

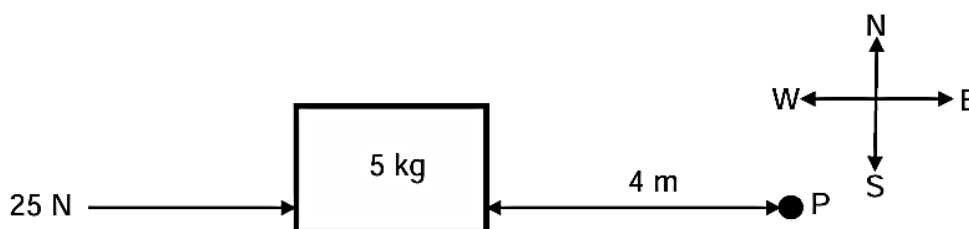
Newton's Laws Application: Exam Revision Tracker

Attempt #1		Attempt #2		Attempt #3		Attempt #4		Attempt #5	
Total	Score	Total	Score	Total	Score	Total	Score	Total	Score
17		19		12		26		14	
Percentage =		Percentage =		Percentage =		Percentage =		Percentage =	

Newton's Laws Application: Attempt #1

Total = 17 Marks

A box of mass 5 kg is **pushed** along a horizontal surface, a distance of 4 m to point P eastwards by a constant force of 25 N as shown in the diagram below. The coefficient of kinetic friction between the object and the surface is 0,40.



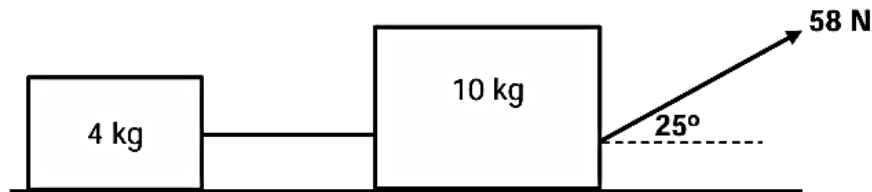
1. Draw a force diagram showing ALL forces acting on the 5 kg box. (4)
2. Write down Newton's second law of motion in words. (2)
3. Calculate the magnitude of the:
 - 3.1 Normal force acting on the 5 kg box (4)
 - 3.2 Friction force acting on the 5 kg box (3)
 - 3.2 Show by calculation that the box is accelerating to the right (4)

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Newton's Laws Application: Attempt #2 ⚡

Total = 19 Marks

Two blocks of masses 10 kg and 4 kg are connected with a light inextensible string and placed on a horizontal surface. When a force of 58 N is applied to the 10 kg block at an angle of 25° with the horizontal, the system accelerates at $2,72 \text{ m}\cdot\text{s}^{-2}$ to the right as shown on the diagram below. The 4 kg block experiences a constant frictional force of 2,5 N.

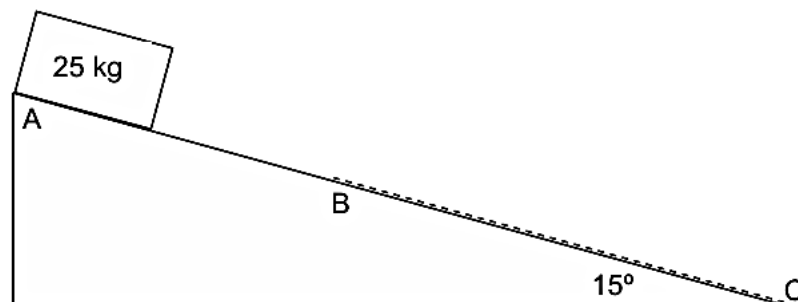


1. State Newton's second law of motion in words. (2)
2. Draw a free body diagram of all forces acting on the 10 kg block. (5)
3. Calculate the: ...
 - 3.1 Tension in the string connecting the two blocks (4)
 - 3.2 Coefficient of kinetic friction between the 10 kg block and the surface (6)
4. The angle at which the force is applied is decreased to 15° . How will the answer in QUESTION 4.3.2 change? Write down only INCREASES, DECREASES or REMAINS THE SAME. Explain your answer. (2)

Newton's Laws Application: Attempt #3 ⚡

Total = 12 Marks

A crate, with a mass of 25 kg, slides down a plane which is inclined at 15° to the horizontal. During the first part of the motion, from A to B, there is no friction between the crate and the plane, but part BC has a rough surface.

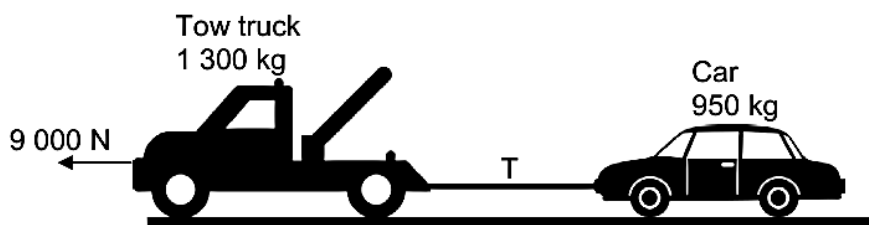


1. Draw a free-body diagram of ALL the forces acting on the crate while it moves from B to C. (3)
2. Calculate the magnitude of the acceleration of the crate while it moves from A to B. (4)
3. Write down the direction of the acceleration of the crate while it slows down from B to C. Write only UP THE SLOPE or DOWN THE SLOPE. (1)
4. The magnitude of the net acceleration from B to C is $1,2 \text{ m}\cdot\text{s}^{-2}$. Calculate the magnitude of the frictional force acting on the crate. (4)

Newton's Laws Application: Attempt #4 ⚡

Total = 26 Marks

The force applied by the engine of the tow truck is 9 000 N. The mass of the tow truck is 1 300 kg and the mass of the car is 950 kg. The vehicles are connected to each other by an inelastic tow bar of negligible mass. See the diagram below.



The tow truck and car move at a CONSTANT VELOCITY.

1. Define the term *frictional force*. (2)
2. NAME AND STATE the law that explains why the force exerted by the tow truck on the car is the same as the force exerted by the car on the tow truck. (3)
3. Draw a labelled free-body diagram indicating all the forces acting on the tow truck. (5)
4. If the coefficient of kinetic friction between the tow-truck tyres and the road surface is 0,45, calculate the:
 - 4.1 Magnitude of the tension in the tow bar (5)
 - 4.2 Coefficient of kinetic friction between the CAR tyres and the road surface (5)

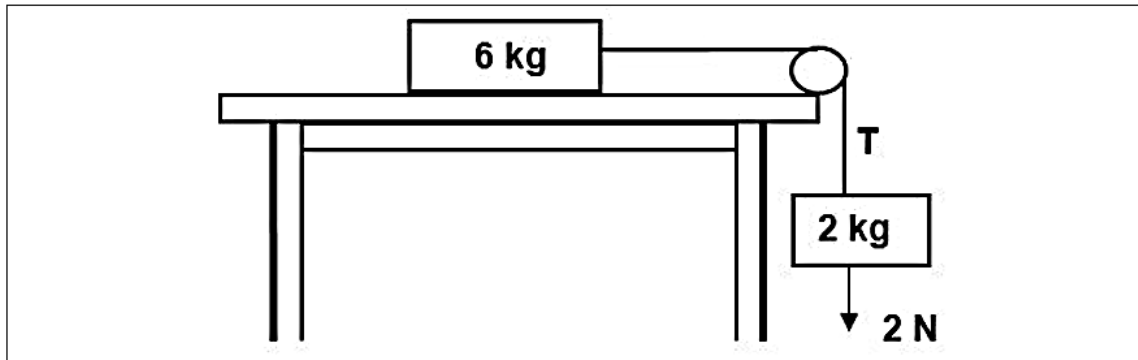
Suddenly the tow bar between the car and the tow truck disconnects and the car comes loose.

5. Using a relevant law of motion, explain why the car continues moving forward for a short distance. (3)
6. Calculate the acceleration of the car as it comes to a stop after a short distance. (3)

Newton's Laws Application: Attempt #5 ⚡

Total = 14 Marks

A 6 kg block on a horizontal rough surface is joined to a 2 kg block by a light, inelastic string running over a frictionless pulley. The frictional force between the 6 kg block and the table is 11,76 N. A downwards force of 2 N is applied to the 2 kg block as indicated in the diagram below.



1. State Newton's Second Law of motion in words. (2)
2. Draw a free-body diagram showing ALL the forces acting on the 6 kg block. (4)
3. Calculate:
 - 3.1 The magnitude of the acceleration of the 6 kg block. (5)
 - 3.2 The magnitude of the tension (T) in the string connecting the two blocks. (2)
4. The rough surface is replaced by a smooth frictionless surface. How will this change affect the answer in QUESTION 4.3.1? Write only INCREASES, DECREASES or REMAINS THE SAME. (1)

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