Mark Scheme for H1 Physics Preliminary Exams 2014
Paper 1

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Ans	A	D	B	D	C	D	A	A	D	D
	Q11	**Q12**	**Q13**	**Q14**	**Q15**	**Q16**	**Q17**	**Q18**	**Q19**	**Q20**
Ans	B	A	A	C	B	B	A	A	D	C
	Q21	**Q22**	**Q23**	**Q24**	**Q25**	**Q26**	**Q27**	**Q28**	**Q29**	**Q30**
Ans	D	D	B	A	D	C	D	C	B	A

1 **Ans: A**

$[V] = \frac{[W]}{[q]} = \frac{[F\,s]}{[It]}$

$= \frac{kg\,m\,s^{-2}\,m}{A\,s}$

$= kg\ m^2\ s^{-3}\ A^{-1}$

2 **Ans: D**

3 **Ans: B**

4 **Ans: D**

5 **Ans: C**

Range , $S_x = u_x t$

$d = v t$

Y direction: u = 0

All the options do not have t in the equation.

Hence apply $S_y = u_y t + ½ at^2$

$h = 0 + ½ g t^2$

and make t the subject

$$t = \sqrt{\frac{2h}{g}}$$

6 **Ans: D**

Using $s_y = u_y t + ½ a_y t^2$

$-120 = (10)(t) + ½ (-9.81)(t^2)$

$t = 6.1$ s

7 **Ans: A**

8 **Ans: A**

Moving upwards, take up at positive

T – W = ma = -ve since lift is decelerating

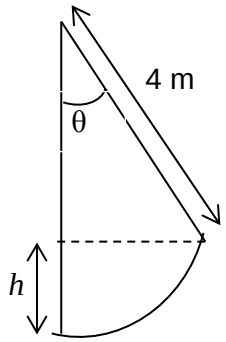
9 **Ans: D**
Since kinetic energy of box X is lost as it is an inelastic collision, and the remaining energy has to be shared between boxes X and Y, this means that X has lost some of its momentum to Y. For options A & B, momentum and energy are two different quantities and one cannot be transformed directly into the other.

10 **Ans: D**
Area under such a curve always represents the work done by the force acting on the elastic object.

11 **Ans: B**
Vertical component of resultant force = 10000 – 9000 = 1000 N (upwards).

12 **Ans: A**
Work done = force *F* x displacement *z*

13 **Ans: A**
From lowest point to the highest point
Loss in K.E = Gain in GPE
$\frac{1}{2} mv^2 = mgh = mg(4 - 4\cos\theta)$
$\frac{1}{2}(3)^2 = 9.81(4)(1 - \cos\theta)$
$\theta = 27.7°$



14 **Ans: C**

15 **Ans: B**
By drawing the next wave (at a later time), we see that Q is moving downwards. Time taken to reach equilibrium position is a quarter of a period, where T = 1/ f = 0.08 s.

16 **Ans: B**
Intensity of emergent light from P_2 will be maximum when the polarizing axes of both polariods are at 0^o, 180^o, or 360^o with each other.

17 **Ans: A**
For destructive interference at *X*, path difference = $(n + \frac{1}{2})\lambda$, where n = 0, 1, 2….
For max λ, n = 0.
Path difference = 90 mm.
Thus λ = 180 mm.

18 **Ans: A**

19 **Ans: D**

20 **Ans: C**

21 **Ans: D**

22 **Ans: D**

23 Ans: B

For resistance across PR, note that resistor SQ can be neglected since there is no current passing through it (S and Q are equipotential). Total resistance = $(½ + ½)^{-1}$ = 1 Ω.

24 Ans: A

No. of electrons, N = (I /e) x t

= (2/ 1.6 x 10^{-19})(3600) = 4.5 x 10^{22}

25 Ans: D

Magnitudes of forces per unit length should be the same by Newton's Third Law.

26 Ans: C

F = BIL cos θ for this question. It will be sin θ instead if the θ is between current and magnetic field lines.

27 Ans: D

The horizontal component of velocity v_x results in no electromagnetic force acting on the electron, but it allows the electron to move to the right.

v_y results in a path perpendicular to the plane of the paper at this instance, hence a circular path with axis parallel to the horizontal.

28 Ans: C.

Incident electron has remaining energy = 12.50 - (13.64 – 1.52) = 0.38 eV
Incident photon will not be absorbed since its energy does not match any of the difference in energy levels in Hydrogen atom. Hence remaining energy = 12.50 eV.

29 Ans: B

30 Ans: A

de-Broglie wavelength λ = h/p
Same λ → same p
p = m v
KE = ½ m v^2 = ½ p^2/m
m_p >> m_e hence KE_p << KE_e.

End of solutions