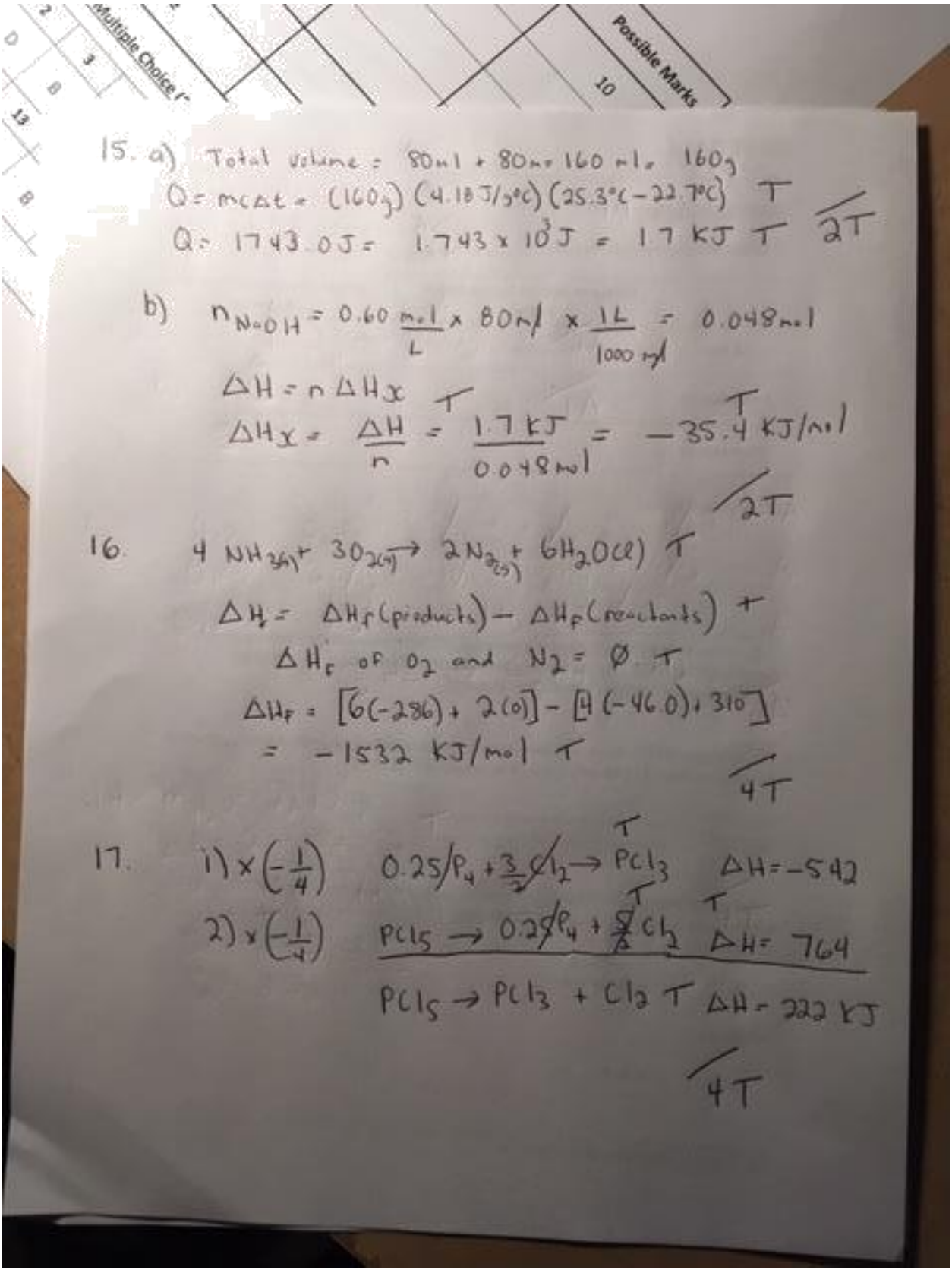
Multiple Choice (2)
Possible Marks
10

11. i) exothermic A✓
ii) exothermic A✓
iii) endothermic A✓
iv) endothermic A✓
/4A

12a) $C + O_2 \rightarrow CO_2$ /2A
b) There are none /1A

13. (1) x 1 $C_2H_6 + 3.5O_2 \rightarrow 2CO_2 + 3H_2O$ A
(2) x -1 $2CO_2 + 2H_2O \rightarrow C_2H_4 + 3O_2$ A
(3) x -0.5 $H_2O \rightarrow H_2 + 0.5O_2$ A
$C_2H_6 \rightarrow C_2H_4 + H_2$
/3A

14. $m_{H_2O} = 2 \times 10^9$ g
$\Delta t = 23 - 18 = 5°C$ T
$c_{H_2O} = 4.18$ J/g°C
$Q = mc\Delta t = (2 \times 10^9)(4.18)(5)$ /4T
$Q = 4.2 \times 10^{10}$ J.



15. a) Total volume = 80 ml + 80 ml = 160 ml = 160 g

$Q = mc\Delta t = (160\,g)(4.18\,J/g°C)(25.3°C - 22.7°C)$ T

$Q = 1743.0\,J = 1.743 \times 10^3\,J = 1.7\,kJ$ T /2T

b) $n_{NaOH} = 0.60\,\frac{mol}{L} \times 80\,ml \times \frac{1\,L}{1000\,ml} = 0.048\,mol$

$\Delta H = n\Delta H_x$ T

$\Delta H_x = \frac{\Delta H}{n} = \frac{1.7\,kJ}{0.048\,mol} = -35.4\,kJ/mol$ T

/2T

16. $4\,NH_{3(g)} + 3O_{2(g)} \rightarrow 2N_{2(g)} + 6H_2O(l)$ T

$\Delta H_r = \Delta H_f(products) - \Delta H_f(reactants)$ +

ΔH_f of O_2 and $N_2 = 0$ T

$\Delta H_r = [6(-286) + 2(0)] - [4(-46.0) + 310]$

$= -1532\,kJ/mol$ T

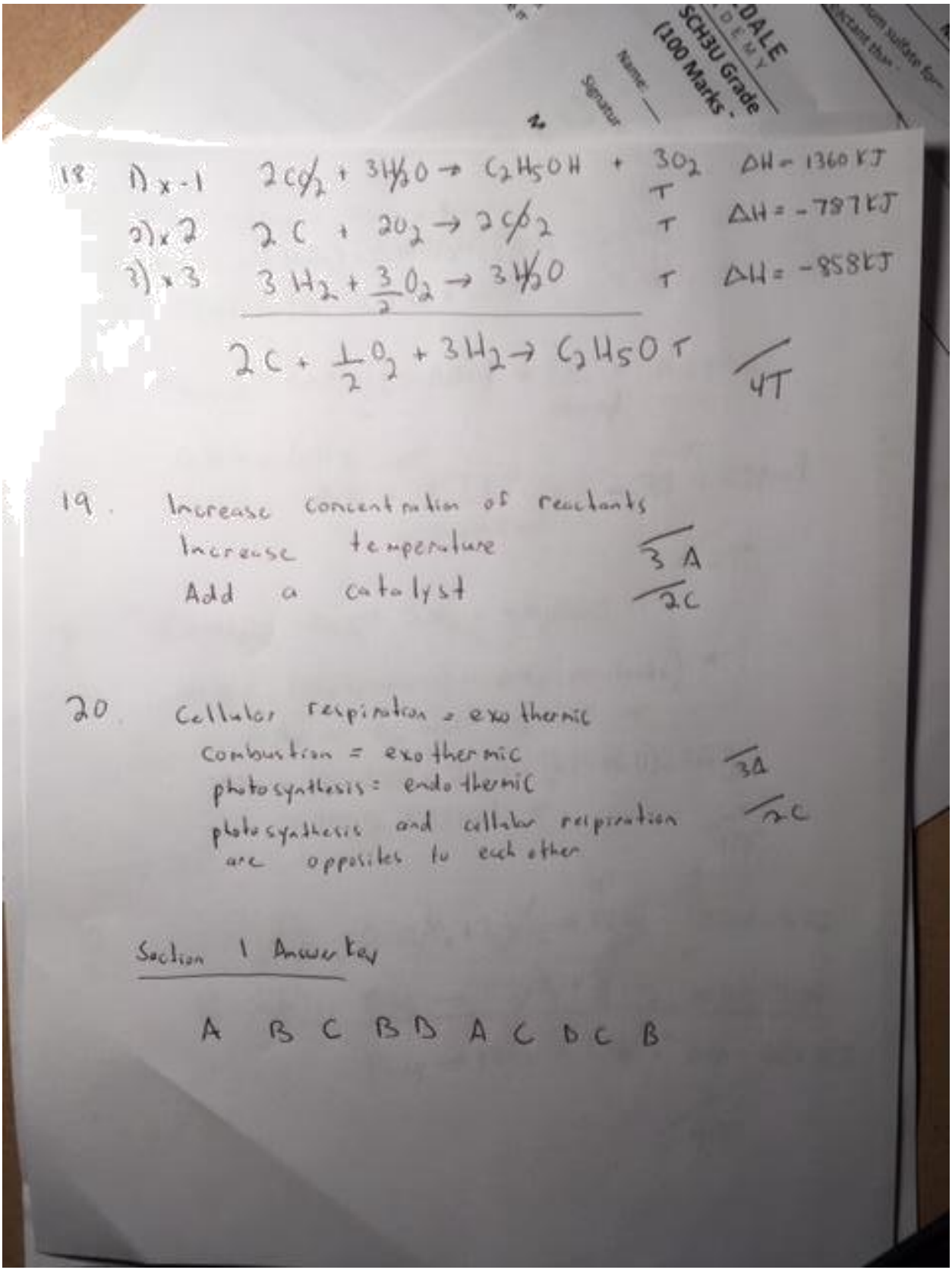
/4T

17. i) $\times\left(-\frac{1}{4}\right)$ $0.25\,P_4 + \frac{3}{2}Cl_2 \rightarrow PCl_3$ T $\Delta H = -542$

2) $\times\left(-\frac{1}{4}\right)$ $PCl_5 \rightarrow 0.25\,P_4 + \frac{5}{2}Cl_2$ T T $\Delta H = 764$

$PCl_5 \rightarrow PCl_3 + Cl_2$ T $\Delta H = 222\,kJ$

/4T



18. 1) x -1 $2C_2 + 3H_2O \rightarrow C_2H_5OH + 3O_2$ T $\Delta H = 1360\,kJ$

2) x 2 $2C + 2O_2 \rightarrow 2C_2$ T $\Delta H = -787\,kJ$

3) x 3 $3H_2 + \frac{3}{2}O_2 \rightarrow 3H_2O$ T $\Delta H = -858\,kJ$

$2C + \frac{1}{2}O_2 + 3H_2 \rightarrow C_2H_5OH$ T

/4T

19. Increase concentration of reactants

Increase temperature

Add a catalyst

/3A

/2C

20. Cellular respiration = exothermic

Combustion = exothermic

photosynthesis = endothermic

photosynthesis and cellular respiration are opposites to each other

/3A

/2C

Section 1 Answer key

A B C B D A C D C B