

G302 HW 2 ANSWER KEY

$$2.1 \quad \text{Age} = (K \times \text{Depth}) + \text{Age of TAP}$$

$$\text{Age} = \left(\frac{500 \text{ yr}}{\text{yr}} \times 50 \text{ m} \right) + (1 \times 10^6 \text{ yrs})$$

$$\text{Age} = 1.025 \text{ my} = 1,025,000 \text{ yr}$$

2.2

$$m = \frac{\Delta \text{Age}}{\Delta \text{Depth}} = \frac{\Delta y}{\Delta x} = \frac{1.05 \text{ my} - 1.01 \text{ my}}{100 \text{ m} - 20 \text{ m}} = \frac{0.04 \text{ my}}{80 \text{ m}} =$$

$$\frac{40000 \text{ yr}}{80 \text{ m}} = 500 \frac{\text{yr}}{\text{m}} = 500 \text{ yr m}^{-1}$$

$$2.3 \quad \text{SED. RATE} = \text{SLOPE OF LINE} = \frac{\Delta \text{Depth}}{\Delta \text{year}} = \text{m/yr}$$

$$\text{RATE} = \frac{20 \text{ m} - 6 \text{ m}}{620,000 \text{ yr} - 570,000 \text{ yr}} = \frac{14 \text{ m}}{50,000 \text{ yr}} =$$

$$2.8 \times 10^{-4} \text{ m/yr}$$

How Long Ago??

$$\left(\frac{1 \text{ yr}}{2.8 \times 10^{-4} \text{ m}} \right) 6 \text{ m} = 21,429 \text{ yr}$$

$$570,000 \text{ yrs} - 21,429 \text{ yr} = 548,571 \text{ years Ago}$$

(2)

2.5 EQ 2.7 = QUADRATIC EQUATION = $y = ax^2 + bx + c$

If: $f = 2g^2 - 10g + 6$

$a = 2; b = 10; c = 6$

(2.6)

EQ. 2.6 Temp = $(-8.255 \times 10^{-5})z^2 + 1.05z + 1110$

= $-647.19 + 2940 + 1110$

Temp = 3402.81°C

EQ 2.8 Temp = $az^4 + bz^3 + cz^2 + dz + e$

Temp = $-1.12 \times 10^{-12} z^4 + 2.85 \times 10^{-8} z^3 +$

$-0.000310 z^2 + 1.64 z + 930$

Temp = $(-1.12 \times 10^{-12})(2800)^4 + (2.85 \times 10^{-8})(2800)^3 +$
 $(-0.000310)(2800)^2 + (1.64)(2800) + 930$

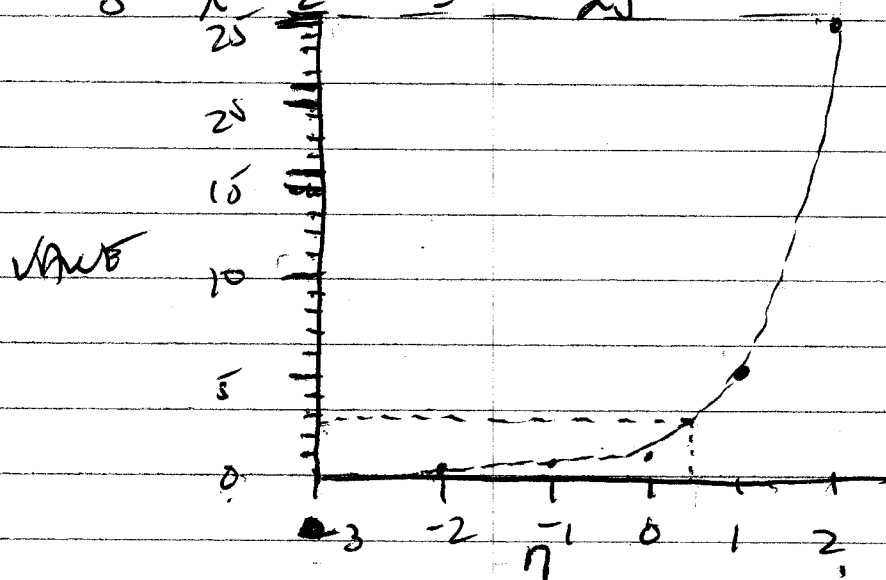
= $-68.84 + 625.6 + 2430 +$

$4592 + 930 = 3653^\circ\text{C}$

TABLE VALUE = 3700°C

(2.7)

5^n	n	VALUE
5^{-2}	-2	0.04
5^{-1}	-1	0.2
5^0	0	1
5^1	1	5
5^2	2	25



$$\sqrt{5} = 5^{1/2} = 2.24$$

~~2.8~~

(2.8)

$$\phi = 0.6 \times 2^{-z} \quad \text{where } z = \text{depth}$$

$$\phi = \text{porosity}$$

$$\phi = 0.6 \times 2^{-2} = \quad \text{if depth} = 2 \text{ km}$$

$$0.15 = 15\% \text{ porosity}$$

(2.9)

$$\phi = \phi_0 e^{-z/\lambda} \quad \text{where } \phi_0 = 0.7 \quad \lambda = 2 \text{ km}$$

$$\phi = (0.7)(2.718)^{-1/2} = 0.42 = 42\%$$

$$2.10 \quad \log_5 x = 2$$

$$x = 25 = 5^2$$

2.11 - For AREA GRAPH

(i) Sed RATE for last 10,000 yr.

$$m = \frac{407 \text{ cm} - 19.75 \text{ cm}}{10,570 \text{ yr} - 1490 \text{ yr}} = \frac{387.25 \text{ cm}}{9020 \text{ yr}} =$$

$$0.04 \text{ cm/yr}$$

(ii) Sed RATE for 10,000 - 15,000 yrs

$$m = \frac{2263 \text{ cm} - 407 \text{ cm}}{14,685 \text{ yr} - 10,570 \text{ yr}} = \frac{1856 \text{ cm}}{4175 \text{ yr}} =$$

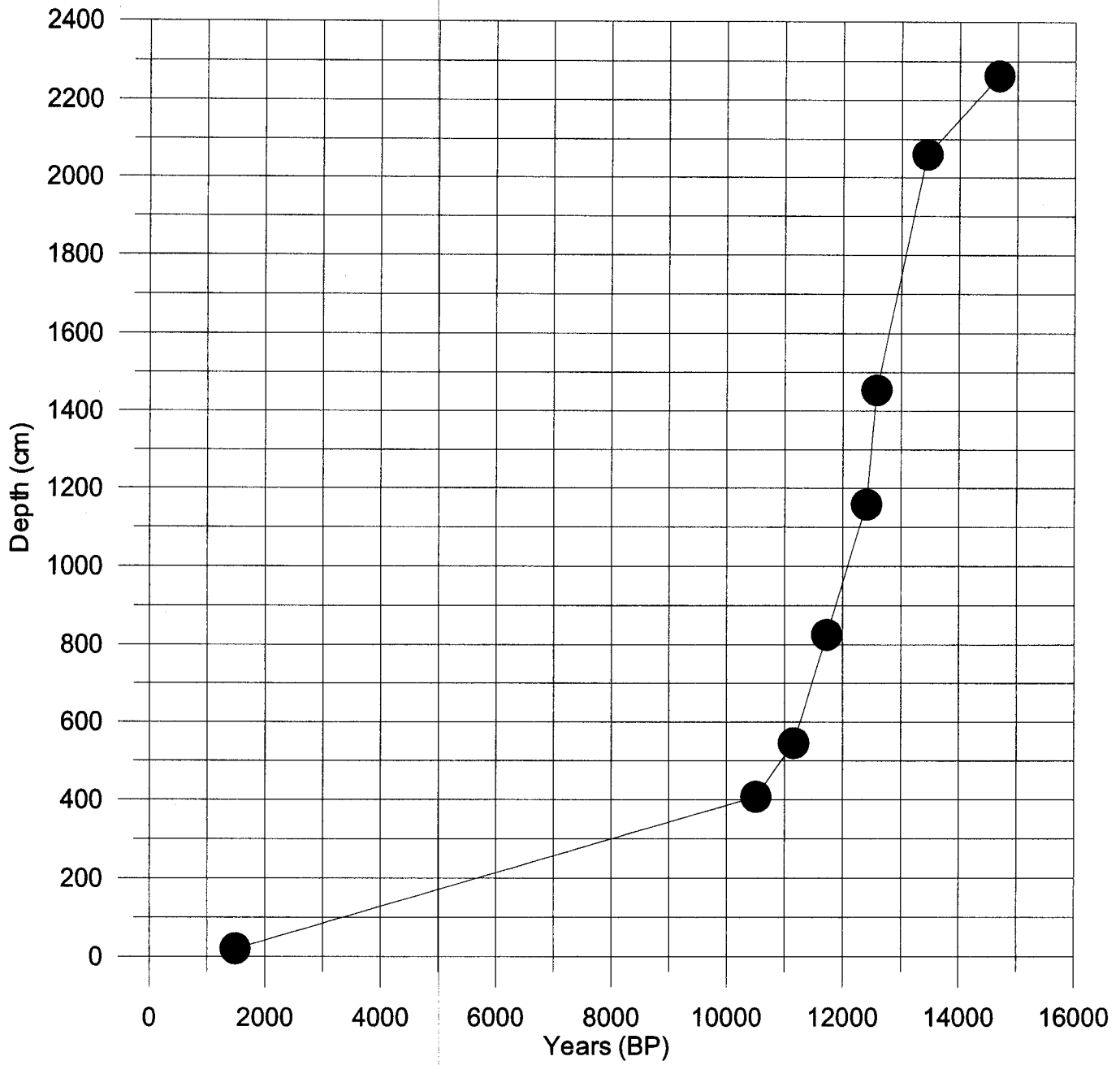
$$0.44 \text{ cm/yr}$$

(iii) TIME SINCE CESSATION

$$19.75 \text{ cm} \left(\frac{1 \text{ yr}}{0.04 \text{ cm}} \right) = 494 \text{ yr}$$

$$1490 \text{ yr} - 494 \text{ yr} = 996 \text{ yrs SINCE}$$

Plot of Depth vs. Age for Q 2.11 Waltham Text, G302



PAUSE

$$Q2.12 \quad C = C_0 F^{(n-1)}$$

$$C = (200 \text{ ppm}) (0.5)^{(6.5-1)} = 200 \text{ ppm} (0.5)^{5.5} = 4.42 \text{ ppm}$$

Q2.13

$$\ln(a) = \ln(a_0) - \lambda t$$

$$a_0 = 1000 \text{ ct/sec}$$

$$\lambda = 10^{-7} \text{ yr}^{-1}$$

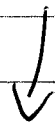
t (m.y)	$\ln(a)$
0	6.91
10	5.91
20	4.91
30	3.91
40	2.91
50	1.91
60	0.91
70	-0.10
80	-1.10
90	-2.10
100	-3.10

SEE ATTACHED

GRAPH

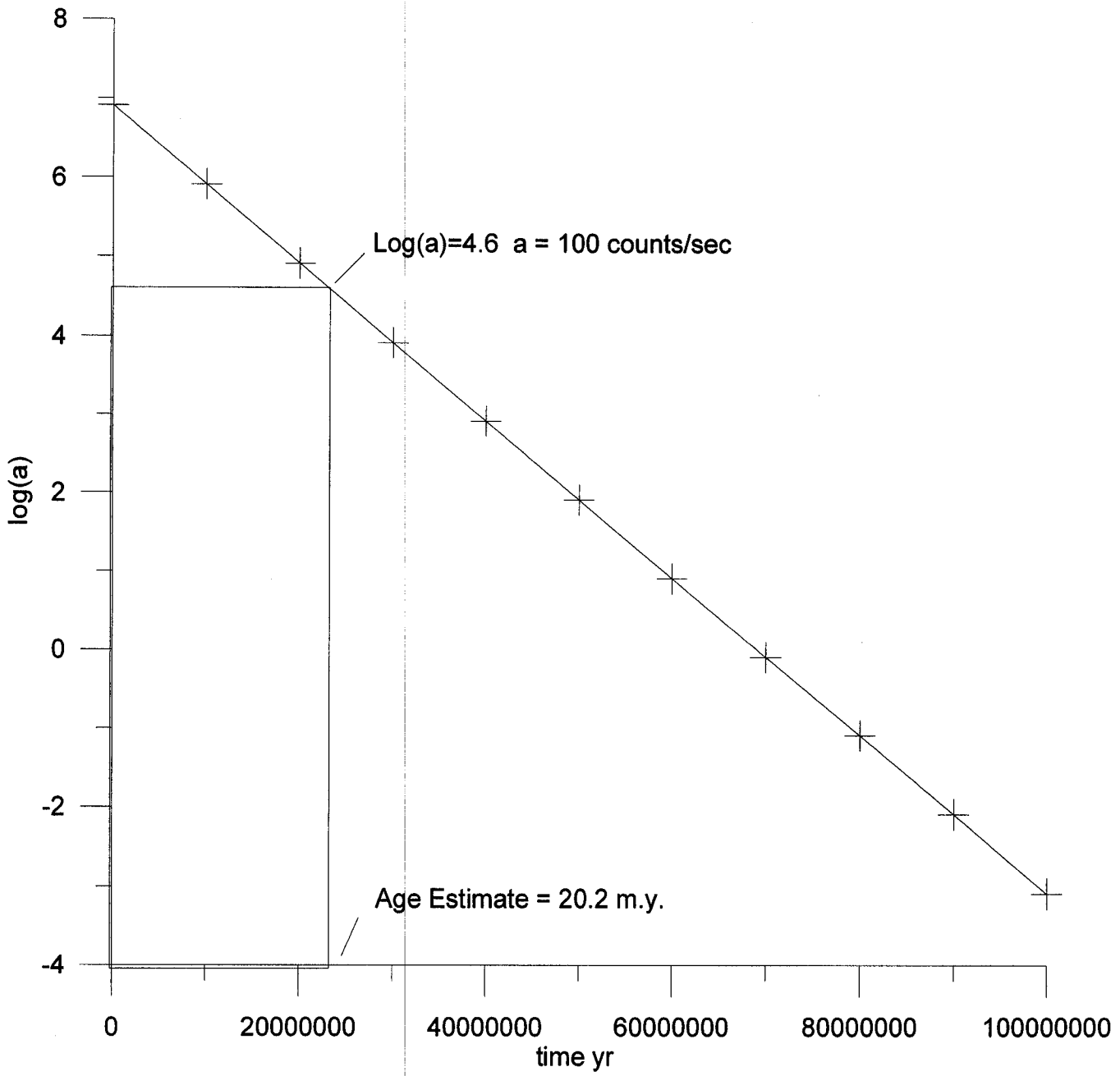
AGE ESTIMATE
FOR

$$a = 100 \text{ ct/sec}$$



20.2 m.y.

Waltham Question 2.13



(2.15)

$$P = P_0 \exp(-z/E) = P_0^{-z/E}$$

$$P_0 = 3 \text{ m/kyr} \quad z = 20 \text{ m}$$

Depth z	P
0	1.0
2	0.89
4	0.80
6	0.71
8	0.64
10	0.58
12	0.52
14	0.46
16	0.42
18	0.37
20	0.33

SEE ATTACHED
GRAPH

Plot of Depth vs. Age for Q 2.15 Waltham Text, G302

