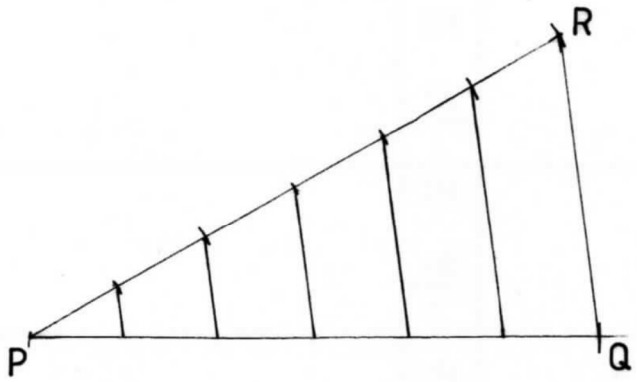
5.2 MATHEMATICS ALTERNATIVE B (122)

5.2.1 Mathematics a lternative b (122/1)

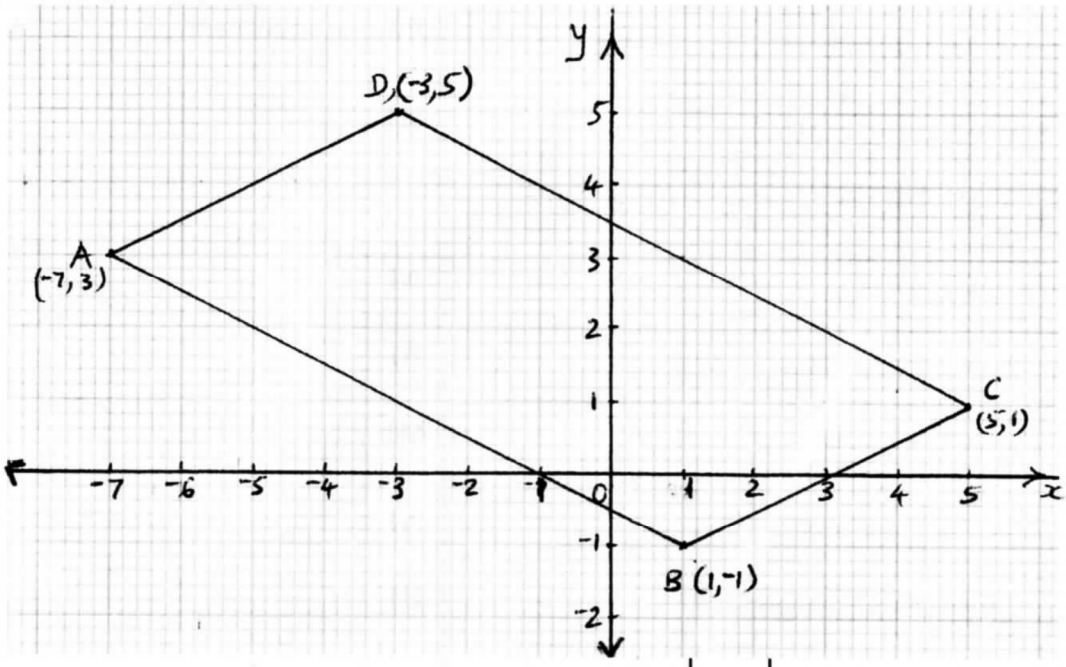
1.	- 3^ 5 -+ 7h÷+ 2^ 3 +- 6h =- 3^- 12h÷2^ 9 h = 36 ÷- 18 =- 2	 M1 M1 A1 3	
2.	(a) Number is 7532 (b) Total value of hundreds digit = 500	B1 B1 2	
3.	$\frac{2}{3}$ # $\frac{27}{5}$ - $2\frac{3}{10}$ = $\frac{18}{5}$ - $\frac{23}{10}$ = $\frac{13}{10}$ $\frac{3}{5}$ ' $4\frac{1}{2}$ + $1\frac{3}{5}$ = $\frac{3}{5}$ # $\frac{2}{9}$ + $\frac{8}{5}$ = $\frac{26}{15}$ 、 $\frac{13}{10}$ $\frac{26}{15}$ = $\frac{13}{10}$ # $\frac{15}{26}$ = $\frac{3}{4}$	M1 M1 A1 3	
4.	Nekesa: Mwita: Auma = 600 : 750 : 650 = 12 : 15 : 13 Amount Mwita got more than Nekesa = $\frac{15}{40}$ # 1200 - $\frac{12}{40}$ # 1200 = 450 - 360 = 90	B1 M1 A1 3	= $\frac{3}{40}$ # 1200 = 90
5.	h = 3r - 1 (h= 3 # 2 - 1= 5 、 $\frac{7r^2 + 2rh}{\sqrt{4h - 2r}}$ = $\frac{7 \# 2^2 + 2\# 2 \# 5}{\sqrt{4 \# 5 - 2\# 2}}$ = $\frac{28 + 20}{\sqrt{16}}$ = $\frac{48}{4}$ = 12	 M1 M1 A1 3	

6.	Area of each face $= \frac{1176}{6} = 196$ Length of side $\sqrt{196}$ $= 14$	M1 M1 A1 3	
7.		B1 B2 3	Line, PR, drawn and divided into six (6) equal parts. Joining QR and drawing five lines parallel to QR intersecting with PQ.
8.	$\sin x = \frac{3}{5}$ *and* $\cos = \frac{4}{5}$ $\therefore 2\sin x - \cos x = 2 \times \frac{3}{5} - \frac{4}{5}$ $= \frac{6}{5} - \frac{4}{5} = \frac{2}{5}$	B1 M1 A1 3	
9.	$5x + 6x(10) = 2600$ $5x + 60x = 2600$ $x = \frac{2600}{65}$ $= 40$ Total number of coins: $= 40 + 6 \times 40 = 280$	M1 M1 A1 B1 4	
10.	$\frac{3^{-2} \times 81^{\frac{3}{2}}}{4^{-3} \div 8^{\frac{1}{3}}} = \frac{3^{-2} \times 3^{2\times3}}{\frac{1}{2^6} \div 2}$ $= 3^4 \times 2^7$ $= 10368$	M1 M1 A1 B1 4	√ powers of 3 √ powers of 2

11.	Marked price $= 5750 \times 1.12 = 6440$ % discount $= \dfrac{6440 - 6118 \times 100}{6440}$ $= 5\%$	M1 M1 A1 3	
12	$9a^2 - \dfrac{16}{b^2c^2} = (3a)^2 - \dfrac{4^2}{(bc)^2}$ $= \left(3a + \dfrac{4}{bc}\right)\left(3a - \dfrac{4}{bc}\right)$	M1 A1 2	
13.	(a) $\begin{array}{c\|ccc} & 12 & 28 & 54 \\ \hline 2 & 6 & 14 & 27 \\ 2 & 3 & 7 & 27 \\ 3 & 1 & 7 & 9 \\ 3 & 1 & 7 & 3 \\ 3 & 1 & 7 & 1 \\ 7 & 1 & 1 & 1 \end{array}$ The height (LCM) $= 2^2 \times 3^3 \times 7$ $= 756$ (b) Number of books $= \dfrac{756}{12} = 63$	M1 M1 A1 B1 4	√ factorization
14.	Let number of sides ben $\therefore (2n - 4) \times 90 = 1260$ $2n \times 90 = 1260 + 360$ $n = \dfrac{1620}{180} = 9$ Size of each angle $= \dfrac{1260}{9} = 140°$	M1 A1 B1 3	

15	L.S.F = $\frac{7.5}{5}$ = 1.5 ∴ A.S.F = 1.5^2 = 2.25 Area of smaller triangle = $\frac{22.5}{2.25}$ = 10 cm^2	B1 M1 A1 3	
16.	r^2 # $\frac{22}{7}$ # $\frac{45}{360}$ = 77 r = $\sqrt{\frac{77 \# 360 \# 7}{45 \# 22}}$ = 14 Circumference = 2 # 14# $\frac{22}{7}$ = 88 cm	M1 A1 M1 A1 4	
17.	(a) (i) Volume of prism = Area of crosssection # L = ;1.4 # 0.8 - $\frac{1}{2}$# $\frac{22}{7}$ # ^0.7 h# 2 = 0.35 # 2 = 0.7 m^3 (ii) Total S.A = 0.8 # 2# 2 + 2 # 1.4 + 0.7 # $\frac{22}{7}$# 2 + 0.35 # 2 = 6+ 4.4 + 0.7 = 11.1 m^2 (b) = $\frac{6 \# 100}{6 + 4.4 + 2 \wedge 0.35 h}$ = 54.05405405 % = 54.1%	M1 M1 M1 A1 M1 M1 M1 A1 M1 A1 10	Multiplication by length rectangular triangular cross section

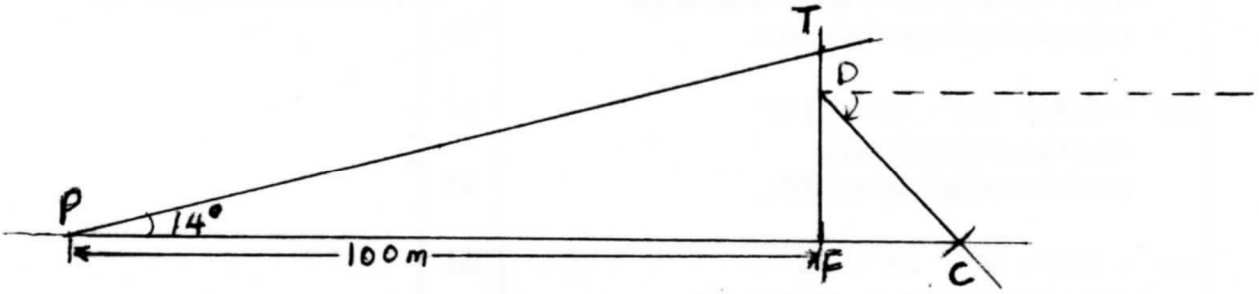
18.



(a)	B1 B1	plotting vertices A, B and C. identifying vertex D (-3, 5) and competing parallelogram.
(b) (i) grad AB = $\frac{3 - -1}{-7 - 1}$	M1	
$= -\frac{1}{2}$	A1	
(ii) $\frac{y-3}{x--7} = -\frac{1}{2}$ or $\frac{y--1}{x-1} = -\frac{1}{2}$	M1	
$y = -\frac{1}{2}x - \frac{7}{2} + 3$ or $y = -\frac{1}{2}x + \frac{1}{2} - 1$		
$y = -\frac{1}{2}x - \frac{1}{2}$	A1	
(c) (i) Let grad L be m		
$\therefore -\frac{1}{2}m = -1$ ($m = 2$	B1	
equation of line $\frac{y-3}{x-1} = 2$	M1	
$y - 2x = 1$	A1	
(ii) y - intercept: when $x = 0$		
$y = 2 \# 0 + 1 = 1$		
$\therefore$ co-ordinates ^0, 1 h	B1	
	10	

19.	(a) $\left(x-\frac{1}{2}\right)(x+1)=0$	B1	or equivalent
	$x^2+x-\frac{1}{2}x-\frac{1}{2}=0$	M1	
	$x^2+\frac{1}{2}x-\frac{1}{2}=0$		
	$2x^2+x-1=0$	A1	
	(b) (i) $(2y+1)(y)=55$	B1	
	$(2y+11)(y-5)=0$	M1	
	$y=-5\frac{1}{2}$ or $y=5$	A1	
	$\therefore$ price of one mango Sh 5	B1	
	(ii) no. of mangoes Karau got		
	mangoes bought $=\frac{95+55}{5}=30$	M1	
	$\therefore$ extra mangoes $=\frac{30}{6}=5$	A1	
	Total mangoes = 30 + 5 = 35	B1	
		10	

20.



(a) √ use of scale	B1	
angle of elevation 14° √ drawn	B1	
completion of scale drawing	B1	
(b) height of mast → 2.5 ± 0.1	B1	
$= 2.5 \times 10$		
$= 25$ m	B1	
(c) position of cable drawn	B1 B1	√ positions of C and D cable CD shown
(d) (i) ∠ of depression of C from D		
$48° \pm 1°$	B1	
(ii) Distance from P to C		
$(10 + 1.8 \pm 0.1) \times 10$	M1	
$= 118 \pm 1\,m$	A1	
	10	

21.	(a) + ROP = 2 # 64° = 128° angle subtended at centre is twice angle subtended at O circumference.	B1 B1	allow other valid reasons
	(b) + PSR = 180° - 64° = 116° opposite angles of cyclic quadrilateral add up to 180°.	B1 B1	
	(c) + ORP = 90° - 64° = 26° angle in semicircle (+ QRP) = 90° and base angles of isosceles triangle equal.	B1 B1	
	(d) + TRP = 64° angle in alternate segment.	B1 B1	
	(e) + RTP = 180 - 2^64 h= 52° + TRP = 64° angle in alternate segment and sum of angles in triangle PRT = 180°.	B1 B1	
		10	

22.	(a) (i) $r = \sqrt{15^2 - 12^2}$	M1	
	$= 9$	A1	
	(ii) Volume of cone:		
	$= \frac{1}{3}r \# 9 \# 9 \# 12$	M1	
	$= 1017.87602$		
	$- 1017.88$	A1	
	(b) (i) $\frac{h}{12} = \frac{6}{9}$	M1	
	$h = \frac{12 \# 6}{9} = 8$	A1	
	(ii) volume of smaller cone		
	$= \frac{1}{3}r \# 6 \# 6 \# 8$	M1	
	$= 301.5928947$		
	$- 301.59$	A1	
	(iii) Volume of frustum		
	$1017.88 - 301.59$	M1	
	$= 716.29$	A1	
		10	

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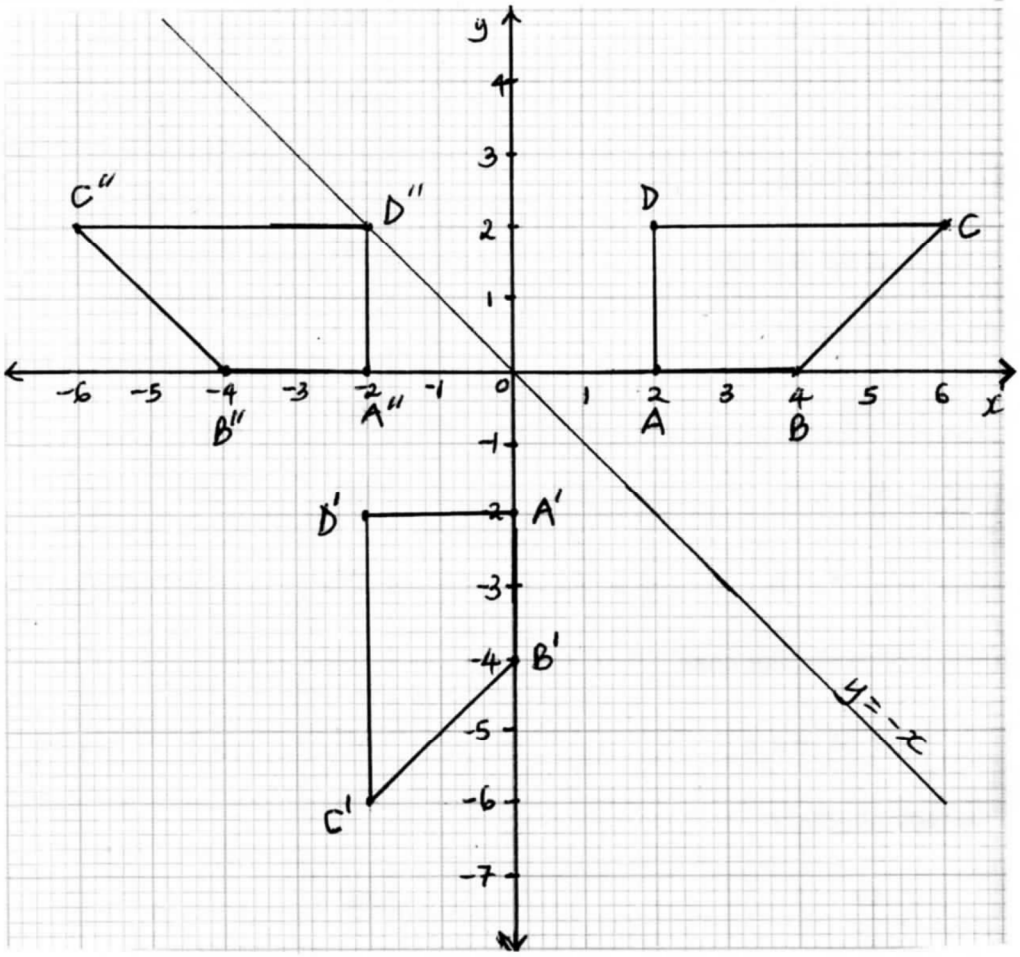

(a) (i) trapezium ABCD √ drawn	B1	
(ii) line of reflection $y = -x$ drawn	B1	may be implied by √ image
trapezium A'B'C'D' √ drawn	B1	
(iii) points A"B"C"D" plotted	B1	
trapezium A"B"C"D" drawn	B1	
(b) transformation which maps A"B"C"D" onto ABCD		
reflection	B1	
on line $x = 0$	B1	or y - axis
(c) directly congruent pair A'B'C'D' and A"B"C"D"	B1	
oppositely congruent pairs ABCD and A'B'C'D'	B1	
ABCD and A"B"C"D"	B1	
	10	

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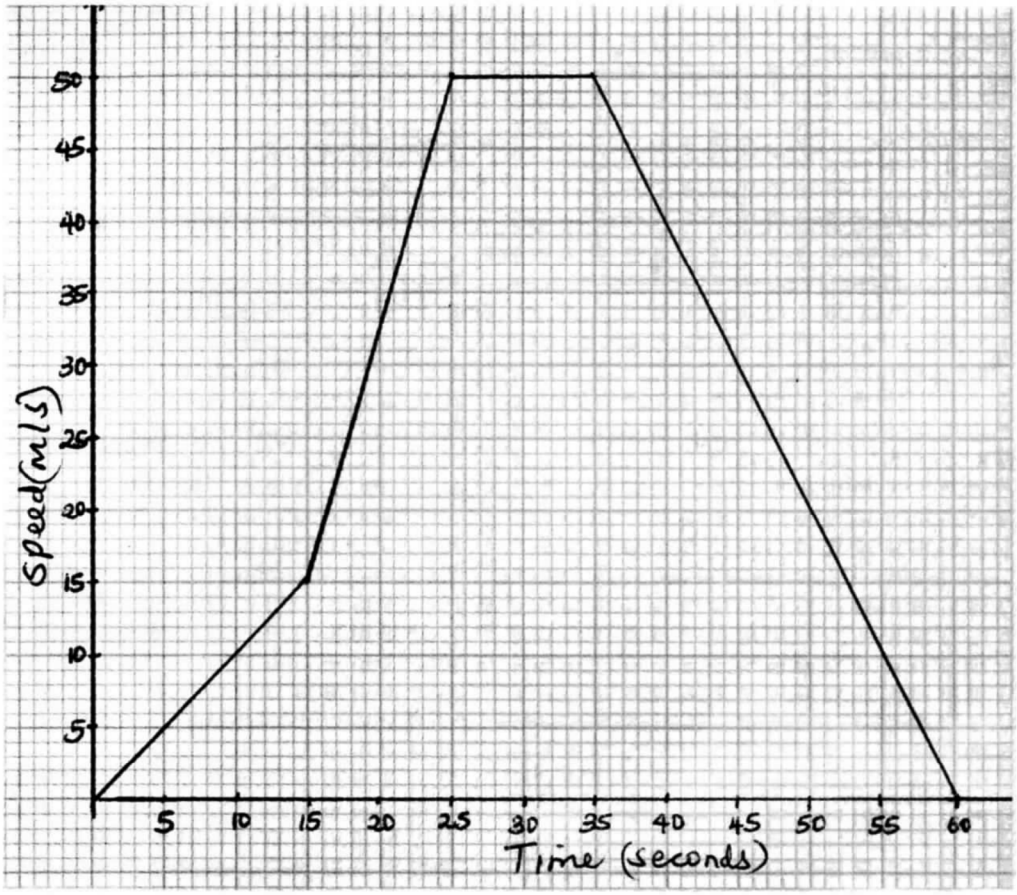

(a) √ scale	S1	
acceleration parts	B1	
constant speed	B1	
deceleration	B1	
(b) (i) deceleration $= \frac{50}{25}$	M1	
$= 2\ m/s^2$	A1	
(ii) Total distance		
$= \frac{1}{2}(15 \times 15) + \frac{1}{2}(15 + 50) \times 10 + 10 \times 50 + \frac{1}{2}(25 \times 50)$	M1	or equivalent
$= 112.5 + 325 + 500 + 625 = 1562.5$	A1	
(iii) Average speed		
$= \frac{1562.5}{60}$	M1	
$= 26.0416 = 26.0\ m/s$	A1	
	10	