FORM TWO: USE OF MATHEMATICAL TABLES MR STEPHEN OGANA.
MARKING SCHEME

1. Use reciprocal to evaluate (2 marks)

$$\frac{8\cdot1}{0\cdot375}-\frac{7\cdot5}{37\cdot5}$$

Solution.

$$\frac{8\cdot1}{0\cdot375}-\frac{7\cdot5}{37\cdot5}=\frac{8\cdot1}{3\cdot75\times10^{-1}}-\frac{7\cdot5}{3\cdot75\times10^{1}}$$
$$=8\cdot1\left(0\cdot2667\times10^{1}\right)-7\cdot5\left(0\cdot2667\times10^{-1}\right)$$
$$=21\cdot6027-0\cdot200025$$
$$=21\cdot40$$

2. Use square roots, reciprocal and square tables to evaluate to 4 significant figures the expression $\left(0\cdot06458\right)^{\frac{1}{2}}+\left(\frac{2}{0\cdot4327}\right)^{2}$ (4 marks)

Solution

$$\left(0\cdot06458\right)^{\frac{1}{2}}+\left(\frac{2}{0\cdot4327}\right)^{2}=\left(6\cdot4\times10^{-2}\right)^{\frac{1}{2}}+\left(\frac{2}{4\cdot327\times10^{-1}}\right)^{2}$$
$$=\left(2\cdot5413\times10^{-1}\right)+2\left(0\cdot2311\times10^{1}\right)^{2}$$
$$=0\cdot25413+4\cdot622^{2}$$
$$=0\cdot25413+21\cdot363$$
$$=21\cdot62$$

3. Use logarithms correct to 4 decimal places to evaluate (3 marks)

$$\frac{\sqrt[3]{82\cdot51\times0\cdot0062}}{\log 2\cdot502}$$

Solution

No	Std form	log
$\sqrt[3]{82\cdot51}$ $0\cdot0062$	$8\cdot251\times10^{1}$ $6\cdot2\times10^{-3}$	$1\cdot9166\times\frac{1}{3}=0\cdot6889$ + $\bar{3}\cdot7924$
		$\bar{2}\cdot4313$
$0\cdot3982=\log2\cdot502$	$3\cdot982\times10^{-1}$	$\bar{1}\cdot6001$ −
		$\bar{1}\cdot8312$
$0\cdot0670$	$6\cdot779\times10^{-1}$	$\leftarrow\bar{1}\cdot8312$

4. Use logarithms to evaluate correct to 4 significant figures (4 marks)

$$\left(\frac{54\cdot5221-0\cdot3521}{\text{Tan }24\cdot8\times\cos78^0}\right)^{\frac{1}{2}}$$

Solution.

$$\left(\frac{54\cdot5221-0\cdot3521}{\tan 24\cdot8\times\cos 78^0}\right)^{\frac{1}{2}}=\left(\frac{54\cdot17}{\tan 24\cdot8\times\cos 78^0}\right)$$

No	Std form	log
$54\cdot17$	$5\cdot417\times10^{1}$	$1\cdot7338$
$\tan 24\cdot8^0$	$4\cdot621\times10^{-1}$	$\bar{1}\cdot6647$ −
$\cos 78^0$	$2\cdot079\times10^{-1}$	$\bar{1}\cdot3179$ +
		$\bar{2}\cdot9826 \rightarrow \bar{2}\cdot9826$
$23\cdot75$	$2\cdot375\times10^{1}$	$\leftarrow 2\cdot7512\times\frac{1}{2}=1\cdot3756$

5. Use logarithms to evaluate $\sqrt[3]{\frac{4\cdot68\times0\cdot1324^2}{5\log 7}}$ (3 marks)

Solution.

No	Std form	log
$4\cdot68$	$4\cdot68\times10^{0}$	$0\cdot6702$ +
$0\cdot1324^2$	$\left(1\cdot324\times10^{-1}\right)^2$	$\bar{1}\cdot1219\times2\rightarrow \bar{2}\cdot2438$ +
$5\log 7$	$4\cdot225\times10^{0}$	$\bar{2}\cdot9140$ − $0\cdot6258$
$0\cdot2687$	$2\cdot687\times10^{-1}$	$\leftarrow \bar{2}\cdot2882\times\frac{1}{3}=\bar{1}\cdot4294$

6. Evaluate using logarithms $\sqrt[3]{\frac{\left(0\cdot07432\right)^2\times\left(48\cdot38\right)^3}{8458}}$ (4 marks)

Solution

No	Std form	log
$\left(0\cdot07432\right)^2$	$\left(7\cdot432\times10^{-2}\right)^2$	$\bar{2}\cdot8711\times2\rightarrow \bar{3}\cdot7422$ +
$\left(48\cdot38\right)^{-3}$	$\left(4\cdot838\times10^{1}\right)^3$	$1\cdot6846\times3\rightarrow 5\cdot0538$ +
8458	$8\cdot458\times10^{3}$	$2\cdot7960$ − $3\cdot9273$
$0\cdot4197$	$4\cdot197\times10^{-1}$	$\leftarrow \bar{2}\cdot8687\times\frac{1}{3}=\bar{1}\cdot6229$

7. Given that $y=\frac{1}{0\cdot1748}+(1\cdot523)^3$. Find the value of $\frac{2}{y}$ .Use reciprocal tables and cubes. (4 marks)

Solution.

$$y=\frac{1}{0\cdot1748}+(1\cdot523)^3$$
$$=\frac{1}{1\cdot48\times10^{-1}}+(1\cdot523)^3$$
$$=0\cdot5723\times10^{+1}+3\cdot533$$
$$=9\cdot256$$

$$\frac{2}{y}=\frac{2}{9\cdot256}$$
$$\frac{2}{y}=2\left(\frac{1}{9\cdot256}\right)$$
$$=2(0\cdot1060)$$
$$=0\cdot2160$$

8. Use logarithms correct to 4 decimal places to evaluate (4 marks)

$$\frac{(0\cdot528)^{\frac{2}{3}}}{3\cdot25\times\log4\cdot8}$$

Solution

No	Std form	log	
$(0\cdot528)^{\frac{2}{3}}$	$5\cdot28\times10^{-1}$	$\bar{1}\cdot7226\times\frac{2}{3}\rightarrow$	$\bar{1}\cdot8151$
$8\cdot25$	$8\cdot25\times10^{0}$	$0\cdot5119$	$-$
$\log4\cdot8$	$6\cdot812\times10^{-1}$	$\bar{1}\cdot8332$ $+$	
		$0\cdot3451\rightarrow$	$0\cdot3451$
$0\cdot2951$	$2\cdot951\times10^{-1}$	$\leftarrow$	$\bar{1}\cdot4700$

9. Use tables of square root, square and reciprocal to evaluate: (2 marks)

$$\frac{1}{x}=\frac{1}{\sqrt{4\cdot296}}+\frac{1}{1\cdot872^2}$$

Solution

$$\frac{1}{x}=\frac{1}{\sqrt{4\cdot296}}+\frac{1}{1\cdot872^2}$$
$$=\frac{1}{(4\cdot296\times10^{0})^{\frac{1}{2}}}+\frac{1}{(1\cdot872\times10^{0})^2}$$
$$=\frac{1}{2\cdot0727}+\frac{1}{3\cdot504}$$
$$=0\cdot7678$$

$$\frac{1}{x}=0\cdot7678$$
$$x=\frac{1}{0\cdot7678}$$
$$=\frac{1}{(7\cdot678\times10^{-1})}$$
$$=0\cdot1302\times10^{1}$$
$$=1\cdot302$$

10. (4 marks)

Use tables of logarithms to evaluate; $\sqrt{\left(\frac{80\cdot26\log7\cdot25}{(9\cdot367+1\cdot98)^2}\right)}$

Solution.

$$\sqrt{\frac{80\cdot26\log7\cdot25}{(9\cdot367+1\cdot98)^2}}=\sqrt{\frac{80\cdot26\times0.8603}{(11\cdot347)^2}}$$

No	Std form	log
$80\cdot26$	$8\cdot026\times10^{1}$	$1\cdot9045$
$0\cdot8603$	$8\cdot603\times10^{-1}$	$+\ \bar{1}\cdot9347$
		$1\cdot8392 \rightarrow 1\cdot8392$
$(11\cdot347)^2$	$(1\cdot135\times10^{1})^2$	$1\cdot0550\times2 \rightarrow 2\cdot1100$ $-$
$0\cdot7321$	$7\cdot321\times10^{-1}$	$\leftarrow \bar{1}\cdot7292\times\frac{1}{2}=\bar{1}\cdot8646$

11. Use logarithms correct to 4 decimal places to evaluate (4 marks)

$$\sqrt[3]{\frac{7\cdot071}{456\cdot3\sin45^0}}$$

Solution

No	Std form	log
$7\cdot071$	$7\cdot071\times10^{0}$	$0\cdot8495$
$456\cdot3$	$4\cdot563\times10^{2}$	$2\cdot6593$ $-$
$0\cdot7071$	$7\cdot071\times10^{-1}$	$+\ \bar{1}\cdot8495$
		$2\cdot5088 \rightarrow 2\cdot5088$
$0\cdot2798$	$2\cdot798\times10^{-1}$	$\leftarrow \bar{2}\cdot3407\times\frac{1}{3}=\bar{1}\cdot4469$

12. Evaluate using logarithms (4 marks)

$$\frac{(0\cdot0021+0\cdot0035)^{\frac{1}{2}}}{1\cdot38\times27\cdot42}$$

Solution

No	Std form	log
$0\cdot0056$	$5\cdot6\times10^{-3}$	$\frac{\bar{3}\cdot7482}{2}=\bar{2}\cdot8741 \rightarrow \bar{2}\cdot8741$
$1\cdot38$	$1\cdot38\times10^{0}$	$0\cdot1399$
$27\cdot42$	$2\cdot742\times10^{1}$	$+\ \underline{1\cdot4381}$ $-$
		$1\cdot5780 \rightarrow 1\cdot5780$
$0\cdot001977$	$1\cdot977\times10^{-3}$	$\leftarrow \bar{3}\cdot2961$

13. Use tables of reciprocals only to work out $\frac{5}{0\cdot0396}+\frac{12}{0\cdot593}$ (3 marks)

Solution.

$$\frac{5}{0\cdot0396}+\frac{12}{0\cdot593}=5\left(\frac{1}{3\cdot96\times10^{-2}}\right)+12\left(\frac{1}{5\cdot93\times10^{-1}}\right)$$
$$=5\left(0\cdot2525\times100\right)+12\left(0\cdot1686\times10\right)$$
$$=126\cdot25+20\cdot232$$
$$=146\cdot482$$

14. Use logarithms correct to 4 decimal places to evaluate (4 marks)

$$\frac{\left(1934\times0\cdot0569\right)^2}{436}$$

Solution.

No	Std form	log
1934	$1\cdot934\times10^3$	$3\cdot2865$
$0\cdot0569$	$5\cdot69\times10^{-2}$	$\bar{2}\cdot7551$ +
		$2\cdot0416\times2=4\cdot0822$
436	$4\cdot36\times10^2$	$2\cdot6395$ −
$27\cdot7700$	$2\cdot777\times10^1$	$\leftarrow1\cdot4437$

15. Use reciprocal, cosine and square tables only to evaluate to 4 significant figures $\left(4\text{ s}\cdot\text{f}\right)$ the expression $\frac{1}{15\cdot79}-\left(\cos73\cdot61\right)^2$ (4 marks)

Solution

$$\frac{1}{15\cdot79}-\left(\cos73\cdot61\right)^2=\frac{1}{1\cdot579\times10^1}-\left(0\cdot2821\right)^2$$
$$=\left(0\cdot6331\times10^{-1}\right)-\left(2\cdot821\times10^{-1}\right)^2$$
$$=0\cdot06331-\left(7\cdot958\times10^{-2}\right)$$
$$=0\cdot06331-0\cdot07958$$
$$=-0\cdot01621$$

16. Use logarithms to evaluate $\sqrt[4]{\left(\frac{4\cdot562\times0\cdot038}{0\cdot82}\right)}$ (4 marks)

Solution.

No	Std form	log
$4\cdot562$	$4\cdot562\times10^0$	$0\cdot6592$
$0\cdot038$	$3\cdot8\times10^{-2}$	$\bar{2}\cdot5798$ +
		$\bar{1}\cdot2390$
$0\cdot82$	$8\cdot2\times10^{-1}$	$\bar{1}\cdot9138$ −
		$\frac{\bar{1}\cdot3252}{4}=\bar{1}\cdot8313$
$0\cdot6781$	$6\cdot781\times10^{-1}$	$\bar{1}\cdot8313$

17. Use tables of reciprocal and square roots to evaluate $\frac{3}{\sqrt{179}-\sqrt{69}}$ (4 marks)

Solution

$$\frac{3}{\sqrt{179}-\sqrt{69}} = \frac{3}{\sqrt{179}-\sqrt{69}}$$
$$= \frac{3}{\sqrt{1\cdot 79\times 10^2}-\sqrt{69}}$$
$$= \frac{3}{13\cdot 379-8\cdot 3066}$$
$$= 3\left(\frac{1}{5\cdot 0724}\right)$$
$$= 3\times 0\cdot 1971$$
$$= 0\cdot 5913$$

18. Find the reciprocal of $0\cdot 324$ correct to 4 significant figures, hence evaluate $\frac{\sqrt[3]{0\cdot 512}}{0\cdot 324}$ (3 marks)

Solution.

$$\frac{1}{0\cdot 324} = \frac{1}{3\cdot 24\times 10^{-1}}$$
$$= 0\cdot 3086\times 10$$
$$= 3\cdot 086$$
$$\frac{\sqrt[3]{0\cdot 512}}{0\cdot 324} = \left(\sqrt[3]{0\cdot 512}\right)\times 3\cdot 086$$
$$= \left(\sqrt[3]{\frac{512}{1000}}\right)\times 3\cdot 086$$
$$= 0\cdot 8\times 3\cdot 086$$
$$= 2\cdot 4688$$