Haileybury

Candidate Name	
Current School	

Physics

Lower Sixth (Year 12) examination
SAMPLE PAPER
Entry 2020

Time allowed: 45 minutes

Please read this information before the examination starts

Attempt as many questions as possible.

Write your answers in the spaces provided on the question paper.

The use of a calculator is allowed.

Quote any **formulae** you use and show relevant working.

Include **units** with numerical answers, where appropriate.

The strength of Earth's gravitational field, g, can be taken as 10 N/kg

1) Figure 1 shows the velocity-time graph for a vehicle travelling in a straight line.

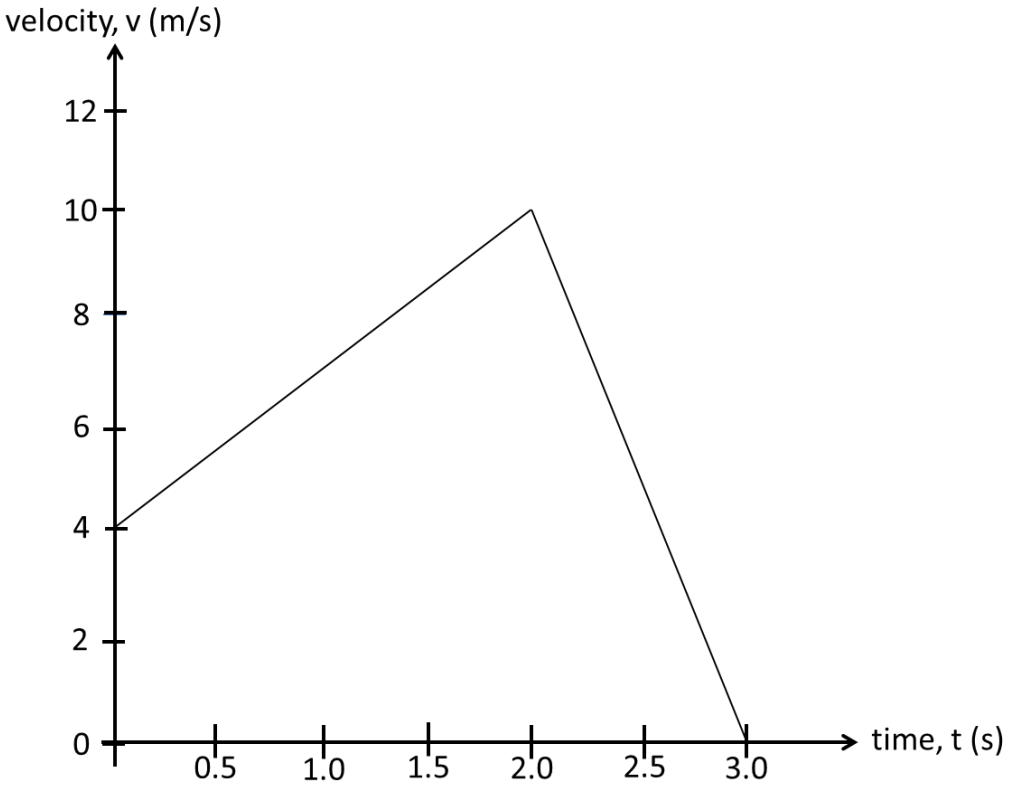

Figure 1
The velocity-time graph for a vehicle

a) Calculate the acceleration of the vehicle.

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b) Calculate the total distance covered by the vehicle, during the journey.

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c) Calculate the average speed of the vehicle during the journey.

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2) It is estimated that the Earth's oceans contain a total of 1.33×10^9 km^3 of water.

a) Calculate the energy necessary to heat the oceans from 15°C to 20°C, given that 1 kg of water requires 4200 J to raise its temperature by 1°C and that the density of water is 1000 kg/m^3. Assume that there is no evaporation.

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b) An asteroid has a mass of 9×10^{14} kg and travels with a speed of 5.0 km/s.

Calculate the kinetic energy of the asteroid.

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c) If the asteroid lands in the Pacific Ocean and 60% of the kinetic energy is used to heat the oceans, calculate the increase in the temperature of the oceans, assuming that there is no water loss during the collision process and the heat energy is evenly distributed throughout the oceans.

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3) An angle can be measured in degrees. One degree is equal to 60 arc minutes. One arc minute is equal to 60 arc seconds.
The angle 54°32’40’’ is an angle of 54 degrees, 32 arc minutes and 40 arc seconds.
Convert this angle into a decimal value of degrees, showing all working.

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4) A car travels at a steady speed of 20 m/s. Explain how it is possible that the car is accelerating while travelling at a steady speed.

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5) Write down four quantities which are vector quantities.

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6) A radio wave has a frequency of 10^6 Hz. Calculate the wavelength of the wave.

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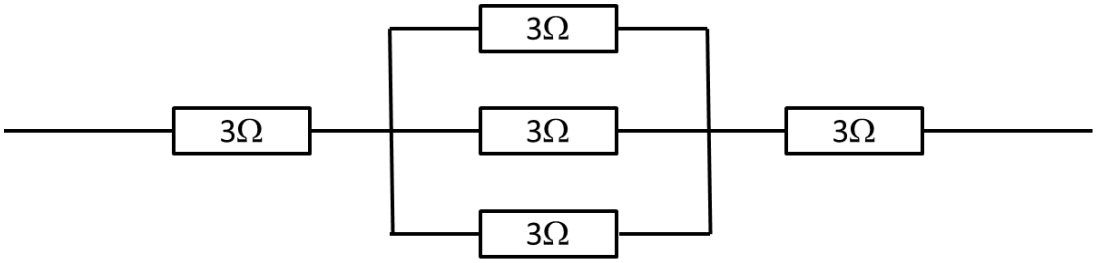
7) Calculate the total resistance of the following combination of resistors:



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8) Explain the energy changes involved in a geothermal power station, from when water enters the Earth until electricity leaves the generator.

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9) Explain what happens to the pressure of a gas in a container, if the volume of the container is decreased while the temperature of the gas remains constant.

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10) With reference to a current flowing through a conductor in a magnetic field, explain how an electric motor works.

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