Newton's laws worksheet 9

Watch this video on lift questions before you start the next exercise

Exercise 7:

For each of the following questions, draw a force diagram before answering the questions. **For the direction use: left, right, upwards, downwards and where no direction is given, say: in original direction of motion or in opposite direction of motion**

1. A boy is cycling on a frictionless road, as he applies a force of 50 N in order to keep moving forward. Calculate the acceleration of the boy. (The combined mass of the boy and bicycle is 70 kg).

a = _____ _____ {leave no space between answer values and units}

Answer value and unit

Direction

2. Ally pushes a box with a mass of 1 kg to the right with a force of 30 N, while the frictional force on the block is 10N. Calculate the acceleration of the box.

a = _____ _____

3. Jess exerts a force of 40 N on a 2 kg box while pushing it to the left, while the frictional force on the box is 5 N. Calculate the acceleration of the box.

a = _____ _____

4. A car of mass 800 kg is travelling at an acceleration of $3 m.s^{-2}$. Calculate the force that the engine exerts on the car.

Fnet = _____ _____

5. Diego applies a force of 50 N to the right on trolley of mass 10 kg. If the trolley moves at a constant velocity to the right. Calculate the Frictional force and the acceleration of the trolley.

F_f = _____ _____

a = _____

6. When Jonathan applies a force of 70 N to the right on a box of mass 2 kg, the box moves to the right with a constant velocity of $4 m.s^{-1}$. Calculate the frictional force on the box.

F_f = _____ _____

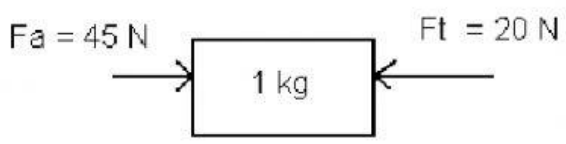
7. A cyclist experiences an acceleration of $3 m.s^{-2}$. If the cyclist experiences a frictional force of 50 N, calculate the force applied by the cyclist. (The combined mass of the cyclist and bicycle is 100 kg).

F_A = _____ _____

8. If Kaylee exerts a force of 90 N on a box of mass 5 kg to the right in order to accelerate the box at 10 $m.s^{-2}$, calculate the frictional force on the box.

F_f = _____ _____

9. Calculate the acceleration of the box.



a = _____ _____

10. If a car accelerates at a rate of $5m.s^{-2}$ and has a mass of 800 kg,

10.1 Calculate the net force on the car

Fnet = _____ _____

10.2 The force applied by the engine if the frictional force on the car is 1000 N.

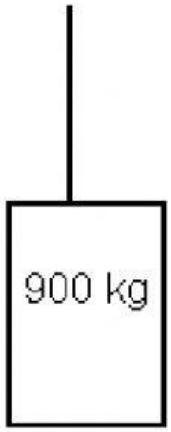
F_A = _____ _____

11. Chloe pushes a box of mass 10 kg and the box accelerates at $3m.s^{-2}$. If Chloe applied a force of 50 N on the box, calculate the frictional force on the box.

F_f = _____ _____

12. Consider the lift below, which has a mass of 900 kg

Calculate the tension in the cable when:



12.1 the lift is stationary

F_T = _____ _____

12.2 it is ascending with a constant velocity

F_T = _____ _____

12.3 it is accelerating upwards with an acceleration of $3m.s^{-2}$

F_T = _____ _____

12.4 It is accelerating downwards with an acceleration of $3m.s^{-2}$

F_T = _____ _____

12.5 it is decelerating at $2m.s^{-2}$ while moving downwards

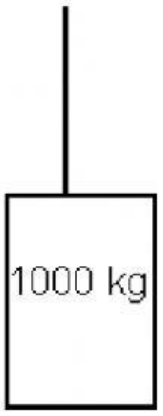
F_T = _____ _____

12.6 it is descending while decelerating at $4m.s^{-2}$

F_T = _____ _____

13 Consider the lift below, which has a mass of 1000 kg

Calculate the tension in the cable when:



13.1 the lift is stationary

F_T = _____ _____

13.2 it is ascending with a constant velocity

F_T = _____ _____

13.3 it is accelerating upwards with an acceleration of $2m.s^{-2}$

F_T = _____ _____

13.4 it the accelerating downwards with an acceleration of $4m.s^{-2}$

F_T = _____ _____

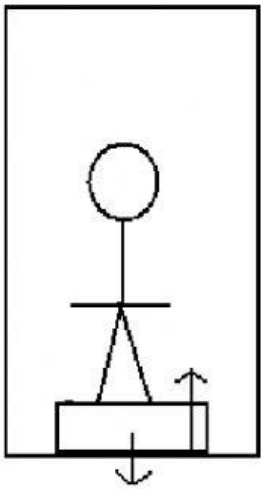
13.5 it is slowing down at $4m.s^{-2}$ while moving downwards

F_T = _____ _____

13.6 it is descending while decelerating at $2m.s^{-2}$

F_T = _____ _____

14) Luyanda is standing on a Newton scale inside a lift Luyanda has a mass of 70 kg.



Calculate the reading on the scale when the lift is:

14.1) Stationary

F_T = _____ _____

14.2) descending with a constant velocity of $8m.s^{-1}$

F_T = _____ _____

14.3) decelerating upwards at $3m.s^{-2}$

F_T = _____ _____

14.4) accelerating downwards at $4m.s^{-2}$

F_T = _____ _____

14.5) accelerating downwards at $3m.s^{-2}$

F_T = _____ _____

14.6) slowing down at a rate of $5m.s^{-2}$ while ascending

F_T = _____ _____

14.7) If Luyanda drops a tennis ball inside the lift, what would the acceleration of the lift need to be, in order for the ball never to hit the floor of the lift.

a = _____ _____

15. Mali is standing on a Newton scale inside a lift
When the lift is accelerating downwards at a rate of $4m.s^{-2}$, the reading on the scale is 290 N. Calculate Mali's mass.

m = _____ _____

16. A lift of mass 800 kg is moving upwards. The tension in the cable is 12 000 N. Calculate the acceleration of the lift.

a = _____ _____

17. A box of mass 8 kg is lifted with a force of 120 N. Calculate the acceleration of the box. (Ignore air resistance)

a = _____ _____