**Name of the Student**:_____
**Max. Marks : 19 Marks** **Time : 19 Minutes**

**Q1.**

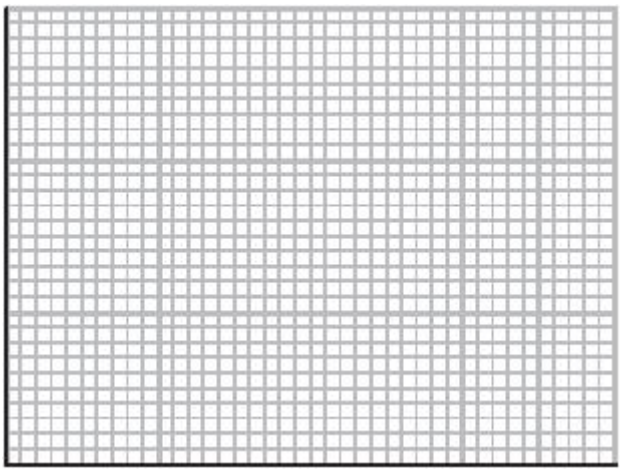
Figure 4 shows two astronauts in space pushing at a satellite.




**Figure 4**

(i) The force $F_1$ is 3.0 N and the force $F_2$ is 2.0 N, acting at right angles to each other.
Draw a vector diagram to scale showing these forces.

**(2)**



(ii) Use the diagram in (i) to estimate the magnitude of the resultant force acting on the satellite.

**(2)**

resultant force = ..... N

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**(Total for question = 4 marks)**

**Q2.**

Figure 15 shows a wooden block connected to a weight by a string.
The string goes over a pulley.

The surfaces of the table and the wooden block are both rough.

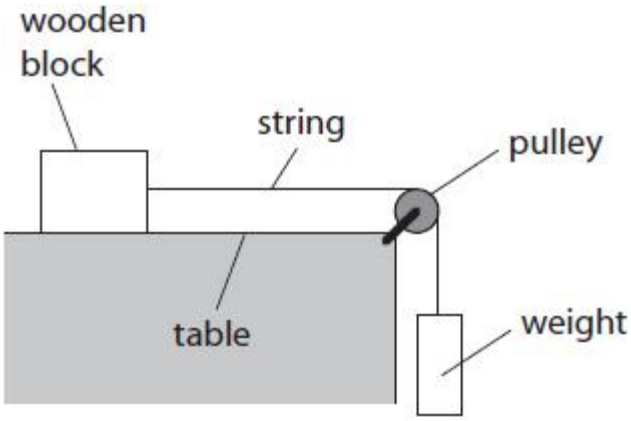



**Figure 15**

The wooden block moves across the table at a constant horizontal velocity.

Several vertical and horizontal forces act on the wooden block as it moves.

Explain how the forces keep the wooden block moving across the table at a constant horizontal velocity.

Your answer should refer to all forces acting on the wooden block.

You may add to the diagram to help with your answer.

**(6)**

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**(Total for question = 6 marks)**

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**Q3.**

(i) Figure 14 shows the vertical forces on an aeroplane.

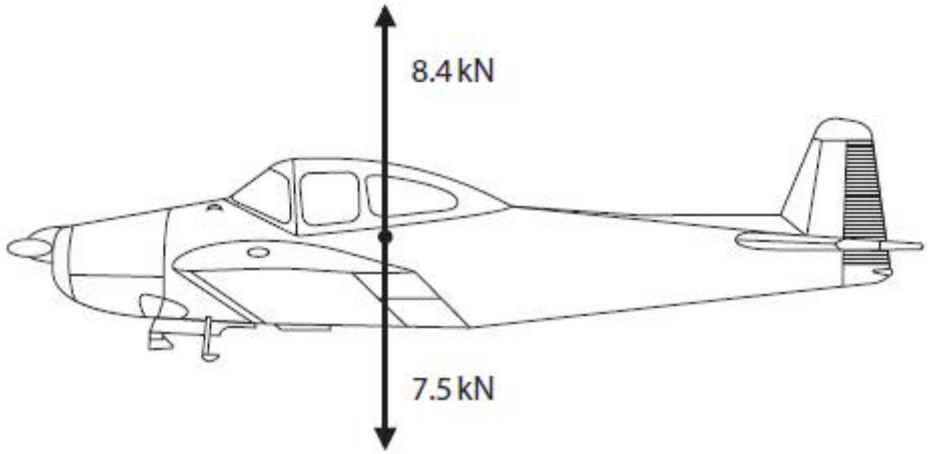



**Figure 14**

Use information from the diagram to determine the size and direction of the resultant vertical force on the aeroplane.

**(2)**

size = ..... kN, direction is .....

(ii) The aeroplane is descending.

Figure 15 shows a diagram of the resultant vertical and horizontal forces on the aeroplane as it is descending.

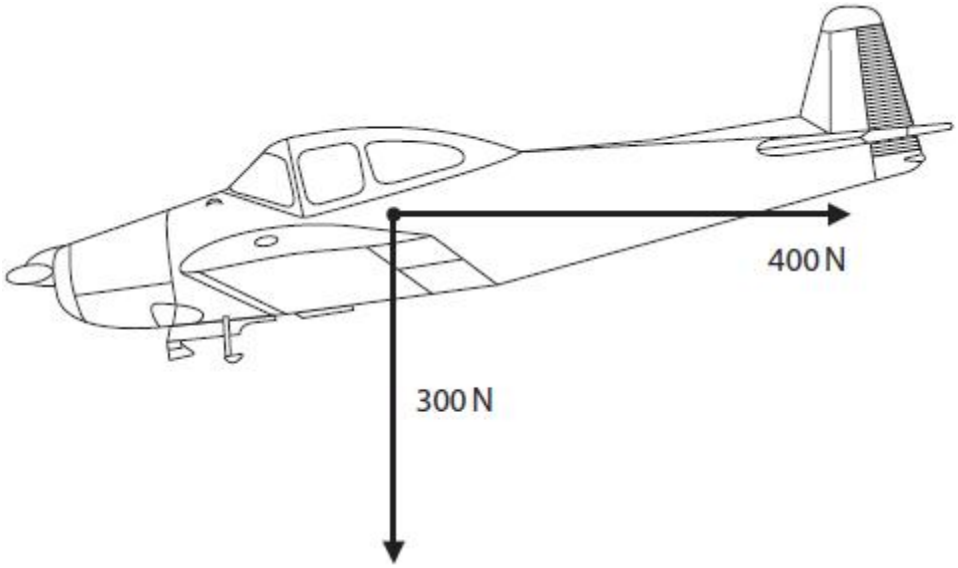



**Figure 15**

Complete the diagram to show the resultant of these two forces.

**(1)**

(iii) The mass of the aeroplane is 750 kg.

Calculate the change in gravitational potential energy of the aeroplane as it descends from 1300 m to the ground.
Gravitational field strength ($g$) = 10 N/kg

**(2)**

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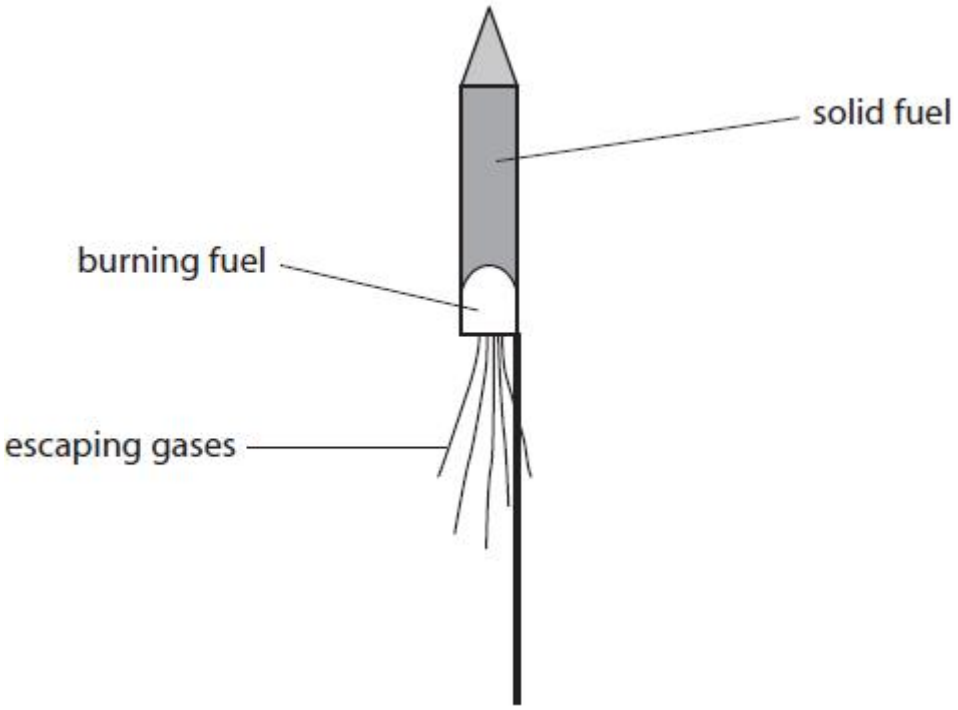
energy = ..... J

**(Total for question = 5 marks)**

**Q4.**

A firework rocket contains a solid fuel inside a cardboard tube.

The burning of the fuel creates a thrust to propel the rocket upwards.




(i) Scientists can refer to several different quantities when describing the motion of the rocket.

| mass | energy | speed | force |
|---|---|---|---|

Only one of these quantities is a vector.
Complete this sentence using **one** of the words from the box.

**(1)**

The vector quantity is .....

(ii) Before the fuse is lit, the total weight of a rocket including fuel is 0.7N.

The gravitational field strength is 10 N/kg.
Complete the sentence by putting a cross (☒) in the box next to your answer.
The total mass of the rocket including fuel is

**(1)**

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- ☐ **A** 0.007 kg
- ☐ **B** 0.07 kg
- ☐ **C** 0.7 kg
- ☐ **D** 7 kg

(iii) There is a resultant force on the rocket of 0.5 N upwards when it takes off.

The arrow on the diagram shows the size and direction of the force of gravity acting on the rocket when it takes off.




Add another arrow to the diagram to show the thrust produced by the burning fuel at the time the rocket takes off.
You should label the arrow with the size of the thrust.

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