# Bangladesh International Tutorial Limited

## Physics Worksheet

## Class-XI

## Worksheet- 04

## Subject Teacher- P.K. Saha

## Total Marks- 30

**Name: _____**

**1** Which of the following is equivalent to the joule in terms of SI base units?

- ☒ **A** $kg\ m^2\ s^{-3}$
- ☒ **B** $kg\ m^2\ s^{-2}$
- ☒ **C** $kg\ m\ s^{-2}$
- ☒ **D** $kg\ m\ s^{-1}$

**(Total for Question 1 = 1 mark)**

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**2** A wind turbine generates 550 W of electrical power for an average of 7 hours each day.

What is the total energy, in MJ, generated each day?

- ☒ **A** 0.23
- ☒ **B** 14
- ☒ **C** 230
- ☒ **D** 14000

**(Total for Question 2 = 1 mark)**

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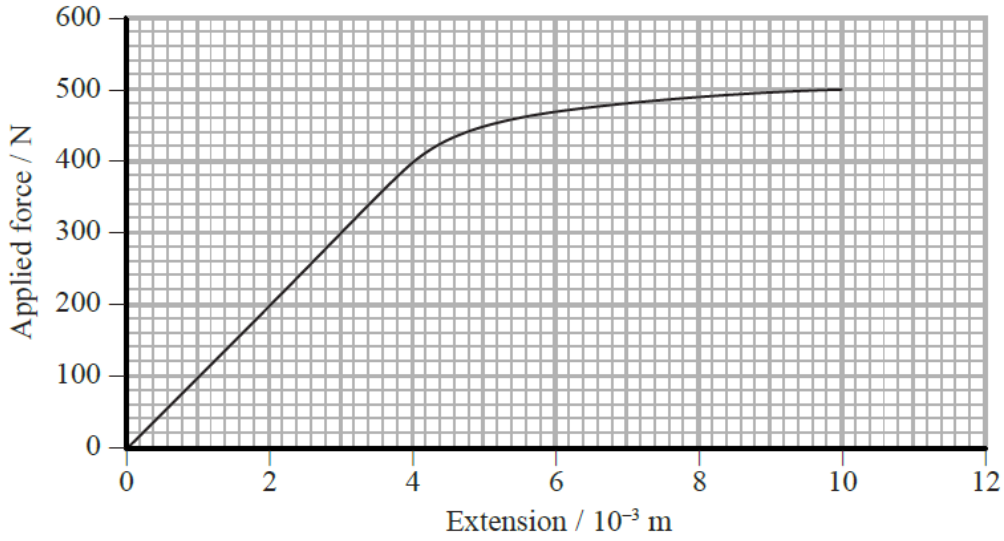
**Questions 3 and 4 refer to the information below.**

A student applied a range of forces to the ends of a copper wire and measured the corresponding new length of the wire.

The force-extension graph for the wire is shown.




**3** What is the maximum force that could be applied and then removed such that the wire would go back to its original length?

☒ **A** 200 N

☒ **B** 300 N

☒ **C** 400 N

☒ **D** 500 N

**(Total for Question 3 = 1 mark)**

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**4** What is the elastic strain energy stored in the wire when it is extended by 4 mm?

☒ **A** 0.8 J

☒ **B** 1.6 J

☒ **C** 800 J

☒ **D** 1600 J

**(Total for Question 4 = 1 mark)**

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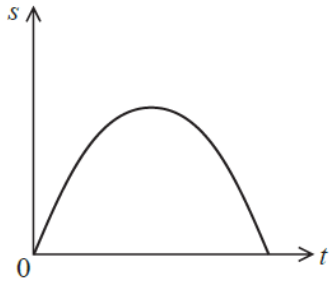
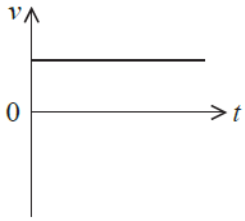
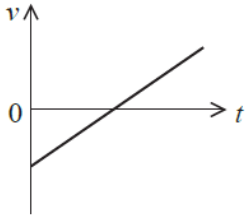
**5** The displacement-time graph for an object is shown.



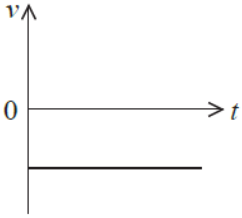

Which of the following is the corresponding velocity-time graph?



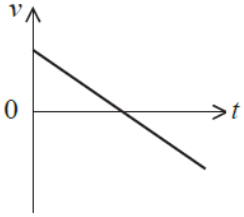

**A**




**B**




**C**




**D**

☒ **A**

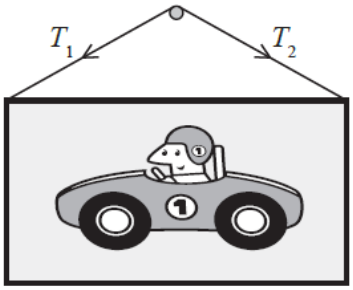
☒ **B**

☒ **C**

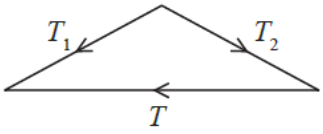
☒ **D**

**(Total for Question 5 = 1 mark)**

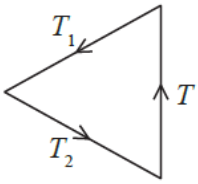
**6** A picture is hung using a wire placed over a small hook as shown.



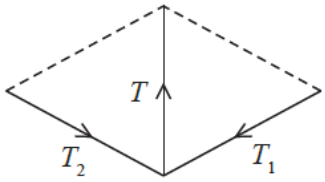

$T_1$ and $T_2$ are the tension forces acting on the hook.
Which of the following correctly shows the vector diagram for the resultant force $T$ of the two tensions?



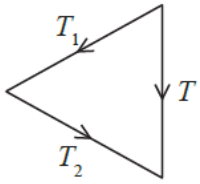

**A**




**B**




**C**




**D**

☒ **A**

☒ **B**

☒ **C**

☒ **D**

**(Total for Question 6 = 1 mark)**

**7** A ball of mass $m$ falls through a height $h$ to the ground.

What is the kinetic energy of the ball halfway to the ground?

☒ **A** $mgh$

☒ **B** $\frac{mgh}{2}$

☒ **C** $\sqrt{mgh}$

☒ **D** $\sqrt{\frac{mgh}{2}}$

**(Total for Question 7 = 1 mark)**

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**8** A car travels at a speed of 20 m $s^{-1}$ due east and then turns around and travels at a speed of 40 m $s^{-1}$ due west.

Taking the direction of due east as positive, select the correct row from the table.

| | Change in speed / m $s^{-1}$ | Change in velocity / m $s^{-1}$ |
|---|---|---|
| ☒ **A** | 20 | −60 |
| ☒ **B** | 20 | 60 |
| ☒ **C** | 60 | −60 |
| ☒ **D** | 60 | 60 |

**(Total for Question 8 = 1 mark)**

**9** A football is kicked across a football pitch with an initial vertical component of velocity $u$. The ball lands back on the pitch after a time of flight $t$.

Which of the following equations can be used to determine $t$?

☒ **A** $\frac{u}{2g}$

☒ **B** $\frac{u}{g}$

☒ **C** $\frac{g}{u}$

☒ **D** $\frac{2u}{g}$

**(Total for Question 9 = 1 mark)**

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**10** A ball was placed on top of a compressed spring. When the spring was released the ball was accelerated vertically upwards.

If this were to be repeated on the Moon, the acceleration of the ball would be

☒ **A** less as the weight of the ball is greater.

☒ **B** less as the weight of the ball is less.

☒ **C** greater as the weight of the ball is greater.

☒ **D** greater as the weight of the ball is less.

**(Total for Question 10 = 1 mark)**

**11.**

A student was asked to define the yield point of a material. The student said 'the stress at which there is a large extension.'

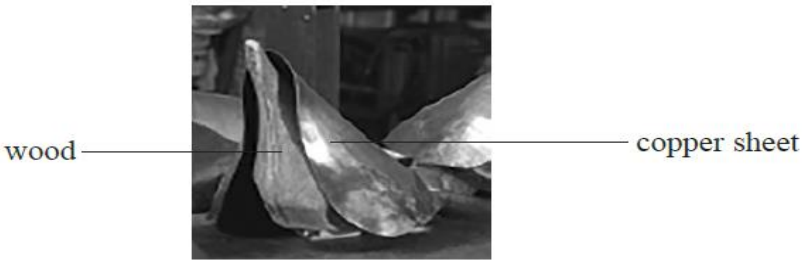
Explain why the student's definition is incorrect.

**(2)**

**12.**

The Olympic flame for the 2012 Games held in London consisted of 204 separate copper petals supported by steel stems.

Each petal was made using a thin copper sheet wrapped around a shaped piece of wood.




(a) Explain why copper was a suitable material from which to make the petals.

**(2)**

(b) Explain why steel was a suitable material from which to make the stems.

**(2)**

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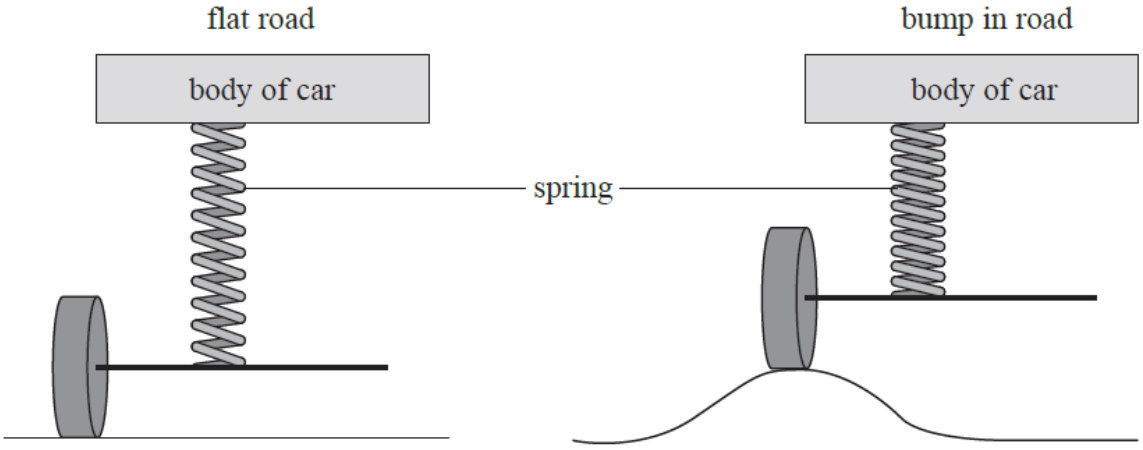
**13.**

Cars have a suspension system which includes springs that are compressed by the weight of the car. This is necessary to keep the body of the car at approximately the same level, when the surface of a road is uneven.

The diagrams show a simplified suspension system for one wheel when on a flat road and when on a bump in the road.




(a) The surface of a racing track is much smoother than the surface of a road. Racing cars are therefore able to use springs with a greater stiffness constant $k$.

(i) Suggest what the effect would be of using springs with a greater value $k$ when driving on a bumpy road.

**(2)**

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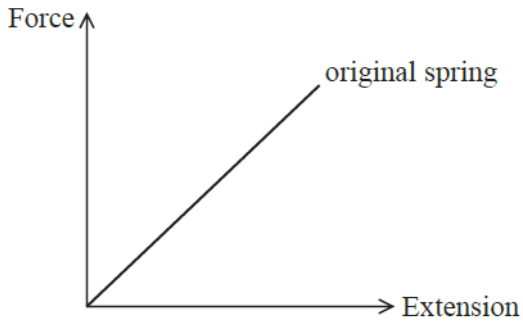
(ii) Add an appropriate line to the force-extension graph for the new spring with a higher value of $k$.

**(1)**




(b) A spring used in the front suspension of a car has an initial length of 0.316 m and a new length of 0.205 m when under a load of 4.07 kN.

Calculate the spring constant of the spring.

**(3)**

Spring constant = .....

**14.**

A spider of mass $m_s$ is hanging from a thread of spider silk. A fly of mass $m_f$ is hanging from another thread of silk below the stationary spider.

The magnitudes of the tensions in each thread of silk are $T_1$ and $T_2$ as shown in the diagram. The free-body force diagram for the fly is also shown.



Free-body force diagram for the fly

(a) (i) Complete the free-body force diagram below for the spider.

**(3)**

(ii) Write equations for the forces acting on the spider and for the forces acting on the fly.

**(2)**

(b) The spider produces more silk, so the length of the thread of silk above the spider increases. The spider and the fly both accelerate towards the ground.

Assuming that the mass of the silk is negligible, calculate their acceleration.

$m_s = 6.5 \times 10^{-4}$ kg

$m_f = 8.0 \times 10^{-5}$ kg

$T_1 = 1.9 \times 10^{-3}$ N

**(3)**

Acceleration = .....