ALEXANDER ROAD HIGH SCHOOL

FEBRUARY 2018 45 MIN

PHYSICAL SCIENCE CONTROL TEST

JA, PE TOTAL = 40

GRADE 11

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 sheets.
- 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.
- Formulas have been included on the reverse side of the answer sheet.

SECTION A

Answer on the answer sheet -

QUESTION 1: Multiple choice

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 – 1.10) on the answer sheet.

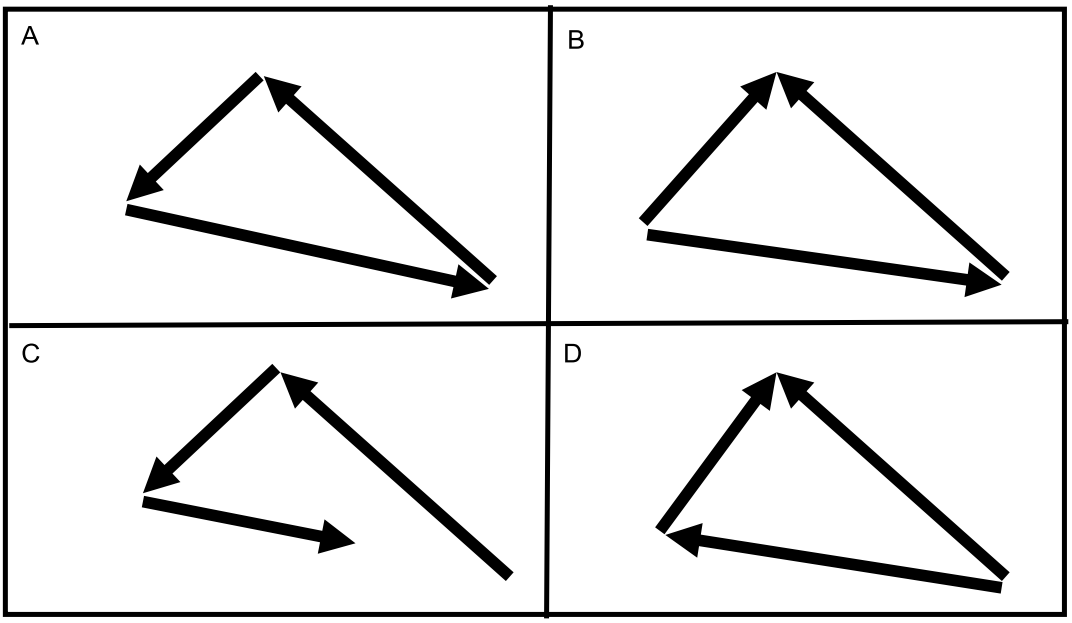
1.1. Which ONE of the following pairs of physical quantities are vector quantities?

A. Velocity and speed
B. Acceleration and force
C. Force and time
D. Mass and weight

1.2. Two forces of magnitudes $21\ N$ and $7\ N$ respectively, act simultaneously on an object. Which ONE of the following CANNOT be the resultant of the two forces?

A. $28\ N$
B. $19\ N$
C. $14\ N$
D. $12\ N$

1.3. Which ONE of the following vector diagrams represents three forces acting on an object simultaneously whilst the object moves at CONSTANT VELOCITY?



1.4. The resistance of an object to a change in its state of motion is referred to as the object's…

A. Mass
B. Weight
C. Inertia
D. Friction

1.5. Which ONE of the following statements about the force of friction is NOT true?

A. Friction always acts parallel to the surface on which the object is moving.
B. Friction opposes motion.
C. Friction acts on moving as well as stationery objects.
D. There is no frictional force acting on an object moving at a constant velocity.

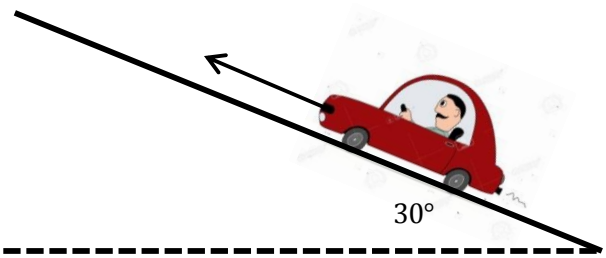
1.6. In which ONE of the following scenarios is there no resultant force acting on the aeroplane?

A. An aeroplane slows down as it approaches the runway to land.
B. In the middle of a flight, an aeroplane rises at an incline at a constant velocity.
C. An aeroplane speeds up at an incline as it takes off.
D. An aeroplane flies around in a circle at a constant velocity.

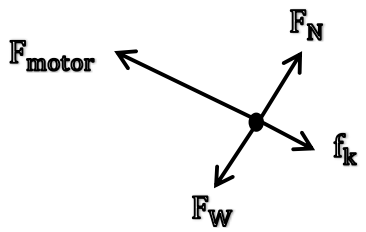
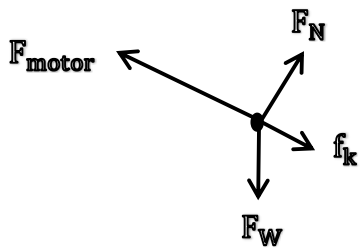
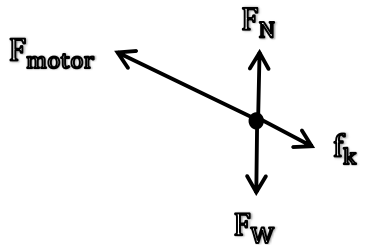
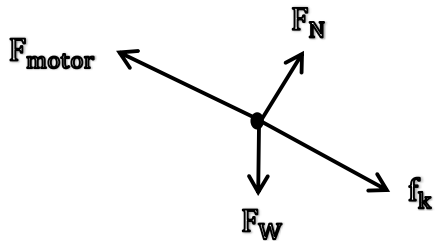
1.7. Which ONE of the following statements is NOT true about Newton's first law of motion?

A. Newton's first law of motion states that an object maintains its state of motion unless a non-zero resultant force acts on the object.
B. Newton's first law of motion is also known as the law of inertia.
C. According to Newton's first law of motion only stationery objects maintain their state of motion when there is no net force acting on the object.
D. According to Newton's first law of motion an object will maintain both its speed and its direction of motion when there is no net force acting on the object.

1.8. A car of mass $650\ kg$ accelerates up the hill on a rough tar road to Alexander Road High School as shown in the diagram below. The hill has an incline of $30°$.



Which ONE of the following free-body diagrams accurately represents the scenario shown above?

A. 	**B.** 
C. 	**D.** 

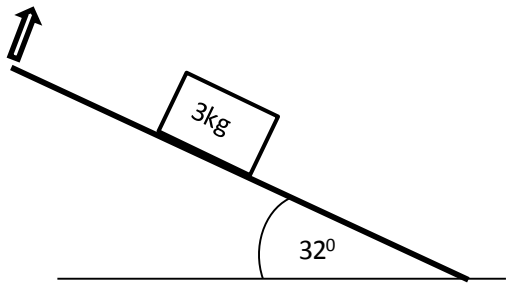
1.9. Siphe has a mass of $45\ kg$ and is standing on a scale in a lift. The reading on the scale is $200\ N$. The lift is…

A. moving downwards at a constant velocity.
B. accelerating upwards.
C. accelerating downwards.
D. in free fall.

1.10. Cyril has a mass of $85\ kg$ and is standing on a scale in a lift moving upwards at a constant velocity. The reading on the scale is…

A. $833\ N$
B. $904\ N$
C. $510\ N$
D. $0\ N$

Question 2: (Section B: answer on folio paper)



An inclined plane has a 3 kg block lying on it. The end is raised slowly until the block just starts to slide when the angle of inclination is 32 degrees.

2.1 Draw a free body diagram of the forces acting on the block at this angle (3)

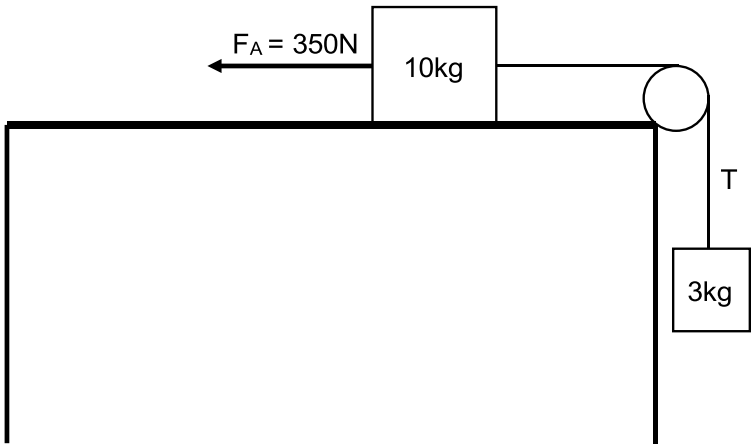
2.2 Determine the components of the weight acting down the plane, $F_{g//}$, and perpendicular to the plane, $F_{g\perp}$. (2,2)

2.3 Determine the coefficient of static friction between the block and the inclined plane. (3)

[10]

Question 3:

A $10\ kg$ block on a table with a smooth surface is joined to a $3\ kg$ block by a light, inelastic string running over a frictionless pulley. A horizontal force of $350\ N$ is applied to the $10\ kg$ block as shown in the diagram below.



3.1. State *Newton's second law of motion* in words. (2)

3.2. Calculate:

3.2.1. The magnitude of the acceleration of the system. (6)

3.2.2. The tension in the string joining the two blocks. (2)

[10]