**Section: A**

*Answer* **ALL** *the questions in this section. Select only* **ONE (1)** *answer for each question and write your answers clearly in the ( ) provided. Answers written anywhere else will* **NOT** *be marked. Workings need* **NOT** *be shown.*

Top of Form



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| **Q1:** | Convert the following: 50 micrometres (µm) = \_\_\_\_\_\_\_\_\_\_\_\_\_ nanometres (nm). | **Mark (1)** |
|  | 50,000 nm | |
|  | 0.05 nm | |
|  | 500,000 nm | |
|  | 5000 nm | |

Bottom of Form

Top of Form



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| **Q2:** | A force of 100 N is applied on a trolley which is initially at rest causing it to accelerate. The object travelled a distance of 0.8 m in the direction of the force. After which, the force is removed. Calculate the work done by the force on the trolley. | **Mark (1)** |
|  | 125 J | |
|  | 40 J | |
|  | 160 J | |
|  | 80 J | |

Bottom of Form

Top of Form



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| **Q3:** | Vectors are the quantities that are described by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | **Mark (1)** |
|  | magnitude | |
|  | velocity | |
|  | both magnitude and direction | |
|  | direction | |

Bottom of Form

Top of Form



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| **Q4:** | What is the acceleration of a car that accelerates uniformly from an initial velocity of 20 m/s to a final velocity of 50 m/s for 10 seconds? | **Mark (1)** |
|  | 3 m/s2 | |
|  | 0 m/s2 | |
|  | 5 m/s2 | |
|  | 2 m/s2 | |

Bottom of Form

Top of Form



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| **Q5:** | What is the SI unit for density? | **Mark (1)** |
|  | kg | |
|  | m3/s | |
|  | kg/m3 | |
|  | N/m3 | |

Bottom of Form

Top of Form



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| **Q6:** | A bag of sand of mass 5 kg is raised over a vertical distance of 13 m. Calculate the potential energy gained by the bag of sand. Assume that the gravitational acceleration is 10 m/s2. | **Mark (1)** |
|  | 325 J | |
|  | 65 J | |
|  | 650 J | |
|  | 130 J | |

Bottom of Form

Top of Form



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| **Q7:** | What will be the acceleration if a net force of 450 N is applied horizontally on the box with a mass of 50 kg as shown in Figure A7?  C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_-239089279_1489887697.png | **Mark (1)** |
|  | 400 m/s2 | |
|  | 9 m/s2 | |
|  | 0.11 m/s2 | |
|  | 10 m/s2 | |

Bottom of Form

Top of Form



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| **Q8:** | What is the energy consumed by a kettle if the power rating of the kettle is 10 W and operating for a period of 15 s? | **Mark (1)** |
|  | 1.5 J | |
|  | 25 J | |
|  | 150 J | |
|  | 0.67 J | |

Bottom of Form

Top of Form



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| **Q9:** | Which of the following is correct for a body which is in static equilibrium? | **Mark (1)** |
|  | The body is moving around in a circular path. | |
|  | The body is at rest. | |
|  | The body is accelerated by an external force. | |
|  | The body is moving with uniform velocity. | |

Bottom of Form

Top of Form



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| **Q10:** | Figure A10 shows the flow of blood in an artery. Arteriosclerosis arises when plaque builds up on the inner walls of arteries, restricting blood flow. Pressure differences across the artery will then cause it to collapse.  C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_-1289365138_-1763358677.png  Which of the following best explains the working principle behind the artery collapse? | **Mark (1)** |
|  | Bernoulli’s principle | |
|  | Heat transfer | |
|  | Interference effect | |
|  | Photoelectric effect | |

Bottom of Form

**Section: B**

*Answer* **ALL** *the questions in this section. Write your answers clearly in the blanks provided. Answers written anywhere else will* **NOT** *be marked. Workings need* **NOT** *be shown.*

Top of Form



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| **Q11:** | Figure B1 shows object X (110 kg) moving to the right at a **constant** velocity of 6 m/s.  C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_-1244377012_848911948.png    (a) What is the magnitude of the acceleration of moving object X?  Ans: m/s2  (b) Determine the kinetic energy of moving object X.  Ans: J | **Mark (2)** |

Bottom of Form

Top of Form



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| **Q12:** | A peach that grows on a tree was pulled at an angle of 30⁰ with a force of 60 N. The force on the peach is shown in Figure B2.  C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_789347183_-497264046.png  By ignoring the effects of air resistance,  (a) Determine the **horizontal** component of the force.  Ans: N  (b) Determine the **vertical** component of the force.  Ans: N | **Mark (2)** |

Bottom of Form

Top of Form



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| **Q13:** | A bus accelerates uniformly from rest to a final velocity, *v*, in the first 5 seconds. The distance travelled by the bus during the first 5 seconds is 30 m.  (a) Determine whether the acceleration of the bus is **constant** or **varying** during the first 5 seconds.  Ans:  (b) Determine the final velocity, *v*, of the bus at the 5th second.  Ans: m/s | **Mark (2)** |

Bottom of Form

Top of Form



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| **Q14:** | (a) The net force required to accelerate the car is 600 N. Determine the work done required for the car to travel a distance of 100 m.  Ans: J  (b) A van accelerates uniformly from rest to a speed of 40 m/s over a distance of 50 m. The net force required to accelerate the van is 2000 N. Determine the mass of the van.  Ans: kg | **Mark (2)** |

Bottom of Form

Top of Form



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| **Q15:** | The mass of the object is 60 kg. The power required to raise the object to a vertical height of 12 m is 750 W. Assume that the gravitational acceleration is 10 m/s2.  (a) Determine the weight of the object.  Ans:  N  (b) What is the time taken to raise the object?  Ans:  s | **Mark (2)** |

Bottom of Form

**Section: C**

*Answer* **ALL** *the questions in this section*. *Write your answers clearly and show your working clearly in the boxes provided*. *Answers written anywhere else will* **NOT** *be marked*.

Top of Form



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| **Q16:** | (a) Can an object be moving when its acceleration is zero? If so, give an example. If not, explain why.  (b) Can an object have constant velocity but varying speed? Explain your answer.  (c) Is there any situation in which there are external forces acting on an object when the acceleration of the object is zero? Explain your answer. | **Mark (6)** |
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Bottom of Form

Top of Form



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| **Q17:** | (a) In a horizontal pipe as shown in Figure C2, liquid flows through segment 1 of the pipe with a cross-sectional area of 3.12 m2 with a velocity of 5 m/s. Calculate the cross-sectional area of the pipe at segment 2 when the velocity of the liquid in the pipe increases to 13 m/s. Assume there is no leak.  C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_695296184_2142189243.png  (b) In another purification system, a liquid is flowing in a pipe at a velocity of 2 m/s and a pressure of 150,000 Pa. The purification system requires the liquid to be at a pressure of 260,000 Pa on a lower level. What is the reduction in height of the pipe in order to achieve this pressure of 260,000 Pa? Assume the velocity does not change. Given that the density of liquid is 740 kg/m3 and gravitational acceleration is 10 m/s2. | **Mark (4)** |
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Bottom of Form

Top of Form



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| **Q18:** | Figure C3 shows an object initially at point A with an initial speed of 15 m/s and slides down a smooth frictionless curved track to point B. Assume that the gravitational acceleration is 10 m/s2.  C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_-784043617_-1742568786.png  (a) Calculate the speed of the object as it reaches point B.  (b) Explain why it is not appropriate to use Newton’s second law of motion (i.e. F=ma) in this question. | **Mark (4)** |
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Bottom of Form

Top of Form



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| **Q19:** | Figure C4 shows a uniform rod of weight, ***W***, that is fixed at D. The rod is supported at A which exerts an upward force, ***R***.  C:\Users\17046589\AppData\Roaming\Republic Poly\eQuest\_assessmentimages\_assessmentimg_-283734597_1022615693.png  (a) State **two** conditions that must be satisfied for the uniform rod to be in static equilibrium.  (b) Determine the upward force, ***R***, if weight, ***W***, is given to be 20 N, and the distance of D from B is twice that of the distance of A from B.  (c) State and explain what would be the effect on the upward force, ***R****,* if a boy walks along the rod from B towards C. | **Mark (6)** |
|  |  | |
|  | Word Count: 105 | Max Words: 500 |

Bottom of Form