ENGINEERING PHYSICS

MCQ– Bridge Course

Choose the correct option.

1) Body of mass 2kg is acted upon by two perpendicular forces 4N along the x-axis and 3N along y-axis. What is the magnitude of the acceleration of the body?
   a) 1.5 ms^{-2} b. 2.0 ms^{-2} c. 2.5 ms^{-2} d. 3.5 ms^{-2}
2) A cylinder rolls up an inclined plane, reaches some height and then rolls down (without sleeping throughout these motions). The directions of the frictional force acting on the cylinder are
   a) Up the incline while ascending and down the incline while descending.
   b) Up the incline while ascending as well as descending.
   c) Down the incline while ascending and up the incline while descending.
   d) Down the incline while ascending as well as descending.
3) A bomb at rest explodes into a large number of tiny fragments. The total momentum of all the fragments.
   a) Is zero.
   b) depends on the total mass of all the fragments.
   c) depends on the speed of various fragments.
   d) is infinity.
4) Which of the following statements is NOT correct? No net force acts on
   a) a drop of rain falling vertically with a constant speed.
   b) a cork floating on water.
   c) a car moving with a constant velocity on a rough road.
   d) a body moving in a circular path at constant speed.
5) A cricket ball of mass 150 gram is moving with a velocity of 12 ms^{-1} and is hit by a bat so that the ball is turned back with a velocity of 20 ms^{-1}. The force of the blow acts for 0.1 s. What is the average force exerted on the ball by the bat?
   a) 18 N
   b) 30 N
   c) 48 N
   d) 60 N
6) A box is being pushed horizontally along the floor in a straight line at a constant speed. What must be true of the magnitude of the applied pushing force compared to the magnitude of the (kinetic) friction force?

a) The applied force must be larger than the frictional force or the object wouldn't be sliding forward.
b) The answer depends on the mass of the box.
c) The frictional force must be just slightly less than the applied pushing force.
d) The applied force is equal in size to the frictional force.

7) Which are the correct units for coefficient of friction?
a) newtons b) m/s c) 1/N d) none of these

8) Considering Newton's model of gravity, which of the following statements concerning the "constants" G and g is true?
a) Neither g nor G depend on location. (They are both "universal" constants.)
b) Both g and G depend on location. (They are "constants" but location-dependent constants.)
c) The value of G is believed to be the same anywhere in the universe.
d) The value of g and G turn out to be equal (to each other) at the surface of a planet.

9) Newton's First Law of Motion is sometimes called the "Law of Inertia". What is "inertia"?
a) Inertia is the word used to describe non-reactive elements like argon.
b) Inertia is just another, scientific name for "weight".
c) It's the name used for the force that keeps a planet (for example)in a (nearly) circular orbit around the Sun.
d) It's the tendency of an object to stay in a constant state of rest or uniform motion.

10) Kepler's laws are mostly applicable..
a) Law of gravity in space.
b) Planetary motions.
c) Conservation of angular momentum.
d) Law of inertia.

11) Newton's theory about gravity says that gravity
a) is what pulls or pushes the planets forward in their orbits around the Sun.
b) exists between any two objects that have mass.
c) only exists for very large objects like planets and stars.
d) is the strongest of all the natural forces (since it rather literally holds the universe together.)

12) A ball rests upon a flat piece of paper on a table top. The paper is pulled horizontally but quickly towards right as shown. Relative to its initial position with respect to the table, the ball _____.

(i) Remains stationary if there is no friction between the paper and the ball.

(ii) Moves to the left and starts rolling backwards, i.e. to the left if there is a friction between the paper and the ball.

(iii) Moves forward, i.e. in the direction in which the paper is pulled.

Here, the correct statement/s is/are _____ .

a) only (i) **b)** only (ii) **c)** both (i) and (ii) **d)** only (iii)

13) The SI unit of magnetic permeability is..
a) TmA^{-2} b) TmA^{-1} c) Tm^{-1} d) Fm^{-1}

14) Direction of the force experienced by a charge particle moving with a velocity v in a uniform magnetic field B is…
a) parallel to v and perpendicular to B
b) parallel to B and perpendicular to v
c) parallel to both v and B
d) perpendicular to both v and B

15) The magnetic permeability of paramagnetic substance is..
a) small and positive b) small and negative
c) large and positive d) large and negative

16) The frequency of the charged particle circulating at right angles to a uniform magnetic field does not depend upon the..
a) speed of particle b) mass of the particle
c) charge of the particle d) magnetic field

17) Which of the following is not a vector quantity?
a) magnetic dipole moment b) moment of inertia
c) torque d) horizontal component of earth's magnetic field

18) Two wires, carrying equal currents in the same direction, placed one can apart experience:
a) an attractive force b) a repulsive force
c) sometime an attractive an sometimes a repulsive force
d) no force at all

19) Transformers are used in..
a) DC circuits alone b) AC circuits alone c) both AC and DC d) None of these

20) An electron enters a region of uniform magnetic field with a certain velocity in the direction of the filed. It will move:

a) along the direction of the filed with unchanged velocity
b) along the direction on filed with decreasing velocity
c) along the direction of filed with increasing velocity
d) in a circle with constant speed

21) Electric potential due to a point charge varies as :

a) r b) r^2 c) 1/r d) $1/r^2$

22) The charge of the electron in coulombs is :

a) None of these b) – 4.8 x 10^{-10} c) + 1.6 x 10^{-10} d) – 1.6 x 10^{-10}

23) A parallel plate capacitor has a capacity of 10 μf. The distance between the plates is doubled without altering any other thing, the capacity (in μF) is now:

(a) 0.2 (b) 0.5 (c) 5 d) 20

24) To estimate magnetic flux density B at the centre of a long solenoid the following measurements are carried out:

P. The volume of the solenoid.

Q. The diameter of each turn of the solenoid.

R. the number of turns per unit length of the solenoid.

S. The current through the solenoid B is dependent on:

a) Only R b) R and S c) Q, R and S d) Q and S

25) Consider the statements:

A. Moving charges do not produce any electric filed.

B. Stationary charges do not produce any magnetic field.

Of the two statement.

a) A is false b) B is false c) Both are false d) both are true

26) Three resistance values 10 ohm, 10 ohm and 5 ohm are to be connected to a 5V battery so as to obtain 0.5 amperes current in the circuit. This can be done by connecting:

a) all resistances in series b) all resistances in parallel

c) two 10 ohm resistance in parallel and 5 ohm resistance in series

d) 5 ohm and 10 ohm resistances in parallel and 10 ohm resistance in series.

27) The resistance of a wire is independent of:

a) its material b) its length

c) its area of cross-section d) the voltage applied to its ends

28) The resistance R of a conductor of length L and area of cross – section A carrying a current I is given by:

a) R=pA/L, where p=specific resistance

b) R = VI, where V = potential different

c) R = σA, where σ = electrical conductivity

d) $R = 2mL/ne^2\tau A$. Where τ = relaxation time, n the electron density e the electronic charge and m is the mass of an electron.

29) Conversion of heat into electrical energy can be achieved by:

a) thermocouple

b) thermister

c) thyratron

d) photo-electric cell

30) An electric heater in marked 100 watt 250 volts. The resistance of the heater elements would be approximately:

a) 16.0 ohm b) 125 ohm c) 62.5 ohm d) 1×10^6 ohm

31) A galvanometer can be converted into a voltmeter by connecting:

a) a low resistance in series with the galvanometer

b) a high resistance in series with the galvanometer

c) a low resistance in parallel with the galvanometer

d) a high resistance in parallel with the galvanometer

32) Consider the statements.

A. Copper wires of same volume but of different radii have the same resistance.

B. Copper wires of different radii have the same resistivity.

Of the two statements:

a) both are true b) A is true c) B is true d) both are false

33) The emf of a battery, compared to its potential difference is:

(a) less b) equal c) more d) none of these

34) Thermal conductivity in metals is:

a) due to positive ions only

b) due to electrons only

c) mainly due to positive ions

d) mainly due to free electron

35) Unit of resistivity is :

a) ohm – metre b) ohm / metre c) ohm / metre ^{2} d) ohm / metre ^{3}

36) The reciprocal of resistivity is known as:

a) susceptibility b) conductivity c) permeability d) permittivity

37) To get the maximum current from a number of cells they should be ground in a mixed way such that:

a) all the cells get connected in series

b) the external resistance is less than he internal resistance of the combination of cells

c) the external resistance of the combination of cells

d) the external resistance is equal to the internal resistance of the combination of cells.

38) Heating effect per second of current t flowing through a conductor of resistance R when a voltage V is applied across it for I second is:

a) V^2/R b) VI/R c) $V^2.R$ d) V I t

39) Two wires A and B of the same material and same length are connected in parallel to the terminals of a.c. supply. The diameter of A is double that of B. the ratio of heat developed in B to that in A is :

a) 4 : 1 b) 1 : 4 c) 2 : 1 d) 1 : 2

40) The buoyant force on an object is dependent on

a) the object's density.
c) the submerged volume of the object.
b) the mass of the object.
d) the shape of the object.

41) The property that most determines whether or not an object will float in oil is the object's

a) weight. b) mass. c) density. d) volume.

42) A ring is having a angular velocity Ω. if we double the speed change in kinetic energy will be..

a) halved
b) unchanged
c) four times
d) eight times

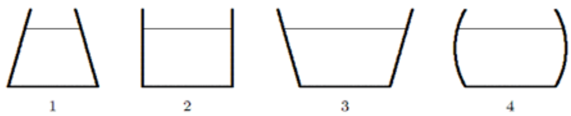
43) One end of a towel dips into a bucket full of water and other end hangs over the bucket. It is found that after some time the towel becomes fully wet. It happens..

a) Because viscosity of eater is high
b) Because of the capillary action of cotton threads
c) Because of gravitational force
d) Because of evaporation of water.

44) The work done in blowing a soap bubble of radius R is W_1 and that to a radius 3R is W_2. the ratio of work done is

a) 1:3 b) 3:1 c) 1:9 d) 9:1

45) The vessels shown below all contain water to the same height. Rank them according to the pressure exerted by the water on the vessel bottoms, least to greatest.



a) 1, 2, 3, 4 b) 3, 4, 2, 1 c) 4, 3, 2, 1 d) All pressure are the same

46) The principle of fluid pressure that is used in hydraulic brakes or lifts is that:

a) pressure is the same at all levels in a fluid

b) increases of pressure are transmitted equally to all parts of a fluid

c) the pressure at a point in a fluid is due to the weight of the fluid above it d)

increases of pressure can only be transmitted through fluids

47) Oil has a smaller density than water. Therefore, an object that will float in oil will

a) float in water, with more of the object submerged.
b) float in water, with the same amount of the object submerged. c) float
in water, with less of the object submerged.
d) not float in water.

48) What will be behavior of convex lens in denser medium?
a) Converging b) Diverging c) unchanged d) imaginary

49) How many diode/s is/are used in designing of half wave rectifier circuit?
a) 1 b) 2 c) 3 d) 4

50) Which phenomenon is responsible for generation of mirage during summer season?
a) total internal reflection b) penetration of light c)
absorption of light d) None of these

51. The buoyant force on an object is dependent on

a) the object's density. **c)** the submerged volume of the object. b) the
mass of the object. d) the shape of the object.

52. The buoyant force on an object submerged in a fluid depends on

a) the object's density.
b) the fluid's density.
c) the acceleration due to gravity.
d) (a) and (b) but not (c).
e) (b) and (c) but not (a).

53. The property that most determines whether or not an object will float in oil is the object's

a) weight. **c)** density. b)
mass. d) volume.

54. An object is placed in a fluid. The buoyant force on the object is proportional to

a) the density of the object.
b) the volume of the object.
c) the density of the fluid.
d) (b) and (c) but not (a).
e) (a) and (b) and (c).

55. Does the air exert a buoyant force on my pen if I throw it across the room?

a) Yes b) No c) There is not enough information.

56. Why does a duck float?

a) The duck weighs less than water. c) The duck has feathers
b) The duck can swim. **d)** The duck has a smaller density than water.

57. An object can float provided its _______ is _________ than the _______ of the fluid,

a) mass . . .less . . . mass
b) density . . . less . . . density
c) mass . . .greater . . .density
d) density . . . less . . . mass

58. A wooden boat with a density of 0.48 g/cc is floating in a vat of oil whose density is 0.80 g/cc.
What percentage of the boat is floating **above** the surface of the oil?

a) 42 %
b) 60 %
c) 52 %
d) 40 %

59. Will an object that floats in water also float in the oil from the previous question?

a) Yes
b) No
c) There is not enough information.

60. Oil has a smaller density than water. Therefore, an object that will float in oil will

a) float in water, with more of the object submerged.
b) float in water, with the same amount of the object submerged.
c) float in water, with less of the object submerged.
d) not float in water.
e) There is not enough information.

61. A boat with a density of 0.75 g/cc is floating in water. What percentage of the boat is floating **above** the surface of the water?

a) 25 %
b) 50 %
c) 75 %
d) None; the boat will actually sink!

62. The pressure at an underwater depth of 33.7 feet is 2 atmospheres (atm). At what depth would the pressure be 3 atm?

a) 67.4 feet.
d) 50.55 feet.
c) 101.1 feet
d) The pressure can never reach 3 atm.

63. The pressure at an underwater depth of 33.7 feet is 2 atmospheres (atm). At what depth would the pressure be 4 atmospheres?

a) 67.4 feet
b) 134.8 feet
c) 101.1 feet
d) The pressure can never reach 4 atm.

64. A 20 kg solid block of Aluminum (▯$_{Al}$ = 2.70 g/cc) is placed in a beaker of water filled to the brim. Some water overflows. The same is done in another beaker with a 20 kg solid block of lead (▯$_{lead}$ = 11.3 g/cc) Does the block of lead displace more, less, or the same amount of water as the aluminum block?

a) More
b) Less
c) The same amount.
d) There is not enough information.

65. If, in problem 17, we continue to use a 20 kg solid block of aluminum, but instead of a 20 kg block of Lead we use a 10 kg block of lead, does the block of lead displace more, less, or the same amount of water as the aluminum block?

a) More
b) Less
c) The same amount.
d) There is not enough information.

66. If, in problem 17, we continue to use a 20 kg solid block of aluminum, but instead of a 20 kg block of Lead we use a **80 kg block** of lead, does the block of lead displace more, less, or the same amount of water as the aluminum block?

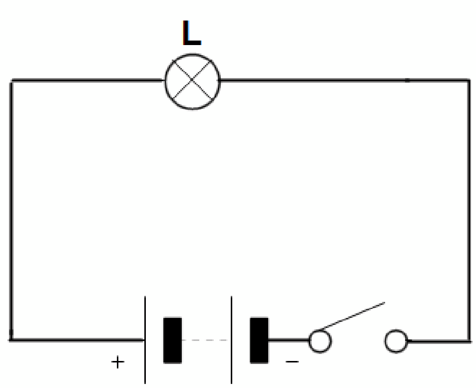
a) More
b) Less
c) The same amount.
d) There is not enough information.

67. Which has a greater buoyant force acting on it, a floating 100 lb piece of wood, or a floating50 lb piece of wood?

a) The 100 lb piece of wood.
b) The 50 lb piece of wood.
c) Since both pieces of wood are floating, they experience the same buoyant force.
d) There is not enough information.

68. The amount of charge flowing through a cross-sectional area of a wire per unit of time is called:

A. Voltage B. Power C. Resistance D. Work **E**. Current



69. What is the direction of the conventional current through the light bulb in the circuit presented by the diagram above?

A. → B. ← C. ↓ D. ↑ E. Out of the page

70. A wire of length L and cross-sectional area A has a resistivity ρ. Which of the following formulas can be used to calculate the resistance of the wire?

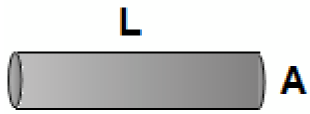
A. R = $\frac{\rho L}{A}$

B. R = $\frac{\rho A}{L}$

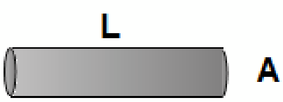
C. R = $\frac{L}{\rho A}$

D. R = $\frac{A}{\rho L}$

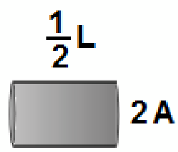
E. R = $\frac{\rho}{A}$



71. All of the following wires are made of the same material but are different sizes. Identify the wire with the lowest resistance.



A.



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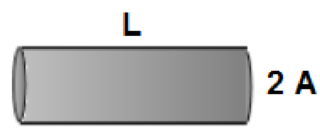
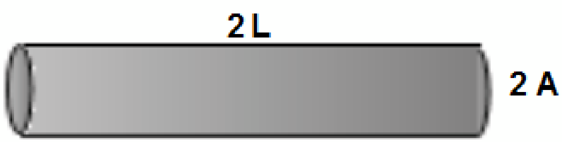


C.

D.


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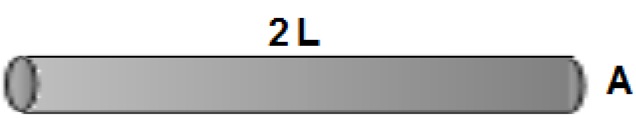


f.

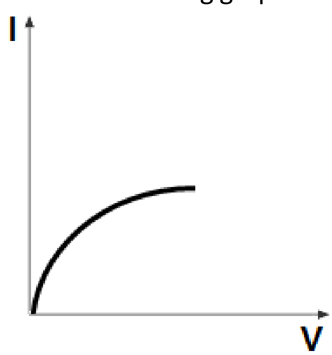
72. Two copper wires have the same cross-sectional area but have different lengths. Wire X has a length L and wire Y has a length 2L. The ratio between the resistance of wire Y and wire X is:

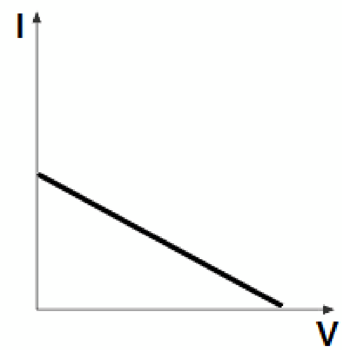
A. $\frac{R_y}{R_x} = \frac{1}{1}$ B. $\frac{R_y}{R_x} = \frac{1}{2}$ **C.** $\frac{R_y}{R_x} = \frac{2}{1}$ D. $\frac{R_y}{R_x} = \frac{1}{4}$ E. $\frac{R_y}{R_x} = \frac{4}{1}$

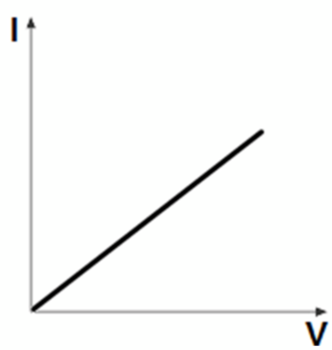
73. Two aluminum wires A and B are presented by the diagram. Wire B has twice the radius of that of wire A. How does the resistance of wire B compare to the resistance of wire A.

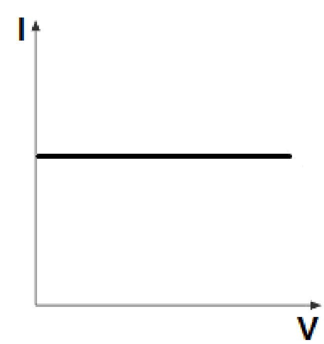
A. $\frac{R_B}{R_A} = \frac{1}{1}$ B. $\frac{R_B}{R_A} = \frac{1}{2}$ C. $\frac{R_B}{R_A} = \frac{2}{1}$ **D.** $\frac{R_B}{R_A} = \frac{1}{4}$ E. $\frac{R_B}{R_A} = \frac{4}{1}$

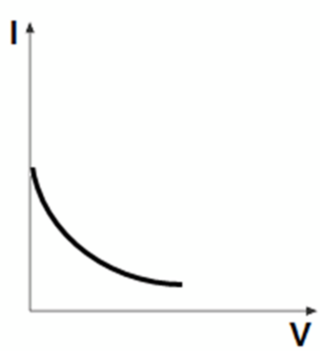
74. Which of the following graphs represents Ohm's law for a solid conductor at the constant temperature?

A. 

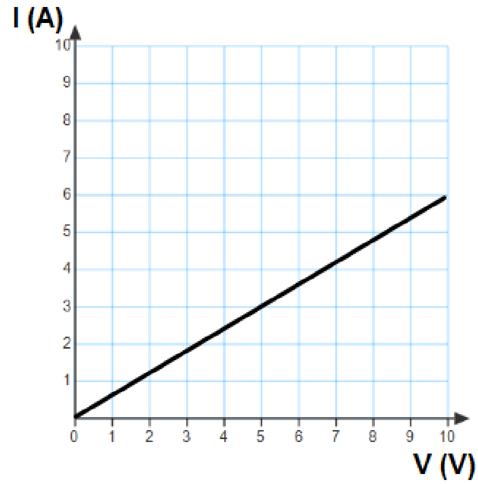
B. 

C. 

D. 

E. 

The electric current as a function of voltage of a wire is presented by the graph to the right. Use this graph for questions 8 and 9.



75. What is the resistance of the wire?

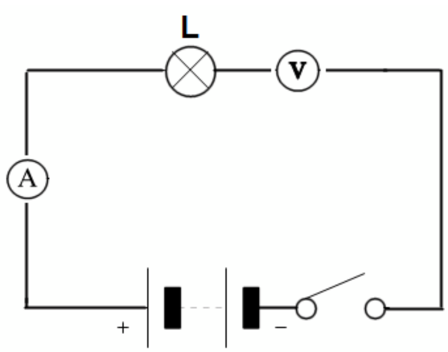
A. 1Ω B.0.8 Ω C.1.6 Ω
D. 0.4 Ω E. 0.2 Ω

76. The electric current as a function of voltage of a wire is presented by the graph. What is the power dissipated in the resistor when the applied voltage is 5 V?

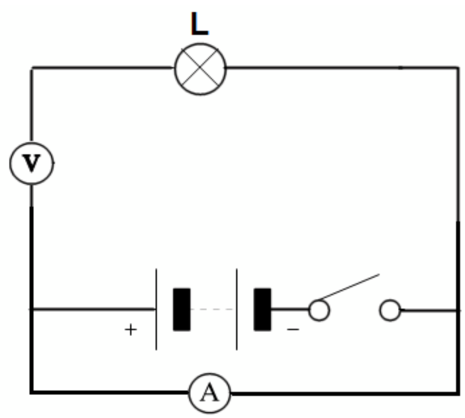
A. 5 W B.10 W C.15 W
D. 20 W E. 25 W

77. A group of physics students performs an experiment with electric circuits. Which of the following circuits can be used to measure the electric current and voltage?

A.



B.



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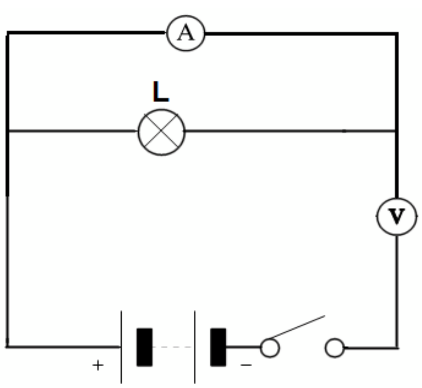
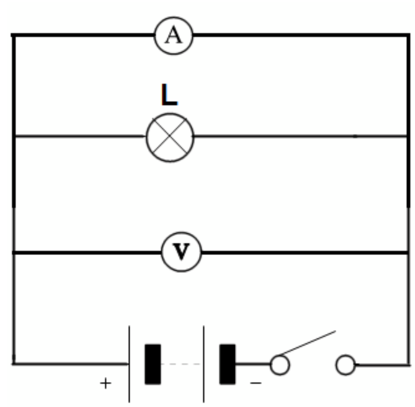


D.



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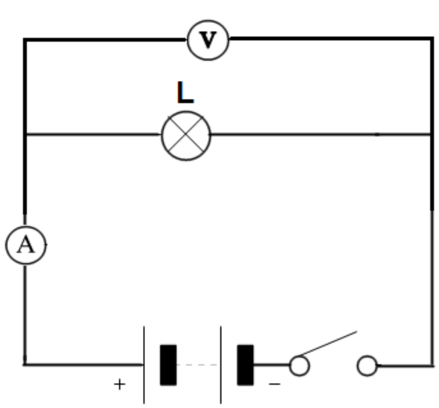
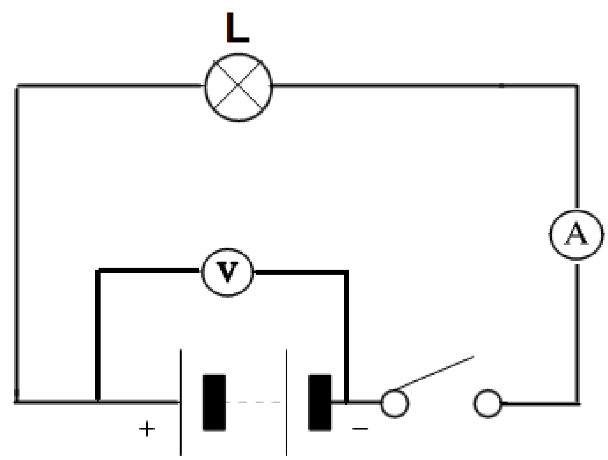
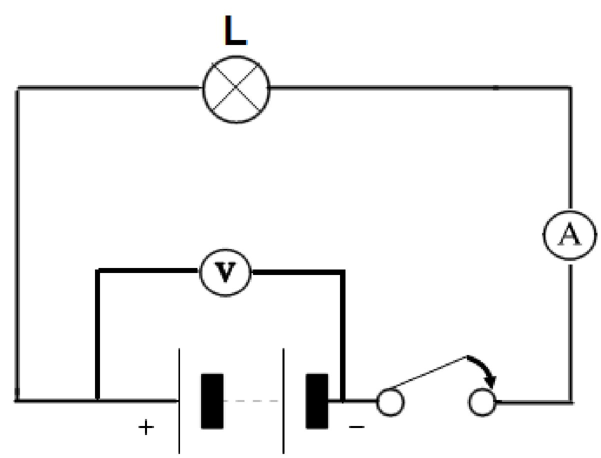
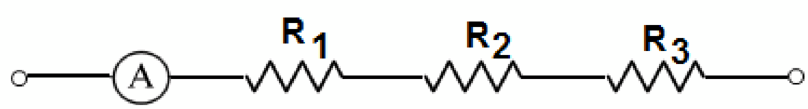


78. When the switch in the circuit presented by the diagram to the right is open, the voltmeter reading is referred to as:
A. Terminal voltage
B. EMF
C. Current
D. Resistance
E. Power



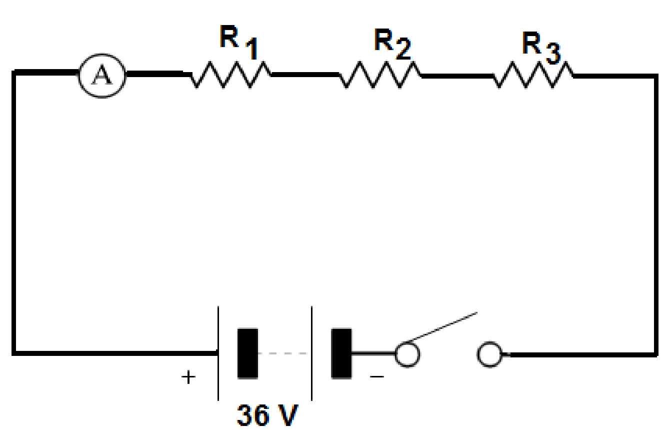
79. When the switch in the circuit presented by the diagram above is closed, the voltmeter reading is referred to:
A. Terminal voltage
B. EMF
C. Current
D. Resistance
E. Power





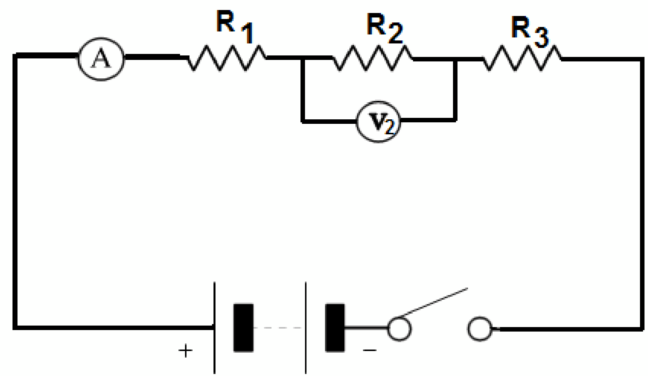
80. An ammeter connected in series with three resistors reads an electric current of 2 A. What is the electric current flowing trough resistor R_3?
A.1 A **B**.2 A C. 3 A D. 4 A E. 5 A

81. Three resistors: $R_1 = 3\ \Omega$,$R_2 = 6\ \Omega$, and $R_3 = 9\ \Omega$ are connected in series to each other and to a 36 V battery. What is the ammeter reading after the switch is closed?
A. 6 A B. 5 A C. 4 A
D. 3 A E. 2 A



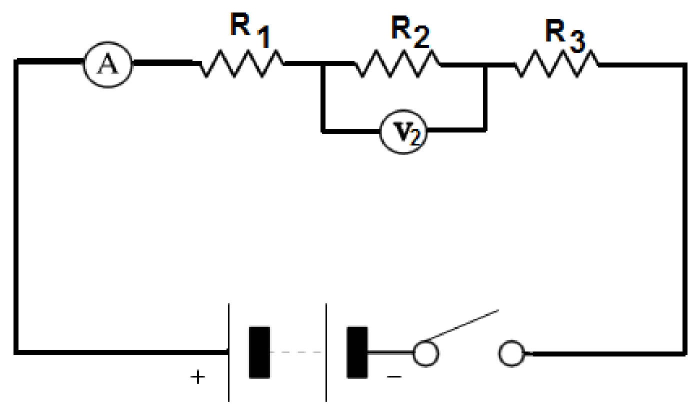
82. Three resistors: $R_1 = 5\ \Omega$,$R_2 = 3\ \Omega$, and $R_3 = 4\ \Omega$ are connected in series to each other. A voltmeter connected in parallel to resistor R_2 measures voltage of 6 V. What is the current through the battery?

A. 2 A B. 5 A C. 4 A D. 3 A
E. 6 A



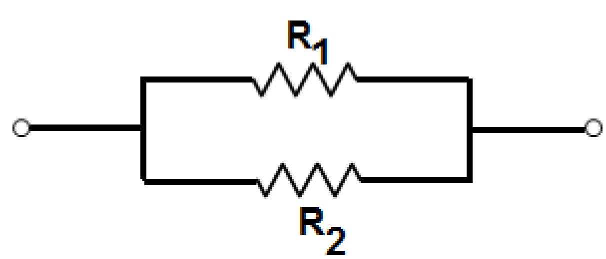
83. Three resistors: $R_1 = 5\ \Omega$,$R_2 = 3\ \Omega$, and $R_3 = 4\ \Omega$ are connected in series to each other. A voltmeter connected in parallel to resistor R_2 measures voltage of 6 V. What is the net voltage in the circuit?

A. 24 V B. 20 V C. 16 V
D. 12 V E. 4 V



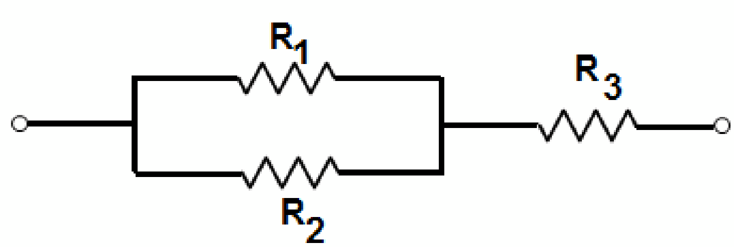
84. Two resistors $R_1 = 3\ \Omega$ and $R_2 = 6\ \Omega$ are connected in parallel. What is the net resistance in the circuit?

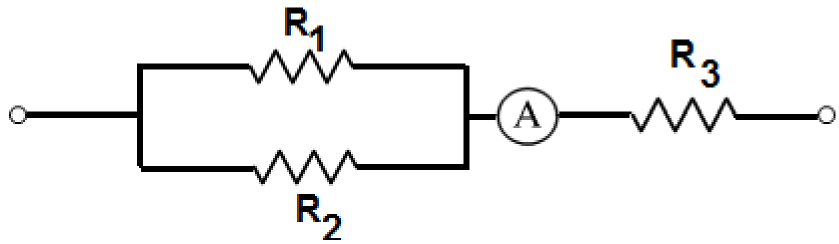
A. 1 Ω B. 3 Ω C. 6 Ω
D. 2 Ω E. 9 Ω



85. Two resistors $R_1 = 6\ \Omega$ and $R_2 = 12\ \Omega$ are connected in parallel to each other and in series to R3 = 2 Ω. What is the net resistance in the circuit?

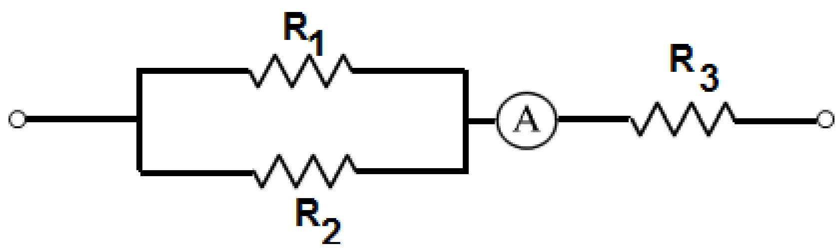
A. 1 Ω B. 3 Ω C. 6 Ω
D. 2 Ω E. 9 Ω





86. Two resistors R_1 = 6 Ω and R_2 = 12 Ω are connected in parallel to each other and in series to R_3 = 2 Ω. An ammeter measures an electric current of 3 A flowing though resistor R_3. What is the net voltage applied to the circuit?

A. 6 V B. 12 V **C**. 18 V D. 24 V E. 36 V



87. Two resistors R_1 = 6 Ω and R_2 = 12 Ω are connected in parallel to each other and in series to R_3 = 2 Ω. An ammeter measures an electric current of 3 A flowing though resistor R_3. What is the current in 12 Ω resistor?

A. 6 A **B**. 1 A C. 3 A D. 5 A E. 7 A