香港考試及評核局
HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

香港中學文憑考試
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION

練習卷
PRACTICE PAPER

組合科學(物理)
COMBINED SCIENCE (PHYSICS)

評卷參考
MARKING SCHEME

(2012年2月25日修訂稿)
(updated as at 25 Feb 2012)

本評卷參考乃香港考試及評核局專爲本科練習卷而編寫，供教師和學生參考之用。學生不應將評卷參考視爲標準答案，硬背死記，活剝生吞。這種學習態度，既無助學生改善學習，學懂應對及解難，亦有違考試着重理解能力與運用技巧之旨。

This marking scheme has been prepared by the Hong Kong Examinations and Assessment Authority for teachers' and students' reference. This marking scheme should NOT be regarded as a set of model answers. Our examinations emphasise the testing of understanding, the practical application of knowledge and the use of processing skills. Hence the use of model answers, or anything else which encourages rote memorisation, will not help students to improve their learning nor develop their abilities in addressing and solving problems.

Section A

1	D
2	A
3	C
4	C
5	C
6	B
7	D
8	B
9	A
10	B
11	A
12	D
13	A
14	C
15	B
16	D
17	C
18	D
19	D
20	B
21	B
22	A
23	C
24	A

Section B Marking Scheme

General Notes for Teachers on Marking

1. This marking scheme has been updated, with revisions made after the scrutiny of actual samples of performance in the practice papers. Teachers are strongly advised to conduct their own internal standardisation procedures before applying the marking schemes. After standardisation, teachers should adhere to the marking scheme to ensure a uniform standard of marking within the school.

2. The marking scheme may not exhaust all possible answers for each question. Teachers should exercise their professional discretion and judgment in accepting alternative answers that are not in the marking scheme but are correct and well reasoned.

3. In the marking scheme, marks are classified as follows :

   'M' marks – awarded for knowing a correct method of solution and attempting to apply it. (Candidates are not expected to write down the formula/method explicitly, marks could be awarded once candidates' work indicated that the particular formula/method had been used.)

   'A' marks – awarded for the accuracy of the answer. (For non-numerical answers, the answers need not be in exact wording as those in the marking scheme.)

   In a question consisting of several related parts, 'M' marks should be awarded to steps or methods correctly deduced from erroneous answers obtained in earlier parts. However, 'A' marks for the corresponding numerical answer should **NOT** be awarded.

4. In questions involving numerical computations, if a candidate's answer clearly indicated that a wrong method had been used (e.g. the application of a wrong formula), the 'A' marks should not be awarded even if the candidate had accidentally arrived at the correct numerical answer. In case of doubt, the benefit should be given in the candidate's favour.

5. If the unit had been stated wrongly in the final numerical answer of a question, or if it had been omitted completely, no 'A' marks should be awarded to the final answer. However, candidates should not be penalised twice in the whole paper for the same error in that unit.

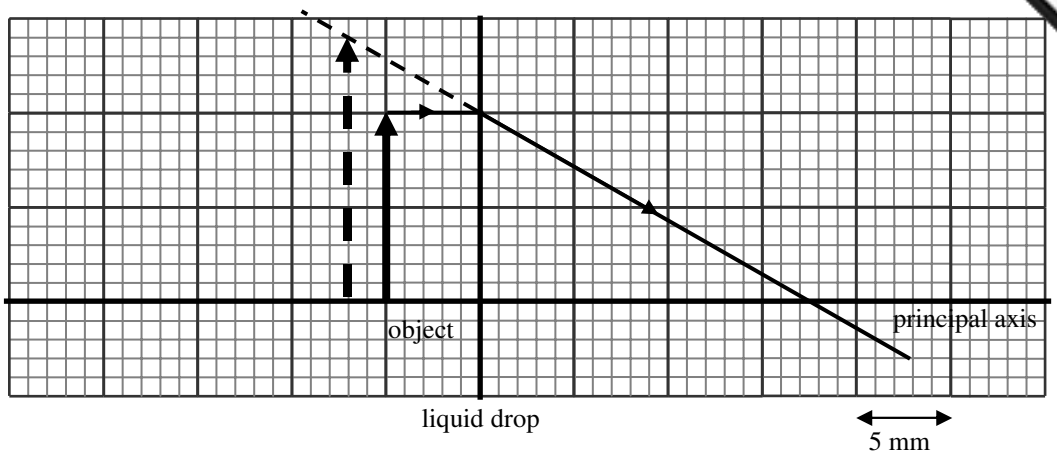
6. In questions asking for a specified number of reasons or examples etc. to be given and a candidate gave more than that is required, the surplus answers should not be marked. For example, in a question asking for two examples, if three had been given by a candidate, then only the first two answers should be marked.

7. Markers could exercise their judgment to split the '2A' or '2M' marks (if any), i.e. to award 1 mark only, if the answer is partially correct.

Solution	Marks	Remarks
1. (a) (i) A black surface is a good absorber of radiation.	1A	
(ii) A cover reduces heat loss due to convection of air.	1A	
(iii) The oil in the copper pipe inside the box is heated and rises.	1A	
Cooler and denser oil from the pipe in the storage tank will move downward and replace the heated oil.	1A	
OR: The oil in the copper pipe inside the box is heated and becomes less dense,	1A	
they rise due to convection.	1A	
	4	
(b) In 1 minute, $E = mc\Delta T$, $= 0.3 \times 2500 \times (37 - 25)$ $= 9000$ J	1M	
$P = E / t$ $= 9000 / 60$	1M	
$= 150$ W	1A	
	3	
2. (a) $a = 3/2 = 1.5$ m s^{-2}	1A	
By $T - mg = ma$ $T - 4 \times 9.81 = 4 \times 1.5$	1M	
$T = 45.24$ N [46 N]	1A	
	3	
(b) Power $= Fv$ $= 4 \times 9.81 \times 3$	1M	
$= 117.72$ W [120 W]	1A	
	2	
(c) Power dissipated against friction at the axle of the motor. / Heat dissipated in the coil of the motor.	1A	
	1	
(d) The parcel first rises and comes to rest momentarily.	1A	
It then falls freely under gravity.	1A	
	2	

Solution	Marks	
3. (a) By the conservation of momentum, $0.03\ v = 0.04 \times 3$ $v = 4\ \text{m s}^{-1}$	1A 1	
(b) By P.E. lost = K.E. gain $mgh = \frac{1}{2} mv^2$ $0.03 \times 9.81 \times h = 0.5 \times 0.03 \times 4^2$ $h = 0.815$ m [0.8 m]	1M 1A 2	
(c) Time of flight = 1.2 / 3 = 0.4 s Vertical distance ball Y travelled before hitting the ground, $S = \frac{1}{2} at^2$ $= 0.5 \times 9.81 \times 0.4^2$ = 0.7848 m (0.785 m) [0.8 m] The height H of the bench is 0.7848 m (0.785 m) [0.8 m].	1A 1M 1A 3	
(d) The time of flight remains unchanged as both the initial vertical speed and the vertical displacement remain unchanged. OR : as it is independent of the horizontal speed of the projectile.	1A 1A 1A 2	
4. (a) $v = f\lambda$ $= (25)(0.8)$ $= 20\ \text{cm s}^{-1}$	1M 1A 2	
(b) Path difference at R = 2.0 cm $= 2.5\ \lambda$ $\therefore$ Destructive interference at R. Amplitude of the water wave at R decreases when another dipper is placed at Q.	1M 1A 1A 3	
5. Connect the ray box to the power supply and switch it on. Put the semi-circular glass block onto the protractor. Direct a light ray into the glass block through the curved side towards its centre. Vary the incident angle in the glass block until the refracted ray is parallel to the straight edge of the glass block. Make sure that the centre of the semi-circular glass block coincides with the centre of the paper protractor. Read the incident angle from the protractor and the critical angle of the glass block can be obtained.	1A 1A 1A 1A 1A 5	

Solution	Marks
6. (a) (i)(ii)	



OR: for (ii)

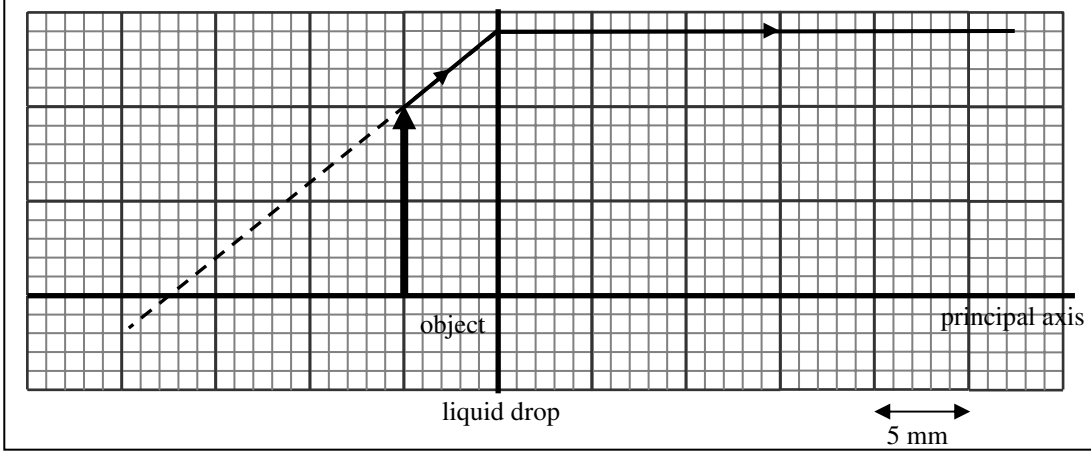
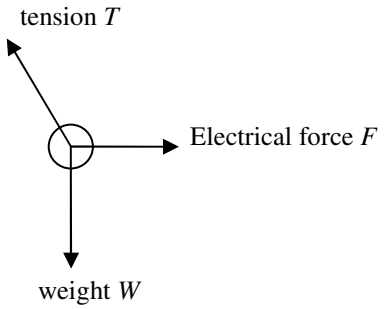


Image position and height correct *Construction ray correct* Focal length = 17.5 mm	1A 1M 1A 3
(b) An incident ray parallel to the principal axis of the liquid will bend towards the principal axis less after passing through the liquid. Thus, the focal length of the liquid drop will increase.	1A 1A 2

Solution	Marks
7. (a) $P = \frac{E}{t}$ $= \frac{2400}{120}$ $= 20$ W	1A 1
(b) $P = VI$ $20 = 12 \times I$ $I = 1.67$ A	1M 1A 2
(c) Total current $= 1.67 \times 2$ $= 3.34$ A As the total current is less than 5 A, the fuse will not blow.	1M 1A 2

Solution	Marks	
8. (a) 		
any two forces correct	1A	
all correct in the free body diagram	1A	
	2	
(b) (i) $\tan\theta = \frac{F}{W}$	1A	
(ii) Electric force $F = qE$		
From (i), $\tan\theta = \frac{F}{W}$		
$= \frac{qE}{mg}$	1A	
$\therefore q = \frac{mg\tan\theta}{E} = \frac{(0.07\times10^{-3})(9.81)\tan 2^\circ}{40000}$		
$= 6.00\times10^{-10}$ C [6.11×10^{-10} C]	1A	
	3	
(c) Move the polystyrene tile / the point of support of the nylon thread, so that the ball is placed in different positions in the space between the plates.	1A	
Angle θ should remain the same if the electric field between the plates is uniform.	1A 1A	
	3	
9. (a) When the primary current is suddenly interrupted, the magnetic field through the secondary coil changes,	1A	
and an e.m.f. is induced across the secondary coil.	1A	
	2	
(b) The number of turns of the secondary coil is much larger than that of the primary coil.	1A	
	1	
(c) By energy conservation, input power should be equal to the output power.		
To produce a large secondary voltage, the primary current should be large.	1A	
Therefore thicker wire of smaller resistance should be used.	1A	
	2	