2019

YEAR 11
YEARLY
EXAMINATION

Physics

General Instructions:

- Reading time – 5 minutes
- Working time – 2 hours
- Write using black pen
- Draw diagrams using pencil
- NESA approved calculators may be used
- A Data Sheet and Periodic Table are provided as an attachment to Google Classroom Yearly Examination assignment
- For questions in Section I, questions will be issued and responded to as a Google Form, which is linked on the following page
- For questions in Section II, show all relevant working in questions involving calculations

Total Marks: 75

Section I — 20 marks (Google Form)

- Attempt Questions 1–20
- Allow about 30 minutes for this part

Section II — 55 marks (pages 3 - 6)

- Attempt Questions 21–33
- Allow about 1 hour and 30 minutes for this part

Section I:

20 Marks
Attempts Questions 1 - 20 (Multiple choice)
Allow about 25 minutes for this section

Section II:

55 Marks
Attempt Questions 21 - 33 (pages 3 - 6)
Allow about 1 hour and 25 minutes for this section

Instructions:

- Show all relevant working in questions involving calculations

Please continue to the next page

Questions 21 (2 Marks)

"I drove for 200 km only to be told that my displacement is zero."

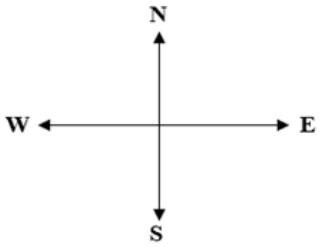
Explain how the driver's statement could be true. **2**

The driver could've driven back to where they came from (there and back)

Questions 22 (5 Marks)

A plane is flying at 500 km h^{-1} in a direction N30°E.

(a) On your answer sheet, draw a vector to represent the plane's velocity, labelling the angle involved. The below plane may be used as a reference: **1**



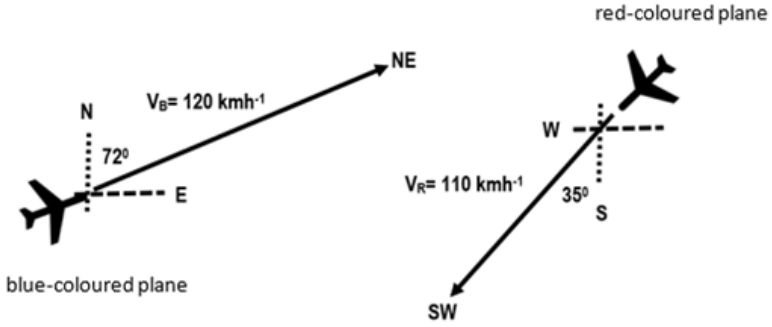
(b) How long would it take the plane to move 750 km to the north? **2**

(c) If the plane flew for one hour at 500 km h^{-1} in a direction of N30°E and a car drove from the same start point directly to the east before turning directly north to get to the same point, how far would the car have to drive in total? **2**

Questions 23 (5 Marks)

A red-coloured racing plane is flying at 110 km h^{-1} S35°W.

The pilot of this plane views a blue-coloured racing plane flying at 120 km h^{-1} N72°E as shown in the diagram.



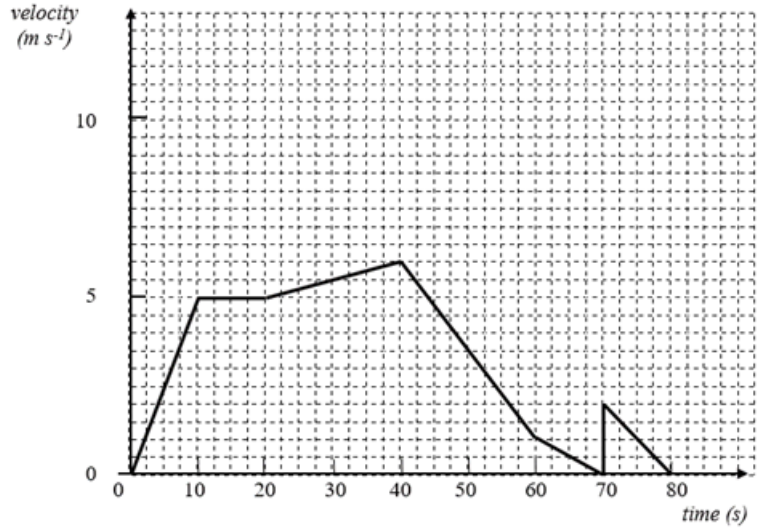
(a) Draw the vector diagram required to calculate the velocity of the blue-coloured racing plane relative to the red-coloured racing plane? **2**

(b) Calculate the relative velocity of the blue-coloured racing plane relative to the red-coloured plane. Show all working. **3**

Questions 24 (7 Marks)

A cyclist is riding on a long, straight road.

The graph below shows their velocity versus time.



(a) At what time(s) is the cyclist stationary? **1**

(b) How far from the start has the cyclist travelled in the first 20 seconds? **2**

(c) The graph contains a section which must be an error. Identify the error and, by referring to the physics involved, explain why it must be an error. **2**

(d) If the combined mass of the cyclist and the bike is 75.0 kg, what net force is acting on the cyclist and their bike at t = 50 s? **2**
(All frictional forces should be ignored)

Questions 25 (6 Marks)

An investigation into the motion of an object down an inclined plane was performed to test the hypothesis:

The angle of inclination of the inclined plane is related to the time taken for a wood block to slide down the plane.

(a) Suggest TWO variables that should be kept constant during this investigation. **2**

(b) Using an equation, show how the acceleration of the wood block is related to the time taken to slide down the inclined plane. **2**

(All frictional forces should be ignored)

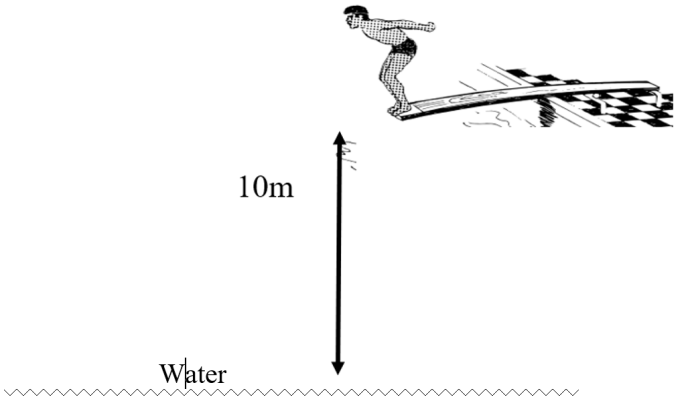
(c) Describe how the kinetic friction between the wood block and the surface of the inclined plane would vary as the angle of the incline changed and how this would affect the results of the investigation. **2**

Questions 26 (2 Marks)

Outline the difference and similarity between elastic and inelastic collisions, giving an example of each. **2**

Questions 27 (6 Marks)

A 60 kg diver travels 10 m to the water surface as he performs his platform dive in the Olympics. It takes 1.375s to reach the water.



(a) Compare the potential energy and kinetic energy at the start of the jump and just before the diver enters the pool. Include an explanation of whether there is any relationship between the energies. **4**

(b) Calculate the average power applied by the diver to the water if it takes him 0.15s to completely enter the water. **2**

Questions 28

Drag racing is a high-speed motorsport that usually involves two cars racing down a straight racetrack to be first across a fixed finish line. It is highly dependent on the friction force achieved between the tyres and the road.

Drag races start from a standing (stationary) start and are timed until they reach the finish line. Changes in the coefficient of static friction greatly affect the result.

(a) Calculate the maximum acceleration possible for a drag racer, which has a mass of 1050 kg, racing on a flat road if the coefficient of maximum static friction of the

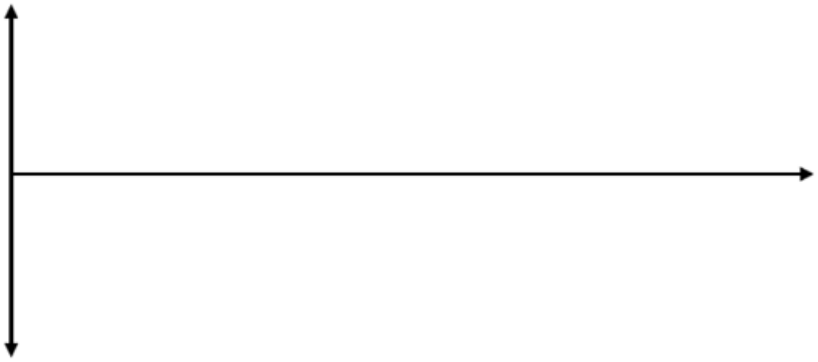
dragster against the road is 1.23.

(b) After two races, tyres on a drag racer become worn and the maximum acceleration decreases to $9ms^{-2}$.

Describe how the coefficient of static friction changes at this point and affects the finishing times of the race?

Questions 29 (4 Marks)

(a) By copying the axes below onto your response page, sketch two wavelengths of a transverse wave with a wavelength of 5.0 cm and an amplitude of 2.0 cm. **2**



(b) Find the wave's period and frequency if it has a velocity of 40 cm s^{-1}. **2**

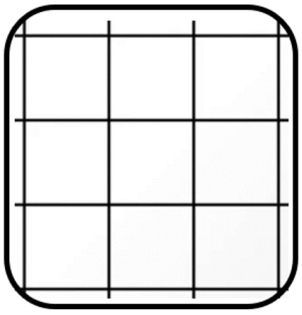
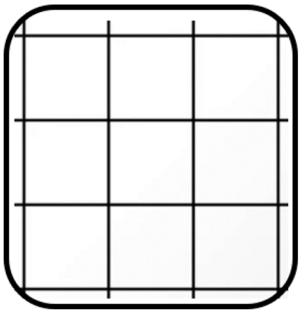
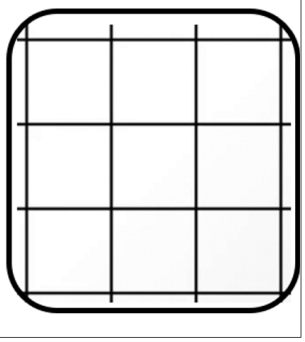
Questions 30 (4 Marks)

Outline a procedure which could quantitatively explore the inverse square relationship between distance and the intensity of sound. **4**

Questions 31 (3 Marks)

Sound waves produced with a sound generator and a cathode ray oscilloscope can be used to compare different sound waves. **3**

Please complete a graphical representation of the oscilloscope screens below in your answer sheet to compare three given waveforms. Label each waveform clearly on your answer sheet.

Waveform A Low pitch, loud sound wave	*Waveform B* Soft, high frequency sound wave	*Waveform C* Standing sound wave
		

Questions 32 (2 Marks)

By drawing rays of light on a copy of the diagram below in your answer sheet, show how a person can see their feet and their head in a mirror which has a length of only half the height of the person. **2**

Questions 33 (3 Marks)

An electric kettle is filled with 750 mL of water at 20°C. It takes 150 s to heat the water to 100°C. **3**

Given that the latent heat of vaporisation for water is 2260 kJ kg^{-1}. How long would it take this kettle to completely vaporise all the water after it has reached 100°C?

End of Section II