

BANGLADESH INTERNATIONAL TUTORIAL LIMITED

Physics Worksheet

Class XI

Subject Teacher: P.K. Saha

WEEK 01

MARKS: 34

STUDENT'S NAME: _____

DATE: 4/4/2020

1 Quantities in physics are classified as either vectors or scalars.

Which of the following units could **only** be used for a scalar quantity?

- A ms^{-1}
- B ms^{-2}
- C kgms^{-2}
- D kgm^{-3}

(Total for Question 1 = 1 mark)

2 Once in orbit above the Earth's atmosphere, the engines on a space rocket are switched off.

Which row of the table correctly states the resulting motion of the rocket and the law explaining this motion?

	Motion of rocket	Explanation
<input type="checkbox"/> A	uniform velocity	Newton's 2 nd law
<input type="checkbox"/> B	uniform velocity	Newton's 3 rd law
<input type="checkbox"/> C	changing velocity	Newton's 2 nd law
<input type="checkbox"/> D	changing velocity	Newton's 3 rd law

(Total for Question 2 = 1 mark)

- 3 A sphere of weight 2.5 N floats in water with $\frac{1}{2}$ of its volume beneath the surface. A force F is applied to the sphere, completely immersing it in the water as shown.

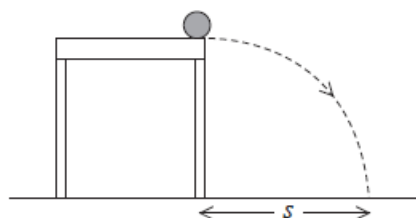


Which of the following is the minimum value of F ?

- A $2 \times 2.5\text{ N}$
 B $1 \times 2.5\text{ N}$
 C $\frac{1}{2} \times 2.5\text{ N}$
 D $\frac{1}{4} \times 2.5\text{ N}$

(Total for Question 3 = 1 mark)

- 4 A ball rolls off a table with a horizontal velocity of 1.2 ms^{-1} . The ball takes 0.9 s to reach the ground and lands a distance s from the table as shown.



Which of the following expressions could be used to determine the value of s in metres?

- A $\frac{1.2^2}{2 \times 9.81}$
 B 1.2×0.9
 C $\frac{1}{2} \times 9.81 \times 0.9^2$
 D $(1.2 \times 0.9) + (\frac{1}{2} \times 9.81 \times 0.9^2)$

(Total for Question 4 = 1 mark)

- 5 A sample of sea water is collected using a beaker. The sample contains some particles of sand which settle at the bottom of the beaker.

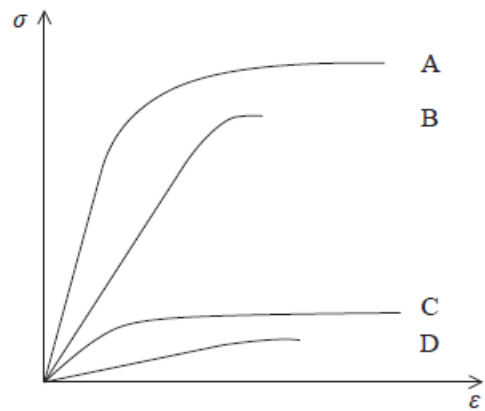
Which of the following would result in a decrease in the time taken for the sand to settle?

- A smaller particles of sand
- B lower temperature of the sea water
- C smaller terminal velocity of sand particles
- D lower viscosity of the sea water

(Total for Question 5 = 1 mark)

- 6 A graph of stress σ against strain ϵ , up to the breaking point, is drawn for four samples of wire, A, B, C and D.

Which sample of wire has both a low elastic limit and a large region of plastic deformation?



- A
- B
- C
- D

(Total for Question 6 = 1 mark)

- 7 A water pump causes 200 g of water to be ejected from the nozzle of a garden hose each second at a velocity of 3 m s^{-1} .

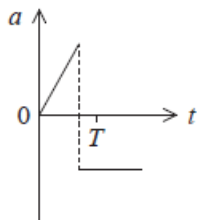
Which of the following expressions could be used to determine the minimum output power in watts required from the pump?

- A $\frac{200 \times 3^2}{2}$
- B $\frac{0.2 \times 3^2}{2}$
- C $\frac{200 \times 3}{2}$
- D $\frac{0.2 \times 3}{2}$

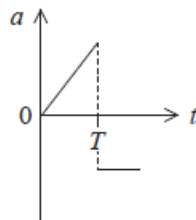
(Total for Question 7 = 1 mark)

- 8 A model rocket is launched and moves vertically upwards while still burning fuel to give a constant upwards thrust. The fuel runs out, and the rocket reaches the maximum height at time T before falling back to the ground.

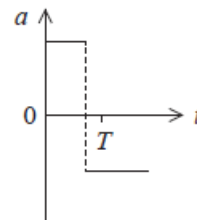
Which of the following graphs could show how the acceleration a of the rocket varies with time t , if the decrease in mass as the fuel burns is neglected?



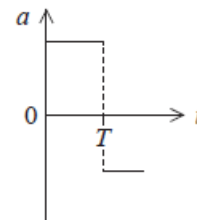
A



B



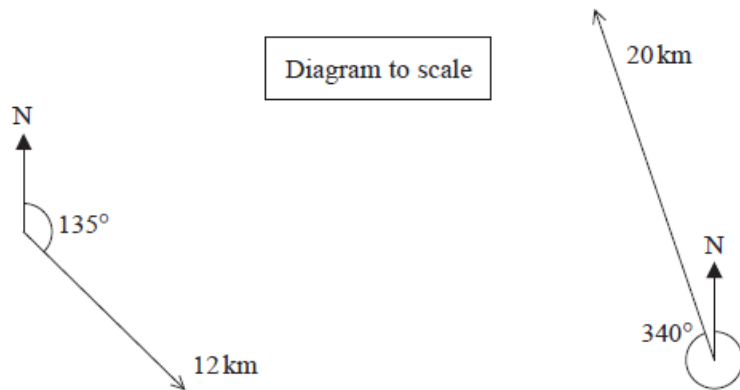
C



D

(Total for Question 8 = 1 mark)

- 9 A student walked 12 km on a bearing of 135° and then walked 20 km on a bearing of 340° as shown.



Which of the following could represent the final displacement of the student from his starting point?

<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D

(Total for Question 9 = 1 mark)

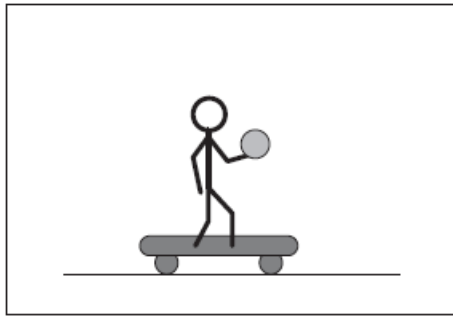
- 10 A lift moves upwards from rest with an acceleration a . A student of mass 70 kg standing in the lift exerts a force of 800 N on the floor of the lift.

Which of the following expressions could be used to determine a ?

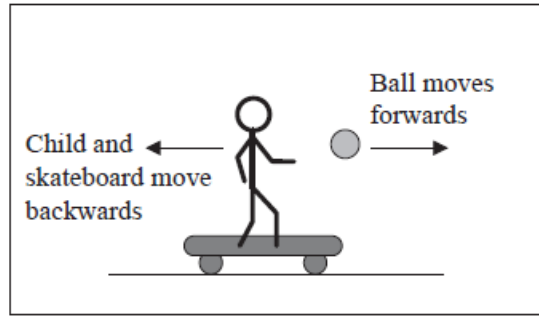
- A $70g = 70a$
- B $800 = 70a$
- C $800 - 70g = 70a$
- D $70g - 800 = 70a$

(Total for Question 10 = 1 mark)

- 11 A child is standing on a skateboard and both are stationary. The child throws a ball forward at a high velocity and the child and the skateboard move backwards at a lower velocity.



Before



After

Explain, in terms of momentum, why the child and the skateboard move backwards at a lower velocity.

(4)

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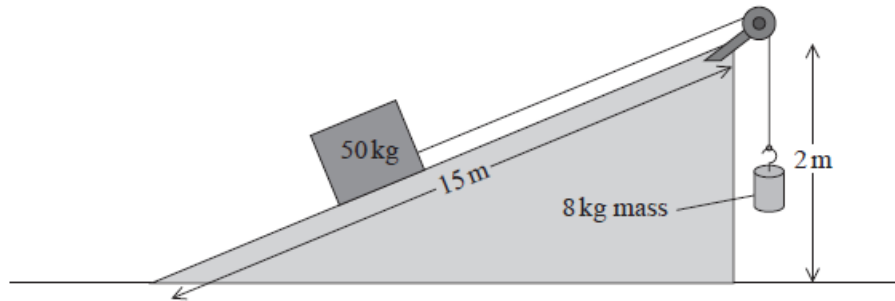
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(Total for Question 11 = 4 marks)

12 Machines make work easier by changing the size or direction of a force. A student designed a simple machine to lift a box of mass 50 kg. The student claimed the efficiency of the machine was greater than 90%.

The machine used a slope of height 2.0 m and length 15 m to move the box. The box was connected to an 8.0 kg mass by a rope over a pulley as shown. As the 8.0 kg mass fell, the box moved up the slope at a steady speed.



Determine whether the maximum efficiency of the machine was greater than 90%.

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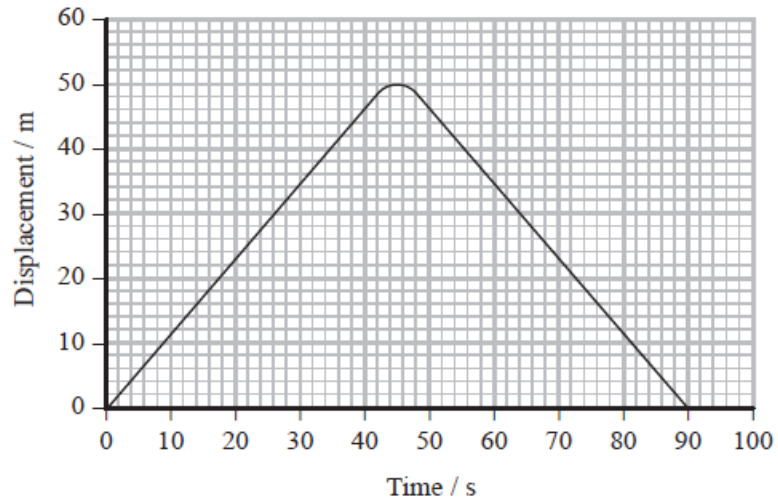
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(Total for Question 12 = 4 marks)

13 A swimmer swims a 100 m race. A simplified displacement-time graph for the swimmer is shown.



(a) Draw a corresponding velocity-time graph for the motion of the swimmer on the axes below. Show all working in the space below.

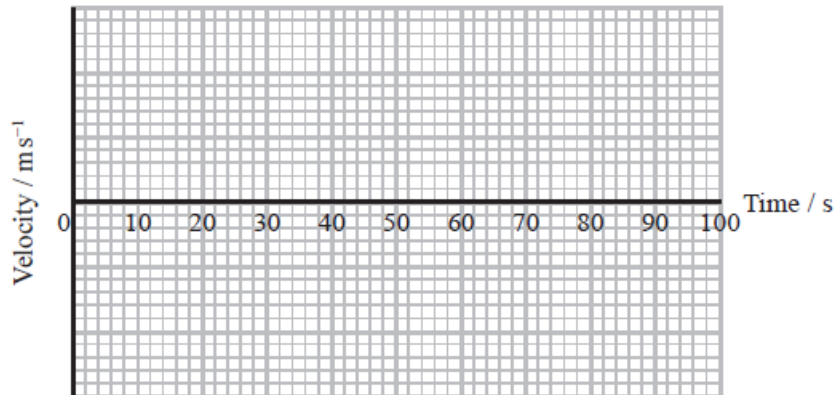
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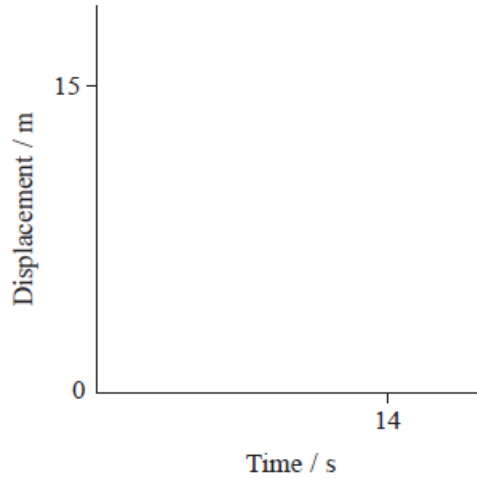
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(b) To increase her initial speed, the swimmer began the race by gliding underwater for 15 m and then began to use her arms and legs. This was not represented on the simplified displacement-time graph.

(i) Sketch onto the axes below to show the actual variation of displacement with time for the first 15 m of the race.

(2)



(ii) Explain one other way in which the motion of the swimmer has been simplified when drawing the displacement-time graph.

(2)

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(Total for Question 13 = 8 marks)

14 A firework is launched into the air and explodes once it reaches a maximum height.



(a) The firework is designed to explode at a maximum height of 350 m.

(i) Show that the vertical component of the velocity at launch is about 80 m s^{-1} .

(2)

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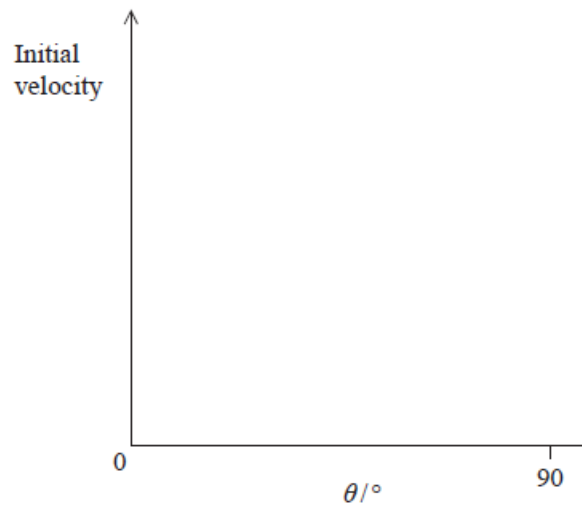
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(ii) The vertical component of the velocity at launch depends on both the initial velocity of the firework and θ , the angle between the initial velocity and the horizontal.

Sketch a graph showing how the initial velocity required for the firework to reach the maximum height of 350 m varies with θ for the firework.

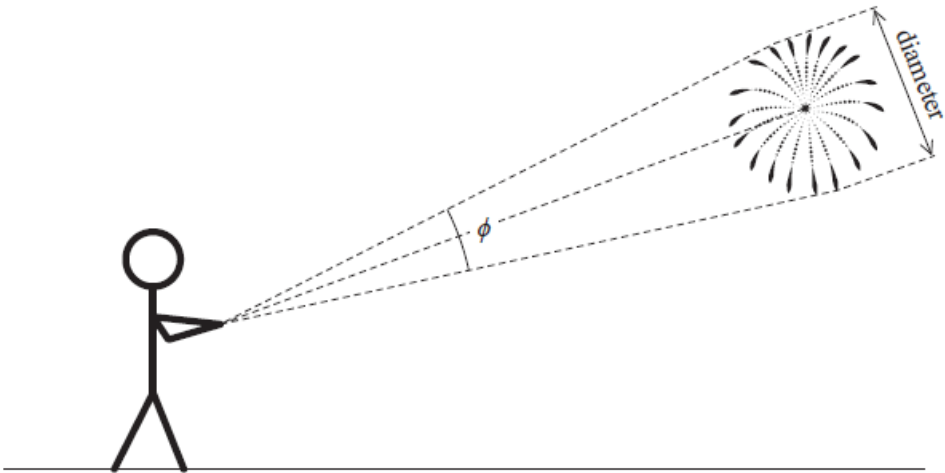
(4)



(b) A student wanted to estimate the maximum diameter of the firework after exploding.

The student estimated:

- the time taken between seeing the firework explode and hearing the firework explode
- the angle ϕ from the top to the bottom of the firework



Describe how the student could determine the maximum diameter of the exploded firework using the estimated data.

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(Total for Question 14 = 8 marks)