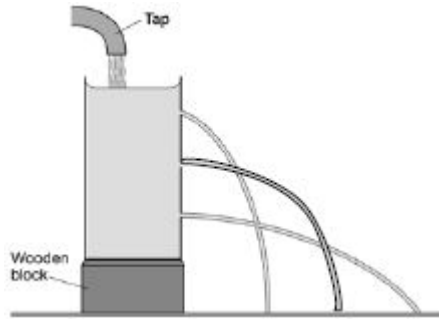


## Mark schemes

- 1.** (a) C 1
- (b) weight =  $2.5 \times 9.8$  1
- weight = 24.5 (N)  
*an answer of 24.5 rounded to 25 scores 2 marks* 1  
*an answer of 24.5 scores 2 marks*
- (c) the upthrust is the same as the weight 1
- (d) (resultant) force = mass  $\times$  acceleration  
*allow  $F = m a$*  1
- (e)  $4.0 = 2.5 \times a$  1
- $a = \frac{4.0}{2.5}$  1
- $a = 1.6 \text{ (m/s}^2\text{)}$  1  
*an answer of 1.6 scores 3 marks*
- [8]**
- 2.** (a)  $p = \frac{27}{0.009}$  1
- $p = 3000$  1
- Pa 1  
*an answer of 3000 scores 2 marks*

(b)



*the water path hits the surface somewhere between the other two paths*

1

(c) pressure increases with depth

*allow when the pressure is higher, the water travels further*

1

(d) pressure acts in all directions

**or**

pressure causes a force on (all) the surfaces

*ignore liquids cannot be compressed*

1

[6]

3.

(a) all heights drawn the same as tube 1

*judge by eye*

1

(b) increasing depth increases the height / mass / volume (of the water column) above the swimmer

*allow more water above (the swimmer)*

*more water is insufficient*

1

increasing the weight / force (of water) acting on the swimmer

1

(c) increase in depth = 1.2 (m)

1

$$(\Delta) p = 1.2 \times 1030 \times 9.8$$

*allow either 0.50 or 1.70 for 1.2*

1

$$(\Delta) p = 12112.8$$

*allow a correctly rounded answer*

*allow a correct calculation using either 0.50 or 1.70*

1

pascals **or** Pa

*do **not** accept pa*

*allow N/m<sup>2</sup>*

1

*an answer of 12 112.8 scores **3** marks*

**[7]**

**4.**

(a) The pressure at X is the same as at Y

1

(b) larger than

1

(c) (i) 3 (N/mm<sup>2</sup>)

*accept 3 000 000 Pa (correct unit must be given)*

*allow **1** mark for correct*

*substitution, ie*

$$\frac{24}{8}$$

*provided no subsequent step*

2

(ii) pascal

1

(d) the brakes would not work

*allow the vehicle (car/bike etc) would not stop*

*accept they would freeze solid **or** seize up*

1

**[6]**

5. (a) hydraulic 1
- (b) 9
- allow 1 mark for a correct substitution, ie  $\frac{1800}{200}$  provided no subsequent step* 2
- (c) an environmental 1
- [4]
6. (a) (i) are incompressible 1
- (ii) in all directions 1
- (b) 1.6
- allow 1 mark for correct substitution, ie  $\frac{80}{50}$  provided no subsequent step shown*
- an answer 0.032 gains 0 marks* 2
- (c) Pa 1
- (d) increases 1
- [6]
7. (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

$$5 \times 10^4 = E$$

$$0.081$$

1

$$F = 5 \times 10^4 \times 0.081$$

1

$$4050$$

1

$$4100 \text{ (N)}$$

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]**