



PHYSICS

BOOKS - SELINA PHYSICS (ENGLISH)

SAMPLE PAPER 2013

Section I

1. Give any two effects of a force on a non-rigid body.



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2. One end of a spring is kept fixed while the other end is stretched by a force as shown in the diagram.

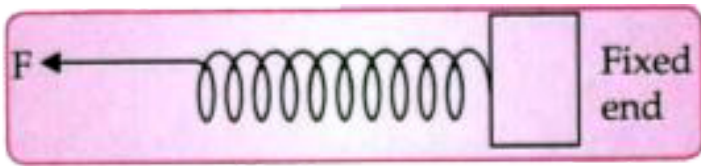


Copy the diagram and mark on it the direction of the restoring force.



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3. One end of a spring is kept fixed while the other end is stretched by a force as shown in the diagram.



Name one instrument which works on the above principle.



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4. Where is the centre of gravity of a uniform ring situated ?



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5. The position of the centre of gravity of a body remains unchanged even when the body is deformed'. State whether the statement is true or false.



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6. A force is applied on a body of mass 20 kg moving with a velocity of $40ms^{-1}$. The body

attains a velocity of 50ms^{-1} in 2 second.

Calculate the work done by the body.



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7. Name the pulley which has no gain in mechanical advantage. Explain, why is such a pulley then used ?



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8. A type of single pulley is very often used as a machine even though it does not give any gain in mechanical advantage.

For what purpose is such a pulley used ?



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9. What do you understand by an ideal machine ? How does it differ from a practical machine ?



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10. When does a machine act as (a) a force multiplier, (b) a speed multiplier. Can a machine act as a force multiplier and a speed multiplier simultaneously?



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11. A girl of mass 35 kg climbs up from the first floor of a building at a height 4 m above the ground to the third floor at a height 12 m above the ground. What will be the increase in

her gravitational potential energy? [

$$g = 10ms^{-2}]$$



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12. Which class of lever found in the human body is being used by a boy:

when he holds a load on the palm of his hand.



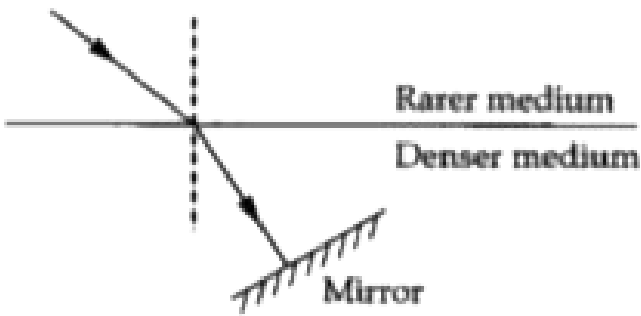
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13. What type of lever is formed by a human body while (a) raising a load on the palm, and (b) raising the weight of body on toes ?



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14. A ray of light is moving from a rarer medium to a denser medium and strikes a plane mirror placed at 90° to the direction of the ray as shown in the diagram.



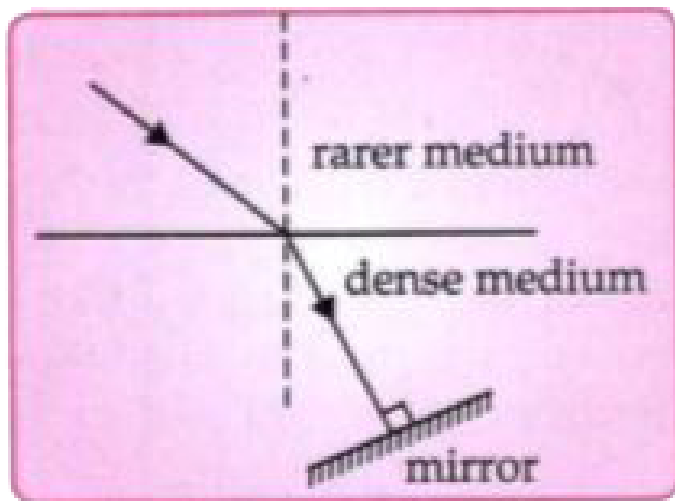
Copy the diagram and mark arrows to show the path of the ray of light after it is reflected from the mirror.



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15. A ray of light is moving from a rarer medium to a denser medium and strikes a plane mirror placed at 90° to the direction of

the ray as shown in the diagram.



Name the principle you have used to mark the arrows to show the direction of the ray.



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16. The refractive index of glass with respect to air is 1.5. What is the value of the refractive

index of air with respect to glass?



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17. A ray of light is incident as a normal ray on the surface of separation of two different mediums. What is the value of the angle of incidence in this case ?



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18. A bucket kept under a running tap is getting filled with water. A person sitting at a distance is able to get an idea when the bucket is about to be filled.

What change takes place in the sound to give this idea ?



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19. A bucket kept under a running tap is getting filled with water. A person sitting at a

distance is able to get an idea when the bucket is about to be filled.

What causes the change in the sound ?



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20. A sound made on the surface of a lake takes 3 s to reach a boatman.

How much time will it take to reach a diver inside the water at the same depth ?

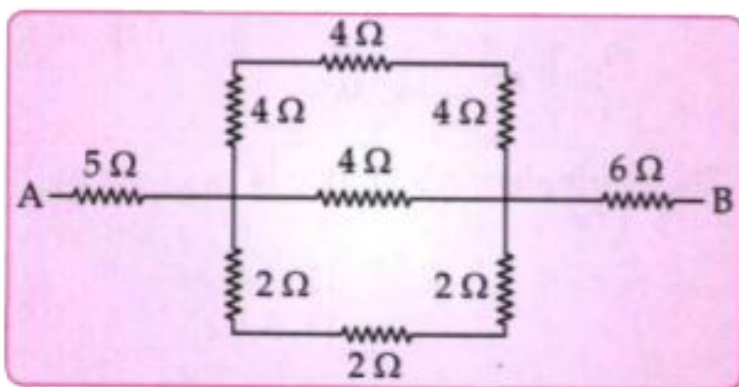
Velocity of sound in air = 330ms^{-1}

Velocity of sound in water = 1450ms^{-1}



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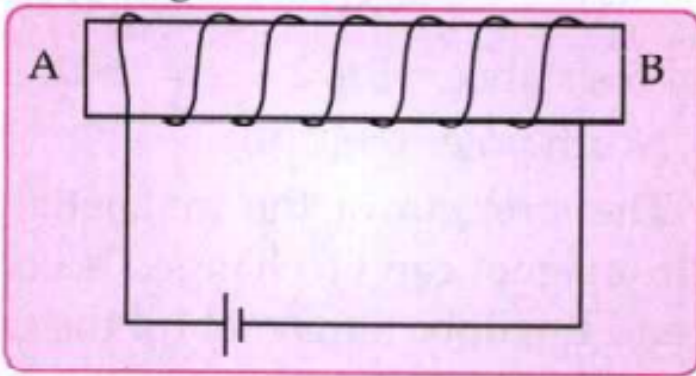
21. Calculate the equivalent resistance between the points A and B for the following combination of resistors :



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22. You have been provided with a solenoid AB.

What is the polarity at end A ?

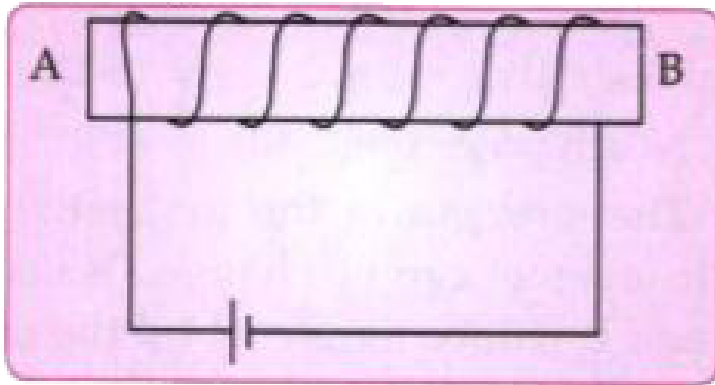


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23. You have been provided with a solenoid AB.

Give one advantage of an electromagnet over

a permanent magnet.



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24. Name the device used to protect the electric circuits from overloading and short circuits.



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25. Name the device used to protect the electric circuits from overloading and short circuits. On what effect of electricity does the above device work ?



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26. Define heat capacity and state its SI unit.



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27. What do you mean by global warming?



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28. How much heat energy is released when 5 g of water at $20^{\circ}C$ changes to ice at $0^{\circ}C$?

[Specific heat capacity of water = $4.2Jg^{-1}^{\circ}C^{-1}$

Specific latent heat of fusion of ice = $336Jg^{-1}$]



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29. Which of the radioactive radiations :
can cause severe genetical disorders.



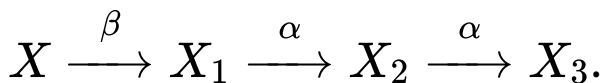
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30. Which of the radioactive radiations :
are deflected by an electric field ?



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31. A radioactive nucleus undergoes a series of decays according to the sequence



If the mass number and atomic number of X_3 are 172 and 69 respectively, what is the mass number and atomic number of X ?



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Section II

1. With reference to the direction of action, how does a centripetal force differ from a centrifugal during uniform circular motion ?



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2. State the principle of conservation of energy.



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3. Name the form of energy which a body may possess even when it is not in motion. Give an example to support your answer.



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4. A coolie is pushing a box weighing 1500 N up an inclined plane 7.5 m long on to a platform, 2.5 m above the ground.

Calculate the mechanical advantage of the inclined plane.





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5. A coolie is pushing a box weighing 1500 N up an inclined plane 7.5 m long on to a platform, 2.5 m above the ground.

Calculate the effort applied by the coolie.



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6. A coolie is pushing a box weighing 1500 N up an inclined plane 7.5 m long on to a platform, 2.5 m above the ground.

In actual practice, the coolie needs to apply more effort than what is calculated. Give one reason why you think the coolie needs to apply more effort.



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7. A block and tackle system of pulleys has velocity ratio 4.

Draw a neat labelled diagram of the system indicating clearly the points of application and direction of load and effort.



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8. A block and tackle system of pulleys has a velocity ratio 4.

What is the value of the mechanical advantage of the given pulley system if it is an ideal pulley system?



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9. Name the radiations :

that are used for photography at night.



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10. Name the radiations :

used for detection of fracture in bones.



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11. Name the radiations :

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



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12. Define the term refractive index of a medium. Can it be less than 1 ?



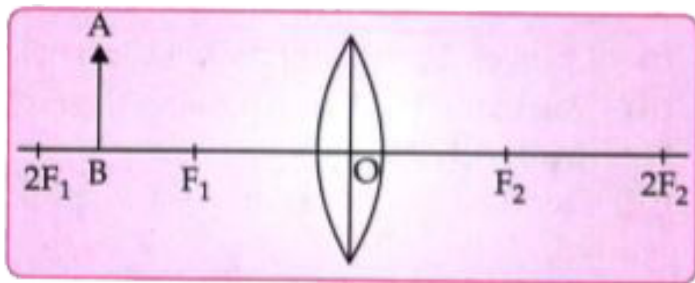
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13. A coin placed at the bottom of a beaker appears to be raised by 4.0 cm. If the refractive index of water is $\frac{4}{3}$, find the depth of the water in the beaker.



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14. 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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15. What is the principle on which SONAR is based ?



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16. An observer stands at a certain distance away from a cliff and produces a loud sound. He hears the echo of the sound after 1.8 s. Calculate the distance between the cliff and the observer if the velocity of sound in air is 340ms^{-1} .





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17. A vibrating tuning fork is placed over the mouth of a burette filled with water. The tap of the burette is opened and the water level gradually starts falling. It is found that the sound from the tuning fork becomes very loud for a particular length of the water column.

Name the phenomenon taking place when this happens.



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18. A vibrating tuning fork is placed over the mouth of a burette filled with water. The tap of the burette is opened and the water level gradually starts falling. It is found that the sound from the tuning fork becomes very loud for a particular length of the water column.

Why does the sound become very loud for this length of the water column?



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19. What is meant by the terms (1) amplitude
(2) frequency, of a wave ?



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20. Explain, why stringed musical instruments,
like the guitar, are provided with a hollow box



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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. How is the heat capacity of the body related to its specific heat capacity ?



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23. 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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24. A certain amount of heat Q will warm 1 g of material X by $3^{\circ}C$ and 1 g of material Y by $4^{\circ}C$. Which material has a higher specific heat capacity?



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25. A calorimeter of mass 50 g and specific heat capacity $0.42 J g^{-1} \text{ } ^\circ C^{-1}$ contains some mass of water at $20^\circ C$. A metal piece of mass 20 g at $100^\circ C$ is dropped into the calorimeter. After stirring, the final temperature of the mixture is found to be $22^\circ C$. Find the mass of water used in the calorimeter.

[specific heat capacity of the metal piece =

$$0.3 J g^{-1} \text{ } ^\circ C^{-1}$$

specific heat capacity of water =

$$4.2 J g^{-1} \text{ } ^\circ C^{-1}]$$



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26. State Ohm's law and draw a neat labelled circuit diagram containing a battery, a key, a voltmeter, an ammeter, a rheostat and an unknown resistance to verify it.



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27. A metal wire of resistance 6Ω is stretched so that its length is increased to twice its original length. Calculate its new resistance.



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28. An electrical gadget can give an electric shock to its user under certain circumstances.

Mention any two of these circumstances.



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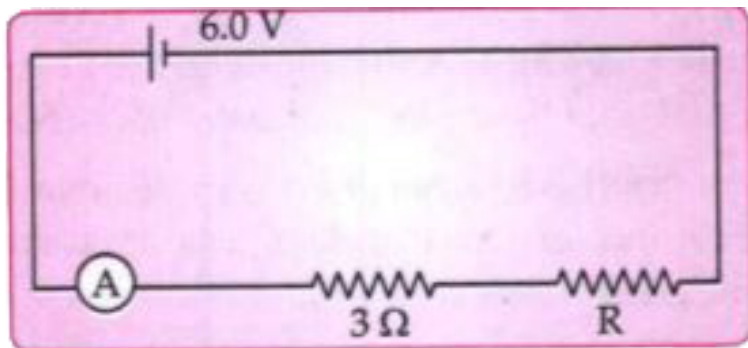
29. What preventive measure provided in a gadget can protect a person from an electric shock?



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30. The figure shows a circuit.

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



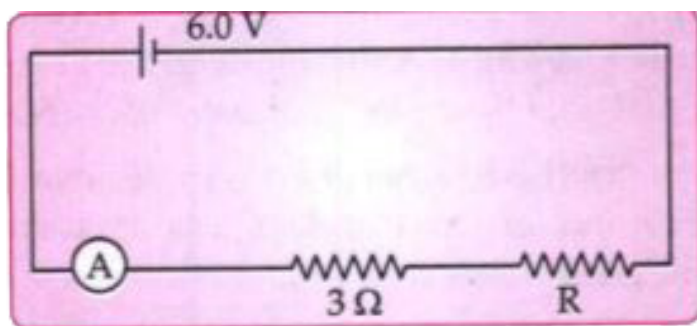
Calculate the value of the unknown resistor R.



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31. The figure shows a circuit.

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



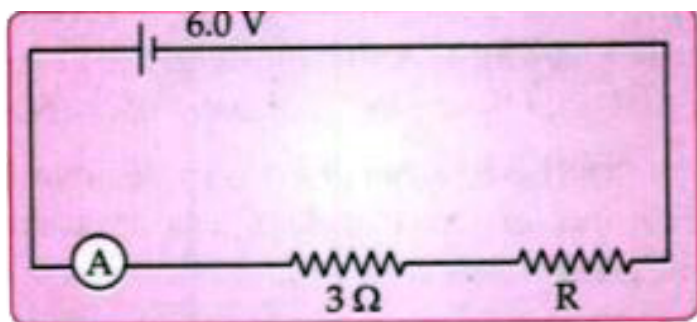
Calculate the charge passing through the 3Ω resistor in 120 s.



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32. The figure shows a circuit.

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



Calculate the power dissipated in the 3Ω resistor.



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33. Name the three main parts of a Cathode Ray Tube.



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34. What is meant by Radioactivity ?



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35. What is meant by nuclear waste ? State one way for the safe disposal of nuclear waste.



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36. Suggest one effective way for the safe disposal of nuclear waste.



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37. Draw neat labeled diagram of a d.c. motor.



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38. What is the function of the split rings in a d.c. motor ?



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39. State one advantage of a.c. over d.c.



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