



ALEXANDER ROAD HIGH SCHOOL

FEBRUARY 2019

50 MIN

PHYSICAL SCIENCE CONTROL TEST 1

EXAMINER: CO

GRADE 12

TOTAL = 40

Instructions

- The question paper consists of 3 questions.
 - Answer all the questions.
 - Answer section A on the answer sheet provided AND section B on folio paper.
 - A non-programmable calculator may be used.
 - Number the answers correctly according to the numbering system.
 - Round off to two (2) decimal places where necessary.
 - A formula sheet is provided on the back of the A5 answer sheet.
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QUESTION 1: Multiple choice (answer on the answer sheet)

Four possible options are provided as answers to the following questions. Each question has only 1 correct answer. Choose the correct answer and write the letter (A – D) next to the relevant question number (1.1 – 1.9) on the answer sheet.

- 1.1 A car travels EAST at constant velocity. The net force acting on the car is...
- A to the east
 - B to the west
 - C zero
 - D to the south
- 1.2 A parcel lying on the front seat of a moving car moves forward when the car suddenly stops. This is an example of:
- A Newton's first law of motion
 - B Newton's second law of motion
 - C Newton's third law of motion
 - D Newton's law of universal gravitation

1.3 Two masses, m_1 and m_2 , a distance r apart, experience a gravitational force of magnitude F . The magnitude of the gravitational force will change to $4F$ if the distance between the masses change to:

- A $\frac{1}{4}r$
- B $\frac{1}{2}r$
- C $2r$
- D $4r$

1.4 A person on planet A, having radius R , experiences a gravitational force F . When the person is on planet B, having a radius $5R$ and the same mass as planet A, the gravitational force experienced will be:

- A $\frac{1}{25}F$
- B $\frac{1}{5}F$
- C $5F$
- D $25F$

1.5 Three masses m , $2m$ and $3m$ are simultaneously dropped from the same height in a vacuum. The acceleration of each mass is a_1 , a_2 and a_3 respectively.

Which ONE of the options below, regarding their accelerations, is correct?

- A $a_1 < a_2 < a_3$
- B $a_1 > a_2 < a_3$
- C $a_1 < a_2 > a_3$
- D $a_1 = a_2 = a_3$

1.6 A constant horizontal force F is applied to a box resting on a horizontal, frictionless surface.

Which ONE of the following statements regarding force F is CORRECT?

Force F will cause the box to move with ...

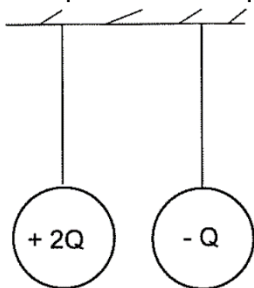
- A constant acceleration.
- B constant velocity.
- C constant kinetic energy.
- D constant momentum.

1.7 Two spheres, A and B, have charges of $+1\text{ C}$ and $+2\text{ C}$ respectively. They are brought into contact with each other and then moved to their original positions.

The amount of charge transferred is ...

- A $0,5\text{ C}$ from B to A.
- B $0,5\text{ C}$ from A to B.
- C $1,5\text{ C}$ from B to A.
- D $1,5\text{ C}$ from A to B.

- 1.8 Two small, identical, oppositely charged spheres with charges $+2Q$ and $-Q$ respectively, suspended from light inextensible strings, are held in fixed positions and prevented from touching. Refer to the diagram below:



Which ONE of the following statements best describes the behaviour of the spheres when they are released?

- A They will move towards each other, touch each other momentarily and then separate.
 - B They will move towards each other, touch each other momentarily and then remain in contact.
 - C They will remain at their original positions and then vibrate.
 - D They move away from each other momentarily and then move towards each other.
- 1.9 A point charge Q_1 carrying a charge of $-q$ is close to another point charge Q_2 carrying a charge of $+2q$.

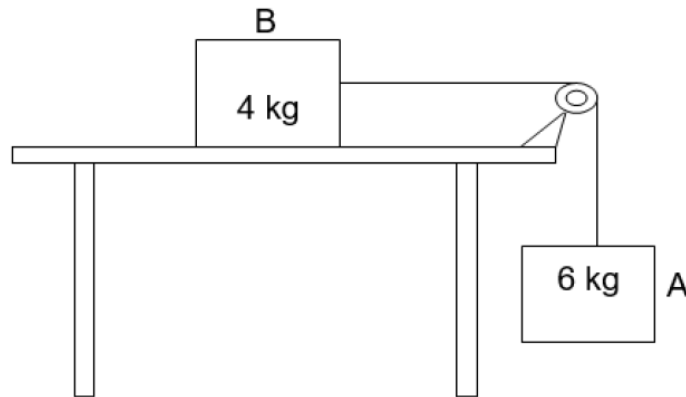


If the magnitude of the electrostatic force that Q_1 exerts on Q_2 is F , then the electrostatic force that Q_2 exerts on Q_1 is equal to ...

- A F directed towards Q_2 .
- B F directed towards Q_1 .
- C $2F$ directed towards Q_2 .
- D $2F$ directed towards Q_1 .

[9x2=18]

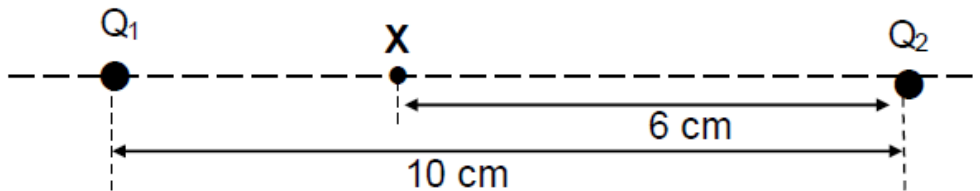
2. A 4 kg block B, resting on a flat, rough horizontal table, is connected by a light inextensible string to a 6 kg block A. The string is passed over a light frictionless pulley in such a way that block A hangs vertically downwards as shown in the diagram below.



- 2.1 Write down Newton's **Second** Law of motion in words. (2)
- 2.2 Draw a free-body diagram of all forces acting on block B. (4)
- 2.3 The kinetic frictional force experienced by block B is 32,53 N to the left.
Calculate the magnitude of the acceleration. (6)
- 2.4 Calculate the coefficient of kinetic friction between the surface of the table and block B. (3)

[15]

3. The diagram below shows Q_1 with a charge of $+1,0 \times 10^{-6}$ C placed 10 cm from a charge Q_2 with a charge of $+2,0 \times 10^{-6}$ C.



- 3.1 State *Coulomb's Law of Electrostatics* in words. (2)
- 3.2 Calculate the net electrostatic force that an **electron** placed 6 cm from Q_2 at point X will experience. (5)

[7]
[40]