SECTION A (40 Marks)

1a) • Dangerous liquids (acids) • sharp objects • High tables • Dark rooms	2	Any two correct responses	
b) – Teacher spelling out rules and regulations – Learning operation of apparatus before using it – Use of apparatus common to the learner	3	Any three correct responses	

2. B weighs more.
   – Iron is denser than water,
   From mass = volume × density
   Extra mass of B compared to A is, due
   to extra mass due to higher density of
   iron.

3a) – Conduction – Convection – radiation	3	Award 1 score for each response (correct)	
b)• Lagging using insulators around the container to prevent conduction • Covering to prevent convection • Using highly polished dishes	2	Award 1 score for each correct response	

4a) • Refraction, as light from the coin bends at the interface and appears to come from a near point.	3	1 score for stating refraction 1 score for the effect of refraction 1 score for the conclusion	
b) • Reduce on amount of water, then real depth of coin from surface reduces, and hand can reach the coin	2	Award 1 score for each correct response	

5a) Distance, = 80 + 60 = 140 m.

b)

$x = \sqrt{80^2 + 60^2}$

= 100 m

Class → Staff room
↑
Lab
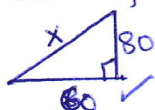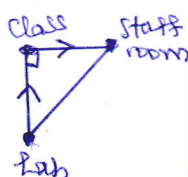
6• Sagging so as to allow room for,
expansion, during hot weather or,
contraction during cold weather,
without risking contact of wires | 5

7•

(10×75 kg)   (10×45 kg)
750N   450N

$\hat{c} = 450 \times 5$, $G = 750 \times x$;

$G = \hat{c}$,
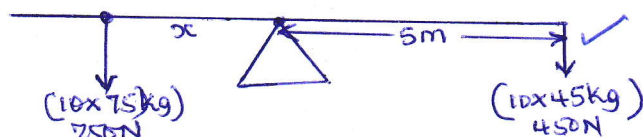
$\Rightarrow 750x = 450 \times 5$

$x = 3m$

Correct diagram (1 score)

Correct statement of
formula (1 score)

Substitution & correct
answer with unit
(3 score)

5. - Sharp pointed metals (are spikes),
   × Working as lightning conductors,
   × To repel electrons due to electrostatic
     induction with the cloud
   × transfer the electrons via the copper strip
     and plate to the earth.
   × so as to minimise effects of lightning
     and thunder

| | 5 | Award 1 score for each correct response regardless of order. |

SECTION B (60 Marks):-

a) Time taken, From 9:25am to 9:30am, 5 minutes
$$= 5 \times 60 = 300s. ✓$$

$$u = \frac{36 \times 1000}{60 \times 60} = 10 ✓; \quad v = \frac{144 \times 1000}{60 \times 60} = 40 ✓$$

$$a = \frac{v-u}{t} = \frac{40-10}{300} = 0.1 \, ms^{-2} ✓$$

$$S = \left(\frac{v+u}{2}\right) t = \left(\frac{40+10}{2}\right) \times 300 = 7500m.$$

| | 7 | Conversion from km/hr to m/s is a must. |

b) (i) A faces;
 • Supporting extra load of wheel barrow.
 • Experiencing extra effects of friction.

   B faces;
 • Hard labour, no use of machine
 • Bigger health risks due to contact with dusty bricks
 •

(ii) Distance of;
   A; $\left(\frac{500}{30} \times 2\right) - 1 \Rightarrow 17 \times 2 - 1 = 33$ times ✓
   $$D = 33 \times 100 = 3300 m$$
   B; $\left(\frac{500}{8} \times 2\right) - 1 \Rightarrow 63 \times 2 - 1 = 125$ times ✓
   $$D = 125 \times 100 = 12500m ✓$$
   Extra distance = 12500 - 3300 ✓
   $$= 9200m$$

| | 4 | Any 4 correct responses |

10 a) (i) • Both are upright.
         • Both are same size.

   • Image is virtual, object is real.
   • Image is laterally inverted, object is proper.
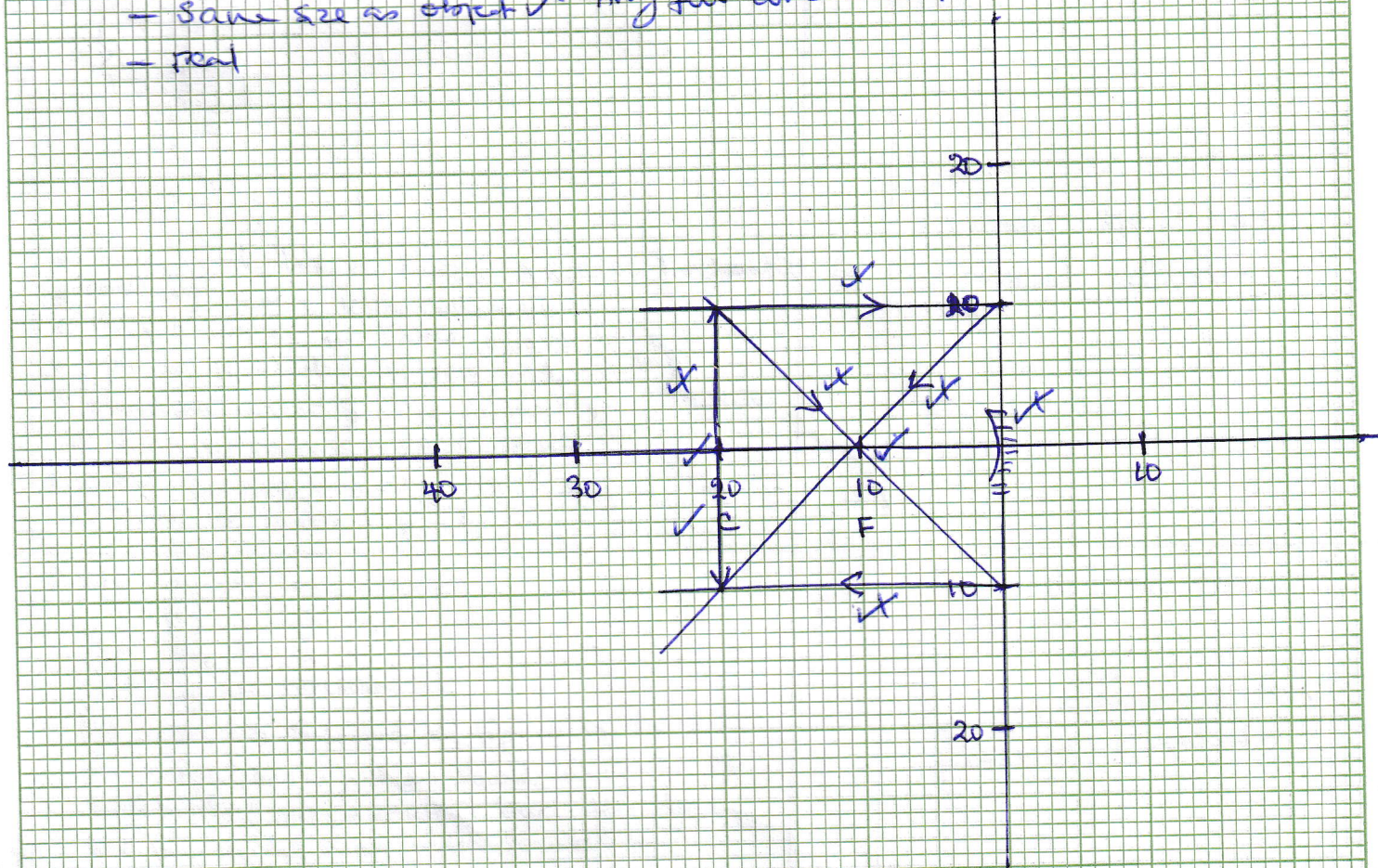
(ii) • Image would be smaller than object ✓
     • Image would be nearer to mirror than object. ✓

| | 2 | |
| | 2 | |

(i) height = 10cm ✓
(ii) $M = \dfrac{V}{U} = \dfrac{20}{20} = 1$ ✗

Nature of Image formed
- Inverted ✗
- Same size as object ✓   Any two correct responses
- real

11a) $F = 60 \times 10 = 600N$,

(i) $A = 0.002 \times 2 = 0.004 \, m^2$
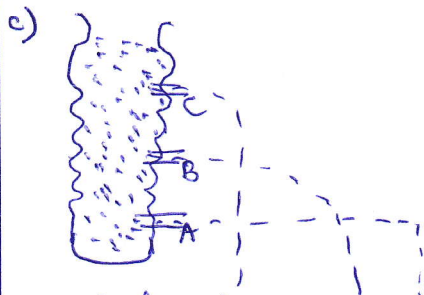
$P = \frac{F}{A} = \frac{600}{0.004} = 150,000 \, Pa$ ✓

(ii) $A = 0.002$,

$P = \frac{600}{0.002} = 300000 \, Pa.$ ✓

b(i) - Pain due to high pressure, ✓ ✓
 - Falling due to unstable equilibrium

(ii) Damage due to high pressure. ✓

c)

- Drilling holes at levels A, B, C of the bottle
- Covering holes with Cellotape.
- Pouring water in bottle above hole C
- opening the holes by removing Cellotape
- observing water pouring furthest from A due to high pressure at deeper point
- water pouring nearest from C due to low pressure at shallow point.

6. Score 1 for each correct step with or without a diagram.

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12 a)(i) • They are longitudinal.
 • They cannot pass through a vacuum
 • They travel in straight lines
 • They are mechanical

(ii) Frequency of sound by tiptoeing thief is infra (lower) than sound in range of audibility (20Hz - 20KHz) but the dog's ear can detect such infra sound.

3

b(i) - Current flows,
 hammer hits the gong,
 sound is heard. ✓

(ii) - Air is removed gradually,
 sound fades,
 and is not heard at all when all air is removed. Conclusion? ✓

3

c(i) - Echo as sound is reflected by wall. ✓

1

(ii) $2d = s \times t$ ✓

$s = \frac{2d}{t} = \frac{2 \times 640}{4} = 320 \, m/s$ ✓

3

1 Score for each correct response

Score 1 a least 1 for each correct response

3 a(i) – A magnet is a metal that attracts certain metals. ✓

  • Magnetic materials are those that can be turned into a magnet. | 2

(ii) – Hammering midway roughly ✓
  – Electrical with a.c ✓
  – Heating strongly. ✓ | 3

b)(i) Current flows through the coil, the nail becomes magnetised. ✓

(ii) • Current is out of coil, nail loses magnetism ✓ | 3

(ii) • Once it acquires magnetism, it is not lost even when current is switched off.
Conclusion? ✓ | 3

d) • The magnet swings seeking the north and south, being attracted by the earth's magnetic field.
  – When it comes to rest, the north pole is attracted to the south pole hence facing geographic north.
  – The south pole is attracted to the north pole of the earth hence facing geographic south. | 4

14 a)(i) Covid-19 was a sickness that was more risky when the medical personnel is in contact with patient. | 2
  – Temperature gun could take measurements without making contact between user and patient. | 1

(ii) – Readings affected by temperature of the surrounding ✓
  – Readings affected by voltage of cells used. | 2

b)(i) – Alcohol ✓
  – Mercury. ✓ | 2

(ii) Alcohol
– It expands readily ✓
– Low freezing point. ✓
  Mercury
– Does not vaporize or distil in glass ✓
– Cohesive, does not stick on glass ✓ | 2   2

(iii) • Bring it in contact with a warm part.
• liquid expands into the bore.
• Taking length L, L₀ is obtained as length, L₁₀₀ at boiling point and L₀ at the temperature of patient.

$$X = \frac{L_\theta - L_0}{L_{100} - L_0} \times 100°C.$$ | 4

A learner may also explain the steps in calibration of thermometer