FORM FOUR TERM ONE EXAM 2017

MATHEMATICS 121/1
MARKING SCHEME

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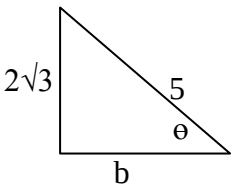
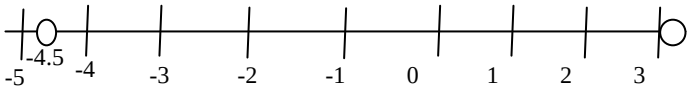
MATHEMATICS 121/1
MARKING SCHEME

1	$\frac{0.4 \div 0.22 - 1.10}{0.125 + 0.251}$ $\frac{1.818 - 1.10}{0.125 + 0.251}$ $\frac{0.718}{0.376}$ =1.910	**M1** **M1** **A1**	**For √ removal of brackets and division**
2	$5148 = 2^2 \times 3^2 \times 11 \times 13$ $6048 = 2^2 \times 3^2 \times 13^2$ $\frac{2^2 \times 3^2 \times 11 \times 13^{\ 2}}{2^2 \times 3^2 \times 13^{2\ \frac{1}{2}}}$ $\frac{2^4 \times 3^4 \times 11^2 \times 13^2}{2 \times 3 \times 13}$ $2^3 \times 3^3 \times 11^2 \times 13$	**B1** **M1** **A1**	
3	Total sales $\frac{97.5}{100}$ x 385,000 commission= 375,375 $\frac{3}{100} x\ 150{,}000 + \frac{1.5}{100}\ (375{,}375 - 150{,}00)$ $4{,}500 + 3{,}380.60$ 7880.60	**M1** **M1** **M1** **A1** **4**	
4.	$\frac{4 - x}{2x + 1} = \frac{1}{7}$ $28 - 7x = 2x + 1$ $27 = 9x$ $x = 3$ B $-1,3$ (x, y) $\frac{y-3}{x+1} = -7$ $y - 3 = -7x - 7$ $y = -7x - 4$	**M1** **A1** **M1** **A1** **4**	
5.	$25^x . 25^{-1} + 5^{2x} = 130$		**Alt**

	$5^{2x}\ \frac{1}{25}+1\ =130$ $5^{2x}=130\ \text{x}\frac{25}{26}$ $5^{2x}=5^3$ $x=\frac{3}{2}$	**M1** **M1** **A1**	Let y= 5^{2x} $y\ \frac{1}{25}\ +y=130$ $y+25y=130x\ 25$ $y=\frac{130+25}{26}$ $=125$ $5^3=5^{2x}$ $x=\frac{3}{2}$
6	$Gain\ in\ speed\ \ 72-56\ \ km/h$ $=16km/h$ $distance\ in\ 54\ sec$ $\frac{16\times1000\times54}{60\times60}$ $=240$ $lentgh\ of\ second\ train$ $240-100$ $=140m$	**B1** **M1** **A1** **3**	
7.	 $(2\ \ \overline{3})^2+b^2=5^2$ $b^2=25-12$ $b=\ \ \overline{13}$ $\frac{tan\theta=2\ \ \overline{3}}{\overline{13}}$	**M1** **A1** **2**	
8.	$no\ of\ girls\frac{2}{7}x\ 35=10$ $boys\ 45-10=35$ $\frac{10+x}{35}=\frac{4}{5}$ $50+5x=140$ $5x=140-50=90$ $x=18$	**M1** **M1** **A1**	$no.of\ girls$

9	$\frac{2}{x-2}-\frac{1}{x+5}=\frac{2}{x+1}$ $\frac{2\ x+5\ -1(x-2)}{x-2\ (x+5)}=\frac{2}{x+1}$ $\frac{2x+10-x+2}{x-2\ (x+5)}=\frac{2}{x+1}$ $\frac{x+12}{x-2\quad x+5}=\frac{2}{x+1}$ $\frac{2x+10-x+2}{x-2\ (x+5)}=\frac{2}{x+1}$ $x+1\quad x+12\ =2\ x-2\ (x+5)$ $x^2+13x+12=2x^2+6x-10$ $x^2-7x-22=0$ $x=\frac{7\pm\sqrt{49+88}}{2}$ $=\frac{7\pm\sqrt{137}}{2}$	**M1** **A1** **M1** **A1** **4**	√ **attempt to solve** **Both values**
10	$longer\ side=x$ $shorter\ side=x-4$ $\frac{1}{2}x\ x+x-4\ =99$ $x^2-11x+9x-99=0$ $x\ x-11\ +9\ x-11\ =0$ $x+9\quad x-11\ =0$ $x=11\ or\ x=-9$ $longer\ side=11$ $shorter\ side=7$	**B1** **M1** **M1** **A1** **4**	$formation\ of\ the\ expression$ $\surd attempt\ to\ solve\ quadratic\ exp$ $both\ \surd$
11	$\frac{2x^2-3xy-\ 2y^2}{9x^2-y^2}\text{x}\frac{3x\ +y}{2x\ +y}$ $\frac{2x^2-4xy+xy-\ 2y^2}{3x-y\ (3x+y)}\text{x}\frac{3x\ +y}{2x\ -y}$ $\frac{2x(x\ -2y)+y(x-2y)}{(3x-y)(3x+y)}\text{x}\frac{3x\ +y}{2x\ -y}$ $\frac{(2x+\ y)(x-2y)}{3x-y\ (3x+y)}\text{x}\frac{3x\ +y}{(2x+y)}$ $\frac{x\ -2y}{(3x-y)}$	**M1** **M1** **A1** **3**	Factorization
12	$\log A=\log K+B\log h$		

	$\log k = -1.301$ $k = 0.0978$ $\log h = \frac{1.301}{4.322} = 0.3010$ $h = 2.000$	**B1** **M1** **A1** **03**	
13	$\frac{1}{3}x + 2 < x + 5$ $-3 < \frac{2}{3}x$ $-9 < 2x$ $-4.5 < x$ $x + 5 < 3x - 1$ $6 < 2x$ $3 < x$  	B1 B1 B1 03	
14	$< DFE\ 180 - 70 = 110$ $< FBC = 25°$ $< ADF = 135°$ $< ABF = 135° - 25°$ $= 110°$	**B1** **B1** **2**	
15	$\log_2 x + \log_x 2 = 2$ $\log_2 x + \frac{1}{\log_2 x} = 2$ $(\log_2 x)^2 + 1 = 2\log_2 x^2$ $(\log_2 x)^2 - 2\log_2 x^2 + 1 = 0$ let $\log_2 x = y$ $y^2 - 2y + 1 = 0$ $y^2 - y - y + 1 = 0$ $y\ y-1\ -1\ y-1\ = 0$ $y-1\ \ y-1\ = 0$ $y = 1$ $\log_2 x = \log_2 2$ $x = 2$	**M1** **M1** **A1** **B1** **4**	√ **change to same logs**

16	$\begin{matrix}\boldsymbol{a}\\\boldsymbol{b}\end{matrix} + \begin{matrix}\boldsymbol{o}\\\boldsymbol{1}\end{matrix} = \begin{matrix}\boldsymbol{-2}\\\boldsymbol{3}\end{matrix}$ $\begin{matrix}\boldsymbol{a}\\\boldsymbol{b}\end{matrix} = \begin{matrix}\boldsymbol{-2}\\\boldsymbol{3}\end{matrix} - \begin{matrix}\boldsymbol{0}\\\boldsymbol{1}\end{matrix} = \begin{matrix}\boldsymbol{-2}\\\boldsymbol{2}\end{matrix}$ $\begin{matrix}\boldsymbol{-2}\\\boldsymbol{2}\end{matrix} + \begin{matrix}\boldsymbol{c}\\\boldsymbol{d}\end{matrix} = \begin{matrix}\boldsymbol{4}\\\boldsymbol{-1}\end{matrix}$ $\begin{matrix}\boldsymbol{c}\\\boldsymbol{d}\end{matrix} = \begin{matrix}\boldsymbol{4}\\\boldsymbol{-1}\end{matrix} - \begin{matrix}\boldsymbol{-2}\\\boldsymbol{2}\end{matrix}$ $\begin{matrix}\boldsymbol{6}\\\boldsymbol{-3}\end{matrix}$ $B(6,-3)$	**B1** **B1** **2**	
17.	$area\ of\ front\ and\ back\ walls$ $6.3x3.2x2$ $= 40.32\text{m}^2$ $area\ of\ side\ walls\ 4.5x3.2x2$ $= 28.8m^2$ $area\ of\ the\ floor 6.3x4.5$ $= 28.35m^2$ $total\ area\ of\ floor\ and\ walls$ $= 40.32 + 28.8 + 28.35$ $= 97.47m^2$ $= area\ of\ door\ is\ 1.85x0.8 = 1.48m^2$ $area\ of\ the\ window = 1.5x0.7x4 = 4.2$ $total\ area\ cemented = 1.48 + 4.2$ $= 5.68m^2$ area to be cemented $= 97.47 - 5.68$ $= 91.79$ **(b)** $cost\ of\ cementing\ materials = 91.79x500$ $= sh.45900$ **(c)** $cost\ of\ labour = 20\%x\ 45900$ $= 9{,}180$ $total\ cost\ of\ cementing$ $= 45900 + 9180$ $= 55080$	**M1** **M1** **A1** **M1** **A1** **M1** **A1** **M1** **M1** **A1** **10**	
18.	**(a)** $angle\ STQ = 28^o$ $angles\ in\ the\ alt.segment$ **(b)**	**B1** **B1**	

	$TQU = \frac{180-54}{2} = 63^0$ $base\ angles\ of\ isco\ \Delta$ **(c)** $< TQS\ 180 - \ 28 + 54 + 63$ $= 35^o$ $opp\ angles\ of\ cyclic\ quad\ add\ to\ 180^o$ **(d)** $reflex < UOQ = 360 - \ 2\ 54$ ^{2} $= 252$ $angles\ at\ the\ center$ $= twice\ angle\ at\ the\ circum.$ $/angles\ at\ a\ point$ **(e)** $< TQR\ 54 + 63 = 117$ angle in the alt se	**B1** **B1** **B1** **B1** **B1** **B1** **B1** **B1** **B1** **10**	
19	**(a)** $y = b + ax - x^3$ $\frac{dy}{dx} = a - 3x^2$ $turning\ pt\ a - 3x^2 = 0$ $a = 3(2)^2$ $= 12$ $g = b + 12\ 2\ -(2)^3$ $9 = b + 24 - 8$ $b = 9 - 16$ $= -7$ (b) $\frac{dy}{dx}(a - 3x^2\ )$= -6x (c) maximum $y = -7$ $(0, -7)$ $f = 12 - 3x^2$ $gradient = 12$ $x, y\ \ 0, -7$ $= \frac{y+7}{x} = 12$ $= y - 12x + 7 = 0$	**B1** **B1** **m1** **A1** **M1** **A1** **B1** **M1** **B1** **A1** **10**	

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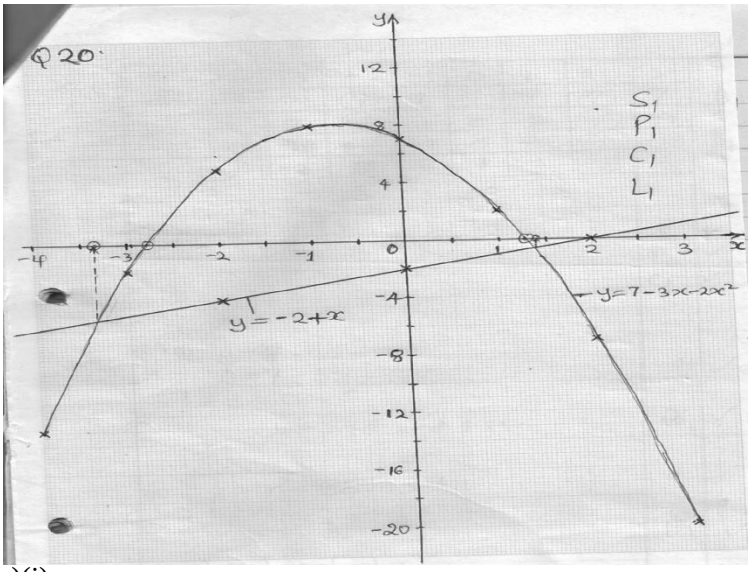
x	-4	-3	-2	-1	0	1	2	3
7	7	7	7	7	7	7	7	7
-3x	12	9	6	3	0	-3	-6	-9
-2x2	-32	-18	-8	-2	0	-2	-8	-18
y	-13	-2	5	8	7	2	-7	-20

(b) On the graph paper



B1

B1

S1 √

P1 √

C1 √

(c)(i)

$$y = 7 - 3x - 2x^2$$

$$\underline{0 = 7 - 3x - 2x^2}$$

y=0

$$x = 2.75 \; and \; 1.25$$

B1 √ **evidence on the graph**

(ii)

B1 √**both correct**

$$y = 7 - 3x - 2x^2$$

$$\underline{0 = 9 + 4x + 2x^2}$$

y= -2+x

B1 √**equation**

x	**-2**	**0**	**2**
y	**-4**	**-2**	**0**

B1 √**both correct**

10

$$x = -3.35, 1.4$$

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(i)$\boldsymbol{PQ = q - p}$

$$ii \;\; \boldsymbol{OR = p + \frac{2}{3}\; q - p}$$

B1

$$\boldsymbol{p + \frac{2}{3}q - \frac{2}{3}p}$$

$$\boldsymbol{\frac{1}{3}p + \frac{2}{3}q}$$

M1

$$iii \;\; \boldsymbol{-\frac{3}{4}p + q}$$

$$b \;\; \boldsymbol{ST = m \;\; q - \frac{3}{4p}}$$

A1

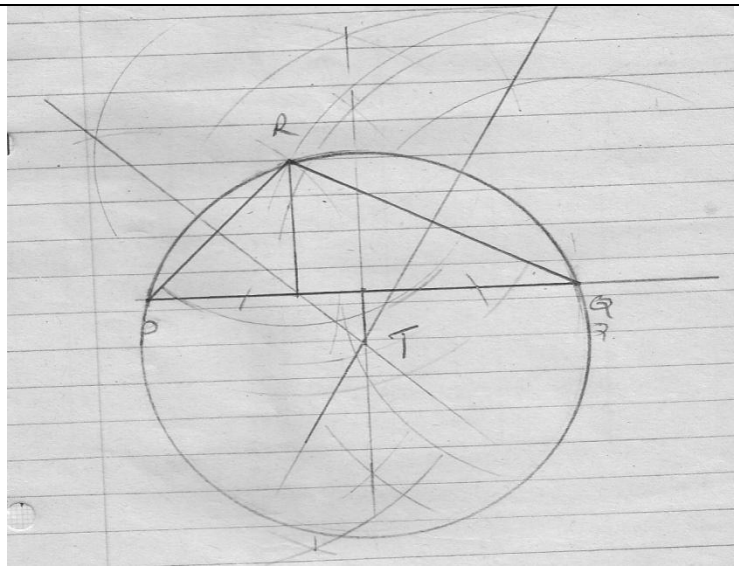
$$\boldsymbol{OT = n \;\; \frac{1}{3}p + \frac{2}{3}q}$$

$$\boldsymbol{OT = os + st}$$

B1

$$\boldsymbol{= \frac{3}{4}p + m \;\; q - \frac{3}{4}p}$$

$$\boldsymbol{OT = \frac{1}{3}np + \frac{2}{3}nq = \frac{3}{4}p + nq - \frac{3}{4}mp}$$

	$\frac{1}{3n} = \frac{3}{4} - \frac{3}{4m} \ldots\ldots\ldots\ldots\ i$ $\frac{2}{3}n = m \ldots\ldots\ldots\ ii$ $\frac{1}{3n} = \frac{3}{4} - \frac{3}{4}\frac{2}{3}n$ $\frac{1}{3}n = \frac{3}{4} - \frac{1}{2}n$ $\frac{1}{3n} + \frac{1}{2} = \frac{3}{4}$ $\frac{5}{6}n = \frac{3}{4}$ $n = \frac{3}{4}x\frac{6}{5}$ $n = \frac{9}{10}$ $m = \frac{2}{3}x\frac{9}{10}$ $m = \frac{3}{5}$ $ST = \frac{3}{5}SQ$ $TQ = \frac{2}{5}SQ$ T *is common*	**M1** **M1** **A1** **B1** B1 B1 10	
22	 $TR = 4.2km$ *c shortest distance* $1.2km$ *d height* 2.9 $\frac{1}{2}x\ 8\ x\ 2.9$ **=11.6 *km2***	**B1** **B1** **B1** **B1** **B1** **B1** **B1** **M1** **A1**	*location of P* *location Q* *location R* *at least 2 bisector* *T located* *perpepndicular drawn value*

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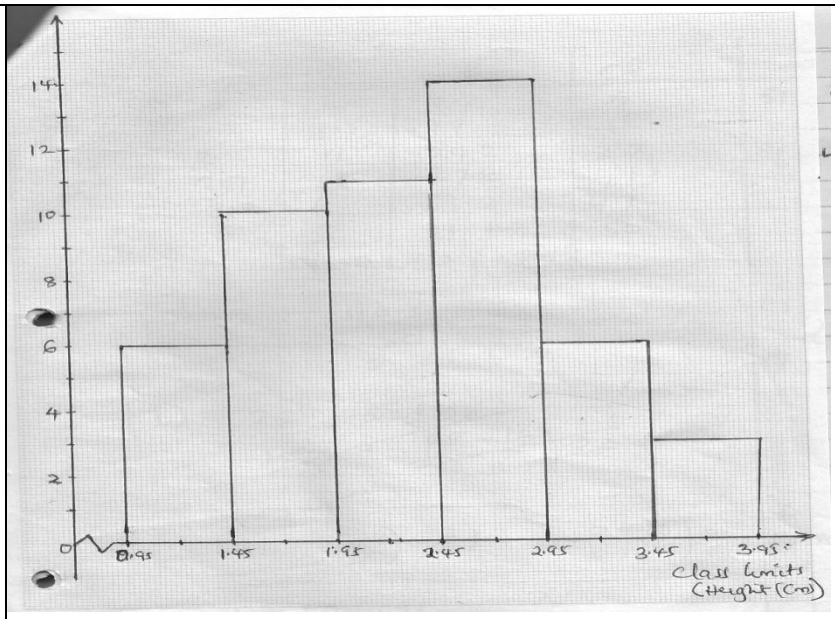


B1 √**and pnts**

B1 √xf

(a)

x	**f**	**xf**	**cf**
1.2	**6**	**7.2**	**6**
1.7	**10**	**17**	**16**
2.2	**11**	**24.2**	**27**
2.7	**14**	**37.8**	**41**
3.2	**6**	**19.2**	**47**
3.7	**3**	**11.1**	**50**
	Σf=50	**ΣXf=116.5**	

M1

A1

$$mean \frac{116.5}{50}$$

$$= 2.33$$

B1 √**cf**

$b)\ 25th\ and\ 26th$

M1

$$\frac{1.95 + \frac{25-16}{11}\ 0.5 + 1.95 + \frac{26-16}{11}\ 0.5}{2}$$

$$\frac{1.95 + 0.4091}{\frac{2.35 + 2.4045}{2}}$$

$$2.382$$

A1

B2 all√ **bars**

b1 4√ **bars**

10

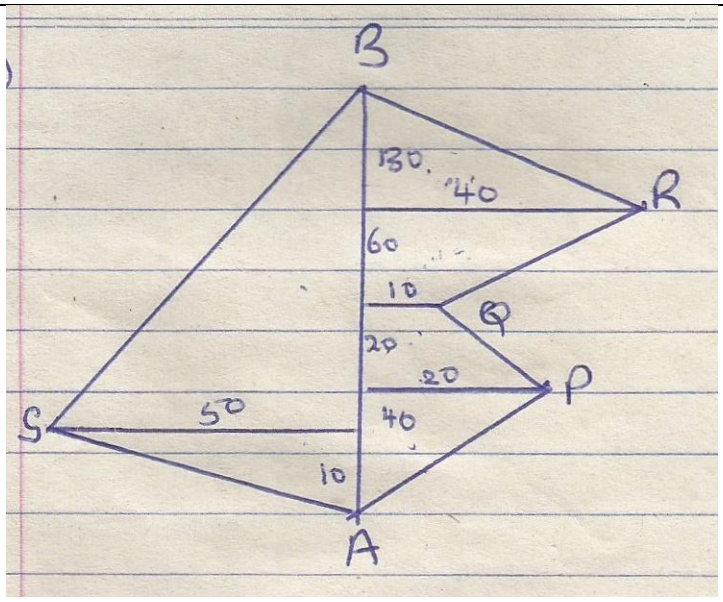
(c)

24. **(a)**

B2 √ **right side for 2**√

B1 √ **left side**

B1 √ **measurement**



½ x 10 x 50
½ x 50 x 250
½ x 20x 50
½ (10+20)20
½ (40+10)60
½ x 40 x 130
½ (500+1250+1000+600+3000+5200)
½ x x 11550

$$\frac{5775}{1000}$$

$0.5775\ ha\ m$

		B1	**Pts labeled**
		B2	**Atleast labeled**
		M1	
		M1	
		A1	
		10	