight; one pound contains ____ grains.
- a. 1,000
 - b. 6,000
 - c. 7,000
 - d. 10,000

ANS: C PTS: 1 REF: Condensation and the Dew Point

24. The building envelope, also referred to as the ____ envelope, is the dividing line between conditioned and unconditioned space in a house.
- a. barrier
 - b. thermal
 - c. dividing
 - d. sealing

ANS: B

PTS: 1

REF: The Building Envelope

25. Winter temperatures between ____°F and 77°F with RH levels ranging between 22% and 70% are generally considered to be comfortable for most people.
- a. 58
 - b. 62
 - c. 65
 - d. 68

ANS: C

PTS: 1

REF: Indoor Comfort

MATCHING

Match each item with a statement below.

- | | |
|--------------------------------|---------------------------------|
| a. First law of thermodynamics | d. Second law of thermodynamics |
| b. Vapor diffusion retarder | e. Potential energy |
| c. Radiation | f. Stack effect |
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1. Stored energy, like a gallon of gasoline or a ton of coal.
 2. Energy is neither created nor destroyed.
 3. Heat moves from high temperature regions to low temperature regions.
 4. Transfer of heat from one surface to another via electromagnetic waves.
 5. Results because cold air is denser than hot air, so hot air rises.
 6. Reduces the amount of moisture that diffuses through building materials into the wall structure.
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- | | | |
|-----------|--------|---------------------------|
| 1. ANS: E | PTS: 1 | REF: Principles of Energy |
| 2. ANS: A | PTS: 1 | REF: Principles of Energy |
| 3. ANS: D | PTS: 1 | REF: Principles of Energy |
| 4. ANS: C | PTS: 1 | REF: Heat Flow |
| 5. ANS: F | PTS: 1 | REF: Air Flow |
| 6. ANS: B | PTS: 1 | REF: Moisture Flow |