ALLIANCE GIRL'S HIGH SCHOOL **MARKING SCHEME**
MATHEMATICS 121/1

SECTION A (50 Marks)

1. $\sqrt{\dfrac{306\times0.36\times10^4}{1.36\times0.64\times10^4}}$

$\dfrac{306\times36\times100}{136\times64}=\sqrt{\dfrac{306}{136}}\times\dfrac{\sqrt{36}\times\sqrt{100}}{\sqrt{64}}$ M1

$\left(\dfrac{306}{136}\right)^{1/2}=\left(\dfrac{9}{4}\right)^{1/2}$

$\therefore\dfrac{\sqrt{9}\times\sqrt{36}\times\sqrt{100}}{\sqrt{4}\times\sqrt{64}}=\dfrac{3\times6\times10}{2\times8}$ M1

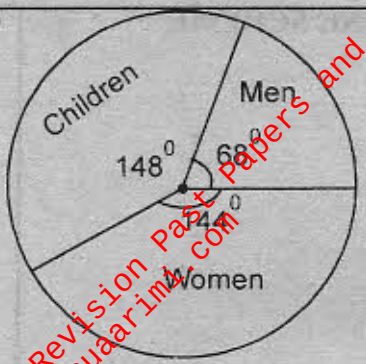
$=\dfrac{3\times3\times5}{4}=\dfrac{45}{4}$ A1

$=11\dfrac{1}{4}$ 3 marks

2. Num. $6ab(4b-3a)$
$-6ab(3a-4b)$ M1
$-2(3a-4b)(2a-3b)$ M1
DEN. $-2(6a^2-17ab+12b^2)$
$=-2(3a-4b)(2a-3b)$
Prod 72 } -9
Sum -17 } -8 A1
$=\dfrac{3ab}{2a-3b}$
$-2[6a^2-9ab-8ab+12b^2]$
$-2[3a(2a-3b)-4b(2a-3b)]$
or
$-2[6a^2-8ab-9ab+12b^2]$
$-2[2a(3a-4b)-3b(3a-4b)]$
$\dfrac{-3ab}{3b-2a}$ 3 marks

3. a) Let children be x
$\therefore\dfrac{170+x}{530+x}\times360^0=216^0=\dfrac{61200+360x}{530+x}=216$ M1
$\therefore 61200+360x=114480+216x$
$\therefore 144x=53280$ A1
$x=370$ 2 marks

b)



Angle rep children $= \frac{370}{900} \times 360$

$= 148^0$ B1

Men $= 216 - 148^0 = 68^0$

Women $= 144^0$

2 marks

4. $x + y = 58$.....(i)
$x - y = y + 4$.....(ii) } M1

Let x be greater no.

y smaller no.

$x = 40$
$y = 18$ } A1

$\therefore x + y = 58$

$x - 2y = 4$ M1

$3y = 54$

$\therefore y = 18$

$x = 58 - 18$

$x = 40$

3 marks

5. $5^2.5^1 + 6(5^x) = 275$

$5^x(5+6) = 275$ M1

$5^x(11) = 275$ M1

$5^x = \frac{275}{11} = 25 = 5^2$ A1

$\Rightarrow x = 2$

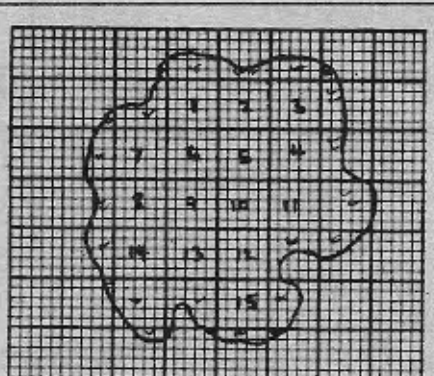
3 marks

6. $(1+0.8)\text{km} \div \left(\frac{10}{60} + \frac{2}{60}\right)\text{hr}$ M1 A1

$= \frac{9}{5} \times \frac{5}{1} = 9\text{km/hr}$

2 marks

7. a)



$Area = 15 + \left(\frac{23}{2}\right) = 26.5cm^2$

$= 15 + \left(\frac{24}{2}\right)$ M1

$= 27cm^2$ A1

2 marks

b). 1cm rep. 4000m

$\therefore 1cm^2$ rep. $16\,000\,000 m^2$

Area in ha $= \frac{265 \times 16000000}{10000}$

Area in ha $= 423200ha$

$= 424000ha$

M1

A1

2 marks

8. $Log_2 y^2 = \log_2 16 + \log_2 (y+5)$

$\log_2 y^2 = \log_2 (16y + 80)$

$y^2 = 16y + 80$

$y^2 - 16y - 80 = 0$

$prod. -80$ | -20

$sum -16$ | 4

$y^2 + 4y - 20y - 80 = 0$

$y(y+4) - 20(y+4) = 0$

$(y-20)(y+4) = 0$

$y_1 = 20$

$y_2 = -4$

M1

M1

A1

3 marks

9. Mass of alloy $= 102 + 45 = 147g$

Vol. of A $= \frac{102}{17} = 6cm^3$

Vol. of B $= \frac{45}{3} = 15cm^3$ } B1

Total vol. A + B $= 21cm^3$

density of Alloy $= \frac{147g}{21cm^3}$

$= 7g/cm^3$

M1

A1

2 marks

10. $125^0 + 140^0 + 160^0 + (n-3)145^0 = (2n-4)90^0$ M1

$425^0 + 145n - 435 = 180n - 360^0$

$350^0 = 35n$

$n = \frac{350^0}{35} = 10$ sides A1

$S_n = (2(10) - 4)90^0 = 16 \times 90 = 1440^0$ B1

Exterior angles $= 360^0$

$55 + 40 + 20 = 115^0$

$\therefore 360 - 115 = 245^0$

$\frac{245^0}{180 - 145^0} = \frac{245^0}{35^0} = 7$

$\therefore n = 10$

3 marks

11. A/m of \$ exchange for €650

$= 650 \times \frac{29050}{280} \times \frac{300}{21975}$

$= 920.65\$$

M1A1M1

A1

4 marks

12. Centre $\left(\frac{-13+1}{2}, \frac{-11+3}{2}\right)$

$=(-6,-4)=(a,b) r=7$

$(x-a)^2+(y-b)^2=r^2$

$x^2-2ax+y^2-2by=r^2-(a^2+b^2)$

$x^2+12x+y^2+8y=49-(36+16)$

$x^2+12x+y^2+8y+3=0$

$x^2+y^2+12x+8y+3=0$

B1 M1 A1

2 marks

13. Hire purchase price $=1.5\times17600=26400$

deposit $=\frac{25}{100}\times17600=$ 4400 -

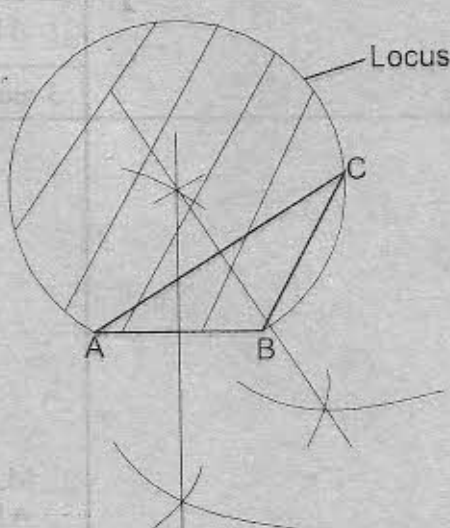
20000

$\therefore$ No. of months $=\frac{22000}{2200}=10 months$

B1 M1A1

3 marks

14.



B1 ✓ bisecting any 2 sides
B1 ✓ major arc ACB
B1 ✓ region shaded and labelled P

3 marks

15. Mid pt $=\left(\frac{-5+3}{2}, \frac{-2+4}{2}\right)=\begin{pmatrix}B1\\-1,1\end{pmatrix}$

$M_1=\frac{4+2}{3+5}=\frac{6}{8}=\frac{3}{4}$

$M_2=\frac{-4}{3}$ B1$(-1,1)(x,y)$

$-4/3=\frac{y-1}{x+1}\Rightarrow 3y-3=-4x-4$

$3y=-4x-1$

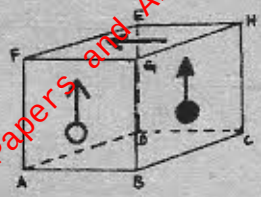
$y=-4/3\,x-1/3$ } B1

Accept $4x+3y=-1$

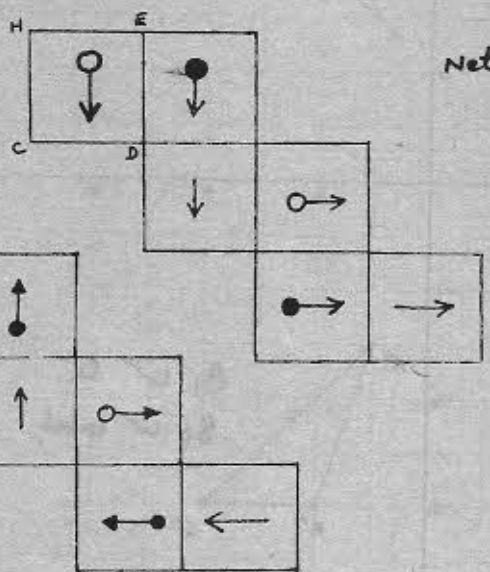
$\frac{x}{3}+\frac{y}{4}=\frac{-1}{12}$

3 marks

16.



cube



Net

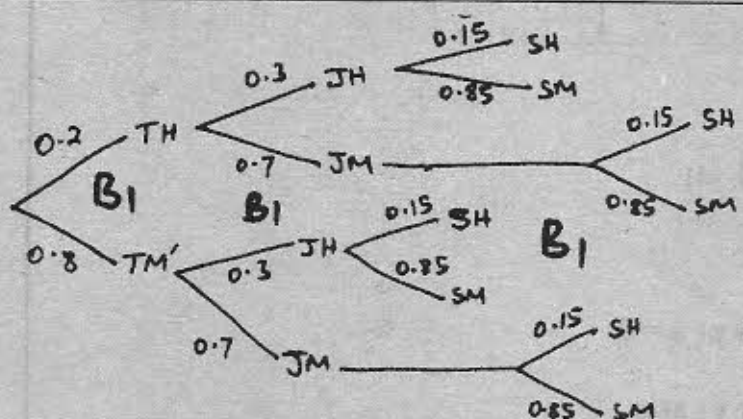
B_1 ✓ pair

B_1 ✓ pair

B ✓ pair

3 marks

17. a)



3 marks

b) (i) P(all Hit)

$= 0.2 \times 0.3 \times 0.15$

$= 0.009$

M1

A1

2 marks

(ii) $(0.2 \times 0.7 \times 0.85) + (0.8 \times 0.3 \times 0.85) + (0.8 \times 0.7 \times 0.15)$

$0.119 + 0.204 + 0.084$

$= 0.407$

M1 all

M1

A1

2 marks

(iii) $(0.2 \times 0.3 \times 0.85) + (0.8 \times 0.3 \times 0.15) + (0.2 \times 0.7 \times 0.15)$

$+ (0.2 \times 0.3 \times 0.15)$

$= 0.051 + 0.036 + 0.021 + 0.009$

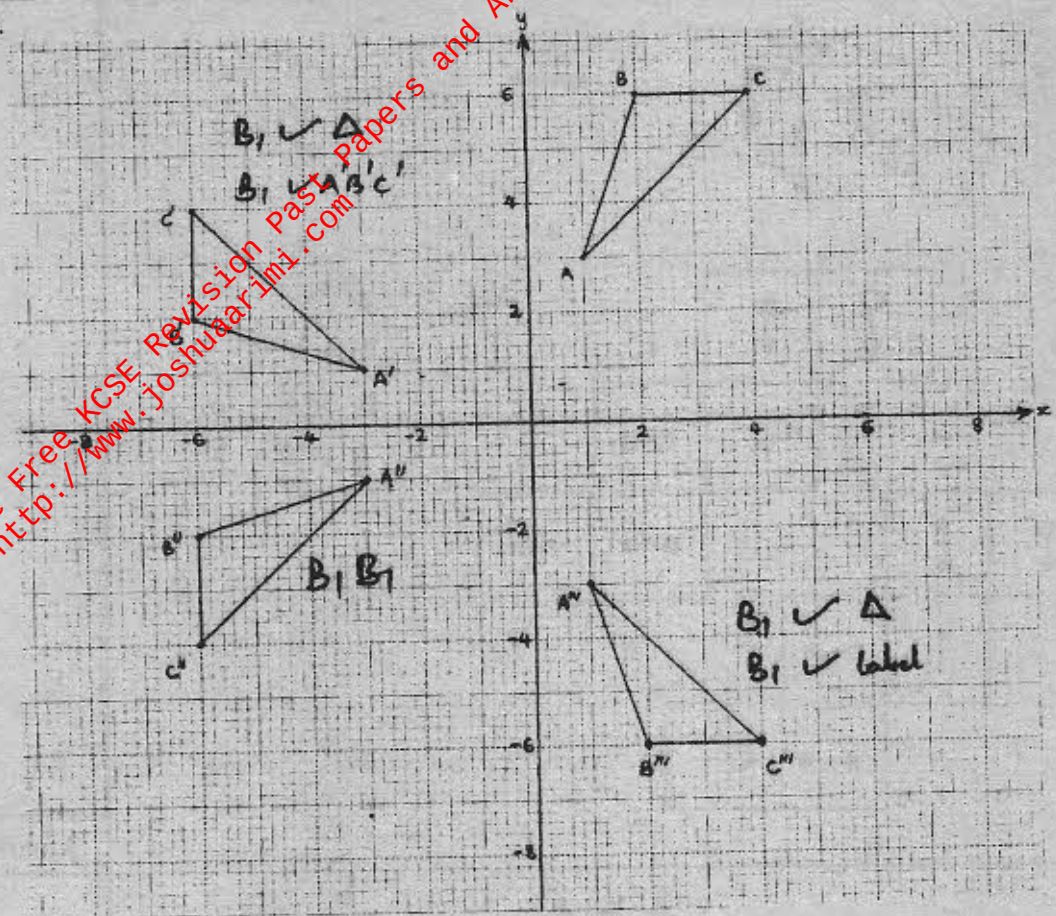
$= 0.117$

M1

A1

10 marks

18.



a) A1(-3,1) B1(-6,2) C1(-6,4) — B1

b) $A^{II}(-3, -1)$ $B^{II}(-6, -2)$ $C^{II}(-6, -4)$ — B1

c) **on the graph**

d) (i) Reflection along y=-x or y+ x = 0 — B1

(ii) Reflection along y=0 or x - axis — B1

10 marks

19. $\text{Spacing} = \frac{36}{6} = 6\text{m}$ — B1

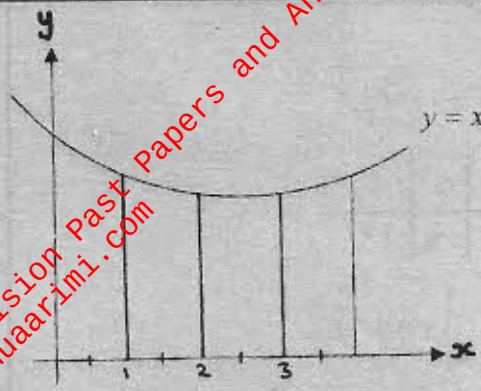
$\text{Area} = \frac{1}{2}(6)[(5+6)+2(5.4+7.0+8.0+5.5+5.8)]$ — M1

$= 3 \times 74.4$ — M1

$= 223.2\text{m}^3$ — A1

4 marks

b.)



4

x	0.25	0.75	1.25	1.75	2.25	2.75	3.25	3.75
y	7.0625	7.5625	8.5625	10.0625	12.0625	14.5625	17.5625	21.0625

B1
B1
4d.p

Area $= 0.5 \times (7.0625 + 7.5625 + 8.5625 + 10.0625 + 12.0625 + 14.5625 + 17.5625 + 21.0625)$
$= 0.5 \times 98.5$
$= 49.25$

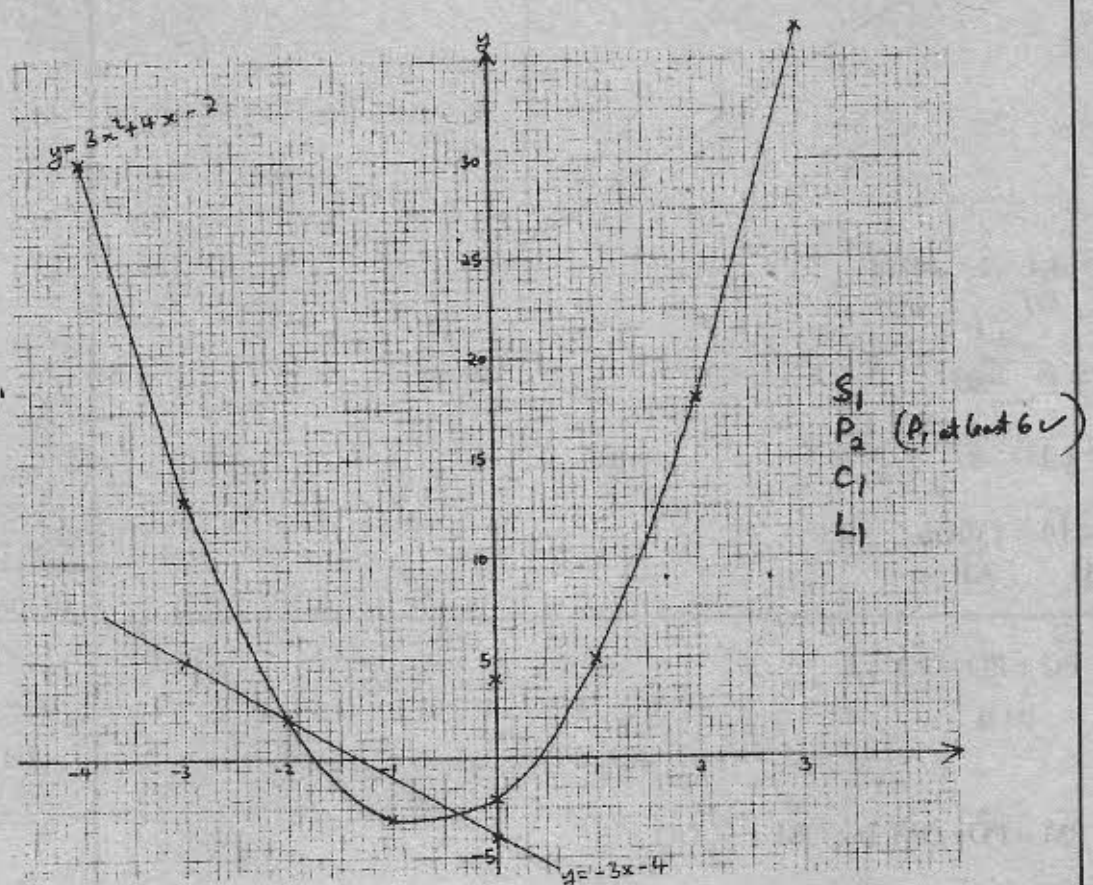
M1
M1
A1
6 marks
10 marks

20. a)

x	-4	-3	-2	-1	0	1	2	3
y	**30**	**13**	**2**	**-3**	**-2**	**5**	**18**	**37**

B_2 all ✓
B_1 at least 6✓

B1



S_1
P_2 (P_1 at least 6 ✓)
C_1
L_1

M1
M1
A1
4 marks

c) (i) $x_1 = +0.4$, $x_2 = -1.7$ } $B_1 \pm 0.1$

M1

(ii) $y = 3x^2 + 4x - 2$

$0 = 3x^2 + 7x + 2$

$y = -3x - 4$ B1

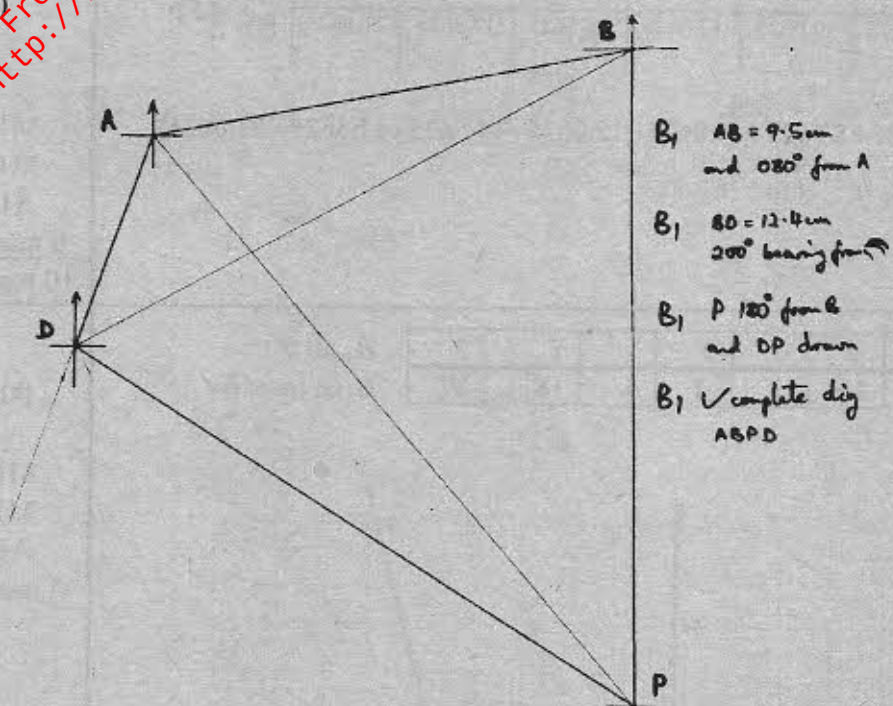
x	−3	0	3
y	5	-4	-13

$x_1 = -2$, $x_2 = -0.4$ } ± 0.1 B1

3 marks

10 marks

21. a)



B_1 AB = 9.5cm and 080° from A

B_1 BD = 12.4cm 200° bearing from B

B_1 P 120° from B and DP drawn

B_1 ✓complete diag ABPD

b(i) AD = 4.4 × 1 = 44km

M1 *A1*

(ii) $242^0 \pm 1^0$ *B1*

(iii) $122^0 \pm 1^0$ *B1*

(iv) 13 × 10 = 130km

M1 A1

10 marks

22.a) (i) $\vec{PQ} = \vec{PO} + \vec{OQ}$

$= -p + q$

B1

(ii) $\vec{PM} = \vec{PO} + \vec{OM}$ but $\vec{OM} = \frac{2}{3}\vec{OQ}$

$\vec{PM} = -p + \frac{2}{3}q$

B1

(iii) $\vec{ON} = \vec{OP} + \vec{PN}$ but $\vec{PN} = \frac{1}{4}\vec{PQ} = \frac{1}{4}(-P+q)$ M1

$\vec{ON} = p - \frac{1}{4}p + \frac{1}{4}q = \frac{3}{4}p + \frac{1}{4}q$ A1

b) (i) $\vec{OX} = k\left(\frac{3}{4}p + \frac{1}{4}q\right) = \frac{3}{4}kp + \frac{k}{4}q$.....(i)B1

$\vec{OX} = \vec{OP} + \vec{PX} = \vec{OP} + h\vec{PM}$

$= p + h\left(-p + \frac{2}{3}q\right) = (1-h)p + \frac{2}{3}hq$.....(ii)B1

if QX used

$\vec{QX} = \frac{3}{4}kp + \left(\frac{k}{4} - 1\right)q$

$\vec{QX} = (1-h)p + \left(\frac{2}{3}h - 1\right)q$

ii) B1 $\begin{cases} \frac{3}{4}k = 1-h \\ \frac{k}{4} = \frac{2}{3}h \Rightarrow k = \frac{8}{3}h \end{cases}$

$\frac{3}{4} \times \frac{8}{3}h = 1-h$ M1

sub. $2h = 1-h$

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

$k = \frac{8}{9}$
$h = \frac{1}{3}$ } A1

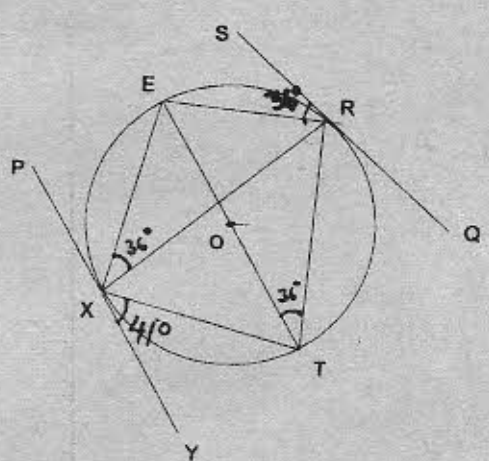
$k = \frac{8}{3}\left(\frac{1}{3}\right) = \frac{8}{9}$

iii) $\therefore PX = \frac{1}{3}PM$

$\therefore PX : XM$

1:2 B1

23.



a) $X\hat{R}T = 41^0 = Y\hat{X}T$ angle on alt. segments B1

$E\hat{R}T = 90^0$ angle sub. by diameter to $C = 90^0$ B1

$\therefore X\hat{R}E = 90^0 - 41^0 = 49^0$ B1

10 marks

b) $E\hat{R}S = E\hat{T}R = E\hat{X}R = 36^0$ angles on alt. segments B1

$X\hat{E}T = Y\hat{X}T = 41^0$ = XRT angles on alt. segments

$R\hat{E}T = 180^0 - (90^0 + 36^0) = 54^0$ Σ angles in a $\Delta = 180^0$

$\therefore X\hat{E}R = 41^0 + 54^0 = 95^0 \Rightarrow X\hat{T}R = 180^0 - 95^0 = 85^0$

opp angle in cyclic B1

B1 Σ upto 180^0

M1

A1

c) $T\hat{X}R = T\hat{E}R = 54^0$ angles sub. by same chord

B1 B1

d) $X\hat{O}T = 2X\hat{R}T$ angle sub a centre is twice angle sub. at C

$\therefore X\hat{O}T = 2 \times 41^0 = 82^0$ B1

10 marks

24. a) $v = \frac{ds}{dt} = 3t^2 - 4t$ M1

When $t = 2$

$v = 3(2)^2 - 4(2)$

$v = 4$ m/s A1

b)(i) at rest $v = O$

$\therefore 3t^2 - 4t = 0$ M1

$t(3t - 4) = 0$

$\therefore t = 0$ but $t > 0$

$t = 4/3$ A1

(ii) $t = 4/3$ at $v = 0$

$\therefore s = \left(\frac{4}{3}\right)^3 - 2\left(\frac{4}{3}\right)^2 + 6$ M1

$= \frac{64}{27} - \frac{32}{9} + 6$

$= 4\frac{22}{27}$ A1

$= 4.815$ A1

(iii) $t = 4 \quad s = 4^3 - 2(4)^2 + 6 = 38m$
$t = 3 \quad s = 3^3 - 2(3)^2 + 6 = 15$ } B1

displacement during 4th sec. = 38 - 15 = 23m

(iv) At maximum velocity a = 0

$a = \frac{dv}{dt} = 6t - 4 = 0$ M1

$6t = 4 \quad t = \frac{2}{3}$ A1

10 marks