

FORM 3 MATHEMATICS P1 MARKING SCHEME

SN	WORKING	
1	$(13824)^{\frac{1}{3}} = (2^9 \times 3^3)^{\frac{1}{3}}$ $= 2^3 \times 3 \checkmark$ $\frac{(2^3 \times 3) - 4}{3 + (4 \div 2) - (5 \times 7)} = \frac{24 - 4}{3 + 2 - 35} \checkmark$ $= \frac{20}{5 - 35}$ $= \frac{20}{-30} =$ $= -\frac{2}{3} \checkmark$	M1 M1 A1
2	Monday hrs $\Rightarrow$ 19hrs 15min Tue, Wed & Thurs $\Rightarrow 24 \times 3 = 72$ hrs. Friday hrs $\Rightarrow$ 18hrs 45min. $\begin{array}{r} 19:15 \\ 72:00 \\ + 18:45 \\ \hline 110 \text{ hrs} \end{array} \checkmark$ Total Time Lost = $\frac{110 \times 30}{60}$ $= 55 \text{ min} \checkmark$ Time on the watch. $\begin{array}{r} 18:45 \\ - 55 \\ \hline 17:50 \text{ hrs or } 5:50 \text{ P.M.} \end{array}$	M1 M1 A1

S/N	WORKING	
3.	$(2^5 \times 5^4 \times 7^3) \times (2 \times 5^2)$ $2 \times 5^2 = 50 \checkmark$ $(2^6 \times 5^6 \times 7^3)^{\frac{1}{3}} = 2^{6 \div 3} \times 5^{6 \div 3} \times 7^{3 \div 3} \checkmark$ $= 2^2 \times 5^2 \times 7$ $= 700 \checkmark$	 M1 M1 A1
4.	Bus $\rightarrow \frac{4}{5}x$ Motor $\rightarrow \frac{2}{3} \times \frac{1}{5}x = \frac{2}{15}x$ Walking $\rightarrow 1 - (\frac{4}{5} + \frac{2}{15})$ $= \frac{1}{15}x \checkmark$ $\frac{4}{5}x = \frac{1}{15}x + 55 \checkmark$ $\frac{11}{15}x = 55 \Rightarrow x = \frac{55 \times 15}{11}$ $= 75 \text{ km.} \checkmark$	
5	Amount in Ksh. $5600 \times 77.43 = \text{Ksh. } 433,608$ Remainder after spending $433,608 - 201,376 = \text{Ksh. } 232,232$ S.A. Rand $\frac{232,232}{9.5} = 24,419.80 \text{ RAND.}$	 M1 M1 A1

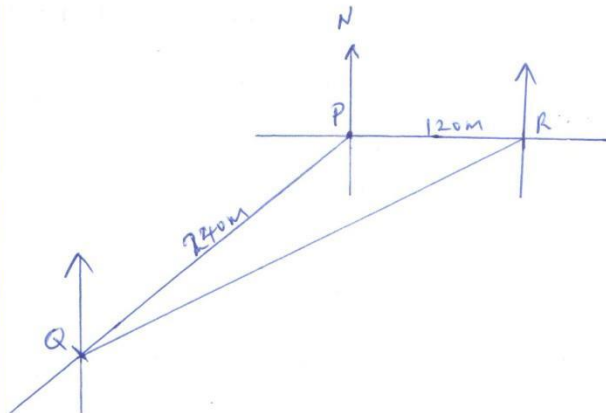
SN	WORKING	
6.	$3x + (x - 20) = 180$ $4x = 200$ $x = 50^\circ \checkmark$ $\text{Exterior Angle} = 50 - 20^\circ$ $= 30^\circ \checkmark$ $\text{No. of sides} = \frac{360^\circ}{30}$ $= 12 \text{ sides} \checkmark$	M1 M1 A1
7.	$\frac{1}{15.79} = \frac{1}{1.579 \times 10}$ $= \frac{1}{1.579} \times \frac{1}{10} \checkmark$ $= 0.6333 \times 0.1$ $= 0.06333 \checkmark$	M1 M1
	$(\text{Ans } 7.361)^2 = (0.2822)^2$ $= 0.0796 \checkmark$ $0.06333 - 0.0796 = -0.01627 \checkmark$	M1 A1
8.	$(x + 20) + (2x + 25) = 90^\circ \checkmark$ $3x + 45 = 90$ $3x = 45^\circ$ $x = 15^\circ \checkmark$ $\tan 15^\circ = 0.2679 \checkmark$	M1 M1 A1

SN	WORKING -	
12.	Numerator - $\frac{3}{4} + \left(\frac{9}{7} \div \frac{3}{4} \times \frac{7}{3} \right)$ $\frac{3}{4} + \left(\frac{9}{7} \times 1 \right) = \frac{3}{4} + \frac{9}{7}$ $= \frac{21+36}{28}$ $= \frac{57}{28} \checkmark$ Denominator $\frac{2}{3} \times \left(\frac{9}{7} - \frac{3}{8} \right) = \frac{2}{3} \times \left(\frac{72-21}{56} \right)$ $= \frac{2}{3} \times \frac{51}{56}$ $= \frac{17}{28} \checkmark$ $\frac{57}{28} \times \frac{28}{17} = 3\frac{6}{17}$	m1 m1 A1
13	$9t^2 - 25a^2 = (3t+5a)(3t-5a) \checkmark$ $6t^2 + 19at + 15a^2 = 6t^2 + 9at + 10at + 15a^2$ $= 3t(2t+3a) + 5a(2t+3a)$ $= (3t+5a)(2t+3a) \checkmark$ $\frac{(3t+5a)(3t-5a)}{(3t+5a)(2t+3a)}$ $\frac{3t-5a}{2t+3a} \checkmark$	m1 m1 A1

S/N	WORKING										
14.	$B.P = 300kg \times Ksh 30$ $= 9000 \text{ Ksh} \checkmark$ $\text{Remainder} = 300 \times \frac{80}{100} = 240kg \checkmark$ $S.P. = 9000 \times \frac{120}{100} = Sh. 10,800 \checkmark$ $S.P. \text{ Per kg} = \frac{10,800}{240} = Sh. 45$	 M1 M1 A1									
15.	$x - 8y - 2 = 0$ $x - 2 = 8y$ $\Rightarrow y = \frac{1}{8}x - \frac{1}{4} \Rightarrow M = \frac{1}{8}$ $\frac{y-3}{x-2} = \frac{1}{8}$ $8y - 24 = x - 2$ $y = \frac{1}{8}x + \frac{22}{8}$										
16.	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>2</td><td>308</td><td>228</td></tr> <tr> <td>2</td><td>154</td><td>114</td></tr> <tr> <td></td><td>77</td><td>57</td></tr> </table> $G.C.D = 2 \times 2$ $= \underline{4M}$	2	308	228	2	154	114		77	57	
2	308	228									
2	154	114									
	77	57									

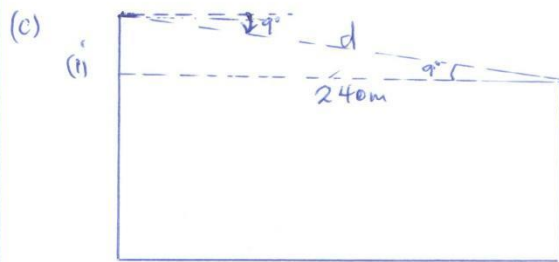
17.

(a)



(b) (i) $RQ = 8.5 \text{ cm} \times 40 \text{ m} \checkmark$
 $= 340 \text{ km} \checkmark$

(ii) Bearing $= 065^\circ \checkmark$



$$\cos 9^\circ = \frac{240}{d} \checkmark$$

$$d = \frac{240}{\cos 9^\circ}$$

$$= 243 \text{ m} \checkmark$$

(ii)

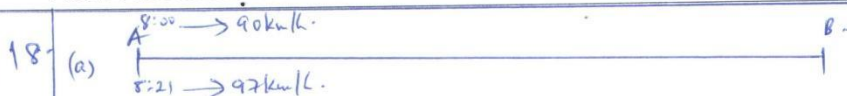
$$\text{Speed} = \frac{\text{distance}}{\text{Time}}$$

$$= \frac{243 \text{ m}}{18 \text{ sec}}$$

$$= 13.5 \text{ m/s} \checkmark$$

$$\frac{13.5 \times 60 \times 60}{1000}$$

$$48.6 \text{ km/h} \checkmark$$



Distance travelled by Tom for 21 min

$$\begin{aligned} D &= s \times t \\ &= 90 \text{ km/h} \times \frac{21}{60} \text{ hr} \\ &= 31.5 \text{ km} \end{aligned}$$

$$\begin{aligned} \text{Relative speed} &= 97 \text{ km/h} - 90 \text{ km/h} \\ &= 7 \text{ km/h} \end{aligned}$$

Time taken by John to catch up.

$$\begin{aligned} t &= \frac{d}{s} \\ &= \frac{31.5 \text{ km}}{7 \text{ km/h}} = 4 \text{ hrs } 30 \text{ min} \end{aligned}$$

$$\begin{array}{r} 8:21 \text{ am} \\ 4:30 \\ \hline 12:51 \text{ P.m} \end{array}$$

(b)
$$\begin{aligned} d &= s \times t \\ &= 97 \text{ km/h} \times 4\frac{1}{2} \text{ hrs} \\ &= 436.5 \text{ km} \end{aligned}$$

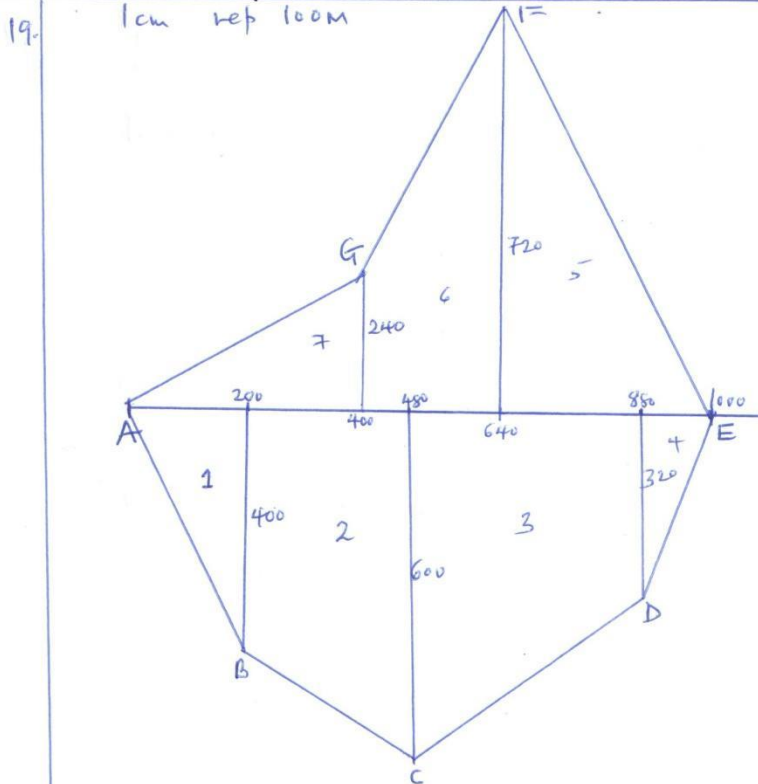
(c) Distance travelled by Paul from B.

$$\begin{aligned} D &= s \times t \\ &= 80 \text{ km/h} \times 2\frac{1}{2} \text{ hrs} \\ &= 200 \text{ km} \end{aligned}$$

Distance travelled by Tom by 11:10 am

$$\begin{aligned} D &= 90 \text{ km/h} \times 3\frac{1}{2} \text{ hrs} \\ &= 285 \text{ km} \end{aligned}$$

$$\text{Distance AB} = 285 + 200 = \underline{485 \text{ km}}$$



$$\text{Area 1} = \frac{1}{2} \times 400 \times 200 = 40\,000 \text{ m}^2$$

$$\text{Area 2} = \frac{1}{2} \times 280 \times (400 + 600) = 140\,000$$

$$\text{Area 3} = \frac{1}{2} \times 400 \times (600 + 800) = 184\,000$$

$$\text{Area 4} = \frac{1}{2} \times 120 \times 320 = 19\,200$$

$$\text{Area 5} = \frac{1}{2} \times 360 \times 720 = 129\,600$$

$$\text{Area 6} = \frac{1}{2} \times 240 \times (240 + 720) = 115\,200$$

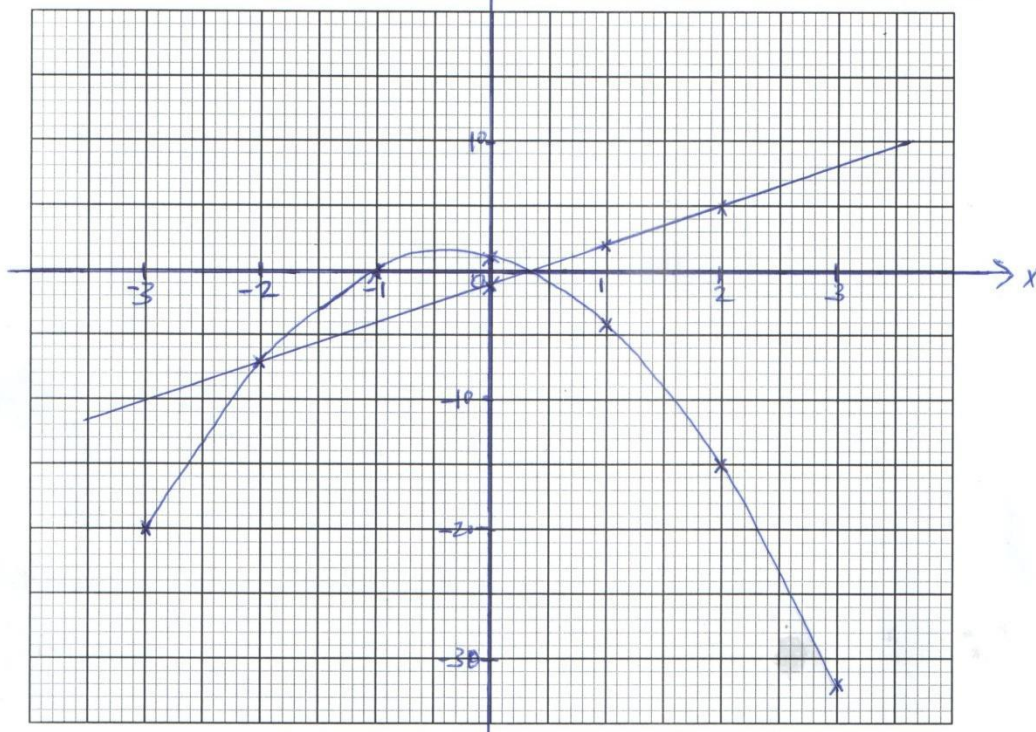
$$\text{Area 7} = \frac{1}{2} \times 400 \times 240 = 48\,000$$

$$\text{TOTAL} = 676\,000 \text{ m}^2$$

$$\text{Area in ha} = \frac{676\,000}{10\,000} = 67.6 \text{ ha.}$$

20. Complete the table for the function $y = 1 - 2x - 3x^2$ in the range $-3 \leq x \leq 3$ (2mks)

X	-3	-2	-1	0	1	2	3	
$-3x^2$	-27	-12	-3	0	-3	-12	-27	B)
$-2x$	6	4	2	0	-2	-4	-6	
1	1	1	1	1	1	1	1	B)
Y	-20	-7	0	1	-4	-15	-32	



b) Using the table above and the graph paper provided, draw the graph of $y = 1 - 2x - 3x^2$ (4mks)

c) Use the graph in (b) above to solve
i) $1 - 2x - 3x^2 = 0$ (2mks)

$$x = -1$$

or

$$x = 0.3$$

ii) $2 - 5x - 3x^2 = 0$ (2mks)

$$\begin{array}{r} y = 1 - 2x - 3x^2 \\ 0 = 2 - 5x - 3x^2 \\ \hline y = -1 + 3x \end{array}$$

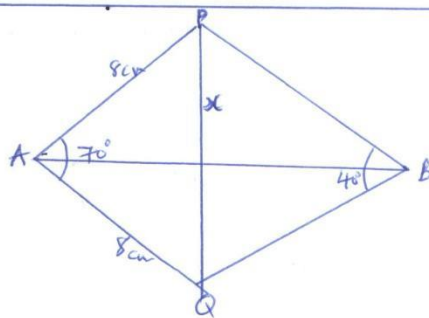
$$y = 3x - 1$$

$$x = -2$$

or

$$x = 0.3$$

21 (a)



$$\sin 35^\circ = \frac{x}{8}$$

$$\Rightarrow x = 8 \sin 35^\circ$$

$$= 4.59 \text{ cm.}$$

$$PQ = 2 \times 4.59$$

$$= 9.18 \text{ cm.}$$

M1
A1

(b)

$$\sin 20^\circ = \frac{4.59}{PB}$$

$$\Rightarrow PB = \frac{4.59}{\sin 20^\circ} = 13.42 \text{ cm.}$$

M1
A1

$$(c) \text{ Area of Segment 1} = \left(\frac{70}{360} \times \frac{22}{7} \times 8^2 \right) - \left(\frac{1}{2} \times 8^2 \times \sin 70^\circ \right)$$

$$= 39.1 - 30.1 \text{ cm}^2$$

$$= 9 \text{ cm}^2$$

M1
A1

$$\text{Area of Segment 2} = \left(\frac{40}{360} \times \frac{22}{7} \times 13.42^2 \right) - \left(\frac{1}{2} \times 13.42^2 \times \sin 40^\circ \right)$$

$$= 62.89 - 57.88$$

$$= 5.01 \text{ cm}^2$$

M1
A1

$$\text{Area of APBQ} = \left(\frac{1}{2} \times 8^2 \times \sin 70^\circ \right) + \left(\frac{1}{2} \times 13.42^2 \times \sin 40^\circ \right)$$

$$= 30.1 + 57.88$$

$$= 87.98 \text{ cm}^2$$

A1

$$\text{Area of shaded R} = 87.98 - (9 + 5.01)$$

$$= 73.97 \text{ cm}^2$$

A1

22. (a)

$$\begin{aligned}\text{Area of } R &= \frac{1}{2} \times 5 \times 3 \checkmark \\ &= \underline{7.5} \text{ square units} \checkmark\end{aligned}$$

(b) (i) Equation of L_1

$$y = 0 \checkmark$$

$$\text{Inequality } \underline{y > 0} \checkmark$$

(ii) Equation of L_2 $(6, 0)$ and $(0, 5)$

$$M = \frac{5-0}{0-6} = -\frac{5}{6} \checkmark$$

$$\frac{y-5}{x-0} = -\frac{5}{6}$$

$$6y - 30 = -5x$$

$$5x + 6y = 30 \checkmark$$

$$\underline{5x + 6y \leq 30} \checkmark$$

(ii) Equation of L_3 $(3, 0)$ and $(0, 5)$

$$M = \frac{5-0}{0-3} = -\frac{5}{3} \checkmark$$

$$\frac{y-5}{x-0} = -\frac{5}{3} \checkmark$$

$$3y - 15 = -5x$$

$$5x + 3y = 15$$

$$\underline{5x + 3y \geq 15} \checkmark$$

M1

M1

A1

M1

M1

A1

23 (a)

$$\frac{40}{100} \times 1,350,000 = \text{sh. } 540,000$$

(b) Bela : Joan : Trinity = 112,000 : 128,000 : 210,000
= 56 : 64 : 105

$$\text{Amount shared Equally} = \frac{30}{100} \times 1,350,000 = 405,000$$

sh. 135,000 Each Partner.

$$\text{Trinity's share} = 135,000 + \left(\frac{105}{225} \times 405,000\right)$$

$$= 135,000 + 189,000$$

$$= \text{sh. } 324,000 \checkmark$$

$$\text{Bela} = 135,000 + \left(\frac{56}{225} \times 405,000\right)$$

$$= 135,000 + 100,800$$

$$= \text{sh. } 235,800 \checkmark$$

$$\text{Difference} = 324,000 - 235,800 = \text{sh. } 88,200 \checkmark$$

(c) Joan's share = $135,000 + \left(\frac{64}{225} \times 405,000\right)$

$$= 135,000 + 115,200$$

$$= \text{sh. } 250,200 \checkmark$$

$$\% \text{ of the total Amount} = \frac{250,200}{810,000} \times 100\%$$

$$= 30.8\%$$

24.

$$(a) \angle PRQ = 90^\circ - 30^\circ \\ = 60^\circ$$

$$(b) \angle RPQ = 90^\circ - 60^\circ \\ = 30^\circ$$

$$(c) \angle ORP = 2\angle RPS \\ = 2 \times 35^\circ \\ = 70^\circ$$

55

$$(d) \angle RTQ = 180^\circ - 90^\circ - 30^\circ \\ = 60^\circ$$

$$(e) \angle PRS = 90^\circ - 35^\circ \\ = 55^\circ \checkmark$$

$$\angle PVS = 180^\circ - 55^\circ \\ = 125^\circ \checkmark$$