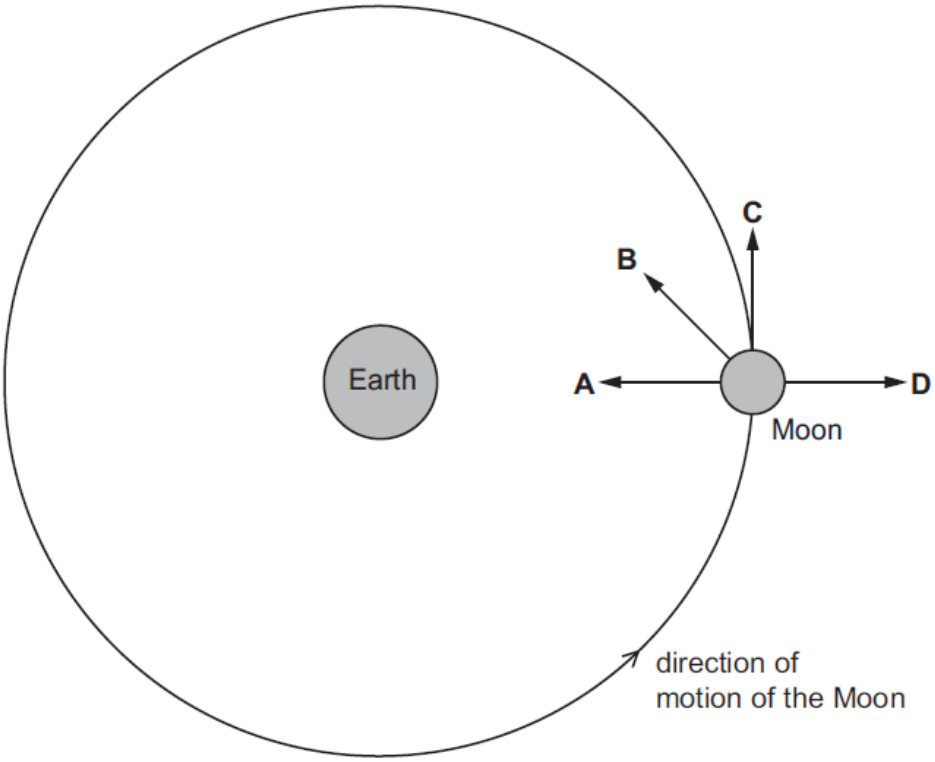
Forces – 2022 June O Level 5054

1. June/2022/Paper_11/No.3

The diagram represents the Moon in its orbit around the Earth.

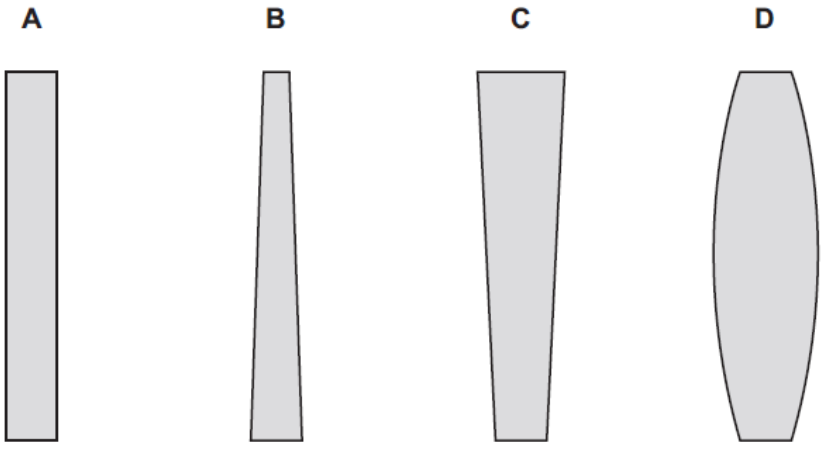
Which arrow represents the direction of the resultant force acting on the Moon at the instant shown?



2. June/2022/Paper_11/No.6

Four glass objects have square bases of equal area.

Which object is the least stable?



3. June/2022/Paper_12/No.1

A force of 3.0 N and a force of 4.0 N act on an object.

What is the maximum possible resultant of these two forces?

A 1.0 N **B** 5.0 N **C** 7.0 N **D** 12 N

4. June/2022/Paper_12/No.4

A 60 kg passenger enters a stationary lift. The gravitational field strength g is 10 N/kg.

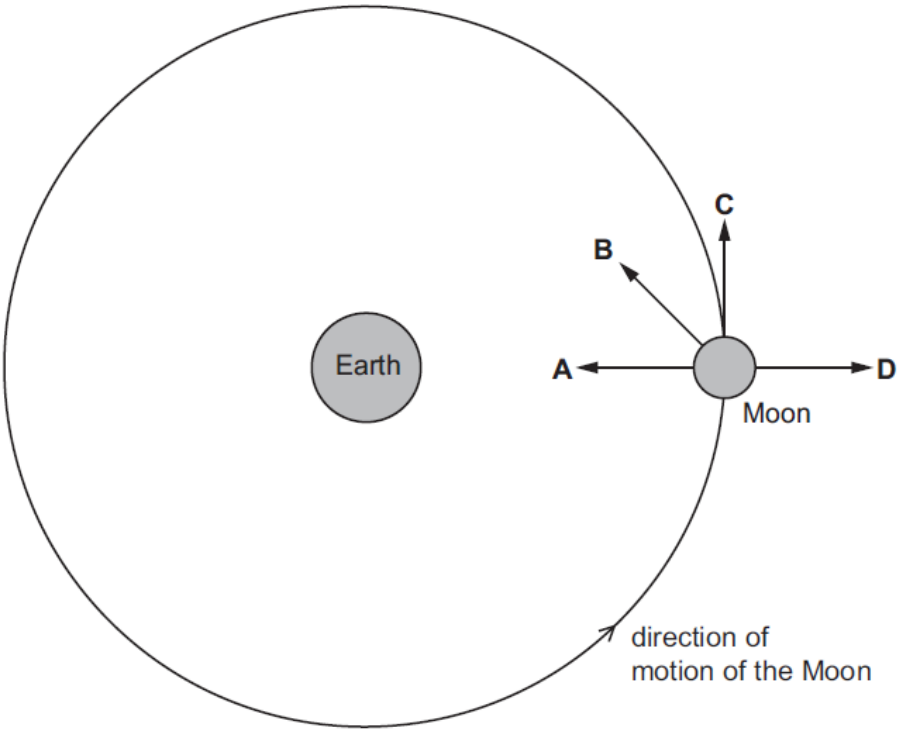
How much force does the floor of the lift exert on the passenger when the lift accelerates upwards at 2.0 m/s^2?

A 120 N **B** 480 N **C** 600 N **D** 720 N

5. June/2022/Paper_12/No.5

The diagram represents the Moon in its orbit around the Earth.

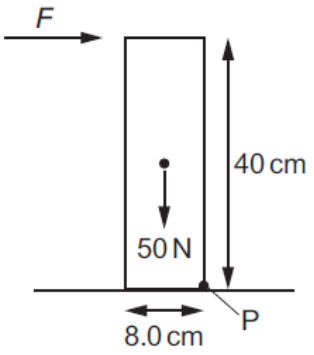
Which arrow represents the direction of the resultant force acting on the Moon at the instant shown?



6. June/2022/Paper_12/No.7

The diagram shows a uniform solid rectangular block of weight 50 N that is pivoted about point P.

The height of the block is 40 cm. The base of the block is 8.0 cm wide.

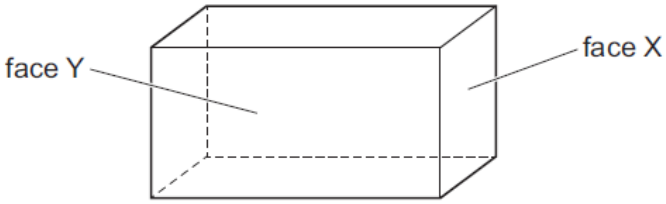


Which horizontal force *F* just makes the block start to rotate about P?

A 2.5 N **B** 5.0 N **C** 10 N **D** 160 N

7. June/2022/Paper_12/No.8

The centre of mass of a solid rectangular block is at its centre. A small heavy weight is available.



In which arrangement is the centre of mass the lowest?

A with face X on a table

B with face Y on a table

C with face X on a table and the heavy weight attached centrally on top of the block

D with face Y on a table and the heavy weight attached centrally on top of the block

8. June/2022/Paper_12/No.10

An elastic spring has an unstretched length of 30 cm.

A load of 6.0 N is hung from the spring and the length of the spring is now 66 cm.

The 6.0 N load is removed and the spring returns to its original length. A load of 2.0 N is now hung from the spring.

What is the new length of the spring?

A 22 cm **B** 40 cm **C** 42 cm **D** 52 cm

9. June/2022/Paper_21/No.1

Fig. 1.1 shows a model of the human arm. The rubber band represents the muscle that moves part of the arm XY up.

A mass is suspended from XY, as shown in Fig. 1.2. The weight of section XY is negligible and the model is at rest.

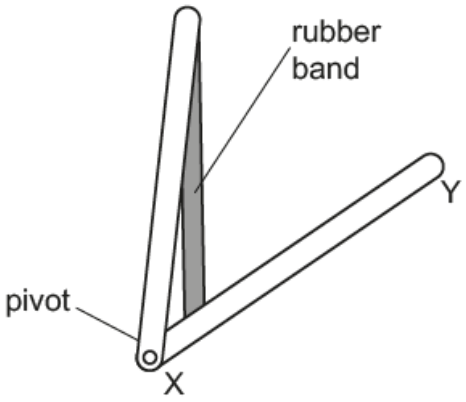


Fig. 1.1

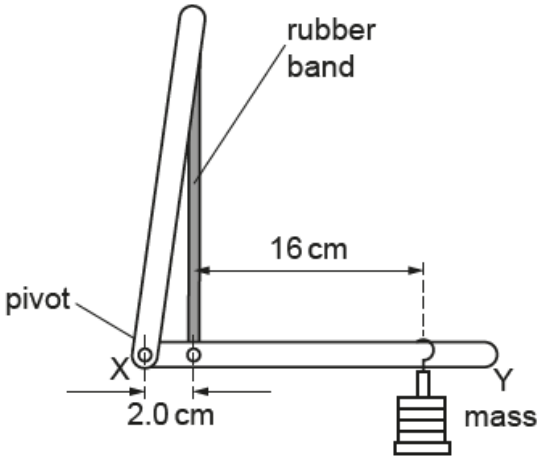


Fig. 1.2 (not to scale)

(a) (i) State **two** ways in which the dimensions of the rubber band change as the mass is added to section XY.

.....

..... [2]

(ii) State the form of energy stored in the stretched rubber band.

..... [1]

(b) (i) State the principle of moments.

.....

.....

.....

..... [2]

(ii) Explain why the force that the rubber band exerts on section XY is larger than the weight of the mass.

.....

.....

..... [1]

(iii) The mass suspended from section XY in Fig. 1.2 has a weight of 4.0 N.

Calculate the force that the rubber band exerts on section XY.

force = ... [2]

(iv) Explain how your answer to **(b)(iii)** is different if the weight of section XY is **not** negligible.

.....

.....

..... [1]

[Total: 9]

10. June/2022/Paper_22/No.1(c)

(c) A boat pulls the waterskier to the right with a horizontal force of 50 N. The waterskier travels at a constant speed.

(i) Explain, in terms of the horizontal forces acting, why the speed is constant.

.....

..... [2]

(ii) The horizontal force acting to the right increases from 50 N to 70 N. The sizes of any other forces are unchanged.

Calculate the acceleration of the waterskier.

acceleration = ... [3]