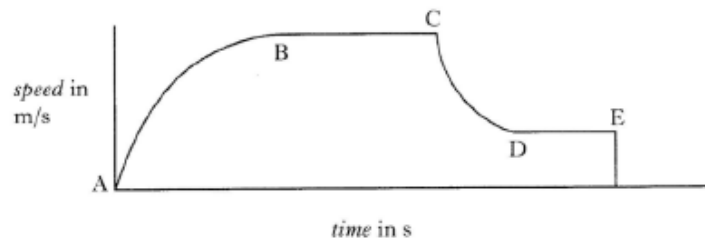


1.2 Forces Past Paper Questions

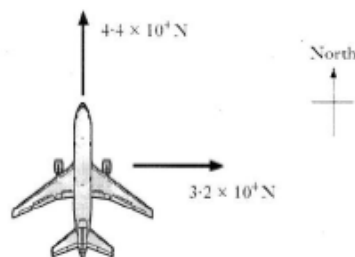
Q1. A parachutist jumps out of an aircraft. Sometime later the parachute is opened.

The graph shows the motion of the parachutist from leaving the aircraft until landing.



Which parts of the graph show when the forces acting on the parachutist are balanced? (1)

Q2. During a flight an aircraft's engines produce a force of $4.4 \times 10^4 \text{ N}$ due North. The aircraft encounters a crosswind blowing from west to east which exerts a force of $3.2 \times 10^4 \text{ N}$.



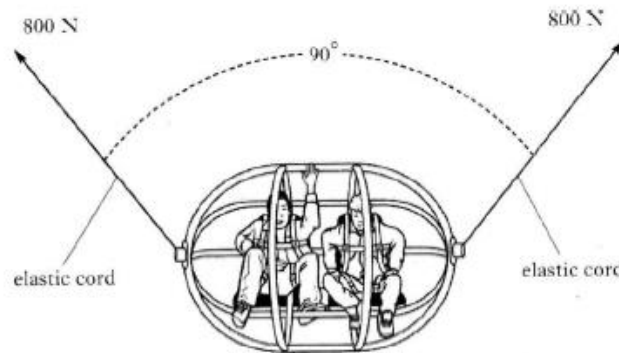
Calculate the resultant force on the aircraft. (3)

Q3 A skier takes part in a downhill competition.

- State two ways the skier can reduce friction in order to reach high speeds. (2)
- When the skier reaches the maximum speed of 65 ms^{-1} this speed is maintained over the rest of the course.

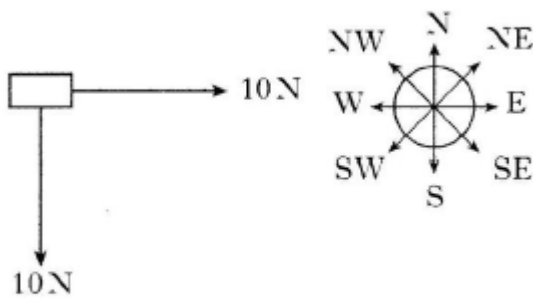
State how the size of the downhill force compares with the size of the frictional force during this part of the course. (1)

Q4. A fairground ride uses a giant catapult to launch people upwards using elastic cords.



Each cord applies a force of 800 N and the cords are at 90° as shown. Using a scale diagram, or otherwise, find the size of the resultant of these two forces. (3)

Q5 Two forces act on an object as shown.

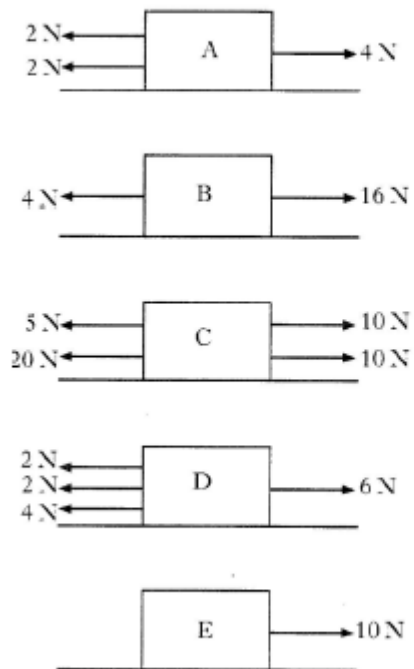


The angle between the forces is 90° . The resultant force is

- A Zero
- B 14N SE
- C 14N NE
- D 20N SE
- E 20N NE

(1)

Q6 Which block has the largest resultant force acting on it?



(1)

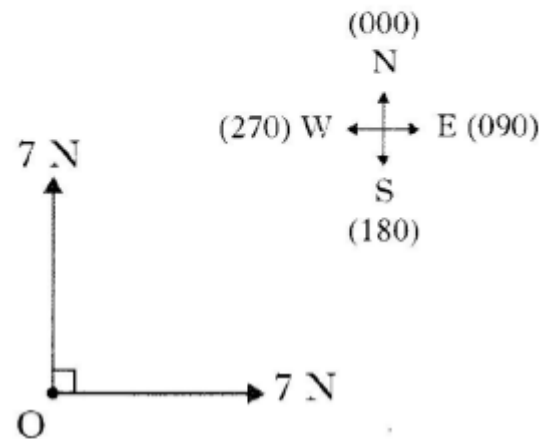
Q7 In outer space the engine of a space probe is switched on for a short time. When the engine is switched off, the rocket

- A Changes direction
- B Moves at a steady speed
- C Slows down
- D Speeds up
- E Follows a curved path

(1)

Q8 Two forces, each of 7N, act on an object O.

The forces act as shown.



The resultant of these two forces is

- A 7N at a bearing of 135
- B 9.9N at a bearing of 045
- C 9.9N at a bearing of 135
- D 14N at a bearing of 045
- E 14N at a bearing of 135

(1)

Q9 A cyclist is stopped at traffic lights and sees the lights turn to green. He accelerates away from the lights. The combined mass of the cycle and cyclist is 75kg. An unbalanced force of 150N acts on this mass.

Calculate the acceleration.

(3)

Q10 A motoring journalist tests the grip on two new designs of tyre.

One set of tyres is placed on car A, the other set of tyres is placed on car B.



Car A



Car B

Each car is driven at a speed of 28ms^{-1} on a dry surface then the brakes are applied until the car stops. The distance travelled by each car during braking is measured.

The table gives information about the cars.

<i>Car</i>	<i>Mass of car in kilograms</i>	<i>Braking distance in metres</i>
A	1500	70
B	800	50

- a) Car B decelerates at 8ms^{-2} during braking.
- Calculate the force required during braking. (3)
 - Calculate the work done on Car B during braking. (3)
- b) The journalist concludes that the tyres on Car B have better grip than those on Car A.
- Explain why the journalist's conclusion may not be correct. (1)

Q11

A plane is flying horizontally at a constant speed.

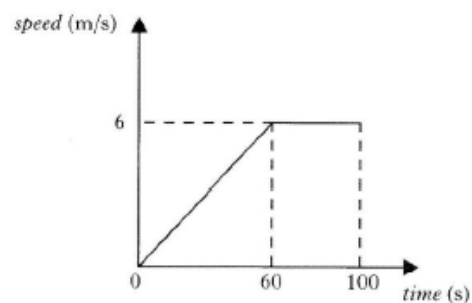
- a) The aircraft and passengers have a total mass of 50 000kg. Calculate the total weight.
- b) State the magnitude of the upward force acting on the aircraft.

(3)

(1)

Q12

A balloon of mass 400kg rises vertically from the ground. The graph shows how the vertical speed of the balloon changes during the first 100s of its upward flight.

**Q13**

Calculate the acceleration of the balloon during the first 60s.

(3)

- b) Calculate the distance travelled by the balloon in 100s.
- c) Calculate the average speed of the balloon during the first 100s.
- d) Calculate the weight of the balloon.

(3)

(3)

(3)

Total Marks 40