



PHYSICS

BOOKS - SELINA PHYSICS (ENGLISH)

SELF ASSESSMENT PAPER -3

Section A

1. (i) What are isobars?

(ii) Give one example of isobars.



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2. The human ear can detect continuous sounds in the frequency range from 20 Hz to 20000 Hz. Assuming that the speed of sound in air is 330 m s^{-1} for all frequencies, calculate the wavelengths corresponding to the given extreme frequencies of the audible range.



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3. Explain briefly why the work done by a fielder when he takes a catch in a cricket match is negative.



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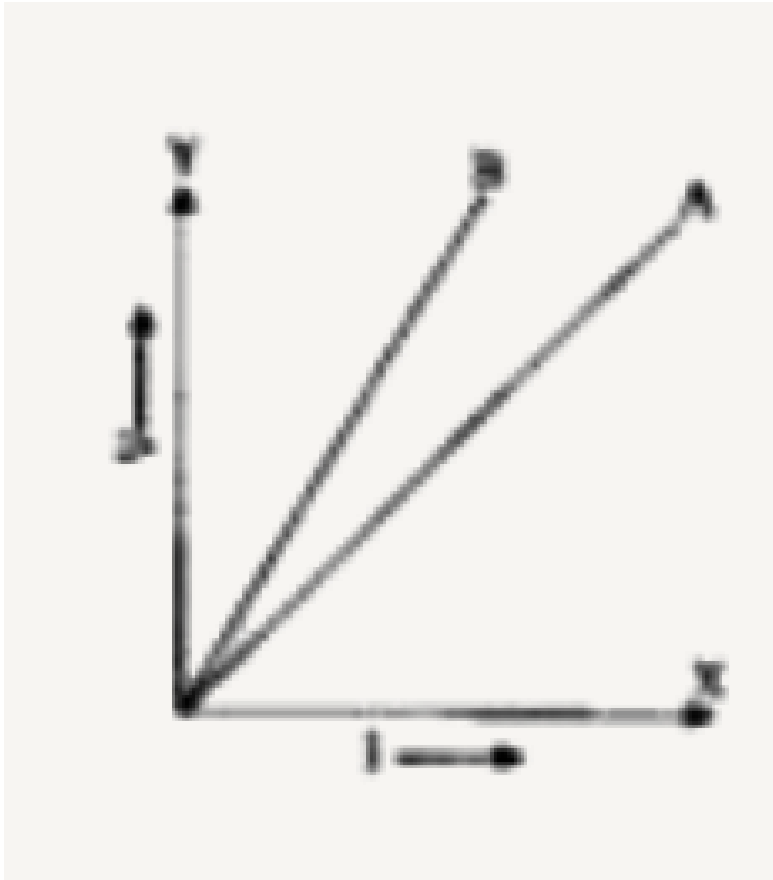
4. What is meant by noise pollution? Name one source of sound causing noise pollution.



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5. The V-I graph for a series combination and for a parallel combination of two resistor is shown in the figure below. Which of the two A or B, represents the parallel combination? Give

a reason for your answer.



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6. A coin at the bottom of a trough containing water to a depth of 15 cm appears to be 3.75 cm raised above from the bottom. Calculate the refractive index of water.



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7. Calculate the resistance of 1 km long copper wire of radius 1 mm. (Resistivity of copper is $1.72 \times 10^{-8} \Omega m$).



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8. Name a prism required for obtaining a spectrum of ultraviolet light.



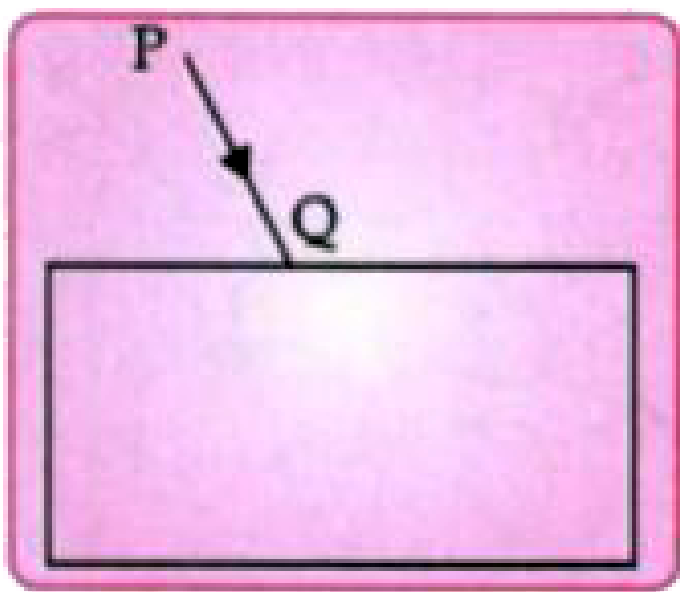
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9. Name the radiations which can be detected by a thermopile.



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10. In the diagram below, PQ is a ray of light incident on a rectangular glass block.



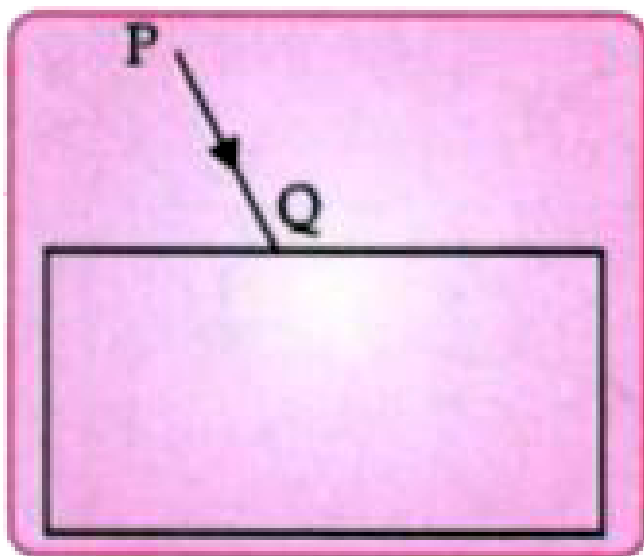
Copy the diagram and complete the path of the ray of light through the glass block. In your diagram, mark the angle of incidence by

letter 'i' and the angle of emergence by the letter 'e'.



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11. In the diagram below, PQ is a ray of light incident on a rectangular glass block.



How are the angles i and e related to each other?



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12. The graph between angle of deviation (δ) and angle of incidence (i) for a triangular prism is represented by:



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13. A pulley system has three pulleys. A load of 120 N is overcome by applying an effort of 50 N. Calculate the mechanical advantage of this system.



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14. Why is it not advisable to use a piece of copper wire as fuse wire in an electric circuit ?



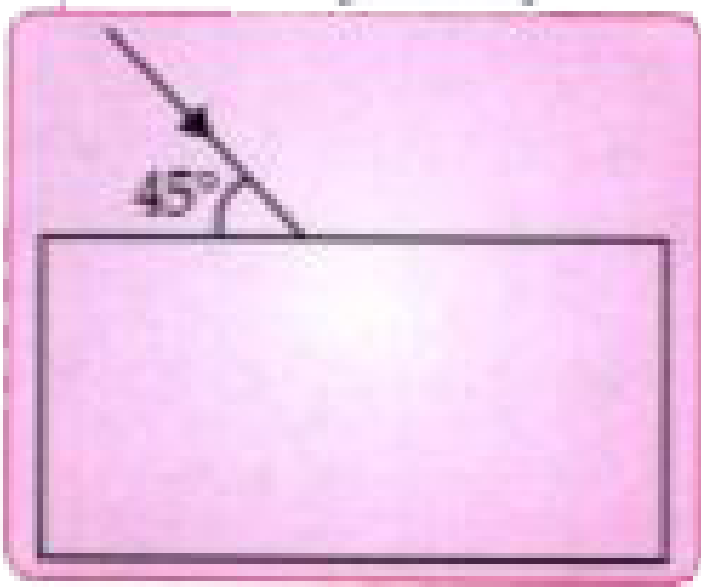
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15. Name the material which is used as a fuse wire



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16. Draw the diagram given below and clearly show the path taken by the emergent ray:



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17. What energy conversions take place in the following when they are working?

Electrical toaster.



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18. What energy conversions take place in the following when they are working?

Microphone



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19. Name a prism required for obtaining a spectrum of ultraviolet light.



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20. Name the radiations which can be detected by a thermopile.



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21. Why does a bottle of soft drink cool faster when surrounded by ice cubes than by ice cold water, both at $0^{\circ}C$?



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22. Two forces each of 5 N act vertically upwards and downwards respectively on the two ends of a uniform meter rule which is placed at its mid-point as shown in the diagram. Determine the magnitude of the resultant moment of these forces about the midpoint.



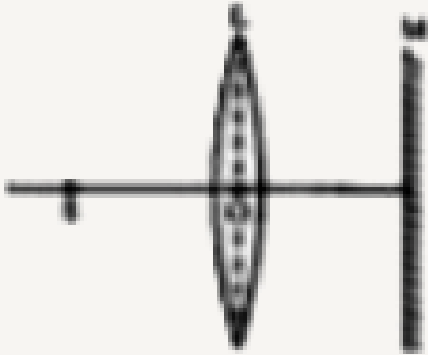
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23. Water is used in hot water bottles for fomentation. Give a reason.



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24. The diagram shows a point source of light S, a convex lens L and plane mirror M. These are placed such that rays of light from S return to it after reflection from M.



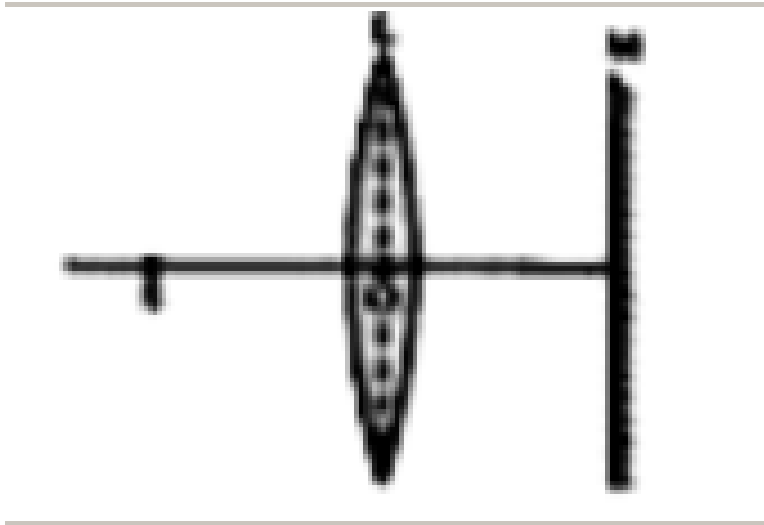
What is the distance OS called?



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25. The diagram shows a point source of light S, a convex lens L and plane mirror M. These

are placed such that rays of light from S return to it after reflection from M.



To which point (left of S or right of S) will the rays return, if M is moved to the left and brought in contact with L?



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26. Give two examples of material required in resistance wire.



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Section B

1. What name is given to the acceleration experienced by a particle in uniform circular motion?



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2. Where does the position of centre of gravity lie for

(1) A circular lamina

(2) A triangular lamina



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3. What are damped vibrations ?



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4. Give examples of damped oscillation.



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5. Name the phenomenon that cause a loud sound when the stem of a vibration tuning fork is kept pressed on the surface of a table.



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6. How does a stretched string on being set into vibration, produce the audible sound?



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7. Will the sound be audible, if the string is set into vibration on the surface of the moon?

Given reason for your answer.



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8. A body of mass 50 kg has a momentum of 3000 kg ms^{-1} . Calculate:

The kinetic energy of the body.



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9. A body of mass 50 kg has a momentum of 3000 kg ms^{-1} . Calculate:

The velocity of the body.



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10. The relationship between the potential difference and the current in a conductor is stated in the form of a law.

Name the law.



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11. The relationship between the potential difference and the current in a conductor is stated in the form of a law.

What does the slope of V-I graph for a conductor represent?



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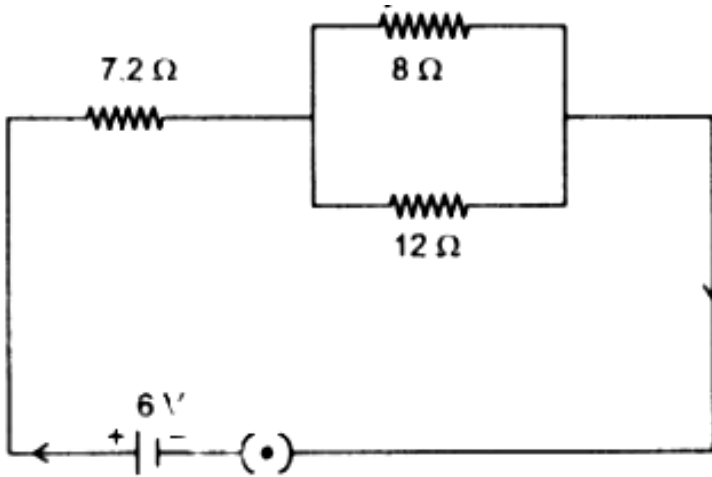
12. The relationship between the potential difference and the current in a conductor is stated in the form of a law.

Name the material used for making the connecting wire.



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13. Three resistors are connected to a 6 V battery as shown in the figure



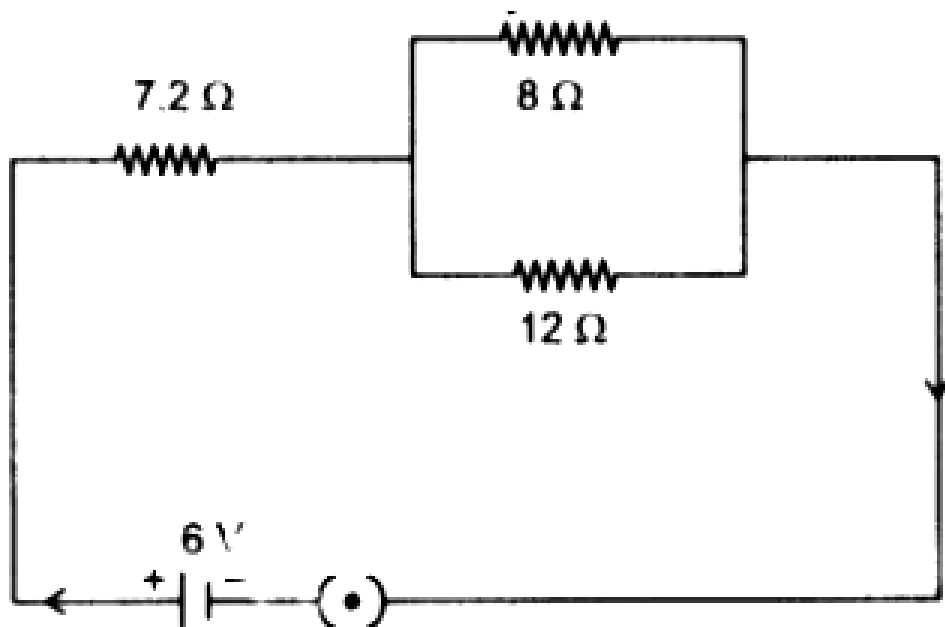
Calculate:

the equivalent resistance of the circuit



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14. Three resistors are connected to a 6 V battery as shown in the figure



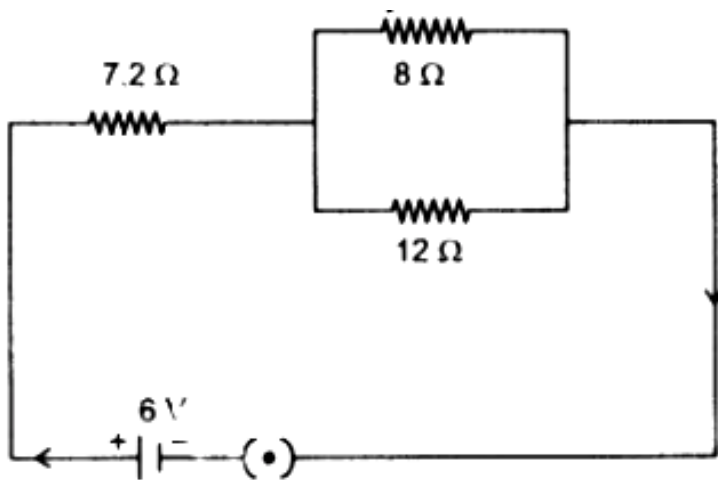
Calculate:

total current in the circuit.



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15. Three resistors are connected to a 6 V battery as shown in the figure



Calculate:

potential difference across the 7.2 ohm resistor



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16. Write an expression for the electrical energy spent in the flow of current through an electrical appliances in terms of I , R and t .



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17. At what voltage is the alternating current supplied to our houses ?



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18. How should the electric lamps in a building be connected ?



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19. A lens forms an erect, magnified and virtual image of an object.

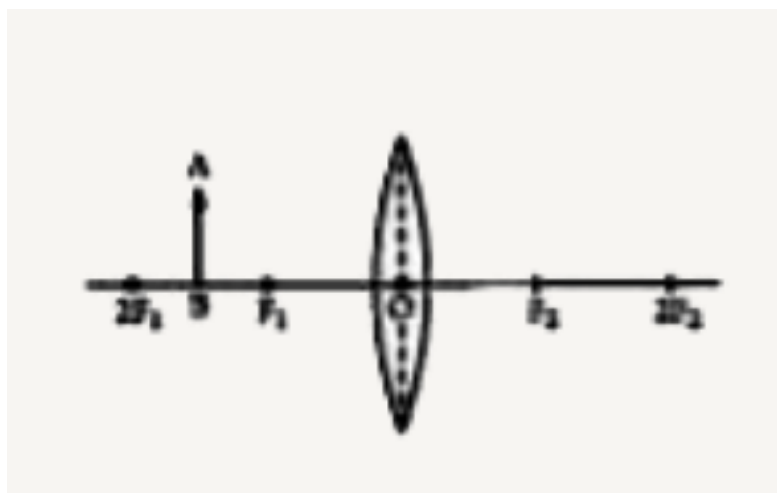
Draw a labelled ray diagram to show the image formation.



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20. An object AB is placed between $2F_1$ and F_1 , on the principal axis of a convex lens as shown in the diagram.

Copy the diagram and using three rays starting from point A, obtain the image of the object formed by the lens.



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21. It is observed that the temperature of the surroundings starts falling when the ice in a frozen lake starts melting. Give a reason for the observation.



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22. A substance has nearly zero resistance at a temperature of 1 K. What is such a substance called?



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23. State the factors affecting the resistance of a conductor.



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24. A pulley system has a velocity ratio 3. draw a diagram showing the point of application and direction of load (L), effort (E) and tension (T). It lifts a load of 150 N by an effort of 60 N. calculate its mechanical advantage. Is the pulley system ideal ? Give reason.



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25. The pulley system drawn lifts a load of 150 N when an effort of 60 N is applied. Find its mechanical advantage.



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26.

- (i) Draw a diagram to show a block and tackle pulley system having a velocity ratio of 3 marking the direction of load (L), effort (E) and tension (T). [4]
- (ii) The pulley system drawn lifts a load of 150 N when an effort of 60 N is applied. Find its mechanical advantage.
- (iii) Is the above pulley system an ideal machine or not?



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27. A battery is designed by connecting four cells, each of emf 1.5 V and resistance 2.0 ohm in parallel. If this battery is now connected to an resistance of 2.5 ohm, find the total resistance of the circuit



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28. A battery is designed by connecting four cells, each of emf 1.5 V and resistance 2.0 ohm

in parallel. If this battery is now connected to an resistance of 2.5 ohm, find the current flowing in the external circuit



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29. A battery is designed by connecting four cells, each of emf 1.5 V and resistance 2.0 ohm in parallel. If this battery is now connected to an resistance of 2.5 ohm, find the potential drop across the terminal of the cells.



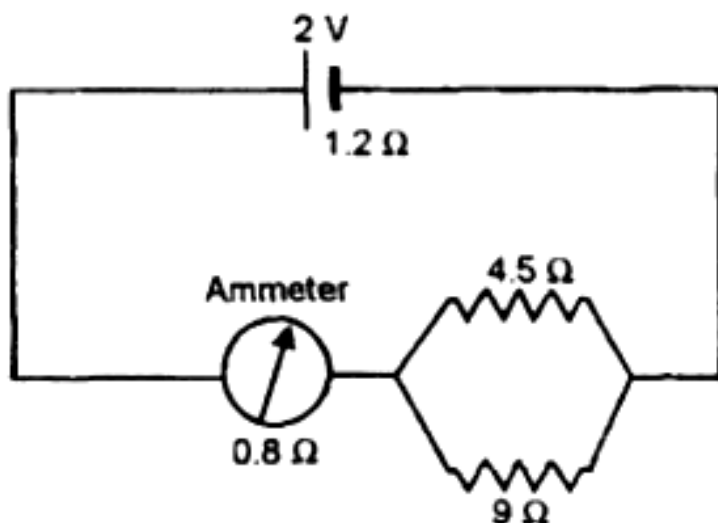
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30. List the names of three electrical gadgets used in your house. Write their power, voltage rating and approximate time for which each one is used in a day. Hence find the electrical energy consumed by each in a month of 30 days.



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31. A cell of e.m.f. 2V and internal resistance $1.2\ \Omega$ is connected with an ammeter of resistance $0.8\ \Omega$ and two resistors of $4.5\ \Omega$ and $9\ \Omega$ as shown in the diagram below:

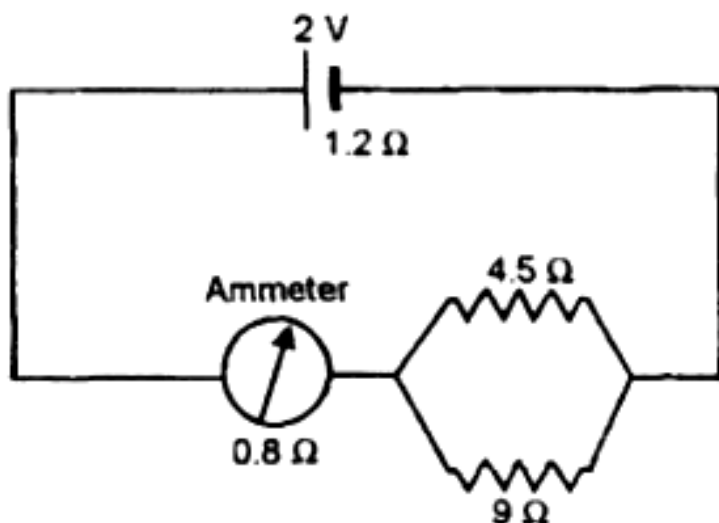


What would be the reading on the Ammeter?



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32. A cell of e.m.f. 2V and internal resistance $1.2\ \Omega$ is connected with an ammeter of resistance $0.8\ \Omega$ and two resistors of $4.5\ \Omega$ and $9\ \Omega$ as shown in the diagram below:



What is the potential difference across the terminals of the cell?



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33. Draw a diagram of a right angled isosceles prism which is used to make an inverted image erect.



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34. A ray of light falls normally on a rectangular glass slab.

Draw a ray diagram showing the path of the ray till it emerges out of the slab.



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35. A ray of monochromatic light is incident from air on a glass slab.

Name the two rays that are parallel to each other.



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36. A ray of monochromatic light is incident from air on a glass slab.

Mark the lateral displacement in your diagram.



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37. Name any four regions of electromagnetic spectrum (other than visible light) in increasing order of their wavelength.



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Section A

1. Why is the motion of a body moving with a constant speed around a circular path said to be accelerated ?



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2. Name the unit of physical quantity obtained by the formula $\frac{2K}{v^2}$.

where K : kinetic energy, v : linear velocity.



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3. How is the frequency of a stretched string related to:

Its length?



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4. How is the frequency of a stretched string related to:

Its tension?



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5. Draw a ray diagram to illustrate how a ray of light incident obliquely on one face of a rectangular glass slab of uniform thickness emerges.



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6. What characteristics should a fuse wire have?



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7. When does a ray of light falling on a lens pass through it undeviated ?



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8. Which lens can produce a real and inverted image of an object ?



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9. Explain briefly what causes the twinkling of stars at night?



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10. Complete the following sentences :

(a) $1\text{J} = \dots\dots\dots\text{calorie}$.

(b) $1\text{ kWh} \dots\dots\dots\text{J}$



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11. Define the term energy and state its S.I. unit



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12. An electric heater is rated 1000 W - 200 V.

Calculate

the resistance of the heating element.



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13. An electric heater is rated 1000 W - 200 V.

Calculate

the current flowing through it.



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14. Name a gas caused by the Greenhouse effect.



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15. Which property of water makes it an effective coolant ?



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16. State the conditions required for total internal reflection of light to take place.



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17. State the energy changes in the following while in use:

Burning of a candle.



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18. State the energy changes in the following while in use:

A steam engine.



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19. An enemy plane is at a distance of 300 km from a radar. In how much time the radar will be able to detect the plane ? Take velocity of radio waves as $3 \times 10^8 \text{ms}^{-1}$.



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20. Why is white light considered to be polychromatic in nature?



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21. Give the range of wavelength of the electromagnetic waves visible to us.



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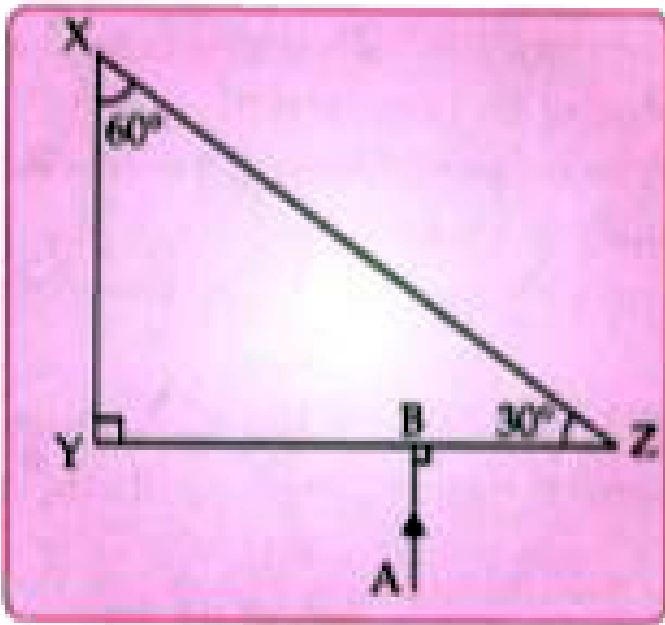
22. Draw a labelled diagram of a three pin socket.



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23. The following diagram shows a 60° , 30° , 90° glass prism of critical angle 42° .

Copy the diagram and complete the path of incident ray AB emerging out of the prism marking the angle of incidence on each surface.



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24. Identify the following wires used in a household circuit :

The wire is also called as the phase wire.



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25. Identify the following wires used in a household circuit :

The wire is connected to the top terminal of a three pin socket.



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26. With reference to the term mechanical advantage, velocity ratio and efficiency of a machine, name and define the term that will not change for a machine of a given design.



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27. State one use and one harmful effect of radioactivity.



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28. How can a temperature in degree Celsius be converted into S.I. unit of temperature ?



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29. A liquid X has the maximum specific heat capacity and is used as a coolant in car radiators. Name the liquid X.



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30. Which of the radioactive radiations occurs in the following cases :

Can cause severe genetical disorder?



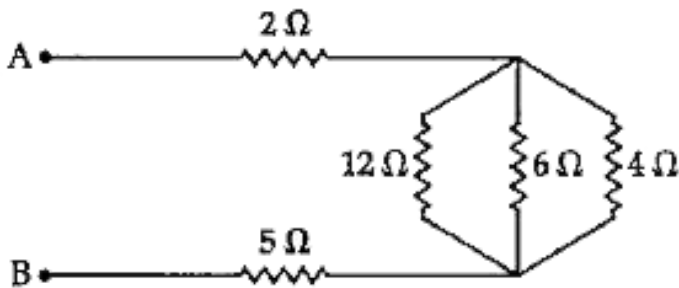
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31. Which of the radioactive radiations :
are deflected by an electric field ?



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1. Find the equivalent resistance between points A and B.



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2. Define the term momentum.

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3. How is force related to the momentum of a body?



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4. State the condition when change in momentum of a body depends only on the change in its velocity.



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5. A wire of length 80 cm has a frequency of 256 Hz. Calculate the length of a similar wire under similar tension, which will have frequency of 1024 Hz.



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6. A certain sound has a frequency of 256 hertz and a wavelength of 1.3 m.

(a) Calculate the speed with which this sound travels.

(b) What difference would be felt by a listener

between the above sound and another sound travelling at the same speed, but of wavelength 2.6 m?



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7. What is MCB ? Why it is convenient over fuse?



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8. Name two factors on which the internal resistance of a cell depends and state how does it depend on the factors stated by you.



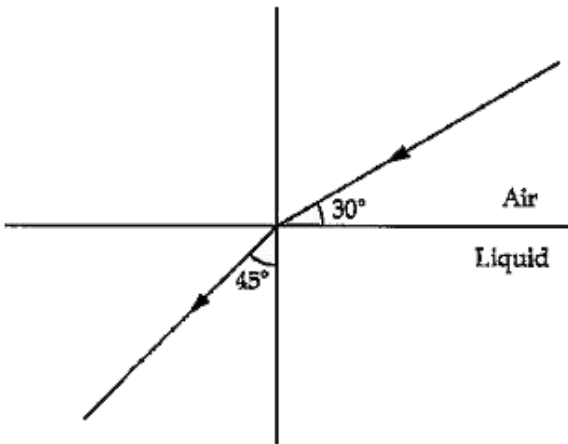
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9. Name any four regions of electromagnetic spectrum in increasing order of frequency.



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10. Calculate the refractive index of a liquid with respect to air applying Snell's law (use geometric construction).



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11. Write a relationship between angle of incidence and angle of refraction for a given pair of media.



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12. When a ray of light enters from one medium to another having different optical densities, it bends. Why does this phenomenon occur ?



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13. Write one condition where it does not bend when entering a medium of different optical density.



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14. Where should an object be placed so that a real and inverted image of the same size as the object is obtained using a convex lens ?



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15.

A lens forms an erect, magnified and virtual image of an object.

(i) Name the lens.

(ii) Draw a labelled ray diagram to show the image formation.



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16. Derive a relationship between mechanical advantage, velocity ratio and efficiency of a machine.



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17. Explain why mechanical advantage of a class II lever is always more than 1.



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18. Which particles are responsible for current in conductors?



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19. To which wire of a cable in a power circuit should the metal case of a geyser be connected?



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20. Material with which a fuse is made



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21. Which two of the three wires of a household circuit are at the same potential ?



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22. At what frequency is A.C. supplied to residential houses ?



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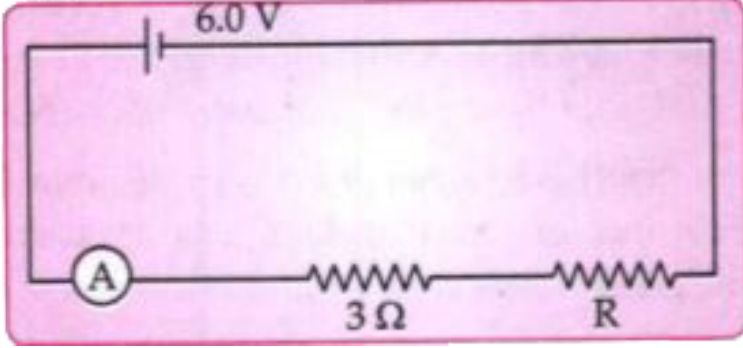
23. Name the wire in a household electrical circuit to which the switch is connected.



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24. The figure shows a circuit.

When the circuit is switched on, the ammeter reads 0.5A.



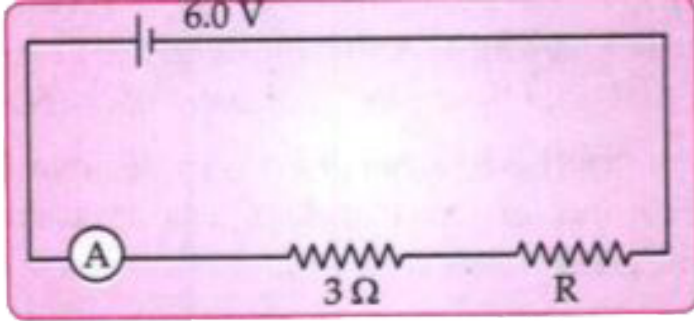
Calculate the value of the unknown resistor R.



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25. The figure shows a circuit.

When the circuit is switched on, the ammeter reads 0.5A.



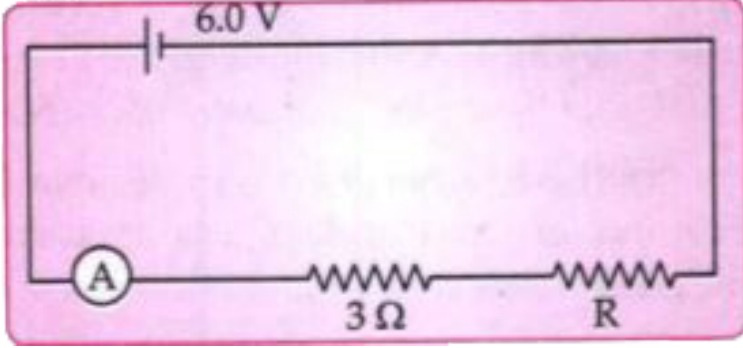
Calculate the charge passing through the 3Ω resistor in 120 s.



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26. The figure shows a circuit.

When the circuit is switched on, the ammeter reads 0.5A.



Calculate the value of the unknown resistor R.

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27. Explain why strings of different thickness are provided on a stringed instrument.

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28. Specific heat capacity of substance A is 3.8 J/gK , whereas the specific heat capacity of substance B is 0.4 J/gK

Which of the two is good conductor of heat ?



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29. Specific heat capacity of substance A is 3.8 J/gK , whereas the specific heat capacity of substance B is 0.4 J/gK

Which of the two is good conductor of heat ?





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30. Specific heat capacity of substance A is $3.8Jg^{-1}K^{-1}$ whereas the specific heat capacity of substance B is $0.4Jg^{-1}K^{-1}$.

If substances A and B are liquids then which one would be more useful in car radiators ?



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31. Water in lakes and ponds do not freeze at once in cold countries. Give a reason in

support of your answer.



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32. What is the principle of Calorimetry?



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33. Name the law on which this principle is based.



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34. State the effect of an increase of impurities on the melting point of ice.



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35. Name the radiations :

that are used for photography at night.



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36. Name the radiations :

used for detection of fracture in bones.



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37. Name the radiations :

whose wavelength range is from 100 \AA to 4000 \AA (or 10 nm to 400 nm).



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38. Name one radio isotope and state its use.



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39. state one safety precaution for each of the following: (1) in handling of a radioactive substance. (2) in establishment of nuclear power plant.



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40. A certain nucleus X has a mass number 14 and atomic number 6. The nucleus X changes to ${}_7Y^{14}$ after the loss of a particle.

Name the particle emitted.



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41. A certain nucleus X has a mass number 14 and atomic number 6. The nucleus X changes to ${}_7Y^{14}$ after the loss of a particle.

Represent this change in the form of an equation.



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42. A certain nucleus X has a mass number 14 and atomic number 6. The nucleus X changes to ${}_7Y^{14}$ after the loss of a particle.

A radioactive substance is oxidized. What change would you expect to take place in the nature of its radioactivity ? Give a reason for your answer.



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