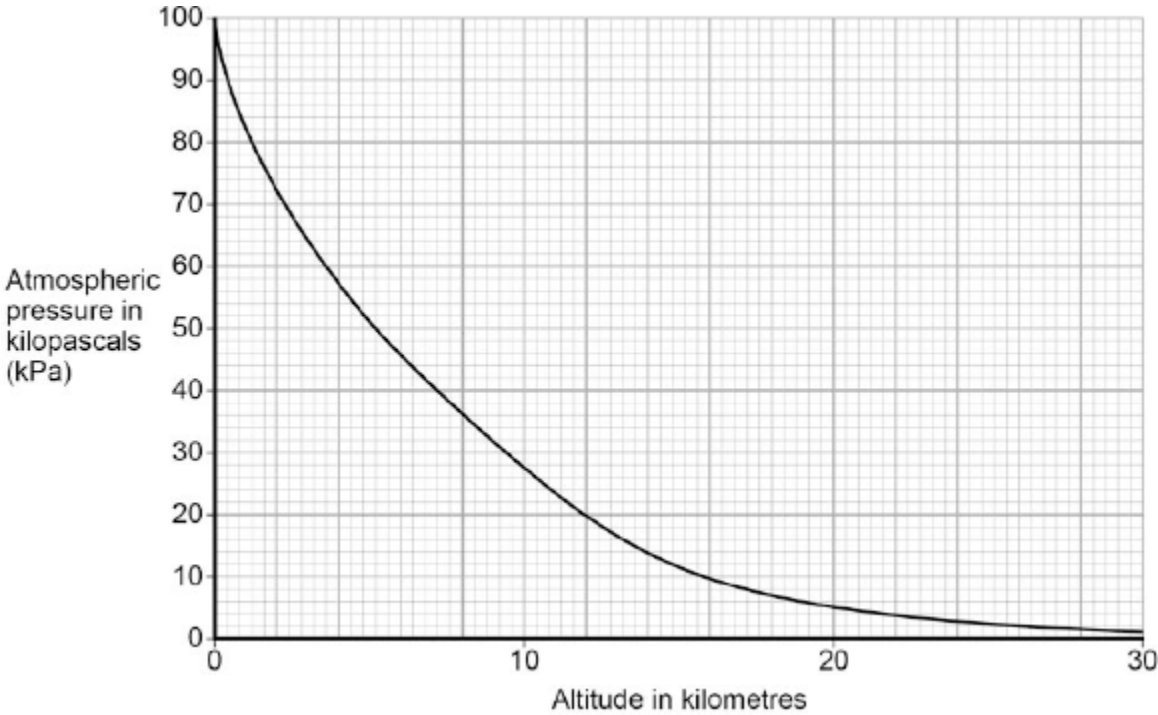


1

Figure 1 shows how atmospheric pressure varies with altitude.

Figure 1



(a) Explain why atmospheric pressure decreases with increasing altitude.

.....

.....

.....

.....

.....

.....

(3)

(b) When flying, the pressure inside the cabin of an aircraft is kept at 70 kPa.

The aircraft window has an area of 810 cm<sup>2</sup>.

Use data from **Figure 1** to calculate the resultant force acting on an aircraft window when the aircraft is flying at an altitude of 12 km.

Give your answer to two significant figures

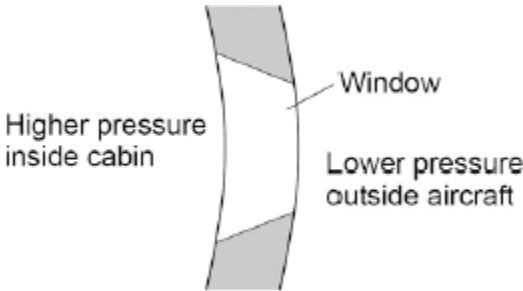
.....  
.....  
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Resultant force = ..... N

(5)

(c) **Figure 2** shows the cross-section of one type of aircraft window.

**Figure 2**



Explain why the window has been designed to have this shape.

.....  
.....  
.....

(2)  
(Total 10 marks)

## Mark schemes

- 1** (a) air molecules colliding with a surface create pressure 1
- at increasing altitude distance between molecules increases
- or**
- at increasing altitude fewer molecules (above a surface) 1
- so number of collisions with a surface decreases
- or**
- or so always less weight of air than below (the surface) 1
- (b) atmospheric pressure = 20 kPa from graph **and** conversion of 810 cm<sup>2</sup> to 0.081 m<sup>2</sup>  
*allow ecf for an incorrect value clearly obtained from the graph* 1
- $5 \times 10^4 = \frac{F}{0.081}$  1
- $F = 5 \times 10^4 \times 0.081$  1
- 4050 1
- 4100 (N) 1
- allow 4100 (N) with no working shown for 5 marks*  
*allow 4050 with no working shown for 4 marks*
- (c) force from air pressure acting from inside to outside bigger than force acting inwards 1
- so keeps the window in position 1
- [10]**