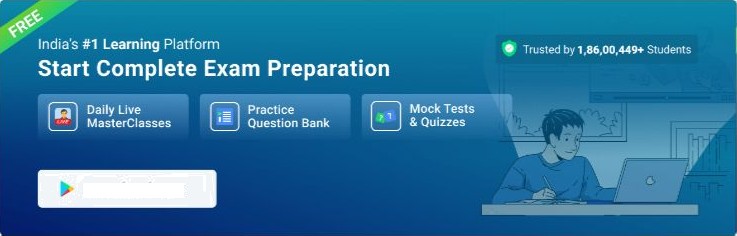
Physics ¢lueations



Phvsic

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#### Queatlon 1:

[V ie'.\*.' this QLie sti all Airline >](https://testbook.com/objective-questions/mcq-on-physics--5eea6a1339140f30f369eeee)

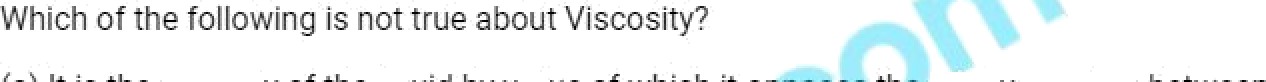
Which of the following shows correct relation between Mass and Inertia?

1. Inertia is directly proportional to Mass
2. Inertia is inveisly proportional to mass
3. No effect on each other
4. None of the above

### Attempted

Anawer (Detailed Solution Below)

Option 1 : Inertia is directly proportional to Mass



[Physics](https://testbook.com/learn/physics-ac-generator/) concepts can get a little tricky. Learn with Testbook sndlest yourself with our lessons. You’ll find detailed explanations with every topjc associated.



##### CONCEPT:

* + Inertia is the ability of a body by virtue of which it opposes a change.
  + According to Newtons finn law of motion, an object will remain at rest or in uniform motion in a straight line unless acted upon by an external force.

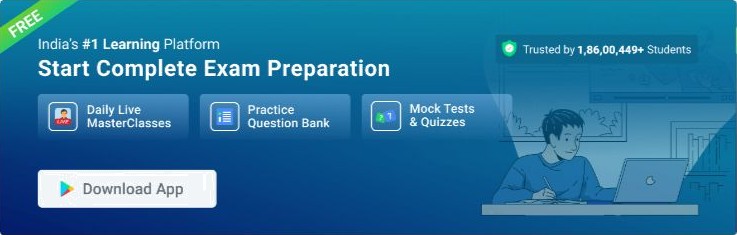
° The inertia of rest: When a body is in rest, it will remain at rest until we apply an external force to move it. This property is called inertia of rest.

* + - The inertia of motion: When a body is in a uniform motion, it will remain in mation until we apply an external force to stop it. This property is called inertia of motion.



* + **lnwtla Is directly proportional to Mase.** So option 1 is correct.

' If the mass is high then the inertia is also high and vice versa is also true



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\a/ it iS £rlu Kruger Ty ui LrTU iiQuiU uy virLuU ui wrTiñrT i£ U OSeV L£TU rUiaLivu rTiutiuri ueTwUUrT i £t\*

adjacent layers.

1. Viscosity is not a property of gases. ” '
2. The viscosity of a liquid decreases withiricrease in pressure.
3. The viscosity of an ideal fluid is zero.

• -• . '” ”

* 1. a and d oily.



1. a, b, c, and d
2. b, and c only
3. Not Attempted

(Detailed Solution Below) Option 4 : b, and c only

“\*

Physics Question 2 Detetled Solution -,

CONCEPT “

Viecoaity: It is the property of a fluid, by virtue of which it opposes the rdétl¥p on between its different layers is known as viscosity. - ” \_

This force is known as the viscous force. ' ’ '

Mathematically, *F* — *A* ‘^’

- ’\*

where, q = coefficient of viscosity, sea, dv/dx -’velocity gradient.

EXPLANATION ,

Fluid means any liquid or gaa that can flow. As described above,

* It opposes relative motion between adjacent layers therefore option 1 la ¢wtecL

the pro as) therefore, option 2 is b oorrech



*. F ——*

* q P w viscosity increases pressure increases and vice versa therefore option 3 Is incorrect
* For the ideal fluid viscosity is zero therefore option 4 is correct



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[@UeStion 3:](https://link.testbook.com/XVertTSUigb)

# The wavelength of the incident photons for a photoelectric emission process is increased then the photoelectric current will-

#### Increase

1. Decrease

#### \*—mains same

1. Mora - an one of the above

#### None of the above

Option 3 . Remains same

Physics Question 1 Detailed Solution

CONCEPT:

#### Photoelectrie effect: \’/I en light of sufficiently small wavelength is incident on a metal surface, electrons are ejected from the rn9tal instantly This phenomenon is called th. photoeleetric effect.

* Photocurrent: The rate of loo'.'.' of .lectrons in the photoelectric emission process is called photoeurrent.

#### The photocurrent depends on the intensity Of the incident photons.

* Stopping potential: The



### minlmum potemia\ required to stop the elemron emitted from metal so that its kinetic energy becomes zero.

* + Work function: It is the minimum amount of energy required so that metal emits an electron. It is represented with g. I:r: ' eY orjoules.

### !t has differed values ”fferem mmats.

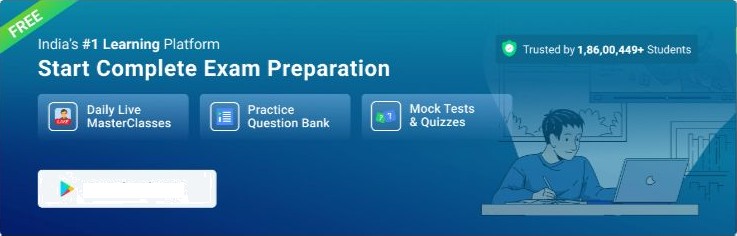
Elnstain9 equatlon for the photoelectric effect is given by:

### h v = g + K.E

WheFe h = planks constant = ó.ó x 10-3^ = 4.14 x 10-' eV-s, v = incident frequency, $ = work function

EXPLANATION:

* + Photocurrent depends on the Intensity of the incident photons. It is independent of the wavelength oftha incident photons. So there will be no effect on photocurrem by ehang\ng the wavelength of the incident photons. So option 3 is correct.



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### According to the special theory of relativity which one is not an absolute quantity?

1.

### time

1. mass

### height

1. More than one of the above

### None of the above

#### Ana¥eer (Detailed Solution Below)

Option 4 : MOTI^ than one of the above



* + According to classical physics, the **inertial** masa of a **body** B **of the yeloctty of**

IlqhL It is regarding as a constam.

' However special theory of relativity leads us to the concept of **yadation of mass with velocity.**

* + It follows from the special theory of relativity that the mass m of a body moving with re\ativistic velocity v relative to an observer is larger than its m« when it is at rest.
  + Same Interesting results of the special theory of relativity can be summarized as follows without going ima their mathematical den“vatioris.

The mass is also not invariant.

If a body at rest has a mass m« its mass when it moves with a velocity v, increases to m given by: m ”•



### According to classical physics, time is an absolute quantity. Bu accor relativity, Time is not an absolute quantity. It depends upon



If the interval of time (say ticking of a clock) between tw

ecial theory of frame of reference.

inertial framR S be I, then the

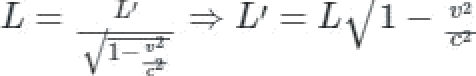
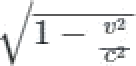
### time interval between these very two signals in at first will be given by

me 3’ moving with respect to the



### This means thatf' has increased or dilated. In other words,the clock will go slow.

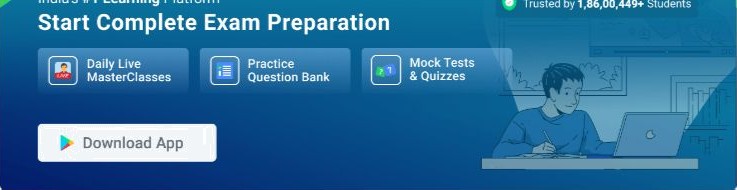
The distance from the earth to a star measured by an observRr in a moving spacDShip would seem smaller than the distance measured by an observer on earth. i.i^: (i-e S' < S).



E < L since v

So, from the above observation;

hgana and Time is not an absolute quality according to the special theory of relativity.



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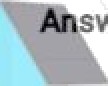
### Special theory of reIaiivity treats problems involving —

1. Inertial frame of reference
2. Non - inertial frame of reference
3. Non - accelerated frame of reference - , ’”\*
4. More than one of the above . , ' .

” '.

1. None of the above ‘

. . ”\_ • \* ' "

{Betailed Solution Below)

#### Option 1 : Inertial frame of reference

CONCEPT'

### The special theory of relativity:

#### Special relatMty is a theory of the structure of space-time.

The special theory of relatMty is put forward by Albert Bngtain.

#### According to this theory, **all the physical laws should be** the same In the martial frame of reference(non-accelerated or frame which is at rest or under uniform motion known as an inertial frame of reference).

* + The

second postulate of this theory is the speed of light c is a constant, Independent **of relative**

# Time

Future I ght cone

#### Observer Space

Pressureof the cone

#### Space

Pas: .igF.: cane



i nrh a s ø LearnEng Plai I or n

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#### The fæme of referenœ: If we are ob any moving body or anybody at raet with æepect to any movtng object or from any rest then the object is called hame of refææice.

There are two types of frame of reference:

#### Inertial frame of reference: The hama of rafarorice having zero acceleration is called the Inergal frama of reference.

* + - This frame of reference will be either in reat or will be moving whh a constam Moclty.

#### Newton's law is valid !n this frame of raference.

* + The non-inertial frame of reference: The frame of reference **having** non-zero acceleration is called a non-Inertial frama of refermoe.

#### Mawton‘s law is not valid in this frame of reference.

* + - For example: If we are observing an object from a freely falling object then this will be a non-inertial frame of reference because the freely falling body has some acceleration.

ŒPLANATtON-

* + As per the postulates, the apedal theory of relativity is only applicable to tha Iriertlal frame of

#### raforenca. Therefore option 1 is correct.

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# What f waves are light wave?

1. Transverse wave
2. Longitudinal wave
3. Both A & B
4. None

(Detailed Solution Below) ' \*

Option 1 : Transverse wave " " ”

**Physics Question 6 Detailed Solution**

**CONCEPT:**

* + Wave: The disturbance that transfers erfergy ftom one place to another is called a wave. There are mainly two types of



Th.e

1. Transverse waves: !n which the movement of the particles is at right angles to

the motion of the energy s called a transverse wave. Light is an example of a transverse wave.

1. Longitudinal wave: The wave in which the movement of the particles is parallel to the motion of the energy is called a longitudinal wave. The sound wave is an example of a longitudinal wave.



* + Mght-wave Is a banavetaa wgva because its components v!brate perpendicular to its direction of propagation. So option 1 is correct.



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 [” ” "' , ” View this Question Dnline >](https://link.testbook.com/XVertTSUigb)

[A 220 V, 100 W bulb is connected to a 110 V source.”CaIcula e the power consumed by](https://link.testbook.com/XVertTSUigb)

[ihe bulb.](https://link.testbook.com/XVertTSUigb)

1. 10 W

2. 15 W

3.

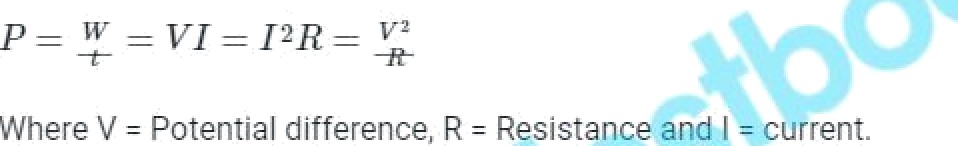
4. 25 W

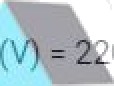
(Detailed Solution Below)

Option 4 : 25 W



CONCEPT: .. ’,

* + Eiectric Power: The rate at which electrical energy !s dissipate‹tintéother1'erms of enegy is called eiectrical power i.e., '

Given - Potentia! difference 0 V, power of the bulb (P) = 100 W and actual voltage ’) = 110

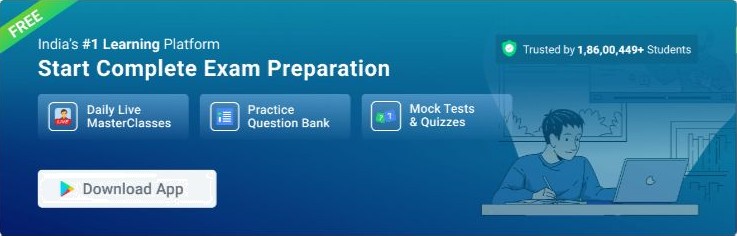
* + The resistance of the bulb can be calculated as,



* + The power consumed by the bulb.





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### [What will be the energy possessed by a siationary object of mass 10 kg placed ai a height of 20 m above the ground? (take g - 10 m/s2) “”](https://link.testbook.com/XVertTSUigb)

1. 2 J •





(Detailed Solution Below) Option 4 : 2 M



The correct answer is 2 kJ.

CONCEPT:

' PoQntlal energy The energy of any object due to its position with respect to a reference point is called potential energy. It is denoted by PE.

Potential energy is given by:

PE = m g h.

Her PE is the Po n alEnergy mrs the mass, g is the acceleration due to gravity, and h Is be

'

|  |  |  |
| --- | --- | --- |
| CALCULATION: |  | |
| Given that: |
| Mass (m) = 10 Kg |
| Height (h) = 20 m  I? E. = 10 x 10 x 20 | ” ' | ' “  ' |
| IN E.= 2000 J |  |  |
| IN E. = 2 kJ |  |  |

.›



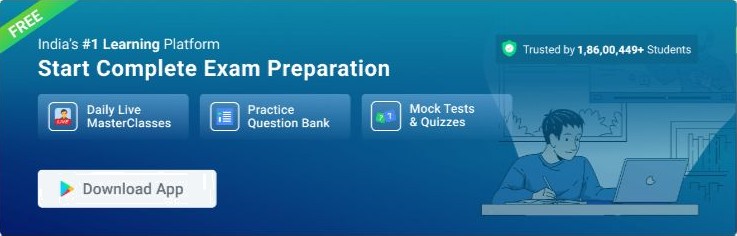


* + Kinetic werqy: The energy due to the motion of the object is called kinetic energy.

° Kinetic merqy (I¢E} = 1/2 (

° Where m is mass and v is velocity.

* + Since the object Is stationary (at reat) so the velocity is zero. Henoe the kinetic energy of the ect will be zero.
  + Only the potential energy of the object will be there at the height.



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[The instrument is used for detecting electric current is](https://link.testbook.com/XVertTSUigb)

1. [Galvanometer](https://link.testbook.com/XVertTSUigb)
2. Tube tester



4. Fathometef

"

### [. .“ ” “‘](https://link.testbook.com/XVertTSUigb)

Answer (Detailed Solution Below) Option 1 : Galvanometer

**Physics Question 9 Detailed Solution**

CONCEPT:

### Galvanometer

A galvanometer is used for detecting current in an electric circuit.

* The galvanometer is the device used for detecting the presence of small currems and voltage or for measuring their magnitude.

The galvanometer is mainly used in the bridges and potemiometer where they indicate the null deflection or zero currem.

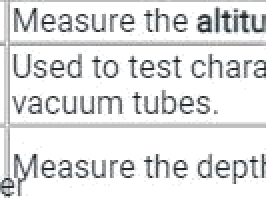
* The potentiometer is based on the premise that the current sustaining coil is kept between the magnetic field experiences a torque.

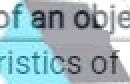
FXPI INATION

* From the above, !t is clear that the galvanometer is the instrument used for detecting the presence of electric currem in a circuit. Therefore option 1“ is correct.

@ Additional Information

### pp m sed to



Altimte Measure theahitude a ”ect.

Tube Used to test charact=.risti tester vacuum tubes.

Fathomet measure the depth of water.

Mistake Point

#### Difference between Ammeter and Galvanomete

* The ammeter shows only the magnitude of the current.
* The galvanometer shows both the direction and magnitude of the currem.

1.



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A body of 20 kg is lying at rest. Under the action of a constant force, it"gains a speed of 7 m/s. The work done by the force will be ”

1. 490J ,

### 2. 500J

3. 390J - - '



(Detailed Solution Below) Option 1 : 490J

##### Physics Question 10 Dctsllerl Solution

The correct answer is 490J

##### CONCEPT

* Work-energy theorem: It states that the sum of work done by all the forces acting on a body is equal to the change in the kinetic energy of the body i.e.,

Work done by all the forces = Kf - K,



Where v = final velocity, u = initial velocity and m = mass of the body CALCULATION: “ : ’ ””

### It is given that, . ' ”

Mass (m) = 20 kg . . ’ •

Final Velocity (v) = 7 m/s and initial velocity‘ (u) -,“0r is

Aocotd8'igto the work-energy th

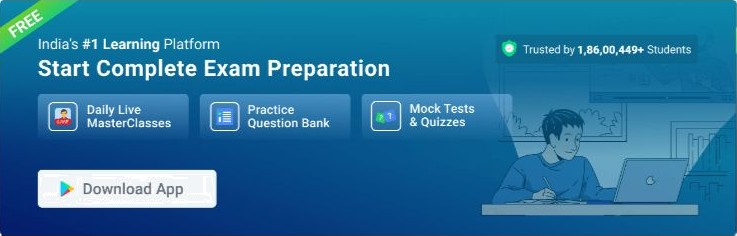


w w = u .c

Since initia! speed is zero so the Initial KE will also be zero. w Work done (W) = Final K.E = 1/2 mv’

W = 1/2 x 20 x 72

W = 10 x 49 W = 490J



 [View this Question Dnline >](https://link.testbook.com/XVertTSUigb)

[What is the force between two small charged spheres having Charges of 2 x 10-’ C and 3 x 10-\* C placed 30 cm apart in the air? . t](https://link.testbook.com/XVertTSUigb)

[1. 5 x 1& 6 N](https://link.testbook.com/XVertTSUigb)

[2. 8 x 10-](https://testbook.com/question-answer/what-is-the-force-between-two-small-charged-sphere--5eaa73f7f60d5d099bebf55d)5 N ' '





(Detailed Solution Below) Option 4 : 6 x 1& 3 N





Coulomb¥ law in Elmbostatics -

CouIomIf¥ law state's that force of interaction between two stationary point charges is directly , proportional to the product of the chargee, and inversely proportional to the square of the . , distance between them and acts along the straight line joining the two charges. •

q F 

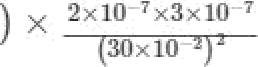


Where K is a constant = 9 x 10 Nm

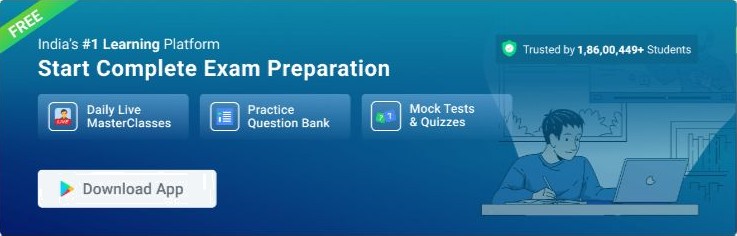
Given — q/ = 2 x 10-7 C, qt = 3 x 10-’ C and r = 30 cm = 30 x 10-2 m

Farce is equal to

*F ——* (9 x 10a







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### [A car, initially at resi travels 20 m in 4 sec along a siraight line with consiant](https://link.testbook.com/XVertTSUigb)

[acceleration. Find the acceleration of car?](https://link.testbook.com/XVertTSUigb)

[1. 4.9 m / s’ ’ •](https://link.testbook.com/XVertTSUigb)

2. 2.5 m / s 2 '

3. 0.4 m / s 2 ‘ "



Anaurer (Detailed Solution Below) Option 2 : 2.5 m / s\*

Physics QueetX›‹i 12 Detailed Solution



* Equation of motion: The mathematical equations used to find the final velocity, displacements, time, etc of a moving object without considering force acting on it are called equations of motion.
* These equations are only valid when the acceleration of the body is constant and they move on a straight line.

There are three equations of motion: ".



V2 = u2 + 2 a S '



Where, V = fina! velocity, u = initial velocity s = distance traveled by the dy under motion, a = acceleration of body under motion, and t = time takert by the body under motion.

#### EXPLANATION: ,.. '

Given that: “



'

Initial velocity (u) = 0 Distance (S) = 20 m Time (t) = 4 sec

Us e S == ut —t— eat\*

20 = 0 1 x a x 4\*

acceleration = a = 20/8 = 2.5 ml

‹

St art Complete Exam P re par at io n

,

.

..



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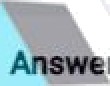
[A particle of charge e and mass m moves with a velocity v in a magnetic field B applied perpendicular to the motion of ihe particle. The radius r of its path in the field is](https://link.testbook.com/XVertTSUigb)



2.

1. -era



r ›'De ailed Solution Below) Option 1 w

CONCEPT:

' When **moving through a magnetic field. the charged** particle experiences a force.

* + When the direction of the velocity of the charged particle is perpendicular to the magnetic

field:

° Magnetic force is always perpendicular to velocity and the field by the Right-Hand Rule.

And the particle starts to follow a curved path.

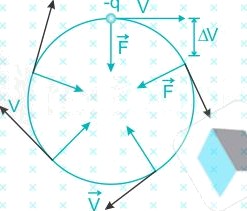
The particle continuously follows this curved path until it forms a complete circle. This magnetic force works as the centripeta! force.

* + Centripetal force (FC) = Magnetic force (FB) w qvB = mv2/R

w R = mv/qB

where q is the charge on the particle, v is the velocity of it, m is the mass of the particle, B is the • magnetic teld in space where it c!rcles, and R is the radius of the circle in which it moves..



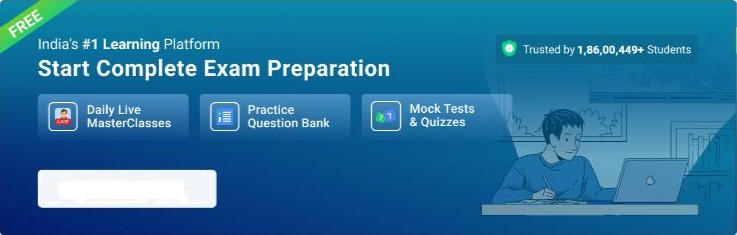


EXPLANATION:

Given that particle has charge e; mass = m; and moves with a velocity v in a magnetic teld B. So

* + Centripetal force (F = Magnetic force (Fg} w qvB = mv^/R

So the correct answer is option 1.



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### [How much work is done in moving a charge of 5 C across to poinis having a potential difference of 16 V?](https://link.testbook.com/XVertTSUigb)

[1. 65 J](https://link.testbook.com/XVertTSUigb)

[2. 45 J](https://link.testbook.com/XVertTSUigb)

3.

(Detailed Solution Below)

Option 4 : 80 J

**Physics Question 1J** Datallerl **Solution**

Option J is correct - - ”'

**CONCEPT:** ' ” • ’

' Electric potemial (V}: The amount of work done to move a unit charge home reference point (or infinity) to a specific point !n an electric field without productnp”erf acceleration is

called electric potential at that point. ”



**Electric potential (V)** =

* + Eieccostatic **Potential Energy:** The amount of Ark done to move a charged particle from infinity to a point in an electric field is known as the potential energy of that charged particle.

## CALCULATION:

### Given that:

Electric charge (q) = 5 C Potential difference (V) = 16 V

Work done (¥f} = cherge (q} x poteflJal **difference (V}**

### Work done (W} = 5 x 16 = SO J



An ammeter is connected in with the circuit.



#### both parallel and series

1. None of the abo've

Option 2 . series

Physîcs Question 15 Detaîled Solution



Ammeter.

#### It is a de‘‹ice r,ser: to measure tl e current in a ci CLiit

* It is generally connected in series in a circuit.

#### This is becar:se the current remains the same wh.n. r›evices are connected ii series

* + The iueal ammeter has Io'‹ r. \*:stance becer.se the reading ›'viII cl gnp. as an extra resistance is ar:r:ed in series

Additional Information

Voltmeter.

* + lt is a device us.ri fcr meas uring tie electric potentiel differei ce bet '/.en t \*/o Peints in ai electric circr.it.

#### lt is col nec\ed i parallel across the t \* o peints to n easur. tl e collage drop Fet '.'een tie

QOiiïT S

#### This is b=.eau se the potential difference remains the same if r.e 'ices are connecter in parallel

* + The voltmeter has high resistance hecause the overall resistance '.'bill not cl anpe if los resistai ce path is off.res to the cL rent in form of voI\*»eter