



Subject: Grade 11 Physical Sciences
Topic: Physical Sciences: Term 1 - Mini-Exam
Total: 111 Marks

Name: _____
Date: _____

This image refers to question: 1

KCl(s)	O ₂ (g)	Ca(s)	NH ₃ (g)	Silicon dioxide(s)	He(g)
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Question 1: Please Fill In The Blanks

6 marks

Study the substances in the diagram.

The molecule that has non-polar covalent bonds (1) .

(2) is formed because of strong electrostatic attraction between positive and negative ions.

The main intermolecular forces are hydrogen bonding between the molecules of (3) .

Possible Answers: Helium | Silicon dioxide | Potassium chloride | Oxygen | Calcium | Ammonia

1	
3	

2	
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This image refers to question: 2



DIAGRAM A

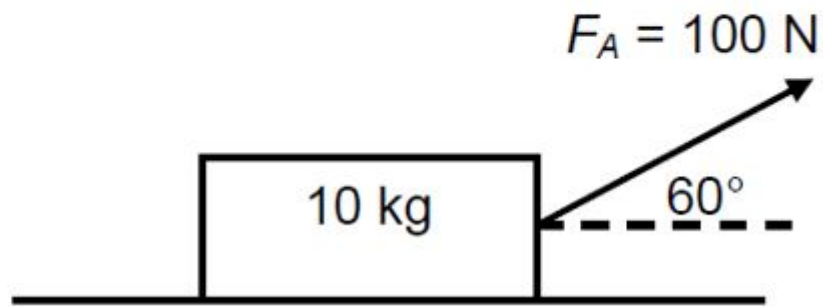
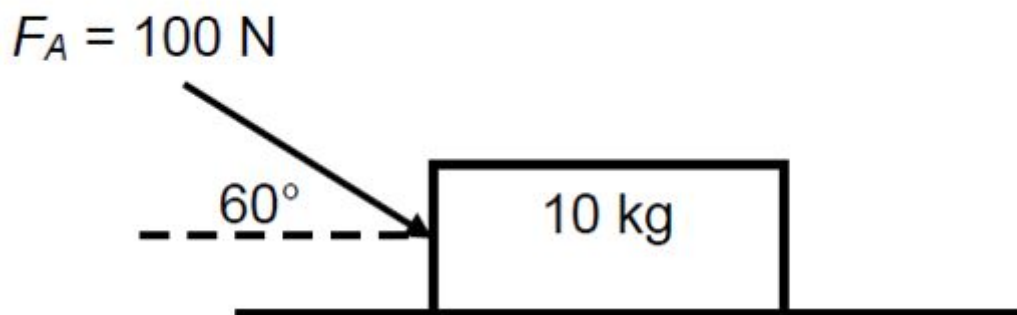


DIAGRAM B



Question 2: Text Input

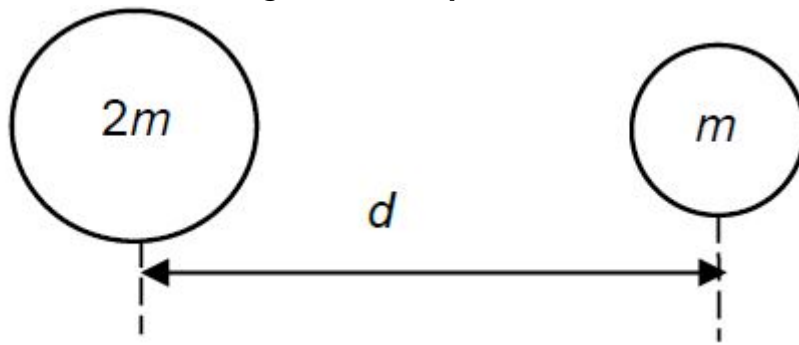
3 marks

A force of 100 N is exerted on an object of mass 10 kg at an angle of 60° with the horizontal as shown in the diagram. In diagram A the object is pulled and in diagram B the object is pushed with a force of the same magnitude.

The frictional force acting on the object would be larger as represented in diagram

Give your answer as either A or B.

This image refers to question: 3



Question 3: Multiple Choice

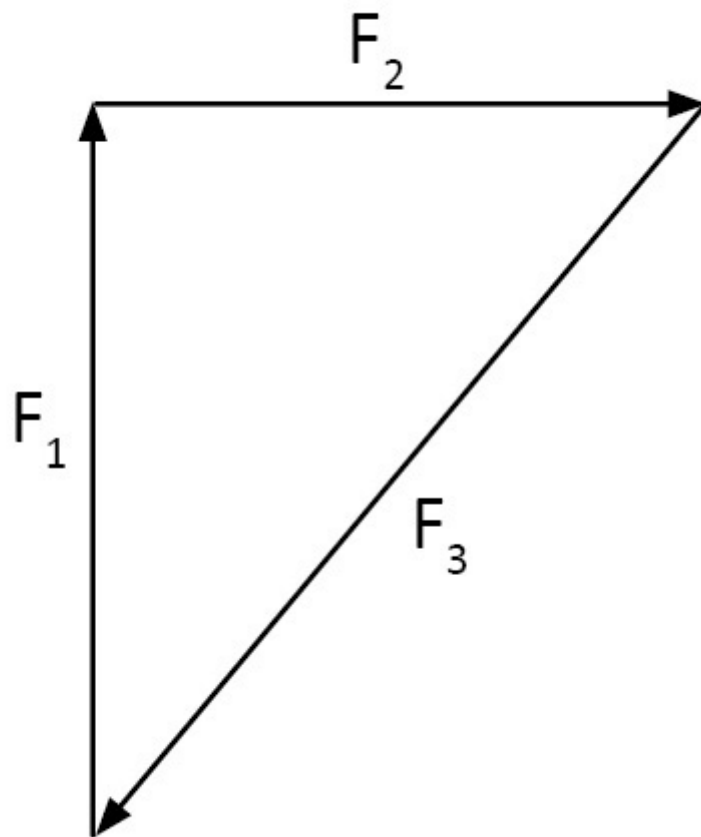
4 marks

Two objects of masses $2m$ and m are arranged as shown in the diagram.

Which one of the changes below will produce the GREATEST increase in the gravitational force exerted by the one mass on the other?

- | | |
|----------|---|
| A | Halve the distance between the masses. |
| B | Double the distance between the masses. |
| C | Halve the smaller mass. |
| D | Double the larger mass. |

This image refers to question: 4



Question 4: True/False

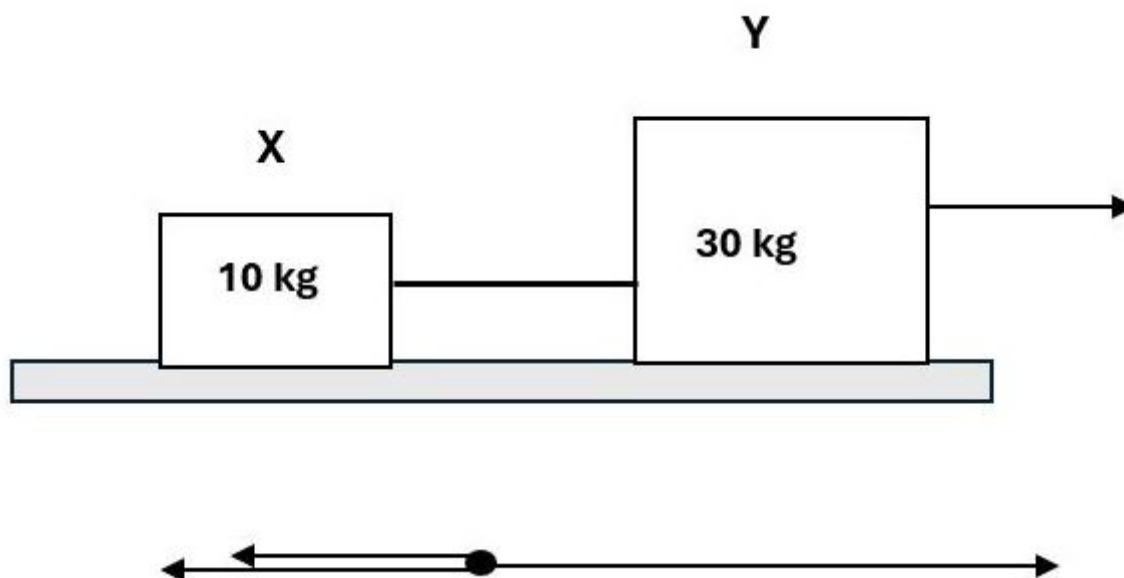
2 marks

In this vector diagram, F_1 is the resultant force of F_2 and F_3 .

TRUE

FALSE

This image refers to question: 5



Question 5: Please Fill In The Blanks

6 marks

Two crates X and Y each with a mass of 10 kg and 30 kg respectively, are connected with a thick inextensible rope as shown on the diagram. A force F , of 400 N is applied on crate Y to the right.

The crates move with an acceleration of $4 \text{ m} \cdot \text{s}^{-2}$ to the right. **The ratio of the frictional forces on the two crates is the same as the ratio of their masses.**

A free-body diagram of the horizontal forces acting on one of the crates is also below the force diagram of the crates.

The free-body diagram represents the horizontal forces acting on crate (1) .

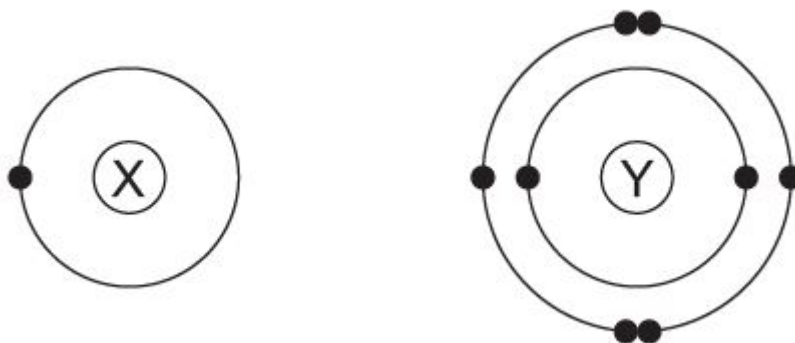
The magnitude and direction of the frictional force acting on the 10 kg crate is (2) N (3) .

Possible Answers: X | Y | 60 | 240 | right | left

1	
3	

2	
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This image refers to question: 6



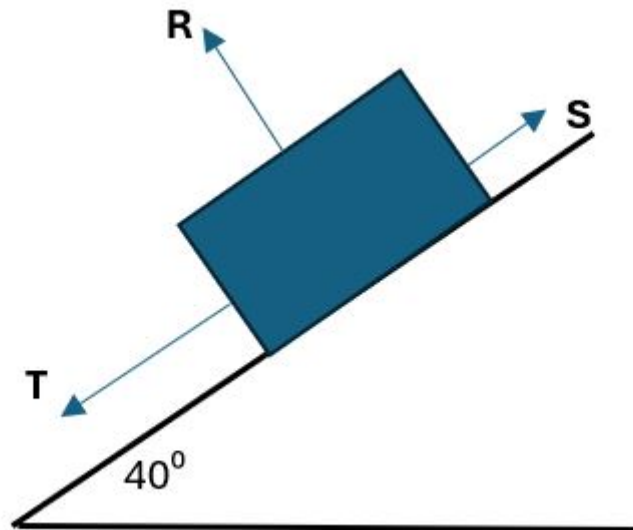
Question 6: Multiple Choice

4 marks

The electronic structure of two atoms, X and Y, is represented in the diagram. When the two atoms bond chemically a **transfer of electrons** takes place. The correct formula of the compound that could be formed is:

- | | |
|----------|------------------|
| A | H ₂ O |
| B | LiO |
| C | NaS ₂ |
| D | K ₂ O |

This image refers to question: 7



Question 7: True/False

2 marks

During a house move, a person uses a plank as a ramp to slide a heavy 600 kg wooden crate from the back of a truck to the ground. The plank is tilted at an angle of 40° to the horizontal. As the crate slides down the ramp, a frictional force of 1 200 N acts on it, opposing its motion.

The motion of the crate is illustrated in the diagram below. The forces acting on the crate are represented by R, S and T.

Label T represents the frictional force of 1 200 N acting on the crate.

TRUE

FALSE

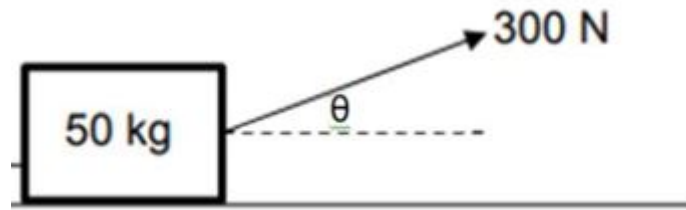
Question 8: Multiple Choice

4 marks

The correct statement regarding a normal force is:

- | | |
|----------|--|
| A | The normal force always equals the weight of an object. |
| B | The normal force always acts upward. |
| C | If an object is moving, the normal force must be changing. |
| D | The normal force of an object on an inclined plane is equal to the perpendicular component of the object's weight. |

This image refers to question: 9



Question 9: Please Fill In The Blanks

4 marks

The applied force of 300 N acts at an angle (θ) of 30° to the horizontal.

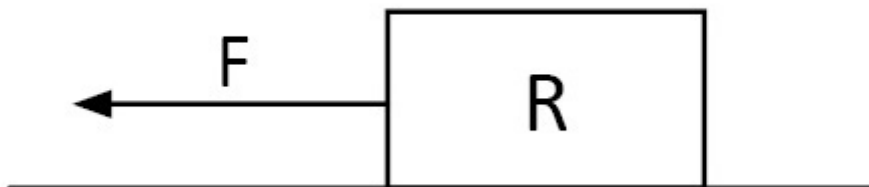
1. The magnitude of the vertical component of the force is (1) N.
2. The magnitude of the horizontal component of the force is (2) N.

Possible Answers: 150 | 519,62 | 259,81

1	
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2	
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This image refers to question: 10



Question 10: Text Input

3 marks

A block (R), being pulled by a force F, and moving to the left on a rough horizontal surface, is slowing down. The direction of the resultant force and the acceleration is to the

Give your answer as ONE word.

--

Question 11: Multiple Choice

4 marks

Which statement is FALSE for kinetic frictional force?

Kinetic frictional force is ...

- | | |
|----------|--|
| A | dependent on the mass of the object. |
| B | dependent on the area of the contact surfaces. |
| C | dependent on the type of surface that objects are in contact. |
| D | smaller than the maximum static frictional force of an object. |
-

Question 12: True/False

2 marks

The carbon dioxide molecule has a bent (angular) shape.

TRUE

FALSE

Question 13: Multiple Choice

4 marks

A 5 000 g crate is placed on a rough horizontal surface with a static coefficient of 0,43.

When a **horizontal force** of 18 N is exerted on the crate it remains stationary.

The magnitude of the maximum static frictional force is:

- | | |
|----------|---------|
| A | 21070 N |
| B | 49 N |
| C | 21,07 N |
| D | 18 N |
-

Question 14: Text Input

3 marks

When a spaceship moves at constant velocity, it means that the resultant force acting on the body is zero.
This phenomenon is best explained by Newton's ... Law.

Give the missing word as your answer.

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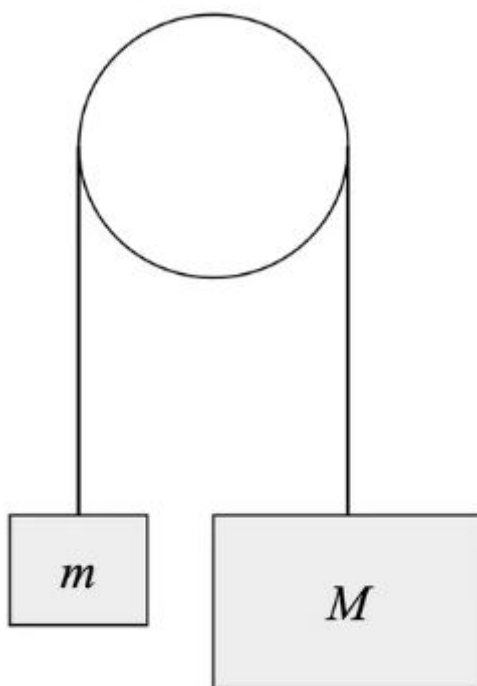
Question 15: Text Input

2 marks

The intermolecular forces for chlorine (Cl_2) and iodine (I_2) are the same, yet the boiling point for I_2 is ... than that of Cl_2 .

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This image refers to question: 16

**Question 16: Please Fill In The Blanks**

8 marks

Two objects (m and M) with masses 0,5 kg and 1,5 kg respectively, are tied to opposite ends of a light string. The string is suspended over a frictionless pulley system.

The 0,5 kg object will accelerate (1) and the 1,5 kg object will accelerate (2) .

The magnitude of the acceleration is (3) $\text{m} \cdot \text{s}^{-2}$.

The magnitude of the tension in the string is (4) N.

Possible Answers: downwards | upwards | 0 | 4,9 | 7,35 | 14,7

1	
3	

2	
4	

Question 17: Text Input

3 marks

The number of valence electrons in a phosphorous atom is

Give your answer as a NUMBER.

Question 18: True/False

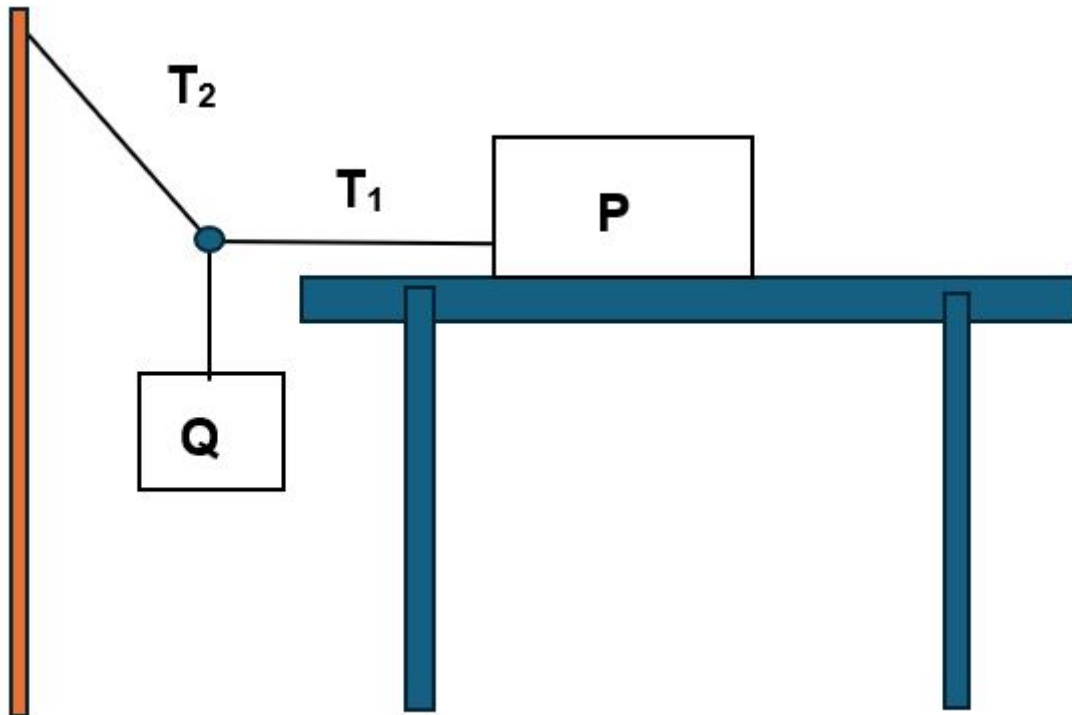
2 marks

Planet X has a mass which is **a third** the Earth's mass and a radius which is $\frac{3}{4}$ the Earth's radius. The acceleration due to gravity for an object on Earth is $9,8 \text{ m} \cdot \text{s}^{-2}$.

The acceleration due to gravity for an object on Planet X will be larger than $9,8 \text{ m} \cdot \text{s}^{-2}$.



This image refers to question: 19



Question 19: Please Fill In The Blanks

8 marks

Block P rest on a rough horizontal table and is connected via a rope T_1 to a hanging block Q with a mass of 50 kg. The ropes from the two blocks are connected to rope T_2 , which makes an angle of 40° with the vertical of a wooden strut.

The system is at rest, and block P experiences a frictional force of 180 N.

The magnitude of the net force acting on block Q is (1) N.

The magnitude of the tension in rope T_1 is (2) N.

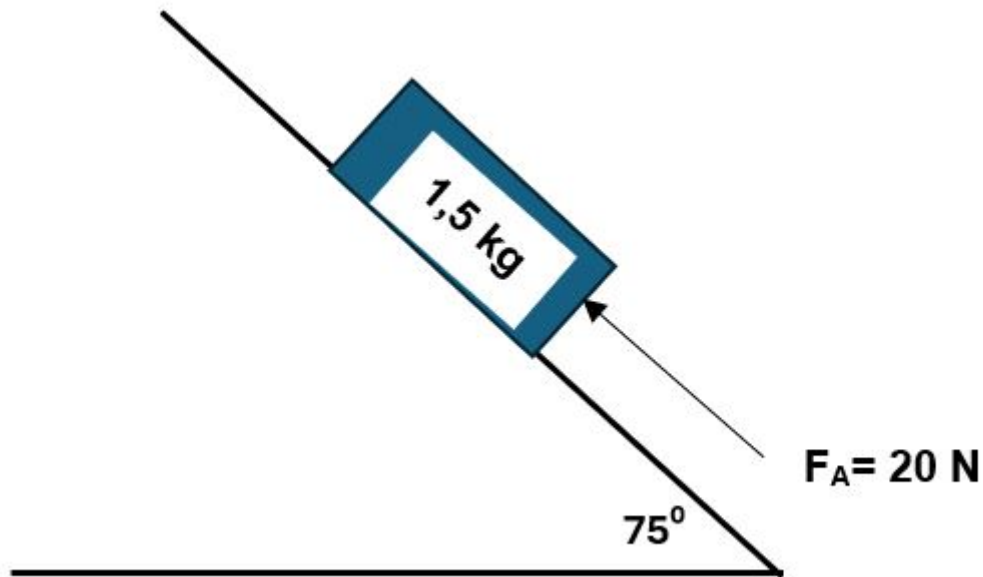
The vertical component of the force in rope T_2 is (3) N (4).

Possible Answers: 490 | downwards | upwards | 180 | 0

1	
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This image refers to question: 20



Question 20: True/False

2 marks

A force of 20 N is applied to the $1,5\text{ kg}$ object, parallel to the plane. The object moves at a **constant velocity** up the inclined plane.

A frictional force of $5,8\text{ N}$ would be acting down the inclined plane.

TRUE

FALSE

Question 21: Text Input

3 marks

Two forces of magnitudes 50 N and 120 N act on a box. To obtain a **minimum resultant force** the angle between the two forces must be ... degrees.

Give your answer as the VALUE of the angle.

Question 22: Multiple Choice

4 marks

According to Newton's Third Law of Motion, the reaction force to the **weight** of a book lying on a table is the

- | | |
|----------|---------------------------------|
| A | normal force. |
| B | force of the book on the Earth. |
| C | force of the book on the table. |
| D | force of the Earth on the book. |
-

Question 23: True/False

2 marks

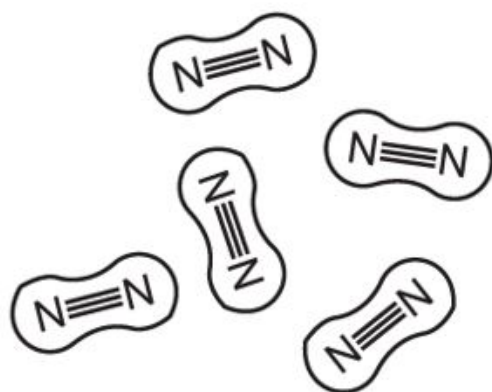
The main intermolecular forces between carbon tetrachloride (CCl_4) molecules are London forces.

TRUE

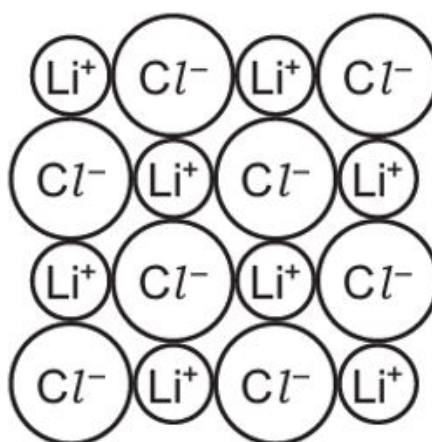
FALSE

This image refers to question: 24

Substance A



Substance B



Question 24: Please Fill In The Blanks

8 marks

Study the diagram representing two substances, A and B.

Substance A will have a (1) boiling point than substance B, because the intermolecular forces between the molecules of A is (2) than the electrostatic forces between the ions of substance B.

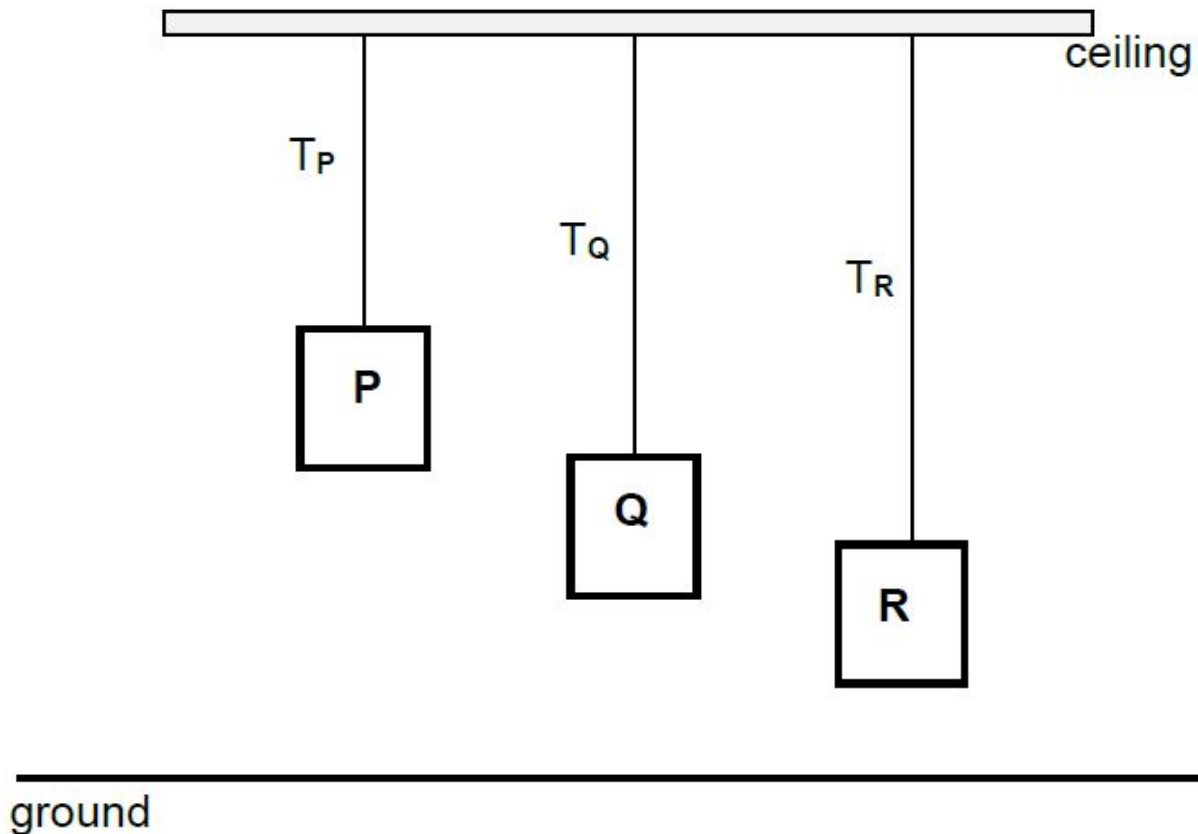
Substance B will conduct electricity in the (3) phase because the (4) would be free to move.

Possible Answers: molten | solid | lower | higher | weaker | stronger | electrons | ions

1	
3	

2	
4	

This image refers to question: 25



Question 25: True/False

2 marks

The diagram shows three blocks, P, Q and R, suspended from a ceiling.

The blocks are identical, stationary and have the same mass but are at different heights above the ground. The connecting strings are massless and inextensible. The tensions in the strings attached to blocks P, Q and R are T_P , T_Q and T_R respectively.

$$T_P = T_Q = T_R$$

TRUE

FALSE

Question 26: Text Input

3 marks

A man with a mass of 80 kg travels in a lift that accelerates at $2 \text{ m} \cdot \text{s}^{-2}$ upwards. The man stands on a newton scale.

While the lift is travelling upwards, the reading on the scale will be ... than 784 N.

Give your answer as either SMALLER or LARGER only.

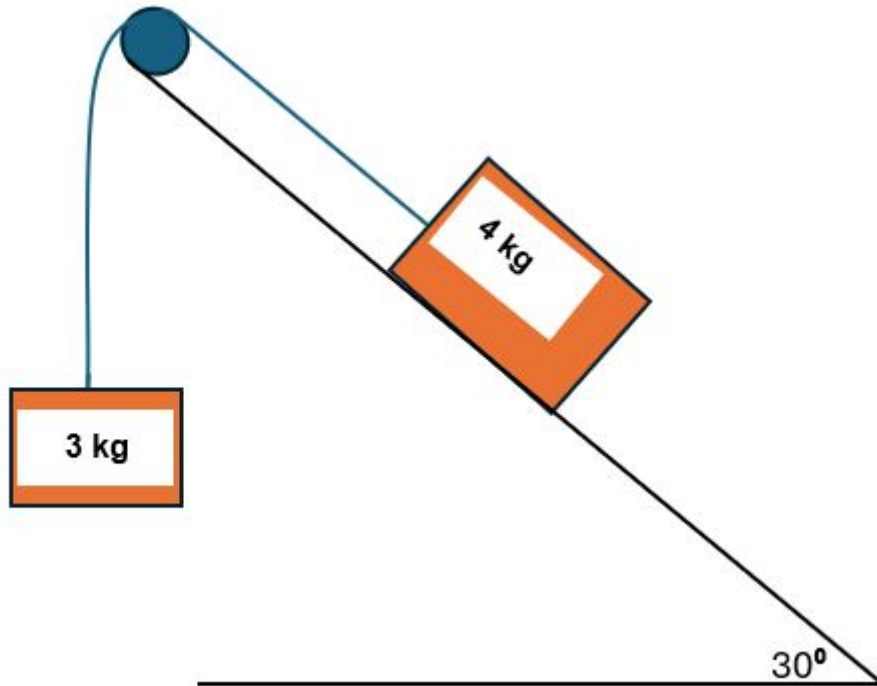
Question 27: Multiple Choice

4 marks

Which one of the following compounds is an example of a non-polar molecule?

- | | |
|----------|------------------|
| A | Water |
| B | Carbon dioxide |
| C | Ammonia |
| D | Hydrogen bromide |
-

This image refers to question: 28



Question 28: Please Fill In The Blanks

4 marks

A 3 kg block is attached to another block with a mass 4 kg by a light inextensible string which passes over a frictionless pulley as shown in the diagram. Initially the 4 kg block is at rest on a slope, which makes an angle of 30° with the horizontal.

When the 3 kg block is released it falls to the ground, the 4 kg block moves up the slope accelerating at $0,43 \text{ m} \cdot \text{s}^{-2}$.

The coefficient of kinetic friction along the slope is $\mu_k = 0,2$.

The frictional force acting on the 4 kg block as it accelerates up the slope is (1) N.

The tension in the string is (2) N when the 4 kg block accelerates up the slope.

Possible Answers: 5,88 | 6,79 | 28,11 | 29,4

1	
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2	
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Question 29: Text Input

3 marks

The amount of energy that must be added to the system to break the bond that has formed.

Give your answer as TWO words.

Question 30: True/False

2 marks

The difference in electronegativity of NH_3 is determined as follows:

$$\begin{aligned}\Delta H &= 3,0 - 2,1 \\ &= 0,9\end{aligned}$$

From this calculation it can concluded that ammonia has polar covalent bonds.

TRUE**FALSE**

Total: 111 Marks