GCSE Physics

Pressure in Fluid

Mark Scheme

Time available: 53 minutes
Marks available: 47 marks

1. (a) C

1

(b) weight = 2.5 × 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 × acceleration

allow F = m a

1

(e) 4.0 = 2.5 × a

1

$$a = \frac{4.0}{2.5}$$

1

a = 1.6 (m/s^2)

1

*an answer of 1.6 scores **3** marks*

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2. (a) $$p = \frac{27}{0.009}$$

1

p = 3000

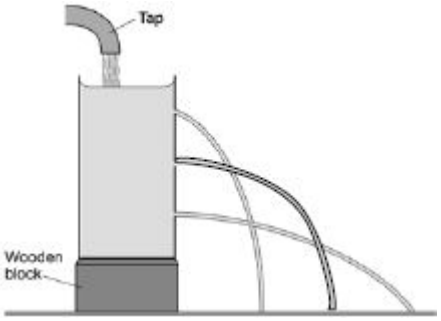
1

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**

(Δ) p = 1.2 × 1030 × 9.8

allow either 0.50 ***or*** *1.70 for 1.2*

1

(Δ) 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^2

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^2)

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^2 to 0.081 m^2

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]