20.a)Distance of bus from Nairobi 500 - 2.5 x 60 =350km ii) Let distance be xkm for bus x = 150 +60t for car x = 100t ∴ 100 t = 150+60t t = $^3/_4$h = 375KM b) Yet to be covered 500 - 375 = 125km time bus takes = $^{125}/_{60}$ = 2h 15min or 125 minutes New speed of car $\frac{125}{125-25}$ $\frac{125}{x} = \frac{100}{10}$ 60 x = 75km/hr or Distance from Nairobi 500 - 60 x 25 =350km relative velocity 100 - 60 = 40km/hr time car takes to reach bus $^{150}/_{40}$ = $3^3/_4$h Distance covered $3^3/_4$ x 100 = 375km b) time taken by car for remaining distance 25min = 2h 5min 1hr 40 min average speed $\frac{125}{1^2/_3}$ = 75km/hr	M1 A1 B1 M1 M1 A1 B1 B1 M1 A1 10 M1 A1 B1 M1 A1	B1 for x = 150 + 60t or x = 100t a) ii Bus $^x/_{60}$ h or Car $^x/_{100}$h $^x/_{60} = {}^x/_{100} + {}^5/_2$ $\frac{10x-6x}{600} = 5/2$ 20x-12x= 3000 8x=3000 x=375km Thy B = $^x/_{60}$ Thy C = $\frac{150+x}{100}$ $\frac{x}{60} = \frac{150+x}{100}$ x=225 Total D 150+225 = 375km time taken by bus for remaining distance $^{125}/_{60}$ = 2h 5 min If $^{125}/_{1.67}$ book fo PA $^{125}/_{1.667}$ accept to give 74.99km
21. ai) Length At =100 tan 30° = 100 x 0.5774 = 57.74 ii = Length AD AC = $\sqrt{57.74^2 + 57.74^2}$ =81.66 OR 81.65 AD^2 = 51.66+80² =2x8166x80COS 100° = 6668 +6400 - 2x81.66x80 x(-0.1736) AD =√15336 =123.8 iii) perimeter AB+B+CC+CD+DA AB=$\sqrt{100^2+57.74^2}$ = $\sqrt{13334}$ = 115.5	M1 A1 M1 A1 M1 A1 M1 M1	x tan 60° - 100 AC - $^{57.740}/_{\sin 45}$ AC = $^{57.74}/_{\cos 45^0}$ $^{100}/_{\cos 30}$ or $^{100}/_{\sin 60}$ AB $^{57.74}/_{\sin 30}$ = $^{57.74}/_{\cos 60^0}$ Accept 57.73 of table model

Perimeter = 11.55+100+57.74+80+123.8 = 477.04 = 477.0(4sf) b) Rolls of wire Length - 477.04 +57.74+81.66 = 666.44 = 616.4 Roles to be bought $\frac{(616.4 - 3 \times 2.8) \times 5}{480}$ = 6.333 = 7 rolls		A1 M1 M1 A1 10	477.1 in case 123.84 is used 6.3375if 4477.1 used
22 a) $\underset{\sim}{OL} = 3\begin{pmatrix}1\\6\end{pmatrix}$ $= \begin{pmatrix}3\\18\end{pmatrix}$ B1 $\underset{\sim}{ON} = \frac{2}{3}\begin{pmatrix}15\\6\end{pmatrix}$ B1 $= \begin{pmatrix}10\\4\end{pmatrix}$ $\underset{\sim}{LN} = \underset{\sim}{ON} - \underset{\sim}{OL}$ $= \begin{pmatrix}10\\4\end{pmatrix} - \begin{pmatrix}3\\18\end{pmatrix}$ B1 $= \begin{pmatrix}7\\-14\end{pmatrix}$ b) $\underset{\sim}{OM} = \underset{\sim}{OL} + \frac{3}{7}\underset{\sim}{LN}$ $= \begin{pmatrix}3\\18\end{pmatrix} + \frac{3}{7}\begin{pmatrix}7\\-14\end{pmatrix}$ M1 $= \begin{pmatrix}3\\18\end{pmatrix} + \begin{pmatrix}3\\6\end{pmatrix}$ $= \begin{pmatrix}6\\12\end{pmatrix}$ = M(6,12) A1 c)i $\underset{\sim}{OT} = \frac{7}{6}\underset{\sim}{OM}$ $= \frac{7}{6}\begin{pmatrix}6\\12\end{pmatrix}$ $= \begin{pmatrix}7\\14\end{pmatrix}$ B1 ii) $\underset{\sim}{LT} = \begin{pmatrix}7\\14\end{pmatrix} - \begin{pmatrix}3\\18\end{pmatrix}$ B1 $= \begin{pmatrix}4\\-4\end{pmatrix}$ $\underset{\sim}{LB} = \begin{pmatrix}15\\6\end{pmatrix} - \begin{pmatrix}3\\18\end{pmatrix}$ B1 B1			using ratio theorem

$= \begin{pmatrix} 12 \\ -12 \end{pmatrix}$ $\underset{\sim}{LB} = 3\underset{\sim}{LT}$ L is common point	B1	
23. a) Slant height $L = \sqrt{3^2+4^2}$ $= 5cm$ Surface area C Cone $\pi \times 3 \times 5$ Cylinder $= \pi\, 6 \times 8$ Hemisphere $= 2\pi \times 3 \times 3$ Total surface area $= 15\pi + 48\pi + 18\pi$ $= 81\pi$ or $254.5cm^2$ b) 15cm: 600cm 1:40 a.s.f. $= 40^2$ $= 1600$ Area of container $= 1600 \times 254.5cm^2$ $= \frac{1600 \times 254.5}{10000}$ $= 40.72m^2$ Paint needed $\frac{40.72}{20} \times 0.75$ $= 1.527$ litres Total = 24.13 + 9.05 + 2.54m1 $= 40.73m2$ Paint needed $= \frac{40.73}{20} \times 0.75ml$ $= 1.527$	B1 M1 M1 A1 B1 B1 M1 M1 M1 A1	56 57.13 150.816 Accept 254.6 when $\pi = {}^{22}/_{7}$ l.s.f. = 1cm:0.4m $= 1cm^2:0.16m^2$ 254.5x0.16 40.72 Conversion $40.74m^3$ if 254.6 used Accept 1.5281 if $\pi = {}^{22}/_{7}$ b) ${}^{15}/_{6} = {}^{3}/_{x}$ $x = 1.2m$ ${}^{15}/_{6} = {}^{4}/_{y}$ $y = 1.6m$ Cylinder $= 2 \times {}^{22}/_{7} \times 1.2 \times 3.2 = 24.12$ Cone $= {}^{22}/_{7} \times 1.2 \times 2 = 7.54$ Hemisphere $= 2 \times {}^{22}/_{7} \times 1.2 = 9.05$
24. a) $S = 5^3 - 5 \times 5^2 + 3 \times 5 + 4$ $= 19m$ b) $V = {}^{ds}/_{dt} = 3t^2 - 10t + 3$ $3 \times 5^2 - 10 \times 5 \times 3$ $= 2.5m/s$ c) Momentarily at rest $v = 0$ $3t^2 - 10t + 3 = 0$ $(3t-1)(t-3) = 0$ $t = {}^{1}/_{3}$ or $= 3$ d) Acceleration when $t = 2$ $a = {}^{dv}/_{dt}$ $= 6t - 10$ $6x2 - 10$ $= 2m/s^2$	M1 A1 M1 M1 A1 M1 M1 A1 M1 A1	Substitution Differenciation Substitution