

NAME:

SCHOOL:.....



WINCHESTER
COLLEGE

WINCHESTER ENTRANCE

Physics Examination

MAY 2 2024

Time Allowed: 30 minutes

Total Marks: 30

The mark for each question is given in brackets [].

Calculators may be used.

Write your answers in this booklet. If you need additional space, please write on sheets of A4 paper and attach them to this booklet. You should show all your working so that credit may be given for partly correct answers.

Diagrams are not drawn to scale.

Do not be discouraged if you do not finish.

P1 When a catapult launches a pellet, we can say that the elastic potential energy of the stretched catapult chord has been converted into the kinetic energy of the pellet.

Alternatively, we can say that energy has been transferred from the elastic store of the catapult to the kinetic store of the pellet through the pathway of mechanical working.

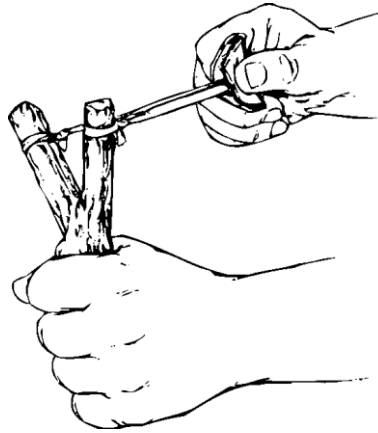


Figure 1: a catapult

Using whichever of these formats you are more confident with, describe the energy changes going on in each of the following cases:

(a) A person climbs up a rope.

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[2]

(b) A toaster is powered by a wind turbine.

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[2]

P2 Barry has wrapped a bar magnet in plasticine to make a model planet.

- (a) Explain, with the aid of a labelled diagram, how measurements could be taken to calculate the density of the model planet by immersing it in water.

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[4]

- (b) The model planet's mass is measured to be 57 g and its volume to be 35 cm³. The bar magnet has a density of 7.9 g/cm³ and a mass of 25 g. Calculate the density of the plasticine. Show all your working and give an appropriate unit.

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[4]

- (c) A second plasticine model planet is attracted by the first one. Barry concludes that the second model planet must also have a bar magnet inside it. Comment on this conclusion.

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[2]

P3 Explain the following in your own words.

You may use a diagram to illustrate your answers if you wish.

- (a) How to make a simple electromagnet.

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- (b) How lunar eclipses occur.

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[2]

(c) What happens to white light when it passes through a prism.

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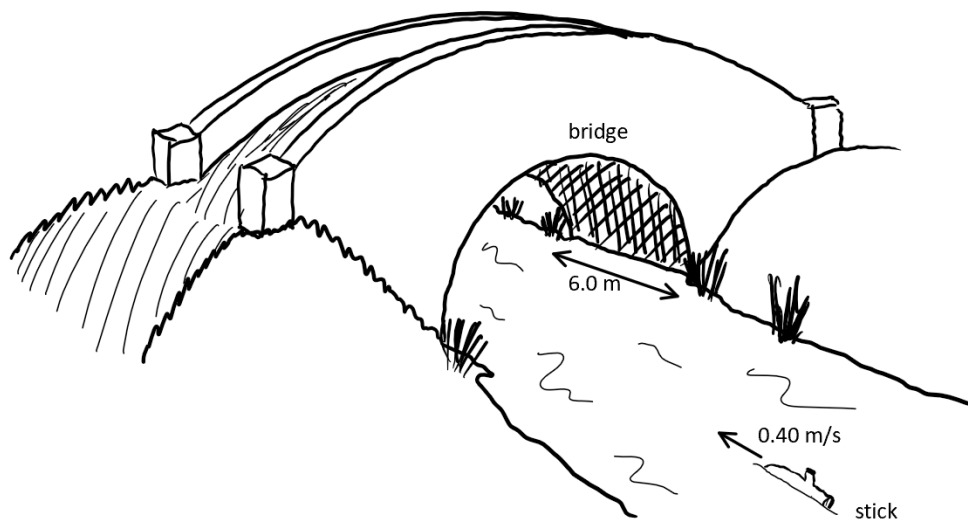
[3]

(d) Why some whistles are audible to dogs but not to humans.

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[2]

- P4 A stick is dropped into a river which carries it along at a steady speed of 0.40 m/s. It passes directly under a bridge which is 6.0 meters wide.



- (a) Calculate how long it will take the stick to pass under the bridge, showing your working and giving an appropriate unit.

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[3]

- (b) A dog sees the stick and begins to swim after it. The dog starts swimming when it is 25 metres behind the stick and catches it after 45 seconds. Calculate the speed at which the dog is moving (relative to the river bank). Show your working and give an appropriate unit.

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[3]

Total: 30 marks

End of this paper

Fig 1: <https://www.anyrgb.com/en-clipart-2vqwc>