TRACK Electrical Pre-Apprenticeship Assessment
Instructions and Formula Sheet

This exam is designed to assess knowledge necessary for success in the TRACK Electrical Pre-Apprenticeship Program.

Instructions

1. The proctor **shall** read the assessment instructions and provide a copy of the TRACK Electrical Pre-Apprenticeship Assessment Instructions and Formula Sheet to each participant prior to administration of the assessment.

2. The proctor **shall not** be the teacher of record for the content being assessed.

3. The TRACK Electrical Pre-Apprenticeship Assessment includes 60 questions. Students will have a maximum of three (3) hours, during a single session, to complete the assessment.

4. Extended time accommodation for testing **is** permissible with appropriate student documentation prior to testing. Students, with extended time accommodation, will have a maximum of five (5) hours, during a single session, to complete the TRACK Electrical Pre-Apprenticeship Assessment.

5. TRACK Electrical Assessment accommodations **shall** be provided in accordance with the student's documented Individual Education Program (IEP), 504 Plan or PSP. The TRACK Electrical assessments **shall** be administered in compliance with the 703 KAR 5:080 Administration Code for Kentucky's Educational Assessment Program, 703 KAR 5:070 Inclusion of Special Populations regulations and the TRACK Electrical Pre-Apprenticeship Assessment Instructions and Formula Sheet.

6. Students **may** use State approved calculators on the TRACK Electrical Pre-Apprenticeship Assessment.

7. Students **may** use the formula sheets provided in, this document, the TRACK Electrical Pre-Apprenticeship Assessment Instructions and Formula Sheet.

8. Students **may** use blank scratch paper to work a problem. All scratch paper **shall** be collected and destroyed by the test administrator immediately following the test.

9. Students **shall** use the National Electric Code (NEC) reference book (2008, or newer) and **may** use Ugly's Electrical reference book to answer questions, as needed. The NEC reference book and formula sheets in the TRACK Electrical Pre-Apprenticeship Assessment Instructions and Formula Sheet document are required testing material for this assessment.

10. Students **shall not** use textbooks, reference materials, smartphones, or other aids (including electronic) not specifically approved in these instructions. Prohibited devices should be collected and securely stored away from the testing area.

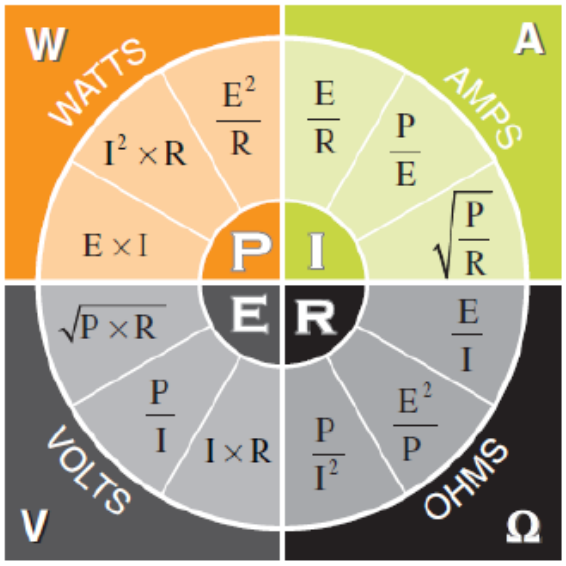
11. Test materials **shall not** be duplicated in any way.

12. Test materials **shall not** be saved to any hard drive, network drive or any other data device.

13. Student test accounts **shall not** be accessed by any person other than the student whose name appears on the test ticket.

14. A student **shall** score at 70% or higher (correctly answering a minimum of 42 out of 60 questions) to pass this assessment.

Formula Sheet



Series Circuits

$$R_T = R_1 + R_2 + R_3$$

$$E_T = E_1 + E_2 + E_3$$

$$I_T = I_1 = I_2 = I_3$$

Parallel Circuits

$$R_T = \frac{1}{\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}+\cdots}$$

$$R_T = \frac{R_1 \times R_2}{R_1 + R_2}$$

$$I_T = I_1 + I_2 + I_3$$

$$E_T = E_1 = E_2 = E_3$$

Peak-RMS Relationship

$$RMS = Peak \times .707$$

$$Peak = RMS \times 1.414$$

Temperature Conversion

$$Temp°\text{F} = (\frac{9}{5}\ Temp°\text{C}) + 32$$

$$Temp°\text{C} = \frac{5}{9}\ (Temp°\text{F} - 32)$$

Voltage Drop 1Ø

$$V_d = \frac{2KIL}{Cm}$$

$$Cm = \frac{2KIL}{V_d}$$

Voltage Drop 3Ø

$$V_d = \frac{(1.732)KIL}{Cm}$$

$$Cm = \frac{(1.732)KIL}{V_d}$$

Circle Formulas

$$Circumference = 2\pi r \text{ or } \pi d$$

$$Area = \pi r^2$$

$$Volume\ of\ Cylinder = \pi r^2 \times height$$

Metric Prefixes

Kilo = 1000

Centi = .01

Milli = .001

Micro = .000001

English Units

12 inches = 1 foot

3 feet = 1 yard

Inductive Circuits

$X_L = 2\pi FL$

Series Inductors $L_T = L_1 + L_2 + L_3$

Parallel Inductors $L_T = \frac{1}{\frac{1}{L_1}+\frac{1}{L_2}+\frac{1}{L_3}+\cdots}$

Capacitive Circuits

$X_C = \frac{1}{2\pi FC}$

Series Capacitors $C_T = \frac{1}{\frac{1}{C_1}+\frac{1}{C_2}+\frac{1}{C_3}+\cdots}$

Parallel Capacitors $C_T = C_1 + C_2 + C_3$

Impedance

$Z = \sqrt{R^2 + (X_L - X_C)^2}$

$Z = \frac{E}{I}$

Transformers

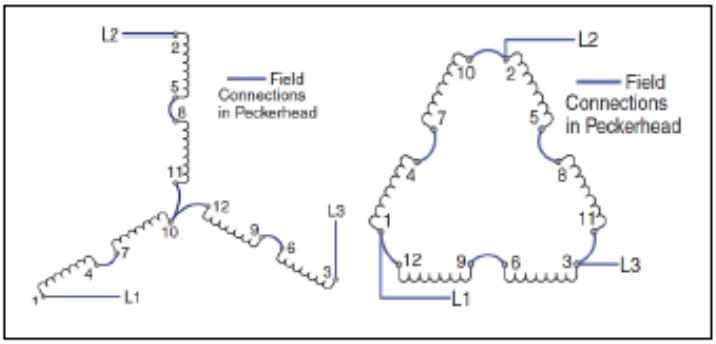
$\frac{E_P}{E_S} = \frac{N_P}{N_S}$

$\frac{E_P}{E_S} = \frac{I_s}{I_P}$

Horsepower

$1\text{Ø HP} = \frac{\text{Volts} \times \text{Amps} \times \text{Efficiency x PF}}{746}$

$3\text{Ø HP} = \frac{\text{Volts} \times \text{Amps} \times \text{Efficiency} \times \text{PF} \times 1.732}{746}$



Wye Transformers

$I_{Line} = I_{Phase}$

$E_{Line} = E_{Phase} \times 1.732$

$E_{Phase} = \frac{E_{Line}}{1.732}$

Neutral Current (unbalanced)

$I_N = \sqrt{(A^2 + B^2 + C^2) - [(A^2 \times B^2) + (B^2 \times C^2) + (A^2 \times C^2)]}$

Delta Transformers

$E_{Line} = E_{Phase}$

$I_{Line} = I_{Phase} \times 1.732$

$I_{Phase} = \frac{I_{Line}}{1.732}$

Short Circuit Calculation

(Note: For this equation express Z as decimal – 3.5%Z = .035 etc.)

3Ø $I_{Line-Line} = \frac{KVA \times 1000}{E_{Line-Line} \times 1.732 \times Z}$

1 Ø $I_{Line-Line} = \frac{KVA \times 1000}{E_{Line-Line} \times Z}$