MARKING SCHEME

Number		Solution and Mark Scheme	Sub Marks	Total Marks
1	(a)	AB and CD	1	**2**
	(b)	$m_{AB} = m_{CD}$ or parallel lines doesn't meet each other	1	
2		$p =$ gradient and $q = y$-intercept $p =$ gradient or $q = y-$intercept $\frac{1}{y} = p\left(\frac{1}{x}\right) + q$	3 B2 B1	**3**
3	(a)	many-to-one	1	**2**
	(b)	$f : x \rightarrow \lvert x \rvert$ or $f(x) = \lvert x \rvert$	1	
4		$m = 5$ and $n = -6$ $m = 5$ or $n = -6$	2 B1	**2**
5		3 $3^x = 2^{xy}$ OR $(\log_2 3)(\log_3 8)$	2 B1	**2**
6	(a)	225 624 **Nota:** Accept 225 625	1	**3**
	(b)	Year 2021 $204255(1.01)^t > 251000$	2 B1	
7	(a)	1814400	1	**3**
	(b)	80640 $2! \times 8!$	2 B1	
8	(a)	$\frac{2}{15}$	1	**3**
	(b)	$\frac{3}{5}$ $\left(\frac{1}{3}\times\frac{3}{5}\right)+\left(\frac{2}{3}\times\frac{2}{5}\right)+\left(\frac{1}{3}\times\frac{2}{5}\right)$ OR $1-\left(\frac{2}{3}\times\frac{3}{5}\right)$	2 B1	

9		$x = 37.76°, 142.24°, 217.76°, 322.24°$ or $37°46', 142°14', 217°46', 322°14'$ $2x = 75.52°, 284.48°, 435.52°, 644.48°$ or $75°31', 284°29', 435°31', 644°29'$ $4\cos 2x = 1$	3 B2 B1	**3**
10		$\sqrt{\frac{1+p}{2}}$ $\frac{1+p}{2}$ $-p = 1-2\sin^2\frac{\theta}{2}$	3 B2 B1	**3**
11	(a)	$\overrightarrow{PR} = 12\underset{\sim}{a} - 8\underset{\sim}{b}$ $\overrightarrow{PR} = \overrightarrow{PQ} + \overrightarrow{QR}$	2 B1	**4**
	(b)	$\overrightarrow{PQ} = \frac{1}{4}\overrightarrow{PR}$ $\overrightarrow{PR} = 4(3\underset{\sim}{a} - 2\underset{\sim}{b})$	2 B1	
12	(a)	-12	1	**3**
	(b)	$y = \frac{1}{12}x + 1$ $m_n = \frac{1}{12}$	2 B1	
13	(a)	$\frac{dA}{dx} = \frac{170}{3} - \frac{50}{3}x$ $y = \frac{34-5x}{3}$	2 B1	**4**
	(b)	$\frac{289}{15}\text{ m}^2$ $x = 3.4\text{ m}$	2 B1	

14	(a)	$2x$	1	4
	(b)	7 $\left[\frac{2mx^2}{2}+3x\right]_0^1=10$ $\frac{2mx^2}{2}$ or $3x$	3 B2 B1	
15		8 years $t^2+242t+2000=4000$ $y=t^2+242t+2000$	3 B2 B1	3
16		$r=\frac{q^2-4}{4}$ or equivalent $r=\left(\frac{-q-2}{2}\right)\left(\frac{-q-2}{2}+2\right)$ or equivalent $\alpha=\frac{-q-2}{2}$ SOR $=\alpha+\alpha+2=-q$ or POR $=\alpha(\alpha+2)=r$	4 B3 B2 B1	4
17	(a)	Two different roots	1	3
	(b)	$x<\alpha, x>\beta$	1	
	(c)	$a\geq 0$	1	
18	(a)	$N(5,0)$	1	4
	(b)	$p=3$ and $q=-5$ $p=3$ or $q=-5$	2 B1	
	(c)	$(3,-6)$	1	

19	(a)	50	1	4
	(b)	Mei Ling failed the test. Third quartile $= 54.5 + \left[\dfrac{\frac{40}{2} - 11}{13}\right]10$ $= 61.42$ $60 < 61.42$ Value of L = 54.5 or F = 11 or $f_m = 13$	3 B2 B1	
20		$\left\|\overrightarrow{PQ}\right\| = 13$ $\sqrt{(h+3)^2 + 5^2} = 13$ $h+3 = 12,\ h+3 = -12$ $h = 9, h = -15$	4 B3 B2 B1	4
21		72.225 $L_{BOC} = \dfrac{1}{2}(15)^2(\pi - 2.5)$ $\angle BOC = (\pi - 2.5)$ rad or $r = 15$ cm	3 B2 B1	3
22	(a)	-5	1	3
	(b)	4 $T_2 = \left(2(2)^2 - 7(2)\right) - (-5)$	2 B1	
23		RM 235 $[204 + 29(4)] - 15 - 30$ $a = 204$ and $d = 4$ or $T_{30} = 204 + 29(4)$	3 B2 B1	3

24	(a)	$x = -\frac{8}{5}$ and $x = \frac{8}{5}$ $\frac{5x}{4} = \frac{16}{5x}$	2 B1	4
	(b)	4092 $S_{10} = \frac{4\left(2^{10} - 1\right)}{2 - 1}$	2 B1	
25		$w = 25.62$ // 25.64 $\frac{w}{20} = z$ $P(150 - w \le X \le 150 + w) = 0.8$ $\Rightarrow P(X \ge 150 + w) = 0.1$ $z = 1.281$ // 1.282	4 B3 B2 B1	4