Name_____ Date_____

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Algebra & Equations Homework

REFERENCES:

Answers:
services.nietc.org
Khan Academy:
https://www.khanacademy.org/math/algebra-home
Math is Fun:
https://www.mathsisfun.com/algebra/index.html
Purple Math:
http://www.purplemath.com/modules/solvelin.htm
NOTE: Subscripts (i.e. X_L, X_C) are used to differentiate between variables. These variables may have similar properties, but are still separate variables. For example: R_1 and R_2 will be used as variables for resistor #1 and resistor #1 in a circuit. Both are measured in Ohms but will likely have different values.

QUESTIONS:

1) Change the following rule into a formula:
The Power In Watts (P) In A Circuit Is Equal To The Voltage (E) Multiplied By The Current (I).
Answer:
a. $I = P \times E$
b. $E = I \times P$
→ c. $P = E \times I$
d. $P = I \times E^2$

2) Change the following rule into a formula.
The Resistance In Ohms (R) In A Circuit Is Equal To The Voltage (E) Divided By The Current (I).
Answer:
a. $E = I \div R$
b. $I = E \div R$
c. $R = I \div E$
→ d. $R = E \div I$

3) Find the value of the variable A in the equation: $A = \frac{BH}{2}$
If B = 13 And H = 5.
Answer:
a. 30. 2
→ b. 32.5
c. 65
d. 65.7

4) $A \times B = AB$ if $AB = 63$ and $B = 12.6$, what is the value of A?
Answer:
e. $A = 3$
→ f. $A = 5$
g. $A = 7$
h. $A = 9$

5) How could someone prove he or she answered the previous question correctly?

Answer:

i. Run the calculation(s) again to test the equation.
j. Substitute any values into the original equation and verify the equality.
k. Substitute the original values into the original equation and verify equality.
→ l. Substitute the calculated values into the original equation and verify equality.

6) If a person multiplies one side of an equation by five, what must he or she do to the other side of the equation?

Answer:

a. Add five.
b. Divide by five.
→ c. Multiply by five.
d. Subtract five.

7) Solve the following equation: $15Y = 90$

Answer:

a. $Y = 0.166$
b. $Y = 5$
→ c. $Y = 6$
d. $Y = 9$

8) To solve $15Y = 90$, a person must _?_ each side of the equation by _?_.

Answer:

→ a. divide by 15
b. divide by 90
c. multiply by 15
d. multiply by 90

9) Solve for R in the following equation: $\frac{R}{5} = 6$

Answer:

a. 15
→ b. 30
c. 36
d. 40

10) To solve $A + 17 = 20$, a person must _?_ each side of the equation.

Answer:

a. add 17 to
b. divide 17 on
c. multiply by 17 on
→ d. subtract 17 from

11) Solve the following equation: $A + 17 = 20$

Answer:

a. $A = -3$
b. $A = 2$
→ c. $A = 3$
d. $A = 7$

12) To solve $A - 7 = 17$, a person must _?_ each side of the equation.

Answer:

- a. add 7 to
- b. divide 7 on
- c. multiply by 7 on
- d. subtract 7 from

13) Solve the following equation: $A - 7 = 17$

Answer:

- a. 10
- b. 14
- c. 21
- d. 24

14) Solve the following equation for *X*: $\frac{(3X)}{3} = \frac{(4-1)}{3}$

Answer:

- a. 1 ÷ 3
- b. 1
- c. 3
- d. *X*

15) Solve the following for *X*: $45X = \frac{120}{2}$

Answer:

- a. $X = 0.075$
- b. $X = 1.33$
- c. $X = 2.667$
- d. $X = 4{,}050$

16) Solve the following for *X*: $X - \left(\frac{7}{2}\right) = 120$

Answer:

- a. $X = 60$
- b. $X = 116.5$
- c. $X = -123.5$
- d. $X = 123.5$

17) Solve the following for *X*: $\frac{128}{X} = 64$

Answer:

- a. $X = 0.2$
- b. $X = 1 \div 2$
- c. $X = 0.75$
- d. $X = 2.0$

18) A(n) _?_ is a shorthand method for writing a mathematical rule.

Answer:

- a. equal sign (=)
- b. equation
- c. formula
- d. math problem

19) The multiplication of two or more quantities may be expressed as the _?_ of the same quantities.

Answer:

a. dividend
b. product
c. quotient
d. sum

20) Division of two quantities is expressed as the _?_ of those two quantities.

Answer:

a. dividend
b. product
c. quotient
d. sum

21) _?_ is expressed as the sum of a given number of quantities.

Answer:

a. Addition
b. Multiplication
c. Subtraction
d. The square of a number

22) Subtraction is expressed as the _?_ two quantities.

Answer:

a. difference between
b. division of
c. ratio of
d. sum of

23) Select the correct Ohm's Law formula that will solve for *E* when only *I* and *R* are known.

Answer:

a. $E = \frac{I}{R}$
b. $E = I \times R$
c. $E = \frac{P}{I}$
d. $E = \sqrt{P \times R}$

24) Given: $X = Y - 8$, $X = 2Y$, Solve for *X:*

Answer:

a. $X = -8$
b. $X = 8$
c. $X = -16$
d. $X = 16$

$2Y = Y - 8$
$Y = -8$
$X = 2 \times (-8)$
$X = -16$

FOR QUESTIONS 25-30 USE THE FORMULAS: $E = I \times R$ AND $P = E \times I$

25) Solve for *E* when only *I* and *P* are known.

Answer:

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

26) Solve for *E* when only *R* and *P* are known.

Answer:

$$E = \sqrt{P \times R}$$

27) Solve for *R* when only *E* and *I* are known.

Answer:

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

28) Solve for *R* when only *E* and *P* are known.

Answer:

$$R = \frac{E^2}{P}$$

29) Solve for *R* when only *I* and *P* are known.

Answer:

$$R = \frac{P}{I^2}$$

30) Given: I = 150 µA R = 450 kΩ, Solve for: E (in volts)

Answer:

a. 6.75 Volts
b. 67.5 Volts
c. 675.0 Volts
d. 6,750.0 Volts

E = 0.000150 × 450,000
E = 67.5 Volts

31) Given: $R_1 = 10$ $R_2 = 20$ $R_3 = 30$ $I_2 = 5$ $I_3 = 2$

$100 = I_1 \times R_1 + I_2 R_2 + I_3 R_3$

Solve for I_1

Answer:

a. $I_1 = -0.1667$
b. $I_1 = 0.1667$
c. $I_1 = -6$
d. $I_1 = 6$

100 = 10(I1) + 20(5) + 30(2)
100 = 10(I1) + 100 + 60
100 = 10(I1) + 160
–60 = 10(I1)
–6 = I1 or I1 = –6

32) Given: I_N = 10 Amps R_N = 2 Ω R_L = 3 Ω

$$I_L = I_N \times \frac{R_N}{R_N + R_L}$$

Solve for I_L

Answer:

a. I_L = 0.25 Amps
b. I_L = 4.0 Amps
c. I_L = 10 Amps
d. I_L = 25 Amps

33) Solve the following equation for HP: $Amps = \frac{HP \times 746}{E \times Efficiency \times P_f}$

Method #1

$$\frac{1}{HP} \times Amps = \frac{\cancel{HP} \times 746}{E \times Efficiency \times P_f} \times \frac{1}{\cancel{HP}}$$

$$\frac{1}{\cancel{Amps}} \times \frac{\cancel{Amps}}{HP} = \frac{746}{E \times Efficiency \times P_f} \times \frac{1}{Amps}$$

$$\frac{1}{HP} = \frac{746}{E \times Efficiency \times P_f \times Amps}$$

$$HP = \frac{E \times Efficiency \times P_f \times Amps}{746}$$

Method #2

$$\frac{Amps}{1} = \frac{HP \times 746}{E \times Efficiency \times P_f}$$

$$\frac{E \times Efficiency \times P_f}{746} \times \frac{Amps}{1} = \frac{HP \times \cancel{746}}{\cancel{E \times Efficiency \times P_f}} \times \frac{\cancel{E \times Efficiency \times P_f}}{\cancel{746}}$$

$$\frac{E \times Efficiency \times P_f \times Amps}{746} = HP$$

34) Solve the following formula for P_f: $KW = \frac{E \times I \times P_f \times \sqrt{3}}{1000}$

$$\frac{KW}{1} = \frac{E \times I \times P_f \times \sqrt{3}}{1000}$$

$$\frac{1000}{E \times I \times \sqrt{3}} \times \frac{KW}{1} = \frac{\cancel{E \times I} \times P_f \times \cancel{\sqrt{3}}}{\cancel{1000}} \times \frac{\cancel{1000}}{\cancel{E \times I} \times \cancel{\sqrt{3}}}$$

$$\frac{1000 \times KW}{E \times I \times \sqrt{3}} = P_f$$

35) Solve the following for $E_{L\text{-}L}$: $f = \frac{1.732 \times L \times I_{3\theta}}{C \times E_{L\text{-}L}}$

$$E_{L\text{-}L} \times f = \frac{1.732 \times L \times I_{3\theta}}{C \times \cancel{E_{L\text{-}L}}} \times \cancel{E_{L\text{-}L}}$$

$$\frac{E_{L\text{-}L} \times \cancel{f}}{\cancel{f}} = \frac{1.732 \times L \times I_{3\theta}}{C \times E_{L\text{-}L}} \times \frac{1}{f}$$

$$E_{L\text{-}L} = \frac{1.732 \times L \times I_{3\theta}}{C \times f}$$

36) CHALLENGE: solve for R_2 if $R_t = 6$, $R_1 = 12$, $R_3 = 30$ and the following formula is true:

$$R_t = \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right)^{-1}$$

$$R_t = \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right)^{-1}$$

$$R_t = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$

$$\frac{R_t}{1} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$

$$\frac{R_t}{1} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$

$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$\frac{1}{R_t} - \left(\frac{1}{R_1} + \frac{1}{R_3}\right) = \cancel{\frac{1}{R_1}} + \frac{1}{R_2} + \cancel{\frac{1}{R_3}} - \left(\cancel{\frac{1}{R_1}} + \cancel{\frac{1}{R_3}}\right)$$

$$\frac{1}{R_t} - \left(\frac{1}{R_1} + \frac{1}{R_3}\right) = \frac{1}{R_2}$$

$$\frac{1}{\frac{1}{R_t} - \left(\frac{1}{R_1} + \frac{1}{R_3}\right)} = R_2$$

$$\left(\frac{1}{R_t} - \left(\frac{1}{R_1} + \frac{1}{R_3}\right)\right)^{-1} = R_2$$

$$\left(\frac{1}{6} - \left(\frac{1}{12} + \frac{1}{30}\right)\right)^{-1} = 20$$