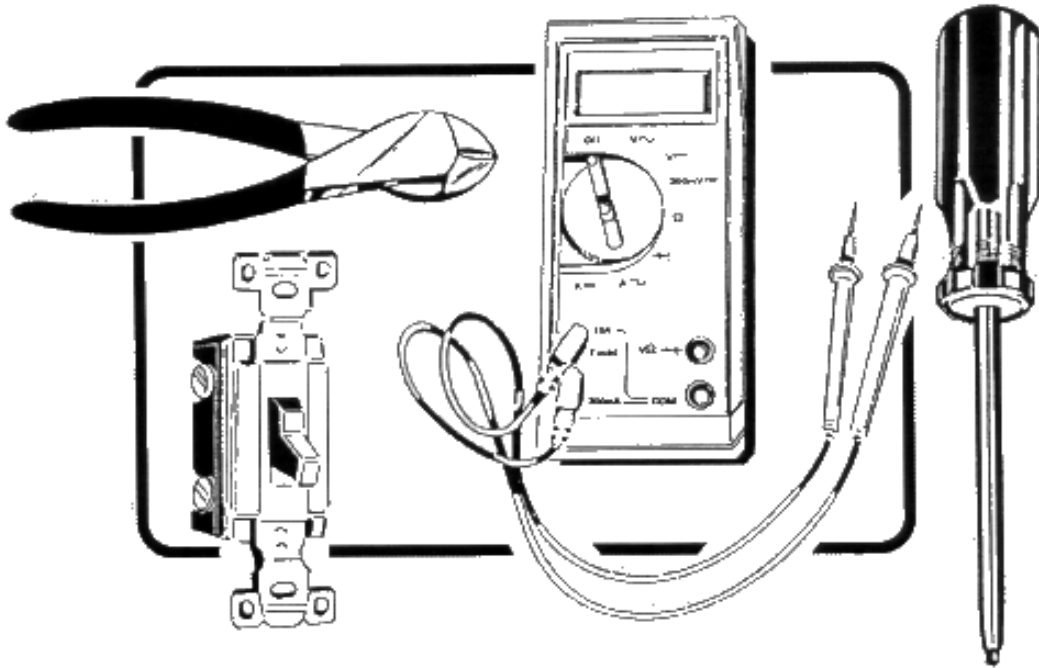


ELECTRICIAN – PRE-APPRENTICESHIP

MATH ENTRANCE EXAM



NOTE: Please DO NOT write in exam booklet.

Use the answer sheet for your answers.

May 2003

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

NOTE: DO NOT MARK SECTION A. PLACE YOUR ANSWERS ON THE SHEET PROVIDED IN SECTION B.

SECTION A

ADDITION: *Add the following:*

1. $89809 + 21318 = ?$

- a. 111127
- b. 111271
- c. 30298
- d. 91940

2. $\frac{2}{3} + \frac{2}{3} = ?$

- a. $\frac{4}{6}$
- b. $\frac{4}{9}$
- c. $1 \frac{1}{3}$
- d. $1 \frac{2}{3}$

3. $\frac{5}{16} + \frac{3}{8} = ?$

- a. $\frac{8}{24}$
- b. $\frac{11}{16}$
- c. $\frac{1}{3}$
- d. $\frac{5}{8}$

SUBTRACTION: *Subtract the following:*

4. $14642 - 12321 = ?$

- a. 13410
- b. 2330
- c. 2231
- d. 2321

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

5. $4 \frac{1}{8} - 1 \frac{2}{3} = ?$

- a. $3 \frac{17}{24}$
- b. $5 \frac{19}{24}$
- c. $3 \frac{1}{8}$
- d. $2 \frac{11}{24}$

MULTIPLICATION: *Multiply the following:*

6. $183 \times 152 = ?$

- a. 335
- b. 27816
- c. 12039
- d. 12694

7. $\frac{9}{10} \times \frac{5}{6} = ?$

- a. $1 \frac{44}{60}$
- b. $\frac{45}{60}$
- c. $1 \frac{1}{4}$
- d. $\frac{3}{4}$

8. $1 \frac{1}{5} \times 2 \frac{2}{3} = ?$

- a. $3 \frac{1}{5}$
- b. $3 \frac{3}{5}$
- c. $1 \frac{3}{4}$
- d. $1 \frac{3}{5}$

DIVISION: *Divide the following:*

9. $3268 \div 42 = ?$

- a. 77.80
- b. 78
- c. 77
- d. 77.81

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

10. $3/4 \div 1/2 = ?$

- a. $1/2$
- b. $1 \frac{1}{2}$
- c. $2/3$
- d. $3/8$

CALCULATIONS: *Complete the calculations as indicated.*

11. $477.075 + 64 + 709.999 + 0.0025 = ?$

- a. 1251.099
- b. 1251
- c. 1251.07
- d. 1251.0765

12. $37.2 - 36.864 = ?$

- a. 0.4
- b. 0.336
- c. 74.064
- d. 0.33

13. $0.25 \times 0.375 = ?$

- a. 0.094
- b. 0.09375
- c. 0.625
- d. .667

DECIMALS:

Convert the following fractions to decimals. Round off to the nearest thousandth.

14. $9/16" = ?$

- a. .375"
- b. .536"
- c. 144"
- d. .563"

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

15. $2 \frac{11}{64}'' = ?$

- a. 2.178"
- b. 2.172"
- c. 2.17"
- d. 2.1719"

16. $\frac{15}{16}'' = ?$

- a. 0.938"
- b. 0.94"
- c. 0.9375"
- d. 0.93"

Convert the following decimals to fractions.

17. $0.0625'' = ?$

- a. $\frac{1}{8}''$
- b. $\frac{3}{32}''$
- c. $\frac{2}{3}''$
- d. $\frac{1}{16}''$

18. $0.75'' = ?$

- a. $\frac{3}{4}''$
- b. $\frac{2}{3}''$
- c. $\frac{5}{7}''$
- d. $\frac{13}{16}''$

19. $0.1875'' = ?$

- a. $\frac{1}{4}''$
- b. $\frac{3}{16}''$
- c. $\frac{5}{16}''$
- d. $\frac{13}{75}''$

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

Solve the following equations.

20. $3.2500 - 0.0125 = ?$

- a. 3.231
- b. 3.262
- c. 3.261
- d. 3.2375

21. $0.625 \times 8.808 = ?$

- a. 5.5
- b. 9.433
- c. 5.505
- d. 8.183

Divide the following decimals.

22. $0.024 \overline{)481.92} = ?$

- a. 4.98
- b. 20080
- c. .000498
- d. 11.566

DECIMAL FRACTIONS:

23. $75/1000 = ?$

- a. .075
- b. $\frac{3}{4}$
- c. .75
- d. 7.5

24. three thousandths = ?

- a. .3
- b. .03
- c. .003
- d. $30/1000$

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

25. fifty-seven ten thousandths = ?

- a. 57/1000
- b. .0057
- c. .057
- d. .00057

ROUNDING:

26. Round 67.1275 to the nearest tenth = ?

- a. 67
- b. 67.1
- c. 67.13
- d. 67.128

27. Round 67.1275 to the nearest hundredth = ?

- a. 67
- b. 67.1
- c. 67.13
- d. 67.128

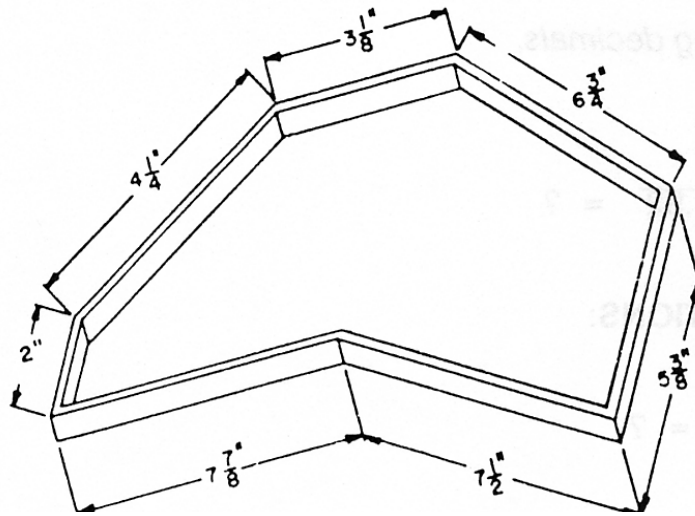
28. Round 67.1275 to the nearest thousandth = ?

- a. 67
- b. 67.1
- c. 67.13
- d. 67.128

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

AVERAGE:

29. What is the average length of the pieces in the diagram below?



- a. $3\frac{3}{8}$ "
- b. 5.267"
- c. $5\frac{1}{4}$ "
- d. $6\frac{1}{8}$ "

NEGATIVE QUANTITIES:

30. $(-1) + (2) = ?$

- a. 3
- b. -3
- c. 1
- d. -1

31. $(-3) - (-4) = ?$

- a. -7
- b. 7
- c. -1
- d. 1

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

SQUARE ROOT:

32. $\sqrt{1024} = ?$

- a. 32
- b. 512
- c. 1024
- d. 1048576

33. $\sqrt{0.09} = ?$

- a. 3
- b. 0.09
- c. 0.3
- d. 8100

EXPONENTS:

34. The value of 6^2 is

- a. 12
- b. 3
- c. 36
- d. 18

35. The value of 4^3 is

- a. 12
- b. 16
- c. 64
- d. 7

EXPRESS THE FOLLOWING IN POWERS OF TEN:

36. $10^3 \times 10^4 = ?$

- a. 10^7
- b. 10,000,000
- c. 10^{12}
- d. 10^{-1}

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

37. $10^9 - 10^5 = ?$

- a. 10,000
- b. 10^4
- c. 10^{14}
- d. 10^{-4}

38. $10,000 = ?$

- a. 10^4
- b. 10^3
- c. 10^2
- d. 10^5

METRIC:

39. The symbol for a milligram is ?

- a. MG
- b. MM
- c. mg
- d. mm

40. A milligram is what part of a gram?

- a. 1/100
- b. 1/1000
- c. 10
- d. 1000

41. A kilometer is how many meters?

- a. 100
- b. 1000
- c>.01
- d. .001

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

42. The symbol for a kilometer is ?

- a. Km
- b. mpg
- c. Kpm
- d. kpm

METRIC CONVERSIONS: *Do the following conversions.*

43. 0.003 L = mL?

- a. 0.3
- b. 3
- c. 30
- d. 3000

44. 47 mm = m?

- a. .047
- b. .47
- c. 4.7
- d. 4700

45. Forty five resistors have a mass of 116.6 g. What is the mass of each resistor? Express your answer to the nearest tenth of a gram.

- a. 2.5
- b. 2.59
- c. 2.591
- d. 2.6

PERCENT:

Convert the following percentages to fractions:

46. $66\frac{2}{3} = ?$

- a. $\frac{200}{3}$
- b. $66\frac{4}{6}$
- c. $\frac{1}{3}$
- d. $\frac{2}{3}$

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

47. $45\% = ?$

- a. $4/5$
- b. $9/20$
- c. $1/2$
- d. $3/8$

Convert the following fractions to percentages:

48. $1/3 = ?$

- a. $.33\%$
- b. 33%
- c. $.67\%$
- d. 67%

49. $4/9 = ?$

- a. $4/9\%$
- b. 40%
- c. 48%
- d. 44%

Convert the following percentages to decimals:

50. $15\% = ?$

- a. $15/100$
- b. $3/20$
- c. $.15$
- d. $.015$

51. $167\% = ?$

- a. $167/100$
- b. $8/50$
- c. 1.67
- d. 16.7

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

Convert the following decimals to percentages:

52. $0.6 = ?$

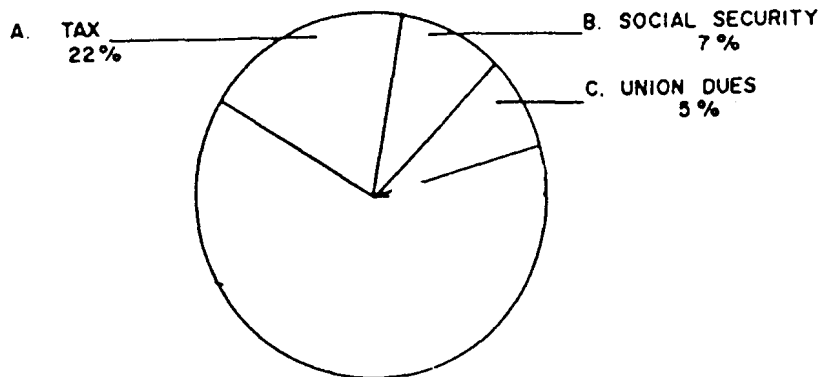
- a. .6%
- b. 6%
- c. 60%
- d. 600%

53. $2.45 = ?$

- a. 2.45%
- b. 24.5%
- c. 245%
- d. 2450%

PROBLEM SOLVING:

An apprentice electrician works 40 hours and earns \$18.00 per hour. The deductions are: income tax – 22%; social security - 7%; union dues – 5%. Find each amount to the nearest whole cent.



54. Income tax = ?

- a. \$15.84
- b. \$158.40
- c. \$327.27
- d. \$32.72

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

55. Social security = ?

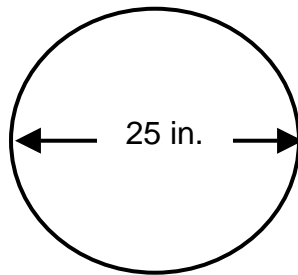
- a. \$50.40
- b. \$51.00
- c. \$54.00
- d. \$54.40

56. Union dues = ?

- a. \$14.40
- b. \$1.44
- c. \$3.60
- d. \$36.00

GEOMETRY:

QUESTIONS 57 TO 58 REFER TO THE DIAGRAM BELOW.



$$\begin{aligned}\pi &= 3.14 \\ \text{Circumference} &= \pi d \\ &\text{or } 3.14 \times d \\ \text{Area} &= \pi r^2\end{aligned}$$

57. The circumference of the circle is

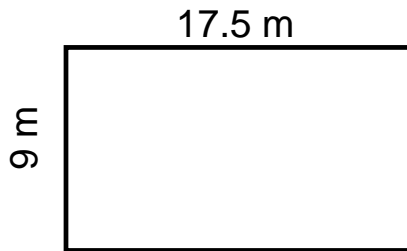
- a. 38 1/4"
- b. 39 1/4"
- c. 78 1/2"
- d. 79 1/2"

58. The area of the circle is

- a. 159.00 sq.in.
- b. 196.00 sq.in.
- c. 490.62 sq. in.
- d. 1962.50 sq.in.

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

QUESTIONS 59 AND 60 REFER TO THE DIAGRAM BELOW.



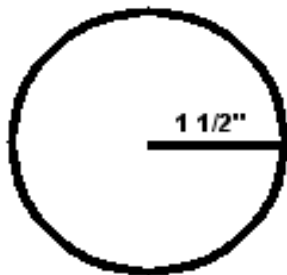
59. For the rectangle above, give the perimeter.

- a. 26.5 m
- b. 53 m
- c. 157.5 m
- d. 702.3 m

60. For the rectangle above, give the area.

- a. 26.5 m
- b. 53 m
- c. 157.5 m
- d. 702.3 m

QUESTIONS 61 TO 63 REFER TO THE DIAGRAM BELOW.



61. For the circle above, give the diameter.

- a. 1.5"
- b. 2.5"
- c. 3"
- d. 4.7"

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

62. For the circle above, give the circumference.

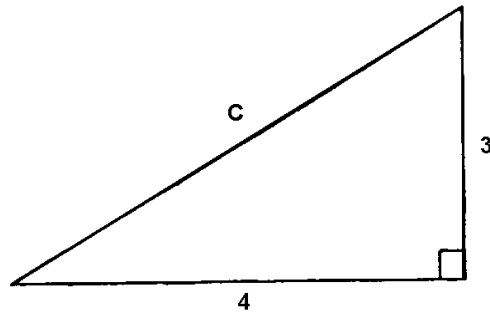
- a. 4.71 m
- b. 7.07 m
- c. 9.42 m
- d. 28.26 m

63. For the circle above, give the area.

- a. 4.71 m
- b. 7.07 m
- c. 9.42 m
- d. 28.26 m

TRIANGLES AND ANGLES

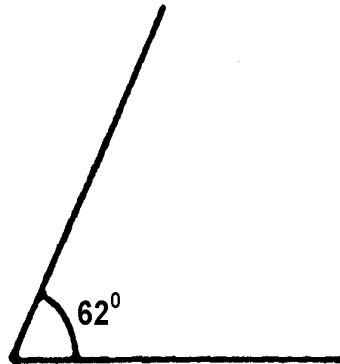
64. Calculate c in the following right triangle.



- a. 3.74
- b. 5
- c. 9.42
- d. 12.56

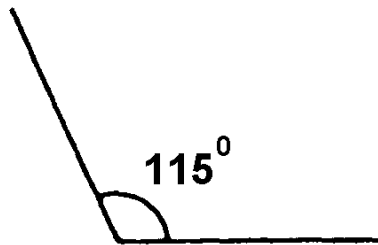
**Electrician – Pre-Apprenticeship
Math Entrance Exam**

65. What is the type of angle shown below?



- a. right
- b. acute
- c. obtuse
- d. hypotenuse

66. What is the type of angle shown below?



- a. right
- b. acute
- c. obtuse
- d. hypotenuse

POWERS: *Solve the following:*

67. The square of 12 = ?

- a. 3
- b. 3.46
- c. 4
- d. 144

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

68. $(2/3)^3 = ?$

- a. $2/27$
- b. $8/27$
- c. $16/27$
- d. $2\ 2/3$

ROOTS: Solve the following:

69. $\sqrt{0.81} = ?$

- a. .66
- b. .9
- c. 1.62
- d. 9

70. $\sqrt{10} = ?$

- a. .1
- b. 3.16
- c. 5
- d. 100

71. $\sqrt{169/121} = ?$

- a. 1.18
- b. 1.4
- c. 1.95
- d. 6.93

RATIO AND PROPORTION:

72. Express the following ratio in lowest terms: 15 to 20 = ?

- a. $3/4$
- b. $3/5$
- c. $7/10$
- d. $15/20$

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

73. Write the inverse of the following ratio: 5 to 7 = ?
- a. $5/7$
 - b. $7/5$
 - c. $.71$
 - d. 1.4
74. The primary winding of an electric transformer has 240 turns, and the secondary winding has 15 turns. What is the ratio of the primary winding to the secondary?
- a. $15/240$
 - b. $240/15$
 - c. $1/16$
 - d. $16/1$
75. Use proportion to solve the following problem. A cylindrical barrel contains 9 kL of gasoline when filled to a depth of 3 m. How many kL does the barrel contain when the level is 2 m?
- a. 2 kL
 - b. 3 kL
 - c. 6 kL
 - d. 13.5 kL
76. Write the following proportion. Do not solve.
- Seven hundred metres in 50 seconds is the same as 420 m in 30 seconds.
- a. $700:50 = 30:420$
 - b. $50:700 = 420:30$
 - c. $700:420 = 50:30$
 - d. $700:50 = 420.30$

ALGEBRA: Solve the following:

77. $4x = 12 + 48$ $x = ?$
- a. $x = 15$
 - b. $x = 51$
 - c. $x = 60$
 - d. $x = 240$

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

78. $Z = \frac{K}{M}$ $K = ?$

- a. $K = .52$
- b. $K = 27$
- c. $K = ZM$
- d. $K = Z/M$

79. $5r^2 + 5 = 130$ $r = ?$

- a. $r = 5$
- b. $r = 10$
- c. $r = 25$
- d. $r = 5^2$

80. Given $T = 260$, $N = 808$

Solve for P where:

$$T = \frac{P \times 5252}{N}$$

- a. $P = T/N$
- b. $P = 40$
- c. $P = 548$
- d. $P = 400$

EQUATIONS: Solve for N in the following questions:

81. $N + 6 = 24$

- a. $N = 4$
- b. $N = 18$
- c. $N = 30$
- d. $N = 144$

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

82. $6N = 24$

- a. $N = 4$
- b. $N = 18$
- c. $N = 30$
- d. $N = 144$

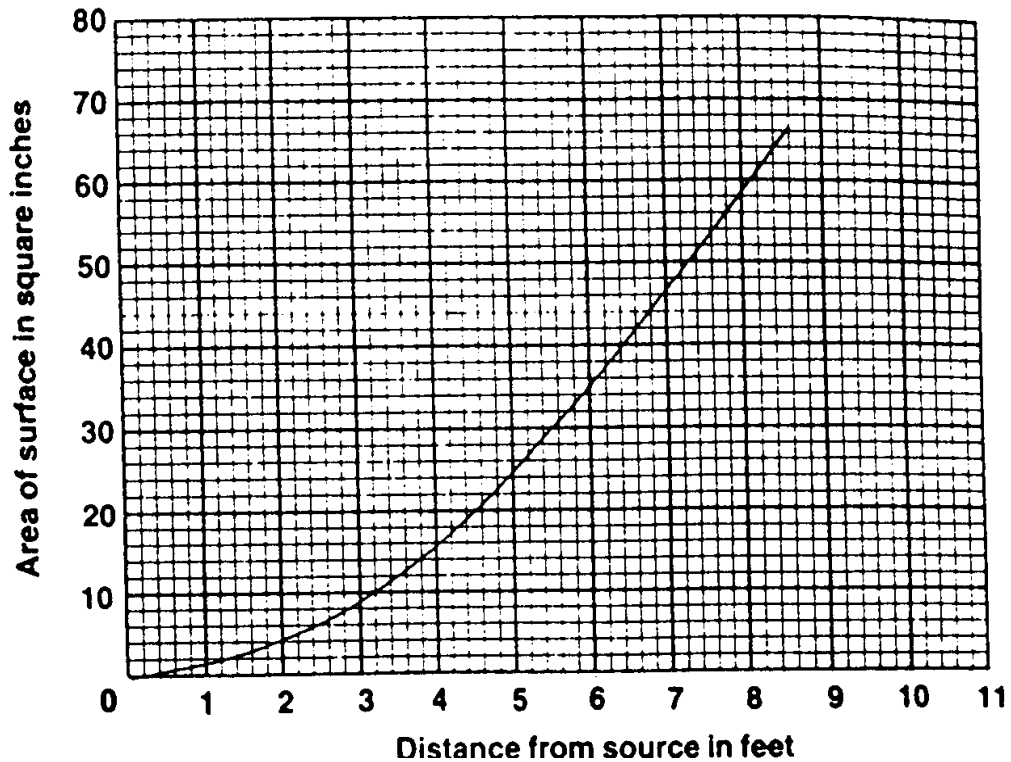
83. $\frac{N}{6} = 24$

- a. $N = 4$
- b. $N = 18$
- c. $N = 30$
- d. $N = 144$

GRAPHS:

84. In the diagram below, the number of square inches of surface covered by light from a point six feet from the source is

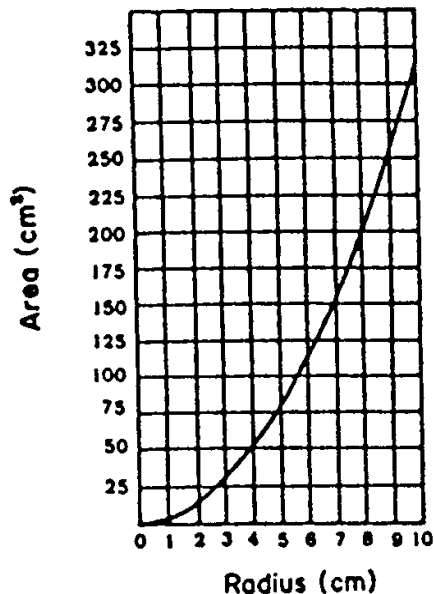
- a. 6
- b. 30
- c. 35
- d. 38



Electrician – Pre-Apprenticeship
Math Entrance Exam

QUESTIONS 85 TO 87 INCLUSIVE REFER TO THE ILLUSTRATION BELOW.

Circle Radius Against Circle Area

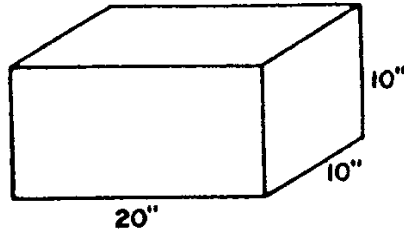


85. Which kind of graph is this?
- pie graph
 - area graph
 - linear graph
 - comparison graph
86. What is the approximate radius of a circle with an area of 100 cm²?
- 5.5 cm.
 - 8.0 cm.
 - 315 cm.
 - 3150 cm.
87. What is the approximate area of a circle with a radius of 9 cm?
- 0.5 cm²
 - 5.5 cm²
 - 260 cm²
 - 300 cm²

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

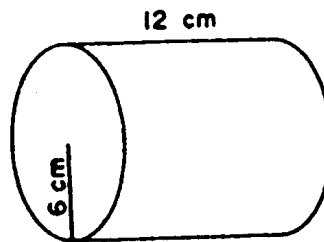
VOLUME:

88. Find the volume of the diagram below.



- a. 200 in^3
- b. 400 in^3
- c. 1.16 ft^3
- d. 13.89 ft^3

89. Find the volume of the diagram below.



- a. 226.19 cm^3
- b. 452.39 cm^3
- c. 1357.17 cm^3
- d. 5428.67 cm^3

90. There are two rectangular tanks.

Tank A's dimensions are: 10m x 6m x 5m.

Tank B's dimensions are: 7m x 4m x 8m.

Which tank holds more?

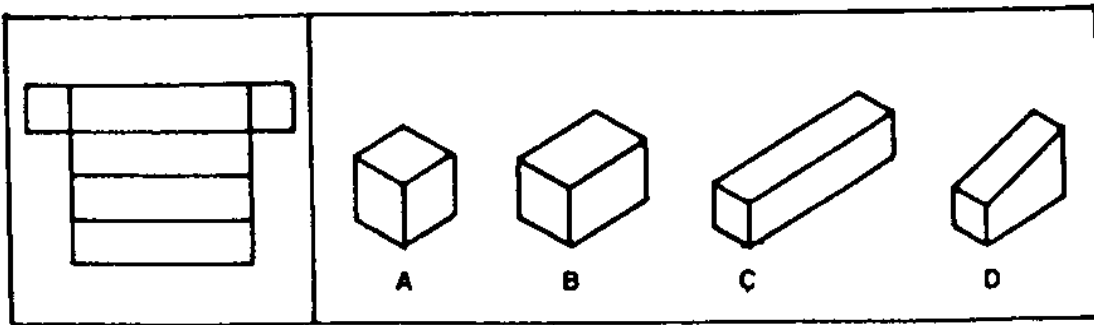
- a. Tank A
- b. Tank B

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

READING DRAWINGS:

91. Which of the figures below, A, B, C, or D can be made from the pattern at the left?

Pattern

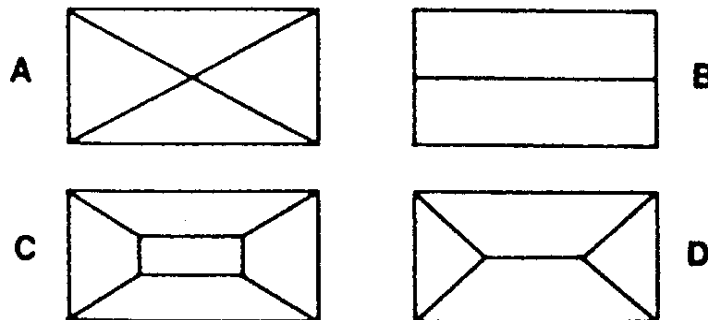


- a. A
- b. B
- c. C
- d. D

92. The **front** and **right side** views of an object are



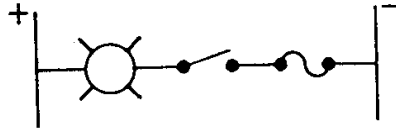
The top view is



**Electrician – Pre-Apprenticeship
Math Entrance Exam**

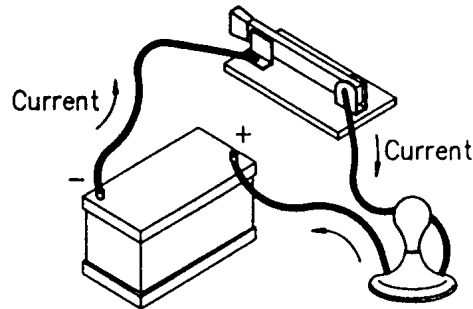
93. The figure below is an example of a

- a. pictorial diagram
- b. block diagram
- c. wiring diagram
- d. schematic diagram



94. The figure below is an example of a

- a. pictorial diagram
- b. block diagram
- c. wiring diagram
- d. schematic diagram



95. A wiring diagram is drawn

- a. with blocks
- b. in several colours
- c. in three dimensional form
- d. in two dimensional form

96. To identify components, a wiring diagram uses

- a. photographs
- b. symbols
- c. blocks
- d. numbers

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

TRADE SCIENCE:

97. Electrical energy is usually sold by the

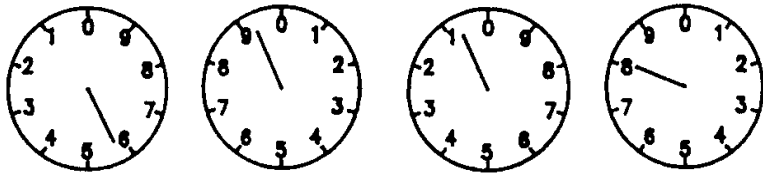
- a. joule
- b. watt
- c. watt-hour
- d. kilowatt-hour

98. The relationship between watts and horsepower is expressed by

- a. $1 \text{ hp} = 1000 \text{ W}$
- b. $7.46 \text{ hp} = 1 \text{ W}$
- c. $1 \text{ hp} = 746 \text{ W}$
- d. $1 \text{ hp} = 9.81 \text{ W}$

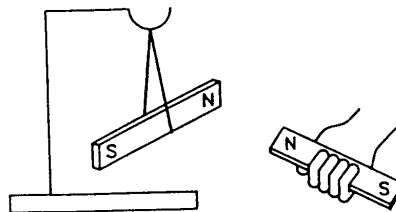
99. The meter reading is

- a. 5008 kWh
- b. 5018 kWh
- c. 5908 kWh
- d. 6918 kWh



100. The north end suspended magnet in the diagram below will spin

- a. towards the held magnet.
- b. away from the held magnet



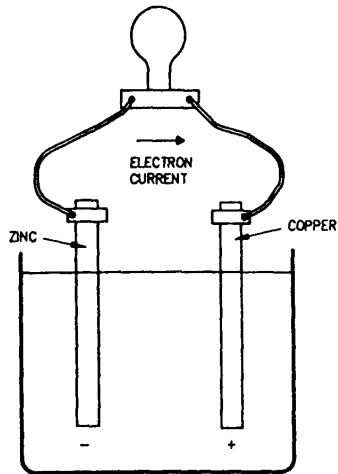
101. Magnetic flux lines outside of a magnet extend from

- a. north to south.
- b. south to north.

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

102. The drawing below represents a

- a. Light circuit
- b. A/C circuit
- c. Simple cell
- d. Dead short



103. The Law of the Conservation of Energy says energy

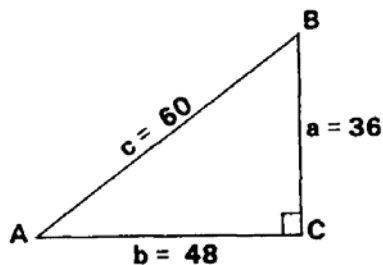
- a. is easy to make.
- b. can only be changed in form.
- c. cannot change form.
- d. can be destroyed.

104. A single kilowatt is the same as (that is, $1 \text{ kW} = ?$)

- a. one horsepower (1 hp).
- b. one hundred watts (100 W).
- c. one thousand watts (1000 W).
- d. one newton-metre (1 N-m).

TRIGONOMETRY:

QUESTIONS 104 TO 107 INCLUSIVE REFER TO THE ILLUSTRATION BELOW.



**Electrician – Pre-Apprenticeship
Math Entrance Exam**

105. In the triangle shown above $\text{SIN } A =$

- a. b/c
- b. a/c
- c. c/b
- c. b/a

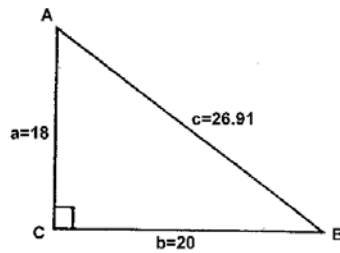
106. In the triangle shown above $\text{SIN } B =$

- a. b/c
- b. a/c
- c. b/a
- d. c/b

107. In the triangle shown above $\text{TAN } A =$

- a. a/b
- b. c/b
- c. b/a
- d. b/c

QUESTIONS 108 TO 110 REFER TO THE ILLUSTRATION BELOW.



108. In the triangle shown above, Angle A =

- a. 1.111°
- b. 41.99°
- c. 48.01°
- d. 26.91°

**Electrician – Pre-Apprenticeship
Math Entrance Exam**

109. In the triangle above, Side C =

- a. 26.91
- b. 36.03
- c. 38.01
- d. 72.00

110. In the triangle shown above, Angle B =

- a. 0.9°
- b. 41.99°
- c. 48.01°
- d. 70.61°