MEMO SEPTEMBER 2010

PHYSICAL SCIENCES GRADE 11

QUESTION 1

1.1 **Mechanical advantage** (1)

1.2 **Conjugate acid** (1)

1.3 **Relative atomic mass** (1)

[3]

QUESTION 2

2.1	A	B	C	~~D~~
2.2	A	B	~~C~~	D
2.3	A	~~B~~	C	D
2.4	A	~~B~~	C	D
2.5	A	B	C	~~D~~
2.6	~~A~~	B	C	D

[6 X 2 = 12]

TOTAL SECTION A : 15

QUESTION 3

3.1 $F = \frac{Gm_1m_2}{r^2}$ ✓

$r^2 = \frac{6.67x10^{-11} x\ 5,97x10^{24} x\ 7,15x10^{28}}{1,13x10^{14}}$ ✓✓✓

$r^2 = 2,52 \times 10^{29}$

$r = 5,02 \times 10^{14}$ m

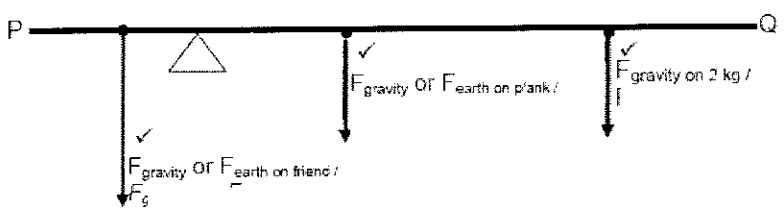
$r = 5,02 \times 10^{11}$ km✓ (5)

3.2 $F_{new} \alpha \frac{2M}{(1/3r)^2}$ ✓ $F_{new} \alpha \frac{2M}{1/9r^2}$ $F_{new} = 18 \times F_{original}$ **or** $(1,13 \times 10^{14}) = 2,034 \times 10^{15}$N✓ (2)

[7]

QUESTION 4

4.1 One mark for each force correctly indicated and correctly labeled.



(3)

4.2

$F_{8\,kg} = 8 \times 9,8 = 78,4$ N
$F_{2kg} = 2 \times 9,8 = 19,6$ N
$\sum \tau = 0$ ✓
$(F_g)(+0,2)$ ✓ + $(78,4)(-1)$ ✓ + $(19,6)(-2)$ ✓ = 0

$$F_g = \frac{117,6}{0,2} = 588 \text{ N} ✓$$

(5)

[8]

QUESTION 5

5.1.1) +7

5.1.2) +4

5.1.3) SO_3^{2-}

5.1.4) H^+

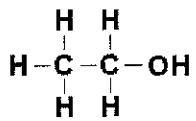
5.2a) CH_3COOH

5.2b) KOH

5.2c) KCH_3COO

5.2d) H_2O

5.3.1)



5.3.2) Elimination (dehydration)
5.3.3) Hydrohalogenation
5.3.4) HBr
5.3.5) Catalyst

[15]

QUESTION 6

6.1 The amount of substance containing Avogadro's number of elementary particles. (2)

6.2. #atoms = 2x(2 x $6,02 \times 10^{23}$) = $2,408 \times 10^{24}$ atoms (2)

6.3. n = # atoms / N_A

= $1,806 \times 10^{24} / 6,02 \times 10^{23}$

=3 mol

m = n.M

= (3)(23)

=69 g (3)

6.4.

$C_xH_yN_z$

C: $\frac{m}{M} = \frac{74}{12} = 6,166$ mol

H: $\frac{m}{M} = \frac{8,65}{1} = 8,65$ mol

N: $\frac{m}{M} = \frac{17,35}{14} = 1,239$ mol

x	:	y	:	z
6,166	:	8,65	:	1,239
5	:	7	:	1

C_5H_7N

$M(C_5H_7N) = 5(12) + (1) + 14 = 81\ g \cdot mol^{-1}$

$\frac{\text{molecular mass}}{\text{emperical mass}} = \frac{162}{81} = 2$ (4)

Molecular formula $C_{10}H_{14}N_2$

6.5 $NaOH + HNO_3 \rightarrow NaNO_3 + H_2O$

$$\frac{n_a}{n_b} = \frac{c_a v_a}{c_b v_b}$$

$$\frac{1}{1} = \frac{c_a(23,5)}{(4.61)(15.3)}$$

$$c_a = 3 mol.dm^{-3}$$

(4)

[15]

TOTAL: 60 MARKS