

2. Common logarithms.

1.	Log 31.59 1.4996 Log a <u>2.6182</u> Log b^{1/3} □28.814 3 Log b □4.6442 b = 0.0004407 b = 0.0004	M1	Subt b logs												
		M1	Multip by 3												
		A1													
		B1													
		04													
2.	Log₁₀25 – log₁₀4 + log₁₀1600 log₁₀$\left(\frac{25}{4} \times 1600\right)$ 4	M1													
		M1													
		A1													
		03													
3	<table><tr><td>No. (0.00246)² 142</td><td>Std. form (2.46 x 10⁻²)² 1.42 x 10²</td><td>Log 2.3909 <u>x 2</u> 4.7818 <u>+2.1523</u> <u>2.9341</u></td></tr><tr><td>0.002 1.14</td><td>2.0 x 10⁻³ 1.14 x 10⁰</td><td>3.3010 <u>+0.0569</u> 3.3579</td></tr><tr><td></td><td></td><td>2.9341 <u>-3.3579</u> <u>1.5762</u> <u>1.5762</u> 3</td></tr><tr><td>3.3527</td><td>3.3527 x 10⁰</td><td>0.5254</td></tr></table>	No. (0.00246) ² 142	Std. form (2.46 x 10 ⁻²) ² 1.42 x 10 ²	Log 2.3909 <u>x 2</u> 4.7818 <u>+2.1523</u> <u>2.9341</u>	0.002 1.14	2.0 x 10 ⁻³ 1.14 x 10 ⁰	3.3010 <u>+0.0569</u> 3.3579			2.9341 <u>-3.3579</u> <u>1.5762</u> <u>1.5762</u> 3	3.3527	3.3527 x 10 ⁰	0.5254	1M	Correct logs addition
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		1M	Correct logs addition												
		1M	Correct logs substractions												
		A1	Correct answer												
		4													
4	log$\left(\frac{1}{4} \times 64\right)$ log$\left(\frac{1}{32} \div \frac{1}{8}\right)$ log 2⁴ log 2⁻² 4 log 2 - 2 log 2 -2	M ₁													
		M ₁													
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		A ₁													
		4													

$$\left[\begin{array}{c} \\ \\ \end{array} \right] \quad \left[\begin{array}{c} \\ \\ \end{array} \right]$$

5. $\left[\quad \right]^x \cdot 2^{6-2} = 2^{4-2}$ M1 for writing in index form

$2^{-3x} \cdot 2^{12} = 2^8$

$12 - 3x = 8$ M1

$x = \frac{4}{3}$

$= 1 \frac{1}{3}$

3

6.	No. 0.6845 ² 0.08416 0.005937 0.3459	std form 6.845x10 ⁻¹ 8.416x10 ⁻² 5.937x10 ⁻³ 3.459x10 ⁻¹	log □1.8354x2 □1.6708 □1.6708 □ <u>2.9252</u> 3 □1.6417 □ <u>1.6417</u> + □1.3125 -□ <u>3.7736</u> ← □1.5389	M1 M1 M1 A1													
				04													
7	<table border="1"><thead><tr><th>Number</th><th>log</th></tr></thead><tbody><tr><td>8.694</td><td>0.9392</td></tr><tr><td>0.1267</td><td>$\bar{1}.1028 \times \frac{1}{3} = \bar{1}.7009$</td></tr><tr><td>0.006974</td><td>$\bar{3}.8434$ $\bar{3}.5443 \times \frac{3}{4}$ $\bar{1}.3861 \times 3 = \bar{2}.1583$ 0.9392 $\bar{2}.1583$ 2.7809</td></tr><tr><td>6.039 × 10²</td><td></td></tr><tr><td>602.9</td><td></td></tr></tbody></table>			Number	log	8.694	0.9392	0.1267	$\bar{1}.1028 \times \frac{1}{3} = \bar{1}.7009$	0.006974	$\bar{3}.8434$ $\bar{3}.5443 \times \frac{3}{4}$ $\bar{1}.3861 \times 3 = \bar{2}.1583$ 0.9392 $\bar{2}.1583$ 2.7809	6.039 × 10 ²		602.9		M1 M1 M1 A1	All logs + - x of logs ÷ × of logs
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8.694	0.9392																
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6.039 × 10 ²																	
602.9																	
				4 marks													

8.

No.	Log	
2849	3.4547	
-		+
0.00574	3.7589	
<u>1.2136</u>		←
36.891.1	1.5669	
-		
<u>0.023</u>	<u>2.3617</u>	
	3.2052	→
-		

All logs read correctly

Correct Addn /subst. of logs.

Attempt to divide by 4

- C.A.O

$$2.0084 \times 10^{-1/4}$$

$$3.178 \times 10^{-1} \rightarrow 1.5021$$

$$\rightarrow 0.3178$$

9. $\log y = \log B + n \log x$
 $n \log x = \log y - \log B$
 $n = \frac{\log y - \log B}{\log x}$

10. $= 6 \log_2 4 + 10 \log_3 3$
 $= 12 \log_2 2 + 10 \log_3 3$
 $= 12 + 10$

11. $\log \frac{2x-11}{2} = \log \frac{3}{x}$

$$(2x-11) = \frac{3}{x}$$

$$2x^2 - 11x - 6 = 0$$

$$(2x+1)(x-6) = 0$$

$$x = -\frac{1}{2} \text{ or } 6$$

$$x = 6$$

12.

No.	Log
0.5241	T.7194
$(0.5241)^2$	T.7194x2
	<u>T.4388</u> +
83.59	1.9222
	1.3610
0.3563	T.5518
$3\sqrt{0.3563}$	$(3+2.5518) \div 3$
	T.8506
	0.3610 -
	1.8506
3.239×10^1	1.5104
= 32.4	

13.

No.	Log
38.32	1.5834
12.964	<u>1.1127</u>
	2.6961
86.37	1.9364
6.285	<u>0.7783</u>
	2.7347
-	1.9587

$$\frac{-3 + 2.9587}{3} = 1.9866$$

$$= 0.9695$$

$$\begin{aligned}
 14. \quad H^3 &= \frac{3d(L-d)}{10L} \\
 \sim 3dL - 10H^3L &= 3d^2 \\
 \sim L(3d - 10H^3) &= 3d^2 \\
 \sim L &= \frac{3d^2}{3d - 10H^3}
 \end{aligned}$$

$$\begin{array}{rcl}
 15. \quad \text{No.} & & \text{Log} \\
 6.195 & & 0.7920 \\
 11.82 & & \underline{1.0726} \\
 & & 1.8646 \\
 83.52 & & \underline{1.9218} \\
 & & 1.9428 \times \frac{1}{4} \\
 & & \underline{4. + 3.9428} \\
 & & \frac{4}{1.9857} \\
 0.9676 & &
 \end{array}$$

$$\begin{aligned}
 16. \quad \log y^2 (x-1) &= \log 9 \quad y^2 (x-1) = 9 \quad \dots (1) \\
 \log (xy) \log 6 & \quad xy = 6 \quad \dots (2) \\
 \text{from (2) } x &= \frac{6}{y} \\
 \text{substitute in (1) } y(\underline{6-1}) &= 9 \\
 & \quad \quad \quad y \\
 6y - y^2 &= 9 \\
 y^2 - 6y + 9 &= 0 \\
 (y-3)^2 &= 0 \\
 y &= 3 \\
 \therefore x &= 2
 \end{aligned}$$

$$\begin{aligned}
 17. \quad \frac{5}{4} \log_{10} 25 + \log_{10} 25x^2 - \log 10 \\
 4 \log 2 &= \log_{10} 25x^2 - 3 \log 2 \\
 2 \log 10 + 2 \log 5 & \\
 \log 10 \times 100 &
 \end{aligned}$$

18.

NO	LOG
	-
0.9895 $\longrightarrow$	1.9954
(0.9895) ² $\longrightarrow$	1.9954 $\times 2$
	1.9908
	-
0.004974 $\longrightarrow$	3.6968
	3.6876 $\div 4$
	1.4219 $\times 3$
6.598	2.2657
	0.8195 -

Use sine rule

3.579×10^2 OR 357.9	$\longleftrightarrow$	2.2657 2.5538
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19. $\log 3x + 8 - \log 8 = \log (x-4)$

$$\log \frac{(3x+8)}{8} = \log (x-4)$$

$$8$$

$$3x + 8 = x - 4$$

$$3x + 8 = 8x - 32$$

$$5x = 40$$

20.

No.	Log
36.72 $\longrightarrow$	1.5649
0.46 ² $\longrightarrow$	2(T.6628)
	<u>T.3256</u>
185.4	0.8905
	<u>2.2682</u>
	-
	$2.9223 \times \frac{1}{3} = \frac{2}{3} + \frac{1.6223}{3}$
3.474×10^{-1}	-
Or 0.3474	1.5408

21. No Log

Sin 44.5 1.8457

Tan 14.9 1.4250 2.5686 -

Cos 82 1.1486 +

1.2772

2

10 x 4.351 0.6386

22. From square roots $\sqrt{12.25} = 3.5$

$$\frac{3.264 \times 1.215 \times 3.5 \times 107}{1.088 \times 0.4725 \times 107}$$

$$\frac{3264 \times 1215 \times 35}{1088 \times 4725}$$

$$\sqrt{27} = 3$$

$$1088 \times 4725$$

$$\sqrt{27} = 3$$

23. $\log_8 (x + 5) - \log_8 (x - 3) = \log_8 4$

$$\log_8 \frac{(x+5)}{x-3} = \log_8 4$$

$$x - 3$$

$$\frac{x+5}{x-3} = 4$$

$$x - 3$$

$$4x - 12 = x + 5$$

$$3x = 17$$

$$x = 17 = 5^2/3$$

$$\text{Or } \log_8 \frac{x+5}{x-3} = 2$$

$$\begin{aligned}
 & \frac{x-3}{3} \\
 8^{2/3} &= \frac{x+5}{x-3} \\
 2^3(2/3) &= \frac{x+5}{x-3} \\
 2^2 &= \frac{x+5}{x-3} \Rightarrow 4 = \frac{x+5}{x-3} \\
 4x-12 &= x+5 \Rightarrow 3x=17 \\
 x &= \frac{17}{3} = 5\frac{2}{3}
 \end{aligned}$$

24.

<i>No</i> 6.57^2 4.317×10^1 $43.17 + 6.57$ 49.74 $(7.92)^2$ $\frac{30.08}{2.636 \times 10^{-2}}$	<i>Log</i> 0.8176 $\frac{2x}{1.6352}$ 0.8987 $\frac{X2}{1.7974}$ $1.4783 + \frac{3.2757}{2.4210}$ $= 0.02636$ $= 0.0264 (4 \text{ d.p})$
<i>No</i> 6.57^2 4.317×10^1 $43.17 + 6.57$ 49.74 $(7.92)^2$ $\frac{30.08}{2.636 \times 10^{-2}}$	<i>Log</i> 0.8176 $\frac{2x}{1.6352}$ 0.8987 $\frac{X2}{1.7974}$ $1.4783 + \frac{3.2757}{2.4210}$ $= 0.02636$ $= 0.0264 (4 \text{ d.p})$

$$\begin{aligned}
 25. \quad \log 120 &= \log 4 + \log 3 + \log 10 \\
 &= \log 2^2 + \log 3 + \log 10 \\
 &= 2\log 2 + \log 3 + \log 10 \\
 &= 2(0.30103) + 0.47712 + 1 \\
 &= 2.07918
 \end{aligned}$$

$$\begin{aligned}
 26. \quad \log_2 (3x-4) &= \frac{1}{3} \log_2 8x^6 - \log_2 4 \\
 \log_2 (3x-4) &= \log_2 (2^3 x^6) - \log_2 4 \\
 \log_2 (3x-4) &= \log_2 2x^2 - \log_2 4 \\
 \log_2 (3x-4) - \log_2 \left[\frac{\quad}{\quad} \right] \\
 &= 3x-4 = \frac{2x^2}{4} \\
 2x^2 - 12x + 16 &= 0 \\
 x^2 - 6x + 8 &= 0 \\
 x^2 - 2x - 4x + 8 &= 0 \\
 (x-2)(x-4) &= 0 \\
 x = 2 \text{ or } x = 4
 \end{aligned}$$

27.

No	Log
5.627	0.7503
$(0.234)^3$	T. 3692
	<u> x 3 </u>
	2.8579
8.237	0.4779
	<u> 0.9158 </u>
	2
2.399×10^{-3}	3.3800
	<u> </u>
	= 0.002399

$$\begin{aligned}
 28. \quad \text{Det } 2 - -3 &= 5 \\
 \text{Area of } A'B'C' &= 5 \times 15 \\
 &= 75 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 29. \quad \log_{10}(6x-2) - \log_{10} 10 &= \log_{10}(x-3) \\
 \log \frac{(6x-2)}{10} &= \log (x-3) \\
 \frac{6x-2}{10} &= x-3 \\
 6x-2 &= 10x-30 \\
 x &= 7
 \end{aligned}$$

$$\begin{aligned}
 30. \quad \text{No.} \quad &0.07526^2 & \text{Log} \quad &2.8766 \times 2 = 3.7532 \\
 &6.652 & &0.8230 = 0.8230
 \end{aligned}$$

$$4.9302$$

$$\frac{4.9302}{3} = 6 + \frac{2.9302}{3}$$

$$= 2.9767$$

$$\text{Antilog} = 9.4776 \times 10^{-2}$$

$$= 0.094776 (\text{accept } 0.09478)$$

<i>No.</i>	<i>Log</i>
4.283	<u>0.6317</u>
0.009478^2	<u>3.9767</u> X 2 +
	<u>5.9534</u>
	<u>4.5851</u> -
$\text{Log } 9.814$	<u>1.9964</u>
	<u>4.5887</u> ÷ 5
2.0785×10^{-1}	<u>1.3177</u>
$= 0.20785$	