



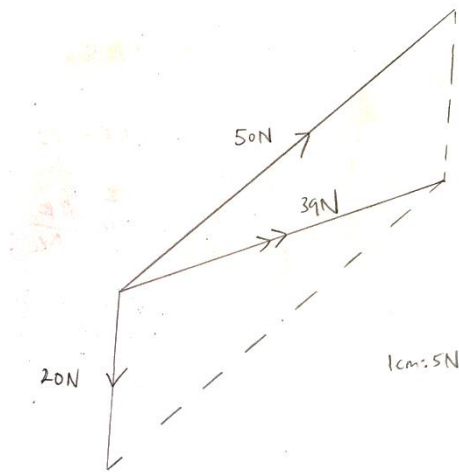
## Suggested Answers to 2016 O level Science Physics 5076/5077 Paper 2

- 1
- a Evaporation is a slow process which can occur at any temperature.
  - b Sheet A will have a faster rate of evaporation as it has a larger surface area than Sheet B.
  - c Lesser thermal energy will be converted into kinetic energy due to a decrease in surrounding temperature. Thus, there will be lesser molecules with sufficient kinetic energy to overcome the intermolecular forces of attraction and escape from the surface of the water. Hence, rate of evaporation will fall.
- 2
- a Vol. of 1 brick =  $0.21 \times 0.10 \times 0.06 = 0.00126 \text{ m}^3$
  - b  $m = \rho \times V$   
mass of 1 brick =  $2300 \times 0.00126 = 2.898 \text{ kg}$   
weight of 30 bricks =  $2.898 \times 30 \times 10 = 869.4 \text{ N}$   
weight of 30 bricks  $\approx 870 \text{ N}$

**Teacher's Comment:** In Physics, always check that your answers make logical sense. If 30 bricks had a total mass of 2.898 kg, then you will not need a wheelbarrow as you just can carry the bricks by hand. 2.898 kg is the mass of ONE brick.

- c Sum of clockwise moments = Sum of anticlockwise moments  
Moments =  $F \times d$   
 $(870 + 110) \times 0.80 = F \times (0.80 + 0.50)$   
 $F = 600 \text{ N}$
- 3
- a  $F = ma$   
 $F = m \left( \frac{v - u}{t} \right)$   
 $F = 1.1 \times 10^3 \times \left( \frac{27 - 0}{6} \right)$   
 $F = 4950 \text{ N}$
  - b distance =  $\frac{1}{2} \times 27 \times 6 = 81 \text{ m}$
  - c  $w = F \times d$   
 $w = 4950 \times 81 = 400950 \text{ J}$   
 $w \approx 400000 \text{ J}$  or  $400 \text{ kJ}$

4 a



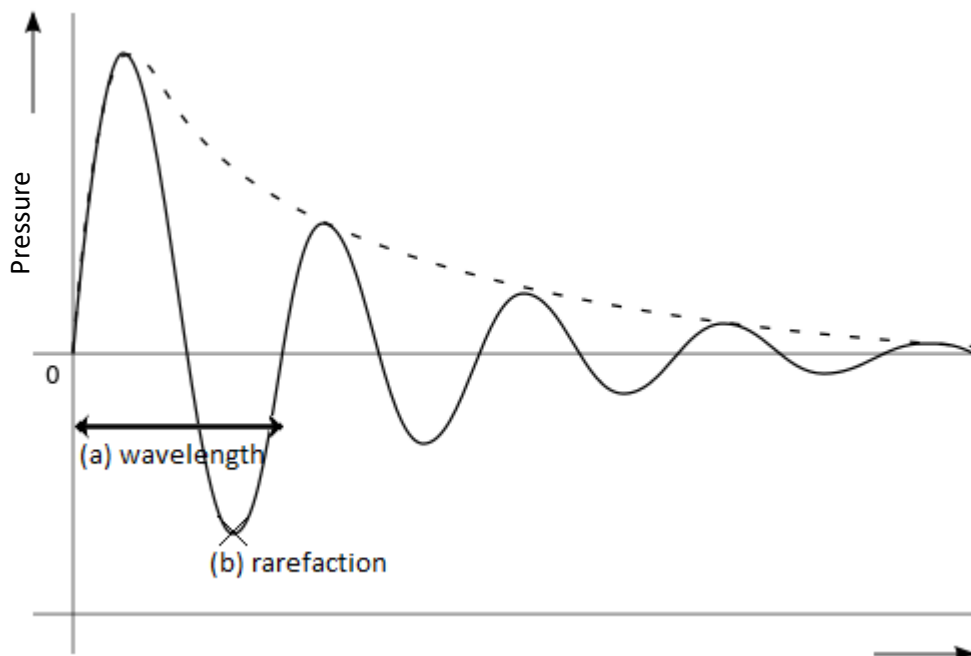
Resultant force = 39N

5 a  $v = f \lambda$   
 $= 5 \times 10^{14} \times (0.6 \times 10^{-6})$   
 $= 3 \times 10^8 \text{ m/s}$

b

Types of waves	Frequency	Wavelength	Speed in vacuum
Radio waves	Lower	Longer	Equal
X-rays	Higher	Shorter	Equal

6



**Teacher's Comment:** Low pressure corresponds to rarefactions.

c As the distance of the loudspeaker increases, the amplitude will decrease and the sound will get softer.

7 When positively charged rod X is placed near an uncharged A, the electrons will flow from A to X. Thus, sphere A becomes positively charged. If the two spheres tend to repel each other, this means that B is also positively charged, since like charges repel. Hence, rod Y should be positively charged too.

8 a  $\frac{1}{R} = \frac{1}{8+2} + \frac{1}{6} = \frac{4}{15}$   
 $R = 3.75\Omega$

b  $I = \frac{V}{R}$   
 $I = \frac{12}{3.75} = 3.2A$

$I_{6\Omega} = \frac{12}{6} = 2.0A$

$I_{8\Omega} = 3.2 - 2.0$

$I_{8\Omega} = 1.2A$

c  $P = IV$

$P_{6\Omega} = 2.0 \times 12$

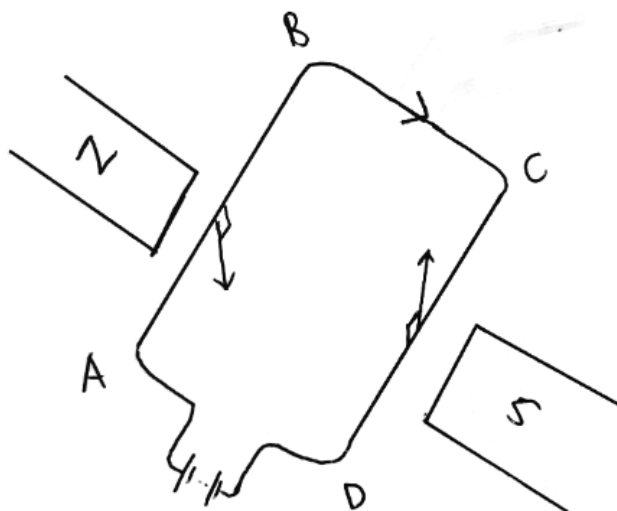
$P_{6\Omega} = 24W$

d  $Q = It$

$Q = 3.2 \times 10 \times 60$

$Q = 1920C$

9



a From B to C

b AB: Downwards

c CD: Upwards

10

a  $K.E = \frac{1}{2}mv^2$   
 $= \frac{1}{2}(1.3 \times 10^5) \times (2300)^2$   
 $= 3.4 \times 10^{11}J$

- b** As stage 1 is moving upwards just before it is detached, it will still retain its upward velocity of 2.3 km/s upon detachment. After detachment, stage 1 will no longer possess an upward driving force and the only force acting on stage 1 would be the downward force due to gravity (weight). Thus, stage 1 will experience a deceleration and its velocity will decrease to zero eventually.
- c** At the highest point, velocity of stage 1 is zero. As it starts to fall, the downward force due to gravity will cause it to accelerate downwards at a rate of  $10\text{m/s}^2$ . However, as the velocity increases, air resistance will increase too. The increasing air resistance which opposes motion, will cause resultant force and the resultant acceleration to decrease. This will continue until the acceleration becomes zero when the air resistance is equal to the weight of stage 1 and the resultant force is zero. Hence, velocity will reach a maximum, known as terminal velocity and stage 1 will continue to drop and will hit Earth at this terminal velocity.

**Teacher's Comment:** It is good to note that air resistance will be lesser at 67km above the Earth's surface than at above sea level. This is because air at 67km above the Earth's surface (at the Mesosphere) is about 1000x less dense than at above sea level (at the Troposphere).

- d** Gravitational potential energy changes to heat energy.

**11 a**

$$n = \frac{1}{\sin c}$$
$$\angle c = \sin^{-1}\left(\frac{1}{1.60}\right)$$
$$\angle c = 38.7^\circ$$

WE DID NOT RECEIVE SOME QUESTIONS OR PARTS OF QUESTIONS. IF YOU REMEMBER ANY QUESTIONS THAT WE MAY HAVE MISSED OUT, PLEASE SEND AN EMAIL TO [ADMIN@PENCILTUTOR.COM](mailto:ADMIN@PENCILTUTOR.COM).