GCSE Physics

Pressure

Mark Scheme

Time available: 55 minutes
Marks available: 47 marks

Mark schemes

1. (a)   any **two** from:

- calculate a mean
- reduces the effect of random errors
    reduces human error is insufficient
- identify / remove anomalies
    allow to assess the repeatability of the data

2

(b)   random error
    allow a parallax error
    human error is insufficient

1

(because) eye position would not be the same each time (relative to the liquid)
    allow systematic error only if it is clear that the student always viewed liquid level from above meniscus (or below)

1

(c)   (a temperature increase would) increase the pressure in the tube (even if the volume was constant)

1

(because a higher temperature would mean) higher (average) kinetic energy of molecules / particles
    allow higher (average) speed for higher (average) kinetic energy

1

(d) $1.6 \times 10^5 \times 9.0$ (= 1.44×10^6)

1

$1.44 \times 10^6 = 1.8 \times 10^5 \times V$
    *allow for **2** marks*

$$V = \frac{1.6 \times 10^5 \times 9.0}{1.8 \times 10^5}$$

1

or

$$V = \frac{1.44 \times 10^6}{1.8 \times 10^5}$$

$V = 8.0$ (cm^3)

1

*an answer of 8.0 (cm^3) scores **3** marks*

(e) work is done on the air (in the tyre)   **1**

so the temperature (of the air) increases
allow the (average) kinetic energy of the particles increases

1
[11]

2. (a) 0 to 25 cm^3

1

(b) control

1

(c) 2 sets of data recorded from line of best fit to show that the product
is the same in both cases (1600)
*allow for **1** mark one set of calculated data for one point on the line
of best fit*

2

(d) decreases

1

increases

1

increases

1
[7]

3. (a) $p = \dfrac{27}{0.009}$
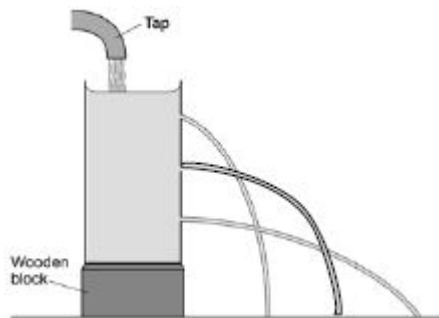
1

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]

4.   (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]

5.   (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

$5 \times 10^4 = \dfrac{F}{0.081}$

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]

6. (a) (i) are incompressible

1

(ii) in all directions

1

(b) 1.6

*allow **1** mark for correct substitution, ie $\dfrac{80}{50}$ provided no subsequent step shown*

*an answer 0.032 gains **0** marks*

2

(c) Pa

1

(d) increases

1

[6]