

Final Exam
Continuing Education Course #091
Geothermal Boreholes

1. Which is not a design software program?
 - ☐ a. GeoAnalyst
 - ☐ b. WriteSoft
 - ☐ c. GHEX Borehole
 - ☐ d. GeoDesigner
2. Select the material with the lowest K value.
 - ☐ a. Portland Cement
 - ☐ b. Ice
 - ☐ c. Glass
 - ☐ d. Asphalt
3. Select the material with the highest K value.
 - ☐ a. Loam
 - ☐ b. Saturated Silt or Clay
 - ☐ c. Clay
 - ☐ d. Dry sand or gravel
4. Select the worse rock type for borehole K value.
 - ☐ a. Granite
 - ☐ b. Gneiss
 - ☐ c. Schist
 - ☐ d. Basalt
5. What is a reasonable K value for average bedrock?
 - ☐ a. 0.5
 - ☐ b. 1.5
 - ☐ c. 2.5
 - ☐ d. 3.5
6. Not a source of rock data
 - ☐ a. Thermal conductivity testing
 - ☐ b. Maps
 - ☐ c. Drillers logs
 - ☐ d. Soil above the rock formation
7. Thermal conductivity test duration
 - ☐ a. 2 hrs.
 - ☐ b. ½ day

- ☐ c. 2 days
- ☐ d. 2 weeks

8. Factor not affecting Borehole Design Length

- ☐ a. Efficient Building BTUs
- ☐ b. Borehole Thermal Resistance
- ☐ c. Temperature of Ground minus Temp Loop Water
- ☐ d. Rig Accessibility

9. A reasonable total borehole Length for 5 tons heating capacity up north

- ☐ a. 500'
- ☐ b. 750'
- ☐ c. 1000'
- ☐ d. 1250'

10. Unsuitable separation distance between boreholes

- ☐ a. 5'
- ☐ b. 15'
- ☐ c. 20'
- ☐ d. 25'

11. Not an input parameter for software programs

- ☐ a. Design heating/cooling loads
- ☐ b. Loop pipe type & size
- ☐ c. Heat Pump type/COP
- ☐ d. Flow Center Specs

12. Factor addressing possible load imbalances

- ☐ a. NAGLL
- ☐ b. NNAGL
- ☐ c. NGANL
- ☐ d. NANGLE

13. Total pipe uncoil footage ordered for a 400' deep borehole

- ☐ a. 400'
- ☐ b. 405'
- ☐ c. 800'
- ☐ d. 810'

14. Suitable Pressure for HDPE testing

- ☐ a. 10 psi
- ☐ b. 50 psi
- ☐ c. 200 psi
- ☐ d. 300 psi

15. Spacing of geo clips

- ☐ a. 10' o.c.
- ☐ b. 25' o.c.
- ☐ c. 50' o.c.
- ☐ d. 100' o.c.

16. Suitable permanent casing material

- ☐ a. Steel
- ☐ b. PVC plastic
- ☐ c. HDPE
- ☐ d. PEX pipe

17. Three bags of silica mixed with one of grout shown. K =

- ☐ a. 0.4
- ☐ b. 0.79
- ☐ c. 1.0
- ☐ d. 1.2

18. Socket fusion temperature

- ☐ a. 300°F
- ☐ b. 400°F
- ☐ c. 500°F
- ☐ d. 600°F

19. Wire Material in electric based heat coupling

- ☐ a. Steel
- ☐ b. Brass
- ☐ c. Iron
- ☐ d. Copper

NOTE: The following question was revised on 26 June 2018

20. Triton Electrofusion Welding uses:

- ☐ a. Special Glue bonds
- ☐ b. Three processes at once.
- ☐ c. Radio Frequency
- ☐ d. None of the above

21. Standard Manifold Name

- ☐ a. Reverse-Return
- ☐ b. Axis Balanced
- ☐ c. Coaxial
- ☐ d. Series

22. Not a Flow Center Manufacturer

- ☐ a. Grundfos
- ☐ b. Wilo
- ☐ c. Bell & Gossett
- ☐ d. Carrier

23. Number of Link Seals to cover 2" HDPE

- ☐ a. 4
- ☐ b. 5
- ☐ c. 6
- ☐ d. 7

24. Diameter in inches of buried marker

- ☐ a. 4
- ☐ b. 5
- ☐ c. 6
- ☐ d. 7

25. Geothermal heating and cooling was installed at Liberty Island's:

- ☐ a. Observation Deck
- ☐ b. Pedestal Base,
- ☐ c. Retail Pavilion
- ☐ d. Ferry Terminal