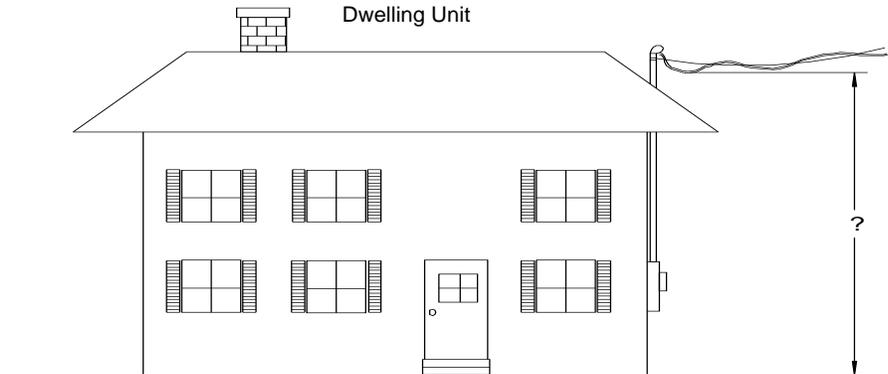NAME:_____ DATE:_____
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RESIDENTIAL PRACTICE EXAM

THE USE OF THE 2020 N.E.C. BOOK IS PERMITTED
(Formulas and Worksheets on back pages)

The following questions are worth one point each.

Dwelling Unit

1.   Based on the drawing above, what is the minimum number of exterior outlets required, assuming no balconies, decks or porches?

   A. 1
   B. 2
   C. 3
   D. 4

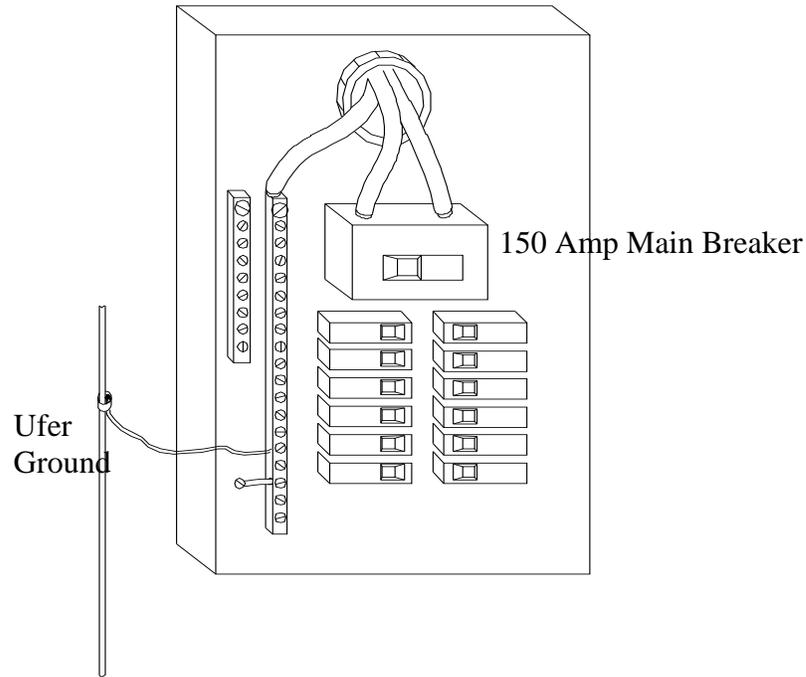   Answer_____

2.   Based on the drawing above, what is the minimum size service for this dwelling.

   A. 100 Amp, 120 Volt
   B. 200 Amp, 120 Volt
   C. 100 Amp, 240 Volt
   D. 200 Amp, 240 Volt

                                                        Answer_____

3.   Rigid nonmetallic PVC conduit is installed underground, in the back lawn, as a raceway between a dwelling and a shed. Three 10 AWG Type THW insulated conductors and a bare 10 AWG equipment ground are pulled into the raceway. The circuit is protected by a 30 amp GFCI circuit breaker. What is the minimum burial depth permitted for the raceway?

   A. 150 mm
   B. 12 inches
   C. 450 mm
   D. 24 inches   Answer_____

150 Amp Main Breaker

Ufer
Ground

4. Based on the drawing above, what is the *minimum* size ungrounded (hot) service wire required?

    A. 1 Copper
    B. 3 Copper
    C. 4 Copper
    D. 4/0 Aluminum

                                             Answer_____

5. Based on the drawing above, what *minimum* size main grounding electrode conductor is required to be run to a Concrete Encased Electrode (UFER Ground)?

    A. #6 THHN Copper
    B. #4 THWN Copper
    C. #2 Bare Copper
    D. #1/0 Bare Aluminum

                                             Answer_____

6. What is the minimum number of 15 amp lighting circuits required for a 3500 square foot residence?

   A. 5
   B. 6
   C. 8
   D. 12

                                                      Answer_____

7. What is the demand factor permitted for a household with a 11 kW range?

   A. 8,000 watts
   B. 9,000 watts
   C. 11,000 watts
   D. 20,000 watts

                                                      Answer_____

8. A continuous load, such as an EV charger, is one in which maximum current is expected to continue for how many hours?

   A. At least one
   B. At least three
   C. No more than five
   D. All night long

                                                      Answer_____

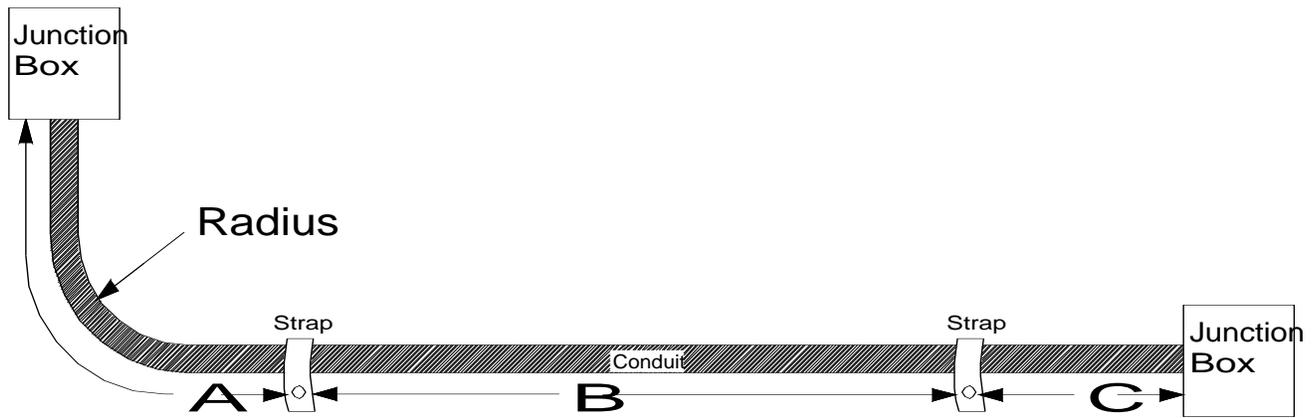9. What is the minimum volume of a 4"x4"x1-1/2" electrical box which has no volume markings on it?

   A. 254 cubic centimeters
   B. 18 cubic inches
   C. 24 cubic inches
   D. 344 cubic centimeters

                                                      Answer_____

10. What is the minimum size of Rigid Steel conduit permitted for three 2/0 AWG type THW compact stranded aluminum conductors used for a 150 amp dwelling service?

   A. 1-1/2 inch
   B. 1-1/4 inch
   C. 1 inch
   D. 2 inch

                                                      Answer_____

Junction Box

Radius

Strap   Strap   Junction Box

Conduit

A   B   C

11. Based on the drawing above, and assuming Flexible Metal Conduit (FMC), what is the *maximum* length of section "C"?

    A. 6 inches
    B. 1 foot
    C. 24 inches
    D. 3 feet

                                               Answer_____

12. Based on the drawing above, and assuming Electrical Metallic Tubing (EMT), what is the *maximum* length of section "B"?

    A. 3 meters
    B. 8 feet
    C. 900 millimeters
    D. 3 feet

                                               Answer_____

13. Based on the drawing above, and assuming 1" Rigid Metal Conduit (RMC), what is the radius of the bend when using a Full Shoe Bender?

    A. 101.6 mm.
    B. 5 inches.
    C. 146.05 mm.
    D. 8 inches.

                                               Answer_____

14. If an EMT conduit containing 3 THHN conductors is run in an attic with a possible temperature of 120°F, what is the correction factor required for determining ampacity?

    A. 82 %
    B. 88 %
    C. 90 %
    D. 91 %

                                               Answer_____

15. A residential dwelling with a 3200 square foot area excluding porches, garage, and unfinished spaces requires a general lighting load of not less than _____VA before application of any demand factors.

    A. 3600 VA
    B. 4500 VA
    C. 10,000 VA
    D. 9600 VA

Answer_____

16. Arc-fault circuit-interrupter protection for receptacle outlets shall be provided for all dwelling unit

    A. Garages
    B. Bathrooms
    C. Living rooms
    D. Furnaces
    E. All of the above
    F. None of the above

Answer_____

17. What must a room have in order to be considered a bathroom?.

    A. Toilet
    B. Tub
    C. Shower
    D. Sink
    E. Urinal

Answer_____

18. If watts and voltage are known, how would current be calculated?

    A. Voltage $\div$ Wattage
    B. Voltage$^2 \div$ Resistance
    C. Watts $\div$ Voltage
    D. Voltage$^2 \div$ Wattage

Answer_____

19. Draw a schematic diagram showing one light being controlled by 4 switches.

The following question is worth 3 points.

20. A ***three-story***, single-family dwelling measures 20' x 30' on the outside of the building. Using the Standard Calculation method, what is the computed minimum size 120/240 volt service assuming a dishwasher rated at 5 amps, a garbage disposal rated at 1/3 hp (use table 430.248), a 10.5kW Range, a 3.5 kW, 240 volt water heater and a 240 volt, 10 amp air conditioner.

    A. 60 Amp
    B. 100 Amp
    C. 150 Amp
    D. 200 Amp

Show your work

Answer_____
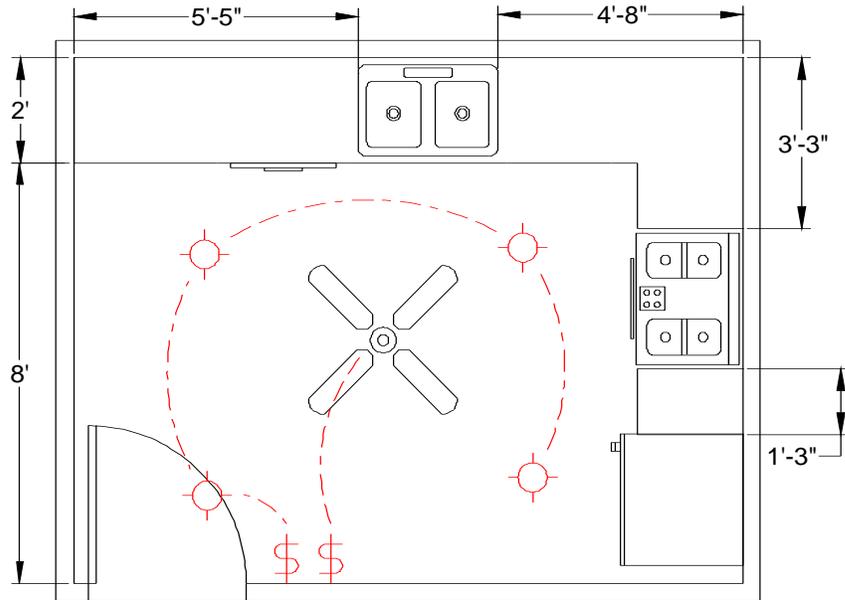
21. Based on the drawing above, what is the minimum number of receptacle outlets required to serve the countertop?

    A. 4
    B. 5
    C. 7
    D. 8

Answer_____

22. Based on the drawing above, the outlets that serve the countertop requires:

    A. GFCI protection
    B. AFCI protection
    C. WR (weather-resistant) rated receptacles
    D. TR (tamper-resistant) receptacles
    E. A,B and D above
    F. All the above
    G. None of the above

Answer_____

23. What **minimum** size metal device box is required for eight 12 AWG Type THWN copper conductors and 2 duplex receptacle outlets?

    A. 3 in. x 2 in. x 3-1/2 in.
    B. 4 in. x 4 in. x 1-1/2 in.
    C. 4 in. x 4 in. x 2-1/8 in.
    D. 3 in. x 2 in. x 2-1/4 in.

Answer_____
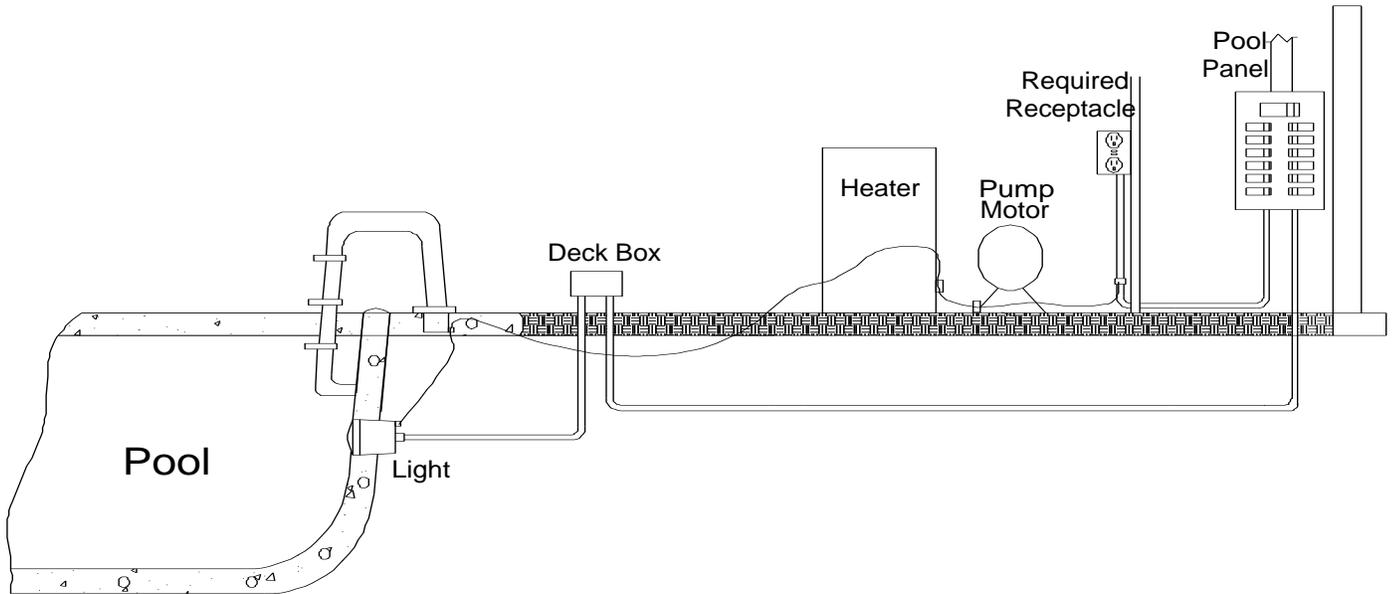
24. Based on the drawing above, what is the **maximum** horizontal distance allowed between the inside wall of the pool and the required receptacle?

    A. 5 ft
    B. 6 ft
    C. 10 ft
    D. 20 ft

Answer_____

25. Based on the drawing above, what is the minimum requirement for the conductor that bonds the pool, light, deck, motor, ladder, etc.?
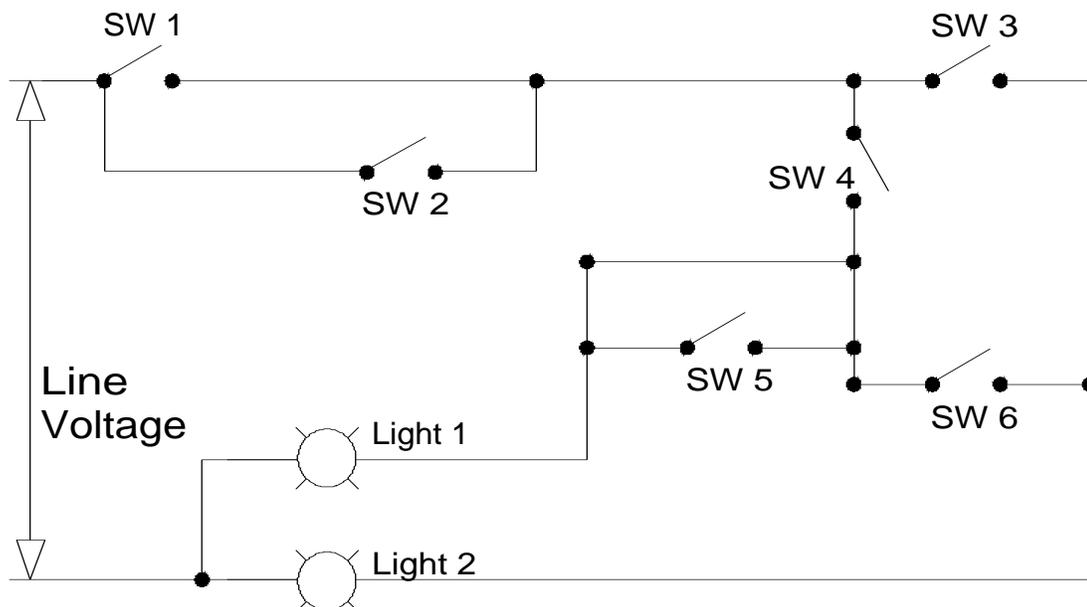
    A. 8 AWG solid copper
    B. 8 AWG stranded copper
    C. 8 AWG solid aluminum
    D. 8 AWG stranded aluminum
    E. A&B above

Answer_____

26. Dwelling unit receptacles shall be located so that no point along the floor line is more than _____, measured horizontally, from an outlet in that space.

    A. 12 ft.
    B. 2 ft.
    C. 6 ft.
    D. 10 ft.

Answer_____

The following questions are based on the drawing above.

27. Which switches may be closed for **only** light 1 to illuminate?

    A. S1, S2, S3   B. S4, S5, S6
    C. S1, S2, S3, S6   D. S1, S2, S4
    E. C and D above   F. All of the above

                                           Answer_____

28. Which switches may be closed for **only** light 2 to illuminate?

    A. S1, S4, S6   B. S1, S2, S3
    C. S2, S4, S5, S6   D. S1, S2, S3, S4, S5, S6
    E. None of the above   F. All of the above

                                           Answer_____

29. Which switches may be closed for **both** lights to illuminate?

    A. S1, S2, S4   B. S1, S2, S5, S6
    C. S2, S3, S6   D. S1, S5
    E. All of the above   F. None of the above

                                           Answer_____

30. What happens if all the switches are closed?

    A. Only light 1 illuminates   B. Only light 2 illuminates
    C. Both lights illuminate   D. A short circuit is created

                                           Answer_____

Electrical Exam Formulas

1) $P = I \times E$

2) $E = I \times R$

3) $P = I \times E \times (PF)$

4) $VD = (2 \times K \times D \times I)/CM$

5) $VD\ (3\ Phase) = (1.73 \times K \times D \times I)/CM$

        P= Power in watts
        I=Current in amps
        E=Voltage in volts
        R=Resistance in ohms
        VD=Voltage drop in volts
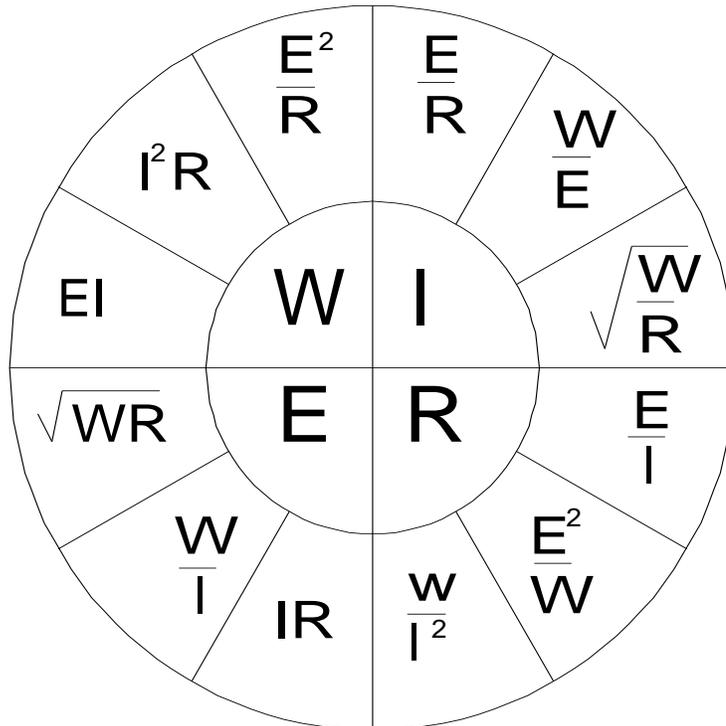   PF=Power factor
        D=Distance (one way) in feet
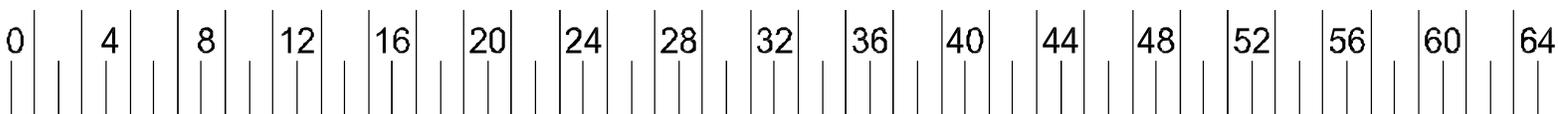   CM=Circular mils of wire (NEC Ch. 9, Table 8)
        K=Resistance of a circular mil-foot (Approx. 12.9 for Cu, 21.2 for Al)
        HP=746 Watts

1/8" Scale

0   4   8   12   16   20   24   28   32   36   40   44   48   52   56   60   64

Dwelling Unit Load Calculations
<u>Standard Calculation</u>

1. General Lighting Loads (220.12)   _____sq. ft. x 3 VA =   _____VA
Minimum number of circuits
_____VA ÷120 Volts = _____Amps
_____Amps ÷15 or 20 amp ckts. = ____ckts

2. Small Appliance Branch Circuits (220.52(B))   _____ x 1500 VA =   _____VA

3. Laundry Equipment Load (220.52(A))   _____ x 1500 VA =   _____VA

4. Total General Lighting, Small Appliance and Laundry Circuit Load (1. + 2. + 3.)   _____VA

5. Application of Demand Factors (Table 220.42)
         5a. First 3,000 Volt-Amperes at 100%   ___3000___ VA
         5b. Line **4** minus 3000 = _____
         5c. If Line **5b** > 117,000, then 117,000x 35% =   _____ VA
         5d. If Line **5b** < 117,000, then Line **5b** x35% =   _____ VA
5e. If line **5b** > 117,000, then Line **4** minus 120,000 = _____ x 25% =   _____ VA
         5f. Net general lighting and small appliance load (5a+5c+5d+5e)   _____ **VA**

6. Appliance load—Dwelling Unit(s) (220.53)

Appliance	Nameplate-VA (Watts)

*See table 430.248
for full-load
current if no
nameplate rating.*
         _____   _____
         _____   _____
         _____   _____
         _____   _____
         _____   _____
         6a. Total (If less than four)   _____**VA**
         6a. Total (If four or more)   _____ x 75% =   _____**VA**

7. Add Other Loads (Range, Dryer, Heat, A/C)
(Use largest of coincident loads)   **7a.** Range load (Table 220.55)   _____**VA**
                    7b. Dryer load (Table 220.54)   _____**VA**
                    7c. _____   _____**VA**
                    7d. _____   _____**VA**
7e. 25% of Largest Motor from sec **6.** or **7.**(220.50)   _____(VA)x 25% = _____**VA**

                    7f. Total Calculated Load (Add 5f. thru 7e.)   _____**VA**

                    Minimum size of ungrounded (Hot) service conductors
                    (Line **7f.** above)VA ÷ 240 Volts = | **Amps** |

8. Minimum Size of Grounded (Neutral) Service Entrance Conductors
         8a. Lighting and small appliance load (**5f.**) + 120 Volt appliance loads (**6a.**)=   _____VA
                    8b. Range load at 70%=   _____VA
         8c. Dryer load larger of 5000 or nameplate Volt-amperes at 70%=   _____VA
                    8d. Total for grounded service-entrance conductor   _____**VA**

                    (Line **8d.** above)VA ÷ 240 Volts= | **Amps** |