**ARANMORE CATHOLIC COLLEGE**

**YEAR 11 ATAR PHYSICS**

**TEST 6: ELECTRICITY**

**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ MARK:**

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| --- |
| /50 |

**Instructions:**

1. Show ***full working out*** to get marks as shown in brackets after each question.
2. All answers are to be written in the spaces provided.
3. Calculators as per Curriculum Council guidelines are permitted.
4. All answers must be in blue or black ink.

**Data:**

Coulomb’s Law constant, *k* = 9 x 109 N m2 C-2

**Questions:**

1. For each of the following charged objects, draw their associated electric field distribution.

[4 marks]

1. b)

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c) d)

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1. Mayen cleaned a compact disc by wiping it with a dry cloth. After a short time he noticed it was dusty again. Explain this observation. [3 marks]
2. Sonurani’s toy truck uses four AAA 1.5 V cells connected in series which draws a current of 75 mA. Calculate the resistance of Sonurani’s toy truck. [2 marks]
3. Lily left her 12.0 volt car battery charging overnight. She noted that it used an average current of 2.40 A over the 12.5 hour period. Calculate :

**a)** The total charge supplied to the battery. [2 marks]

**b)** The work done to charge the battery. [2 marks]

1. Orn and Vy set up a two resistor voltage divider, which is often used to supply a voltage that is different from the power supply. In application, the output voltage depends upon the resistance of the load it drives. The picture at right below shows a typical voltage divider, with connections made across different pin combinations resulting in different potential differences. The diagram below at left shows Orn and Vy’s simplified circuit diagram of the voltage divider:

|  |  |
| --- | --- |
| For this circuit , VTotal = 36.0 V, RBC = 25.0 kΩ and the output voltage required is VBC = 24.0 V. |  |

Calculate the resistance of the other resistor, RAB, that Orn and Vy need to use in their circuit above?

[5 marks]

1. Daniel and Andy wanted to construct the same circuit as Orn and Vy (shown in the diagram in question 5 above), but there were only six 15 kΩ resistors left. Explain how they managed to use some of the 15 kΩ resistors to create the equivalent resistance as the 25 kΩ resistor. Include a sketch to show the connections between the appropriate number of 15 kΩ resistors.

[4 marks]

1. Cheng set up an ammeter and a voltmeter in a simple circuit in order to measure the current and potential drop of his torch globe (light bulb). Sketch a diagram to show how Cheng correctly placed the ammeter and the voltmeter in his simple circuit and explain why ammeters and voltmeters must be placed in this way. [6 marks]
2. If Kali runs all of the following appliances at the same time, will the fuse blow (melt)?

a 300 Ω refrigerator, a 45 Ω heater and a 36 Ω microwave oven.

The appliances are all connected in parallel to a 240 V mains supply power point, and the fuse in the circuit is rated at 10 amps. Explain your reasoning. [4 marks]

1. Two small spheres carrying a charge of 6.0 μC (i.e. 6 x 10-6 C) and 7.5 μC, respectively, are placed 15.0 cm apart in a vacuum. Calculate the force on each sphere.

[4 marks]

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+

15.0 cm

6.0 μC

7.5 μC

# a) Explain why it may be dangerous to operate a mains hair dryer in a bathroom.

[2 marks]

b) Describe two different safety features of our mains electricity supply system.

[2 marks]

1. For the circuit below, determine:

a) The total resistance, [2 marks]

b) The current and potential difference across each resistor and hence find V.

[8 marks]

**B** 75 Ω, 80 mA

**A** 35 Ω

**C** 300 Ω

**D** 25 Ω

V

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# END OF TEST