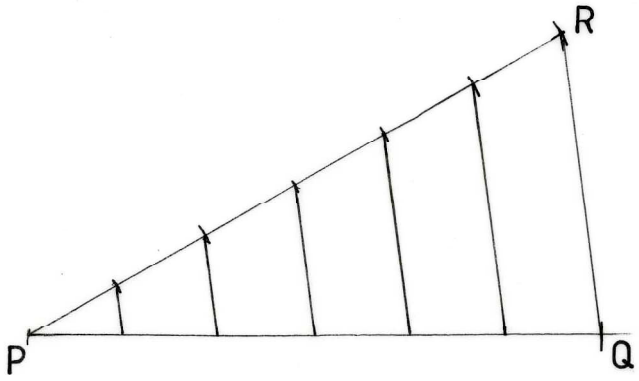
4.3.3 Mathematics Alternative B (122/1)

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

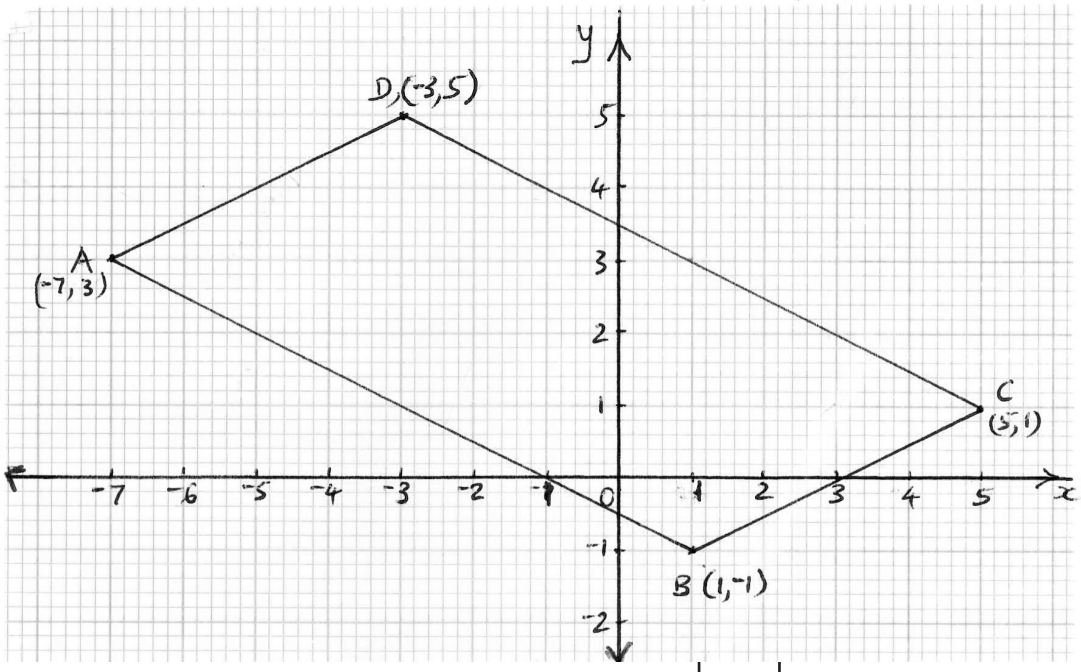
6.	Area of each face $= \frac{1176}{6} = 196$ Length of side $\sqrt{196}$ $= 14$	M1 M1 A1 3	
7.		B1 B2 3	Line, PR, drawn and divided into six (6) equal parts. Joining QR and drawing five lines parallel to QR intersecting with PQ.
8.	$\sin x = \frac{3}{5}$ *and* $\cos = \frac{4}{5}$ $\therefore 2\sin x - \cos x = 2 \times \frac{3}{5} - \frac{4}{5}$ $= \frac{6}{5} - \frac{4}{5} = \frac{2}{5}$	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.	$\frac{3^{-2} \times 81^{\frac{3}{2}}}{4^{-3} \div 8^{\frac{1}{3}}} = \frac{3^{-2} \times 3^{2\times 3}}{\frac{1}{2^6} \div 2}$ $= 3^4 \times 2^7$ $= 10368$	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) $2^2 \times 3^3 \times 7$ $= 756$ (b) Number of books $= \dfrac{756}{12} = 63$	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 $= \dfrac{1260}{9} = 140^\circ$	M1 A1 B1 3	

	12	28	54
2	6	14	27
2	3	7	27
3	1	7	9
3	1	7	3
3	1	7	1
7	1	1	1

15	L.S.F $= \frac{7.5}{5} = 1.5$ $\therefore$ 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.	$r^2 \times \frac{22}{7} \times \frac{45}{360} = 77$ $r = \sqrt{\frac{77 \times 360 \times 7}{45 \times 22}}$ $= 14$ Circumference $= 2 \times 14 \times \frac{22}{7}$ $= 88$ cm	M1 A1 M1 A1 4	
17.	(a) (i) Volume of prism = Area of crosssection × L $= \left[1.4 \times 0.8 - \frac{1}{2} \times \frac{22}{7} \times (0.7)^2\right] \times 2$ $= 0.35 \times 2$ $= 0.7\ m^3$ (ii) Total S.A $= 0.8 \times 2 \times 2 + 2 \times 1.4 + 0.7 \times \frac{22}{7} \times 2$ $+ 0.35 \times 2$ $= 6 + 4.4 + 0.7$ $= 11.1\ m^2$ (b) $= \frac{6 \times 100}{6 + 4.4 + 2(0.35)}$ $= 54.05405405\%$ $= 54.1\%$	M1 M1 M1 A1 M1 M1 M1 A1 M1 A1 10	Multiplication by length rectangular triangular cross section

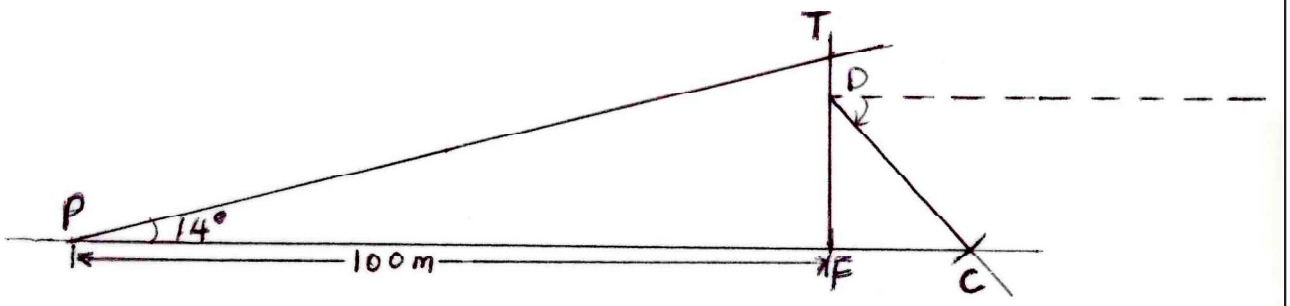
18.



(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		
$\therefore -\frac{1}{2}\text{m} = -1 \Longrightarrow \text{m} = 2$	B1	
equation of line $\frac{y-3}{x-1} = 2$	M1	
$y - 2x = 1$	A1	
(ii) y - intercept: when $x = 0$		
$\text{y} = 2 \times 0 + 1 = 1$		
$\therefore$ co-ordinates $(0, 1)$	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		
	$48^\circ \pm 1^\circ$	B1	
	(ii) Distance from P to C		
	$(10 + 1.8 \pm 0.1) \times 10$	M1	
	$= 118 \pm 1\,m$	A1	
		10	

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

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

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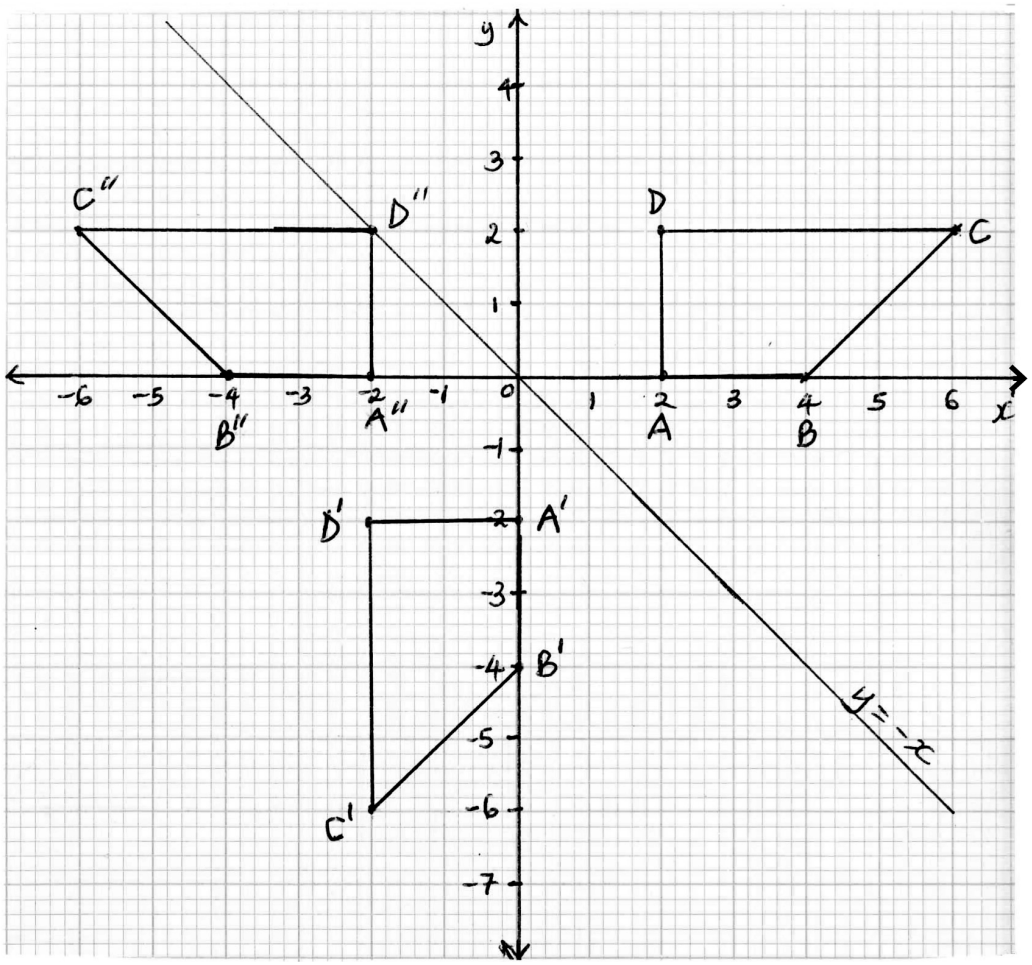
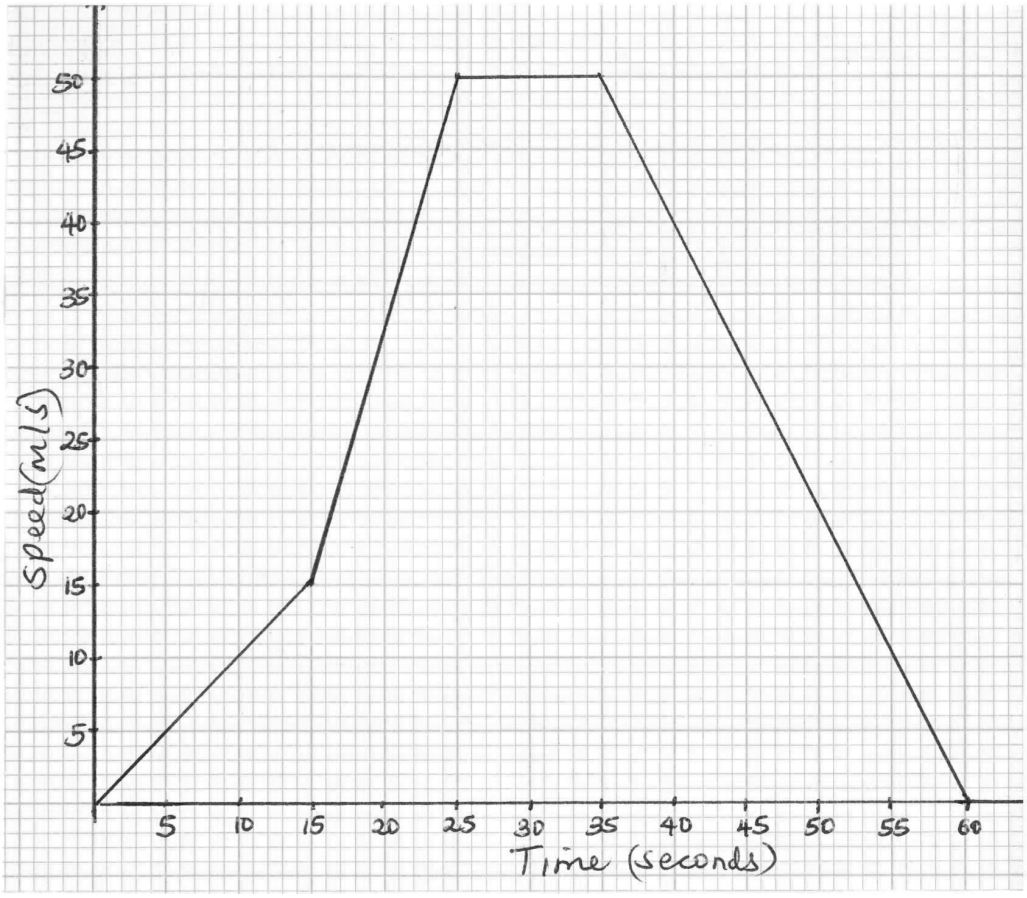


(a) (i) trapezium ABCD √ drawn	B1	
(ii) line of reflection $y = -x$ drawn	B1	may be implied by √ image
trapezium A'B'C'D' √ drawn	B1	
(iii) points A"B"C"D" plotted	B1	
trapezium A"B"C"D" drawn	B1	
(b) transformation which maps A"B"C"D" onto ABCD		
reflection	B1	
on line $x = 0$	B1	or y - axis
(c) directly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

24



(a) √ scale	S1	
acceleration parts	B1	
constant speed	B1	
deceleration	B1	
(b) (i) deceleration $= \frac{50}{25}$	M1	
$= 2\ \text{m/s}^2$	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	