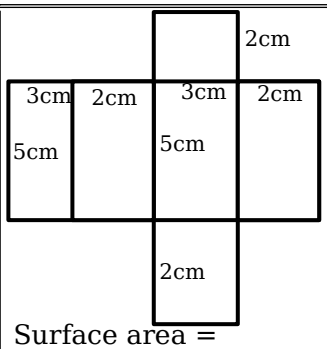
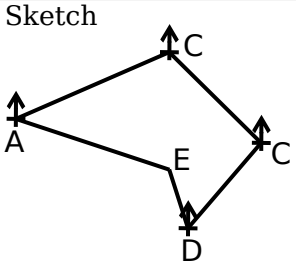
# NAMBALE DIOCESE JOINT EXAM.MATHEMATICS PAPER 1 MARKING SCHEME.(CONFIDENTIAL)

| | | | | | |
|---|---|---|---|---|---|
| 1. | $\frac{23.4-2(10.5)}{3.84}$<br>$=\frac{23.4-21.0}{3.84}$<br>$=\frac{2.4}{3.84}$<br>$= 0.625$ or $\frac{5}{8}$ | M1<br>A1 | 6 | (a) Sum of interior angles = number of triangles x 180<br>Let t be the number of triangles<br>$\Rightarrow 1080 = t \times 180$<br>$t = 6$<br><br>But t = n – 2 where n = Number of sides<br>n = 6 + 2 = 8<br>(b) The size by one interior angle = $\frac{360^0}{n}$<br>$\frac{360^0}{n} = 45^0$<br>Size of one interior angle<br>$180 = \frac{360^0}{n}$<br>$180 - 45$<br>$= 135^0$ | M1<br><br>A1<br><br><br><br>M1<br><br>A1 |
| | | 2 Marks | | | |
| 2. | M:F = 2:3<br>$\therefore m = \frac{2}{3}F$ ---- (i)<br>Sunday service ratio = $\frac{M-10}{F+6} = \frac{1}{3}$<br>$\therefore 3m - 30 = f + 6$<br>$m = \frac{f}{3} + 12$ .... (ii)<br>also $m = \frac{2}{3}f$<br>$\therefore \frac{2}{3}f = \frac{f}{3} + 12$<br>$\frac{1}{3}f = 12$<br>$f = 36$<br>$m = 24$<br>Total no. = 60 | B1 or equivalent<br><br>B1 or equivalent<br><br><br><br><br><br>B1 | | | |
| | | 3 marks | | | 4 Marks |
| 3. | 5000 x 84.15<br>= 420,750<br>420 750<br>289 850<br>130 900<br>$\frac{130900}{80.43} = 1627.50$<br>$\approx 1628$ | M1<br><br><br><br>M1<br>A1 | 7 | $(3^x)^2 - 4(3^x) + 13 = 0$<br>Let $3^x = t$<br>$t^2 - 4t + 3 = 0$<br>$t^2 - 3t - t + 3 = 0$<br>$t(t - 3) -1(t - ) = 0$<br>$(t - 3)(t - 1) = 0$<br>$\therefore t = 3$ or $t = 1$<br>but $3^x = 3$<br>$x = 1$<br>or<br>$3x = 1$ $(3^0)$<br>$x = 0$ | <br><br><br><br><br>M1<br>M1<br><br><br><br>A1 |
| | | 3 Marks | | | |
| 4. | $\frac{4x^2-16x^2}{6x^2-8xy-8y^2}$<br>$\frac{(2x+4y)(2x-4y)}{(2x+4y)(3x-2y)}$<br>$\frac{2x-4y}{3x-2y}$ | M1 for factorizing numerator and denominator M1<br>A1 | | | |
| | | 3 Marks | | | 3 marks |

| | | | | | |
|---|---|---|---|---|---|
| 5 | <br>Surface area =<br>3 x 5 x 2 = 30<br>2 x 5 x 2 = 20<br>2 x 3 x 2 = 12<br>= 62cm$^2$ | B2 Check for other alternatives<br><br>M1<br><br>A1 | 8. | HCF of 240, 320 and 380<br>120 320 380<br>2 120 160 190<br>2 60 80 95<br>5 12 16 19<br><br>HCF = 2 x 2 x 5 = 20 cm<br>Area = $20^2$ = 400cm$^2$ | M1 alternative methods may be applied<br>M1<br>A1 |
| | | 4 Marks | | | 3 Marks |
| 9 | Let the digits be x and y<br>x + y = 16 ..... (i)<br>original no. = 10x + y<br>reversed no. = 10y + x<br>(10y + x) – (10x + y) = 18 ii<br>x + y = 16<br>9y – 9x = 18<br><br>9y + 9x = 144<br>9y – 9x = 18<br>18x = 126<br>x = 7<br>y = 9<br>The no. is 79 | B1 both equations (i) and (ii)<br><br>M1<br><br>A1 | 14 | Let the cost price (C.P) be Sh. x<br>Profit ⇒Sh (420 – x)<br>Loss ⇒Sh (x – 320)<br>Cost price = Sh. 345<br>420 – x = 3x – 960<br>-x – 3x = - 960 – 420<br>-4x = - 1380<br>4x = 1380<br>$x = \frac{1380}{4}$<br><br>= 345<br>Cost price = Sh. 345 | M1 for both profit and loss<br><br>M1 for forming the equation and solving it<br><br>A1 for correct answer |
| | | 3 Marks | | 420 – x = 3(x – 320) | 3 Marks |
| 10. | $\log_{10}(x - 1) + \log_{10}10 = \log_{10}(x - 4)$<br>$\log_{10}((x-1)10) = \log_{10}(x-4)$<br>10 (x – 1) = x – 4<br>10x – 10 = x – 4<br>$x = \frac{2}{3}$ | M1<br>M1<br><br>A1 | 15. | (a) $4^2 = 9^2 + 6^2 – 2$ x 6 x 9 Cos Q<br>108Cos Q = 101<br>Cos Q = 09352<br>Q = Cos-1 0.9352<br>Q = 20.74$^0$<br>(b)∠PSQ = 20.740<br>Area of triangle PQS = $\frac{1}{2}$ x 9 x 10sin 20.74$^0$ = 15.94cm$^2$ | M1<br><br>A1<br><br>M1<br>A1 |
| | | 3 Marks | | | 4 Marks |
| 11. | 3P + 4e = 87 ..... (i)<br>2P + 5e = 93 ..... (ii)<br>2(2P + 4e = 87)<br>3 (2P + 5e = 93)<br>6P + 8e = 174 (iii)<br>6P + 15e = 279 (iv)<br>7e = 105<br>e = 15 | M1<br><br>M1<br><br>M1 | 16. | Cost (x – 20)$^0$ = Sin (2x + 32)$^0$<br>x – 20 + 2x + 32 = 90<br>3x + 12 = 90<br>3x + 78<br>x = 26$^0$<br>Tan (x – 4) = Tan (26 – 4)<br>= Tan 22<br>= 0.4040 | M1<br><br>A1<br><br>B1 |
| | | | | | 3 marks |
| | | | SECTION II | | |

| | | | | | |
|---|---|---|---|---|---|
| | Substitute in (ii)<br>2P + 75 = 93<br>2P = 18<br>P = 9<br>Cost of exercise book Sh. 15<br>Cost of a pen Sh. 9 | A1 | 17. | Sketch<br><br><br>(c) (i) AE = 6.5 ± 0.1cm<br>(ii) Bearing of E from A = $102^0 \pm 1^0$<br><br>KINDLY SEE DRAWING ON PAGE 4 | |
| | | 4 Marks | | | |
| 12. | 45 cows can feed for 3 days<br>∴ 1 cow can feed (30 x 45) days<br>⇒ 50 cows can feed $\frac{30x45}{50}$<br>= 27 days | M1<br>A1 | | | |
| | | 2 Marks | | | |
| 13. | 7y = 3x – 20<br>$y = \frac{3}{7}x - \frac{20}{7}$<br>$g = \frac{3}{7}$<br>Gradient of tar = $\frac{-7}{3}$<br>(512) (x.y) = $\frac{-7}{3}$<br>$\frac{y-2}{x-5} = \frac{-7}{3}$<br>3y – 6 = -7x + 35<br>3y = -7x + 41<br>$y = \frac{-7}{3}x + \frac{41}{3}$ | M1 rewriting in y = mx + C<br>M1 or equivalent<br>A1 or equivalent<br>3y + 7x = 41,<br>7x + 3y – 41 = 0 | | | |
| | | 3 Marks | | | |

18. (a) 100q + 80r = 25600 — B1 or Any other letter
50q + 160r = 18200
(b) 200q + 160r = 51200 — B1
50q + 160r = 18200
150q = 33000
q = 220 — M1 Simultaneous equations
r = 45
(c) $\frac{110}{100}$ x 220 = 242
$\frac{120}{100}$x 45 = 54 — M1
100(242) + 80 (54)
= 28,520 — M1
Profit = 28520 – 25600 — A1
= 2920 — M1
(d) Percentage profit $\frac{2920}{25600}$ — A1
= 11.41%

10 Marks

19.

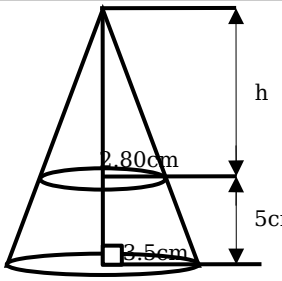
| Length (cm) | Mid pt (x) | F | xf | CF | |
|---|---|---|---|---|---|
| 118 - 126 | 122 | 3 | 366 | 3 | |
| 127 – 135 | 131 | 4 | 524 | 7 | |
| 136 – 144 | 140 | 10 | 1400 | 17 | |
| 145 – 153 | 149 | 12 | 1788 | 29 | |
| 154 – 162 | 158 | 5 | 790 | 34 | |
| 163 – 171 | 167 | 4 | 668 | 38 | |
| 172 – 180 | 176 | 2 | 352 | 40 | |
| | | 40 | 5888 | | |

(a) (i) Modal class ⇒ 145 – 153 — B1
(ii) Median class 145 – 153 — B1 C.F column; B1 median class
(b) (i) Mean of feeding — B1 mid point; B1 xF column
$x = \frac{xf}{f}$ — M1
$= \frac{5888}{40}$ — A1
147.2
(ii) Median = L ( $\frac{\frac{n+1}{2} - c}{f}$ ¿i — M1 Substitution
= 144.5 + ( $\frac{\frac{41}{2} - 17}{12}$ )9 — M1 attempt to simplify
144.5 + $\frac{20.5-17}{12}$ x 9 — A1
144.5 + 2.625
L = $\sqrt{637.25}$
∴ l = 25.24
Curved surface area larger cone — B1
$\pi rL = \frac{22}{7}$ x 3.5 x 25.24 — B1
= 277.64cm² — B1
Curved S.A of the small cone
$\frac{16}{25}$ x 277.64 = 99.9cm² — M1
Total surface area of frustrum — A1
$\left\{\frac{22}{7} x 2.8 x 2.8\right\}$ + — B1
$\left\{\frac{22}{7} x 3.5 x 3.5\right\}$ + 99.95 — B1
cm²
24.64 + 38.5 + 99.95
= 163.09cm² — M1
(b) Volume of small cone
$\frac{1}{3}r^2h = \frac{1}{3}$ x $\frac{22}{7}$ x 2.8 x 2.8 — A1
x 20 = 164.3cm³
Using volume scale factor (V.S.F)
Volume of larger cone
$= \frac{125}{64}$ x 164.3cm³
∴Volume of frustrum
$= \left\{\frac{125}{64} - 1\right\}$ x 164.3
$\frac{61}{64}$ x 164.3
= 156.6cm3

10 Marks

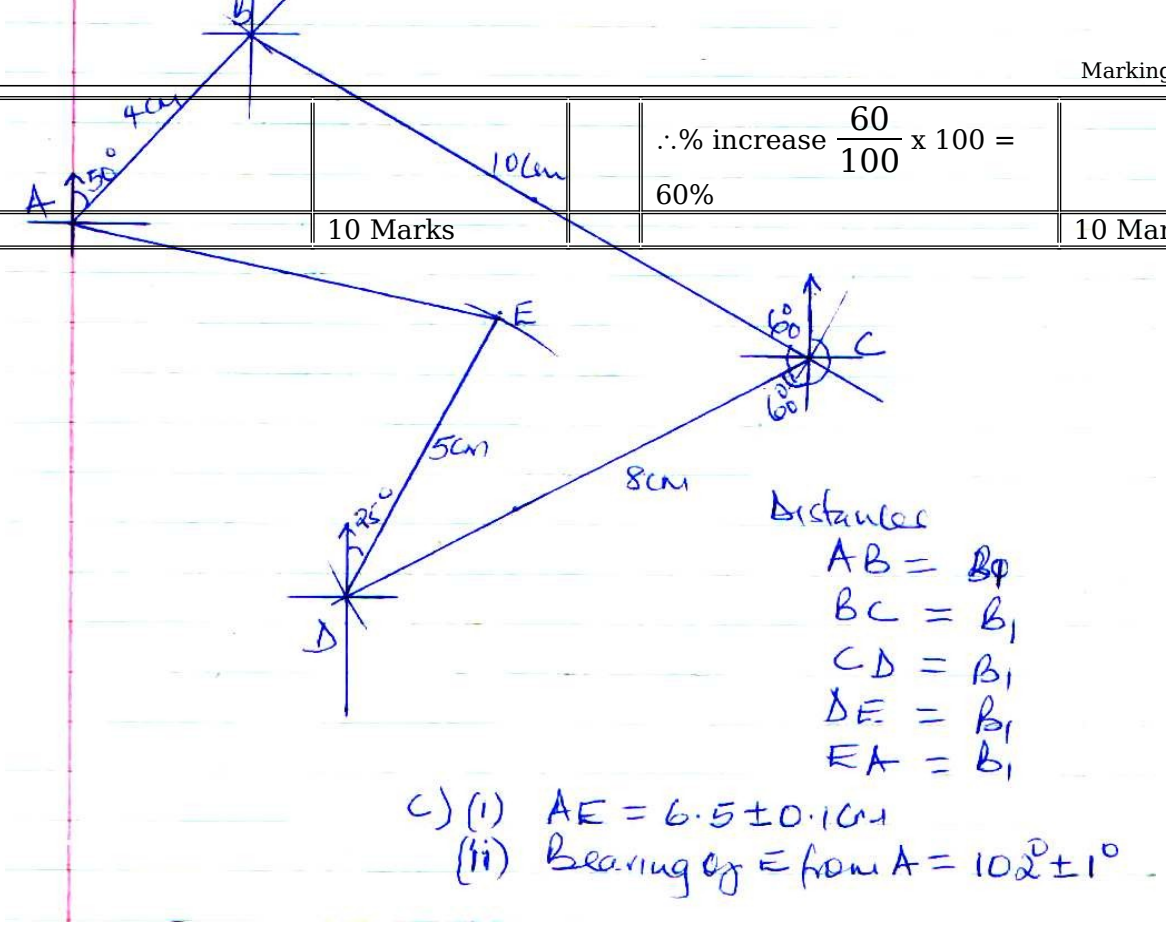
21. $A_1$ (-4,6) $B_1$ (-8,3) $C_1$ (-4, 3)
$A_2\begin{pmatrix}-4\\6\end{pmatrix} + \begin{pmatrix}10\\2\end{pmatrix} = \begin{pmatrix}6\\8\end{pmatrix}$, $A_2$ — 2 Marks correct co-ordinates
$(6,8)$
$B_2 = \begin{pmatrix}-8\\3\end{pmatrix} + \begin{pmatrix}10\\2\end{pmatrix} = \begin{pmatrix}2\\5\end{pmatrix}$, $B_2$
(2,5) — 2 marks
$C_2 = \begin{pmatrix}-4\\3\end{pmatrix} + \begin{pmatrix}10\\2\end{pmatrix} = \begin{pmatrix}6\\5\end{pmatrix}$, $C_2$ — 2 Marks
(6,5)
(a) Transformation is a reflection
on the line y = 1
(b) Simple transformation is
rotation centre (2,0) through
± 180⁰

KINDLY SEE PAGE 5

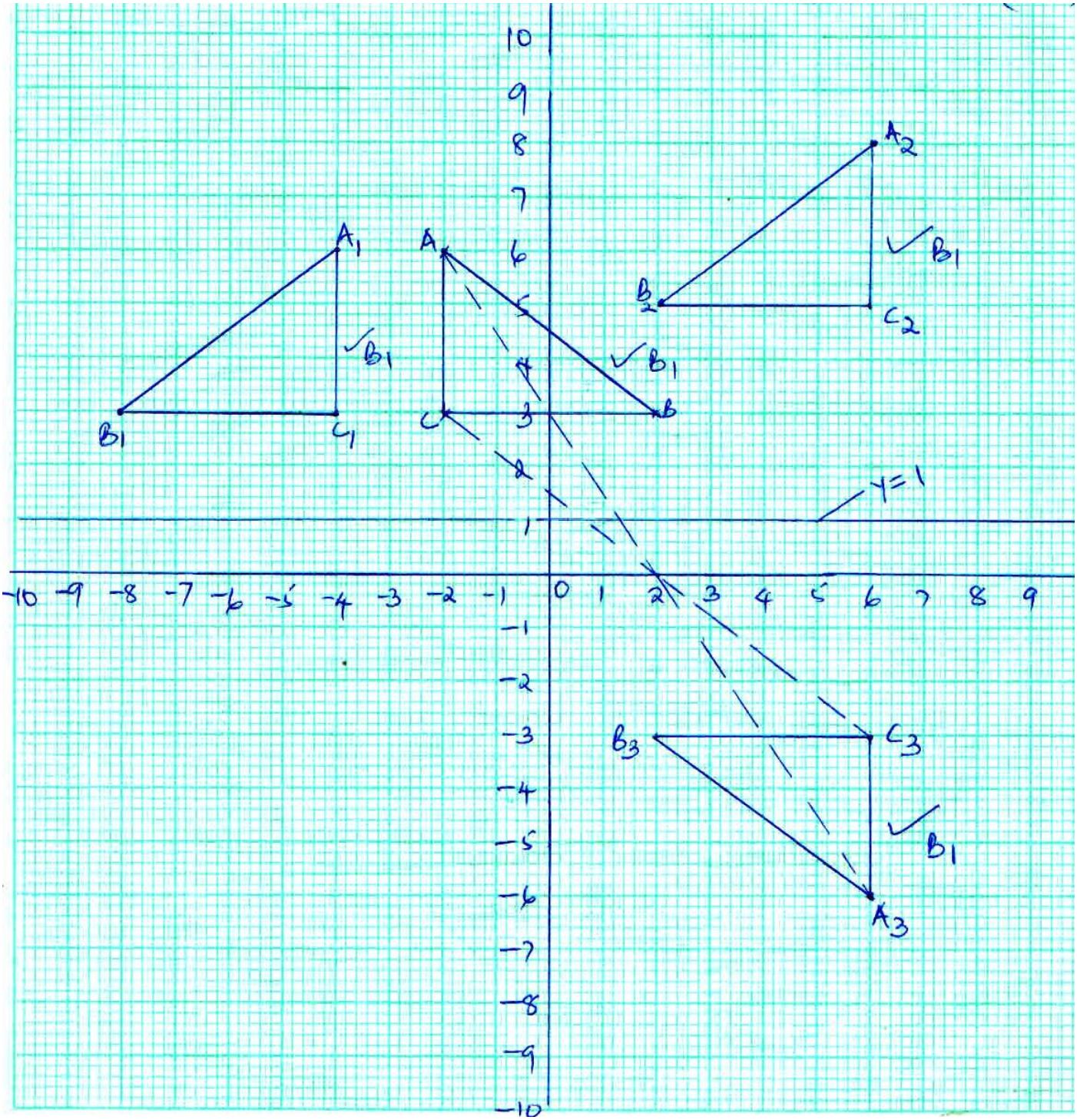
| | | | | | |
|---|---|---|---|---|---|
| | = 147.125 | | | | |
| | | 10 marks | | | |
| 20. | <br>(a) Linear scale factor (L.S.F)<br>$\frac{2.8}{3.5} = \frac{4}{5}$<br>Area scale factor (A.S.F) ( $\frac{4}{5})^2 = \frac{16}{25}$<br>Volume scale factor (V.S.F)<br>¿ = $\frac{64}{125}$<br>From similar triangles<br>$\frac{h}{h+5} = \frac{4}{5}$<br>5h = 5h + 20<br>h = 20cm<br>Length of larger cone<br>$L^2 = 25^2 + 3.5^2 = 625 + 12.25$ | | 22 | (a) (i) $\angle BAC = \angle BCA = 45^0$<br>$ABC = 90^0$ and $\Delta$ ABC is isosceles<br>$\angle DAC = 180^0 - (90^0 + 35^0)$<br>$= 180 - 125$<br>$= 55$<br>$\therefore \angle BAD = 45 + 55 = 100^0$<br>(ii) Reflex $\angle BOD = 2 \times 100 = 200^0$<br>$\therefore$ Obtuse $\angle BOD = 360^0 - 200^0 =$<br>$160^0$<br>(iii) BDG<br>ABGD is a cyclic quad.<br>$\therefore BGD = 180 - 100 = 180^0$<br>(b) $\angle ABE = \angle CBF$<br>$\angle ABE = 45^0$ ($\angle$S in alt. segment)<br>$\angle CBF = 45$ ($\angle$S in alternate segment)<br>$\therefore \angle ABE = \angle CBF$ | M1<br><br><br><br>M1<br>A1<br>M1<br>A1<br><br><br>M1<br><br>A1<br><br>M1<br>M1<br>A1 |
| 23 | (a) $\frac{1}{2}$ x 30hr $\frac{1}{2}$x40hr 60h = 2090<br>95h = 2090<br>h = 22m/s<br>max speed = $\frac{22x3600}{1000}$<br>= 79.2 km/h<br>(b) a = $\frac{22}{30}$<br>= $\frac{11}{30}$<br>(c) $\frac{1}{2}$ x 20 x 11 = $\frac{220}{2}$<br>= 110m<br>(d) Time for half journey<br>$\frac{1}{2}$ x 22 (30 + t + t) = $\frac{1}{2}$ x 2090<br>11 (30 + 2t) = 1045<br>330 + 22t = 1045<br>22t = 919<br>t = 32.5 | M1<br><br>A1<br><br>B1<br><br>M1<br>A1 v 0.7333 m/s accept km/h<br>M1<br>A1<br><br><br>M1<br>M1<br><br><br>A1 | 24. | (a) Let no. of members be = n<br>Each member was to contribute Shs. $\frac{4000}{n}$<br>When 15 members failed to pay<br>No. of members who contributed was n – 15<br>Each member had to contribute<br>Sh. $\frac{400}{n-5}$<br>But this was Sh. 60 more<br>$\Rightarrow \frac{4000}{n-15} - \frac{4000}{n} = 60$<br>$n(4000) = (n - 15)(4000) + 60(n^2 - 15n)$<br>$4000n = 4000n - 60000 + 60n^2 - 900n$<br>$n^2 - 40n + 15n - 1000 = 0$<br>$(n - 40)(n + 25) = 0$<br>$n = 40$ or $n = 25$<br>$\therefore = 40$ There are 40 members<br>(b) Each member was to contribute<br>Sh. $\frac{4000}{40}$ = Sh. 100<br>Increase was 60 | M1<br><br><br><br><br>M1 expression<br><br><br><br><br>M1<br>A1 simplified<br>M1 factorisation<br><br>A1<br><br><br><br>M1A1 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | ∴% increase $\frac{60}{100}$ x 100 = 60% | |
| | | 10 Marks | | | 10 Marks |

No. 17




No. 21


A1
B1
C1
A
B
C
A2
B2
C2
B1
B1
B1
y=1
B3
C3
A3
B1