

<i>School</i>	<i>Candidate's Name (PLEASE PRINT)</i>
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WINCHESTER  
COLLEGE

## **Election**

*Tuesday 24 April 2018*

**Science**

**PHYSICS**

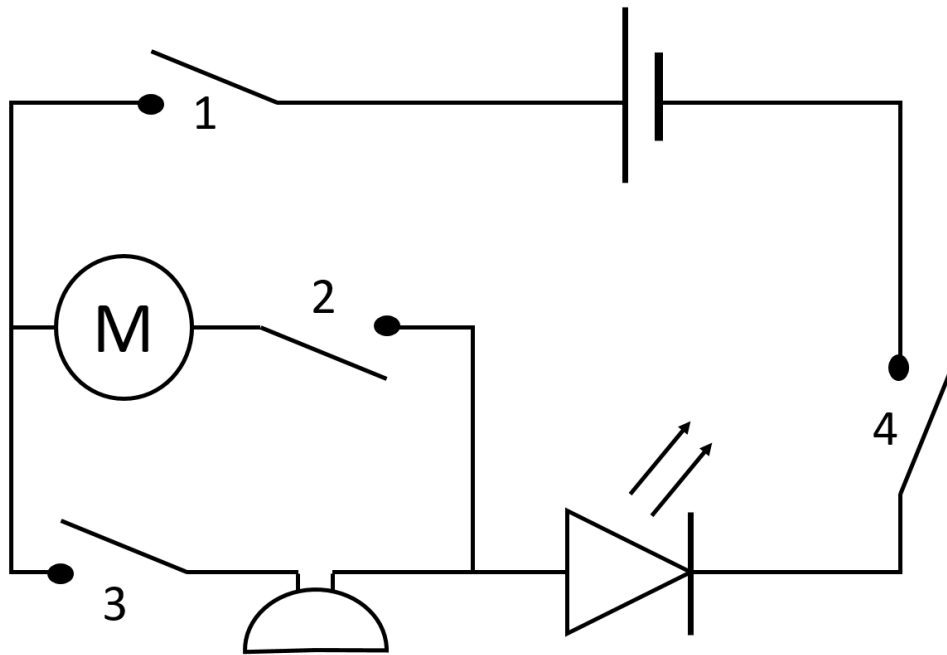
**THEORY SECTION**

*Recommended time: 20 minutes*

**Write all your answers in the spaces on this question paper  
You may use a calculator**

The first 5 questions require you to answer by circling the letters. Each question is worth 2 marks, but only one letter should be circled.

- 1 In the circuit below, which switches should be closed so that the LED and buzzer are on and the motor is off?



**Circle the correct answer**

- A: All of them
- B: 1, 2 and 3
- C: 1, 2 and 4
- D: 1, 3 and 4

[2]

- 2 A pressure pad in a burglar alarm system is placed under the carpet on the floor. It will set off the alarm if it detects a pressure greater than  $1.75 \text{ N/cm}^2$ . A burglar enters the house without setting off the alarm; his feet (size 10) have a combined area of  $400 \text{ cm}^2$  and only apply a pressure of  $1.68 \text{ N/cm}^2$ . What is the maximum weight he can carry to avoid setting off the alarm?

**Circle the correct answer**

A: 28 N

B:  $0.07 \text{ cm}^2$

C: 28 kg

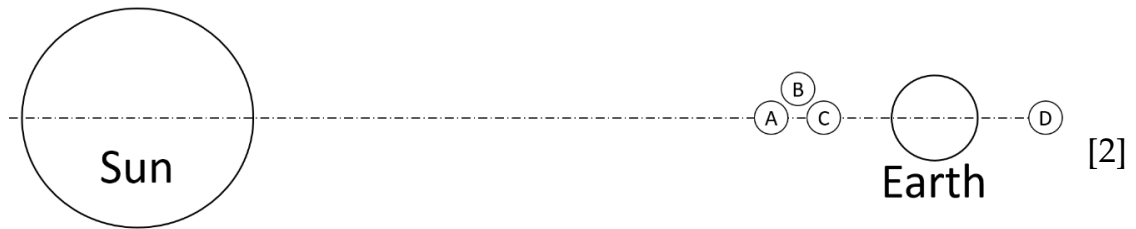
D:  $0.07 \text{ Pa}$

[2]

- 3 In a partial solar eclipse, the Moon obscures part of the Sun. In a total solar eclipse, the Moon completely obscures the Sun. In an annular solar eclipse, a ring of the Sun is visible around the Moon. In a lunar eclipse, the Moon passes through the Earth's shadow.

Each letter in the diagram below shows the position of the Moon for one of these 4 types of eclipse. Circle the letter that represents the position of the Moon during an annular solar eclipse.

**Circle the correct answer**



- 4 Archimedes of Syracuse once said "Give me a lever long enough and a fulcrum on which to place it, and I shall move the world." To test this idea, I place my globe, mass 0.431 kg, 10 cm from the pivot of a see-saw. How far from the pivot must I place my goldfish (Archimedes the 2<sup>nd</sup>), mass 18 g, in order for the system to balance?

**Circle the correct answer**

A: 2.39 cm

B: 23.9 cm

C: 239 cm

D: 2390 cm

[2]

- 5 I hear a gunshot, then the bullet hits the wall next to me 0.37 seconds after. If the bullet travelled at 194 m/s, how far away was the gun fired? The speed of sound in air is 340 m/s.

**Circle the correct answer**

A: 54 m

B: 72 m

C: 126 m

D: 167 m

[2]

6 In the alien city of Sistos, they measure distance in Bologs and Zeeps. There are 4 Bologs in each ZEEP. One Bolog is equal to 1.73 metres.

(a) The tallest building in Sistos is 15 Zeeps, 2 Bologs tall. How tall is it in metres?

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..... [2]

The aliens measure time in Gunars. One second is equal to 1.56 Gunars.

(b) An alien is driving his spaceship at a speed of 3 Zeeps/Gunar. What is his speed in metres/second?

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..... [3]

7 A green car, a red car and a blue car are driving at different constant speeds along a straight road. The green car is moving at a speed of 30m/s. The blue car overtakes, and 6 seconds later it is 33 metres ahead of the green car.

(a) What is the speed of the blue car?

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..... [2]

The red car overtakes the green car 20 seconds after the blue car did.  
The red car travels at 38.5 m/s.

(b) How far ahead of the green car will the red car be when it catches the blue car?

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..... [3]

8 Pure water has a density of  $1.0 \text{ g/cm}^3$ . A teaspoon of salt has a mass of  $5.69 \text{ g}$  and occupies a volume of  $2.63 \text{ cm}^3$ . When salt dissolves in water, the volume it occupies decreases by  $2.5\%$ .

How many teaspoons of salt are required to produce 1 litre ( $1000 \text{ cm}^3$ ) of solution with a density of  $1.04 \text{ g/cm}^3$ ?

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[5]

**End of this section**