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Blk 102, #02-135
Yishun Avenue 5
Singapore 760102

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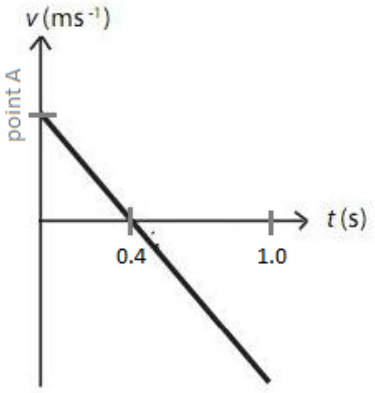
Suggested Answers to 2016 O level Physics 5064 Paper 2

1 **a** As the ball travels upwards, the acceleration is **10m/s^2 downwards**.
When the ball reaches the highest point, the acceleration is **10m/s^2 downwards**.

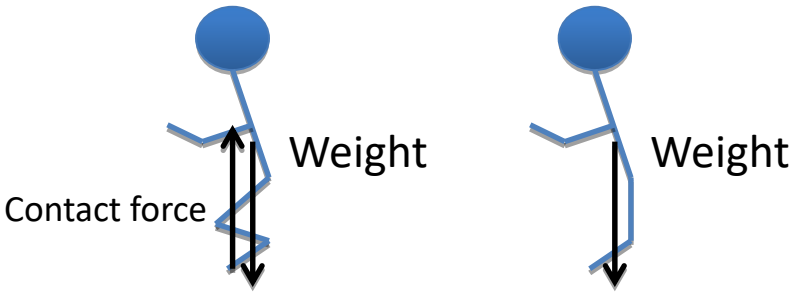
b



c The gradient of a displacement-time graph represents the velocity. During the 1st second the graph is a curve, and hence there is no constant/terminal velocity reached during this period.

d If terminal velocity was reached, the velocity of the ball will remain constant while the acceleration of the ball will be 0m/s^2.

2 **a**



b $a = \frac{(v - u)}{t}$

$a = \frac{1.5 - 0}{0.5} = 3.0 m/s^{-2}$

$F = ma$

$F = 60 \times 3.0 = 180N$

c $P = \frac{F}{A}$

Since the force is weight and $W = mg, P = \frac{mg}{A}$

$P = \frac{60 \times 10}{500 \div 100^2}$

$P = 12000Pa$

d The pressure calculated in (c) only accounts for the force due to his weight. However, the positive resultant force (which allowed him to lift his body in air) during the jump will contribute to a larger downward force when he lands. Since $P = \frac{F}{A}$, when the downward force is larger, the actual pressure exerted on the ground will also be larger than 12000Pa.

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3 **a** $m = \rho V = 1000 \times 200$
= 200000 kg

W = mg
= 200000 x 10
= 2 000 000 N

Work done = F x d
= 2 000000 x 4
= 8 000 000 J

b $\text{Power} = \frac{E}{t} = \frac{8000000}{5}$
= 1600000 W

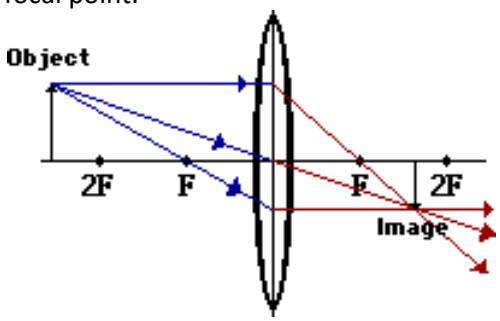
c Some power will be lost as thermal and sound energy. As such, input power must be larger than output power to make up for the possible energy losses.

4 **a** Thermal energy is conducted from the steam, through the copper pipe and to the seawater. This causes the particles of the seawater to gain kinetic energy, hence increasing its internal energy.

b $Q = mc\Delta\theta$
$m = \frac{220 \times 10^6}{3900 \times (49 - 28)}$
$m = 2686.2\text{kg}$
$m \approx 2700\text{kg}$

5 **ai** Focal length of a converging lens is the distance between the optical centre and the focal point.

aii



bi ANGLE OF INCIDENCE WAS 20° AND ANGLE OF REFRACTION WAS 13°

bii Since blue light has a higher refractive index than red light, this means that blue light will refract further away from the normal compared to red light, as the light travels from air to glass.

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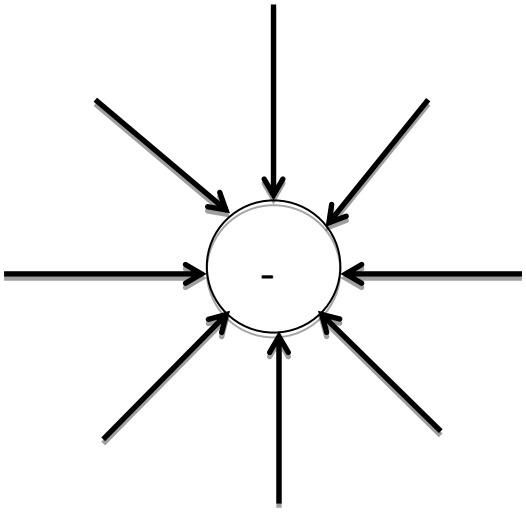
6 **a**



b Top tip of the metal strip: There are negative charges
Bottom tip of the metal strip: There are positive charges

c The distance between the top of the metal strip and the negatively charged sphere is large. This means that the electric field strength interaction with the top of the metal strip would be very weak as the field strength decreases with distance. Hence attraction of the bottom of the strip is more than the repulsion of the top.

7 **a**

$$V_{out} = \frac{R_{LDR}}{R_{LDR} + R} \times V$$

$$V_{out} = \frac{600}{600 + 8000} \times 12 = 0.84V$$

bi $\text{Voltage across resistor} = 12 - 8 = 4V$

bii

$$R_{LDR} = \frac{V_{out}}{V} \times (R_{LDR} + R)$$

$$R_{LDR} = \frac{8}{12} \times (R_{LDR} + 8000) = \frac{8}{12}(R_{LDR}) + \frac{8}{12}(8000)$$

$$\frac{1}{3}(R_{LDR}) = \frac{8}{12}(8000)$$

$$R_{LDR} = 16000\Omega$$

c As the room gets darker, the resistance of LDR increases. The potential difference across it will increase which causes the potential difference across the resistor to decrease since it is in series. Since V_{out} is parallel to the resistor, its potential difference decreases correspondingly, resulting in a dimmer lamp.

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8 **a** Clockwise moment = Anticlockwise moment
F x 25 = 11 + 30
F = 1.64 N

b When the current flows through the coil surrounding the steel core, it will permanently magnetize the steel, as steel is a hard magnetic material. The iron rod will be attracted to it as it is a magnetic material. The contact between the contact rod and the iron rod would be broken, causing the circuit to work only once.

9 **a** From 200m to 160m from the wall, it will not beep. From 160m to 100m, it will beep constantly at 4 times per second. From 100m to 40m, it will beep constantly at 10 times per second. From 40m to 0m, it will become a continuous sound.

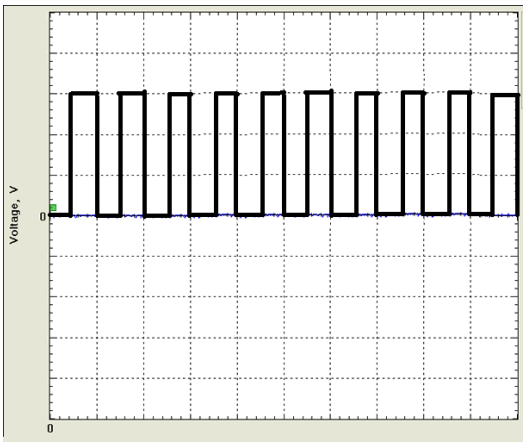
b The frequency of beep count is much more gradually increasing in B than in sensor A giving the driver a better gauge on the distance from the wall.

c $s = \frac{2d}{t}$

$d = \frac{340 \times 4 \times 10^{-3}}{2}$

$d = 0.68\text{m}$

d



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.