

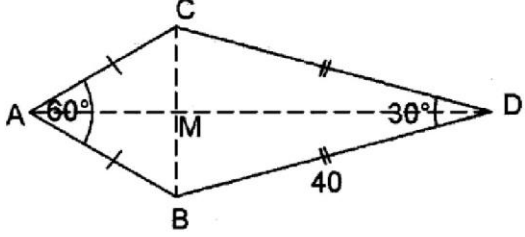
4.4 MATHEMATICS ALTERNATIVE B (122)

4.4.1 Mathematics Alternative B (122/1)


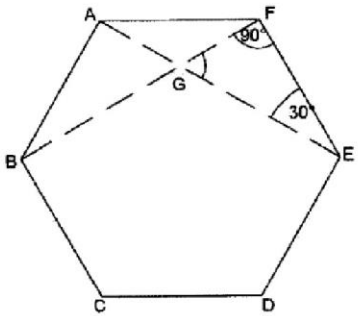
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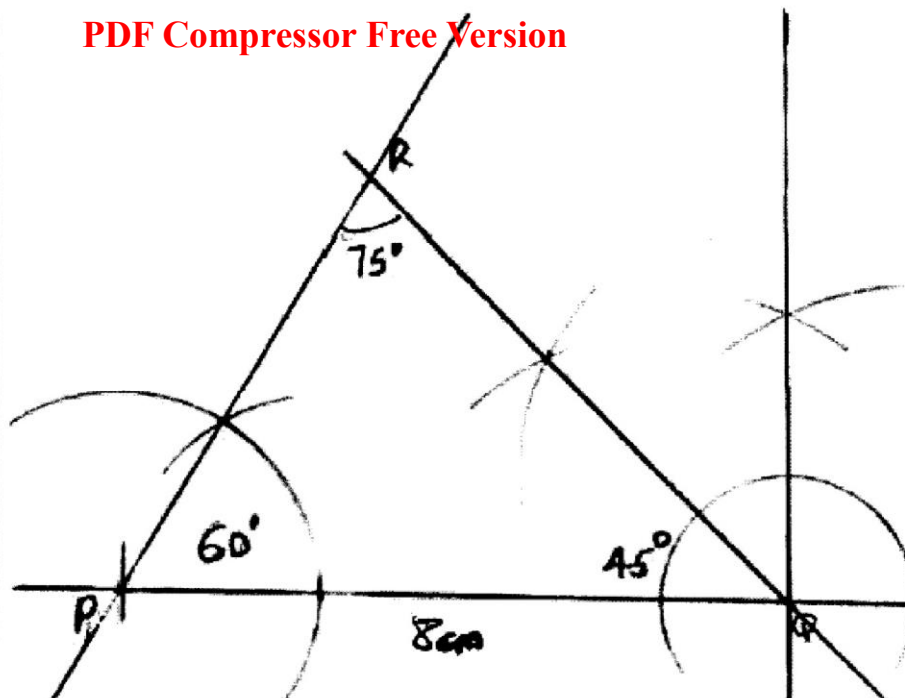
No	Marking scheme	Marks	Comments																		
1	(a) $4732 = 2^2 \times 7 \times 13^2$	B1																			
	(b) $2^2 \times 7 \times 13^2 \times 7 = 2^2 \times 7^2 \times 13^2$ is a perfect square. □ Smallest factor is 7	B1 2																			
2	Time taken: Juma $\frac{3120}{48} = 65$ min, Weru $\frac{3120}{120} = 26$ min, Njeri = $\frac{3120}{156} =$ 20min	M1	or equivalent																		
	LCM of 65, 26, 20 <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>5</td><td>65</td><td>26</td><td>20</td></tr> <tr><td>13</td><td>13</td><td>26</td><td>4</td></tr> <tr><td>2</td><td>1</td><td>2</td><td>4</td></tr> <tr><td>2</td><td>1</td><td>1</td><td>2</td></tr> <tr><td></td><td>1</td><td>1</td><td>1</td></tr> </table> LCM = 260 min or 4h 20 mins Time together is 1120h	5		65	26	20	13	13	26	4	2	1	2	4	2	1	1	2		1	1
5	65	26	20																		
13	13	26	4																		
2	1	2	4																		
2	1	1	2																		
	1	1	1																		
3	$\frac{-9 \div + 3 \times + 4 - - 2}{(+15 - - 5) \div - 4} = \frac{-10}{-5}$ = 2	M1	correct numerator																		
		M1	correct denominator																		
		A1 3																			

4	$\frac{3}{4} \text{ of } 8 \frac{1}{5} - 4 \frac{1}{2} = \frac{3}{4} \times \frac{41}{5} - \frac{9}{2}$ $= \frac{1}{4} \div 1 \frac{1}{8} \times 3 \frac{3}{10} = \frac{1}{4} \times \frac{5}{8} \times \frac{33}{10}$ $= \frac{123 - 90}{11} = \frac{20}{11}$ $= \frac{33}{20} \times \frac{5}{11}$ $= \frac{3}{4}$	M1 M1 A1 3	numerator denominator												
5	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">No</td> <td style="width: 50%;">Log</td> </tr> <tr> <td>84.56</td> <td>1.9272</td> </tr> <tr> <td>$(0.0027)^{1/3}$</td> <td>$3.4314 \div 3 \rightarrow +1.1438$</td> </tr> <tr> <td></td> <td><u>1.0710</u></td> </tr> <tr> <td><u>0.045</u></td> <td>-1.6532</td> </tr> <tr> <td>261.7</td> <td><u>2.4178</u></td> </tr> </table>	No	Log	84.56	1.9272	$(0.0027)^{1/3}$	$3.4314 \div 3 \rightarrow +1.1438$		<u>1.0710</u>	<u>0.045</u>	-1.6532	261.7	<u>2.4178</u>	M1 M1 M1 A1 4	All logs correct Correct cube root Correct multiplication and division
No	Log														
84.56	1.9272														
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<u>0.045</u>	-1.6532														
261.7	<u>2.4178</u>														
6	$4 \times 10 \times 10 + 2 \times (10 \times 10 - x^2)$ $= 400 + 200 - 2x^2$ $= 600 - 2x^2$	M1 M1 A1 3													
7	$\frac{22}{7} \times 0.7 \times 0.7 \times h = 3.234$ $1.54 h = 3.234$ $h = \frac{3.234}{1.54}$ $= 2.1\text{m}$	M1 M1 A1 3	Conversion from l to m ³												

8	$\frac{BM}{40} = \sin 15^\circ \Rightarrow BM = 40 \sin 15^\circ$ <p>PDF Compressor Free Version</p> $BC = 2 \times 40 \sin 15^\circ$ $= 20.71 \text{ cm}$ <p>Area of the quadrilateral</p> $= \frac{1}{2} \times (20.71)^2 \times \sin 60^\circ + \frac{1}{2} \times 40^2 \times \sin 30^\circ$ $= 185.7 + 400$ $= 585.7 \text{ cm}^2$	M1 M1 M1 A1 4	 <p>Area of $\triangle ABC$ Area of $\triangle BDC$</p>
9	$\frac{135}{360} \times \frac{22}{7} \times r^2 = 36.96$ $r^2 = \frac{36.96 \times 360 \times 7}{135 \times 22}$ $r = \sqrt{31.36}$ $= 5.6 \text{ cm}$	M1 M1 A1 3	
10	$\frac{r^2 + \sqrt[3]{r}}{t - 3\frac{2}{3}} = \frac{27^2 + \sqrt[3]{27}}{5 - 3\frac{2}{3}}$ $= \frac{729 + 3}{1\frac{1}{3}}$ $= 540$	M1 A1 2	

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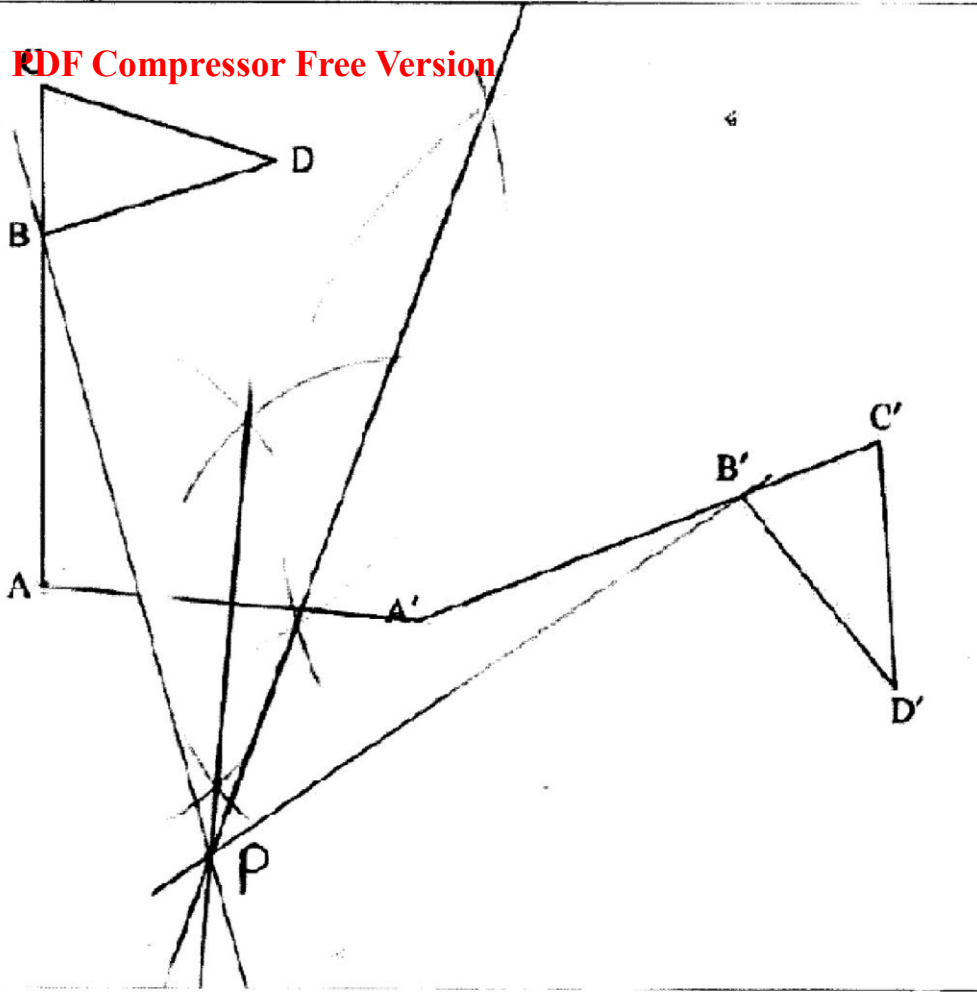
11	<p>Let Njoka's salary be x, and Okoth's salary be y</p> <p>PDF Compressor Free Version</p> $\frac{1}{4}x + \frac{1}{6}y = 16000$ $\frac{4}{9}x + \frac{1}{3}y = 30000$ $3x + 2y = 192000$ $4x + 3y = 270000$ $9x + 6y = 576000$ $8x + 6y = 540000$ <hr/> $x = 36000$ $y = 42000$ <p>Njoka's sh36000 and Okoth's sh42000</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>3</p>	
12	$x - 8 \leq -x \quad -x \geq 4 - 3x$ $2x \leq 8 \quad 2x \geq 4$ $x \leq 4 \quad x \geq 2$ $2 \leq x \leq 4$ 	<p>M1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>4</p>	
13	<p>$\angle BAF = 120^\circ$ interior angle of a regular hexagon</p> $\angle AEF = \angle FAE = \frac{180 - 120}{2} = 30^\circ$ <p>In $\triangle EFG$, $\angle EFG = 120 - 30 = 90^\circ$</p> $\therefore \angle FGE = 180 - (90 + 30) = 60^\circ$	<p>B1</p> <p>B1</p> <p>B1</p> <p>3</p>	

14	<p style="text-align: center;">PDF Compressor Free Version</p>  <p>PR = 5.9 ± 0.1 cm</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>PQ = 8 and $\angle 60^\circ$ constructed</p> <p>75° or 45° constructed</p> <p>Complete Δ</p>
		4	
15	<p>Selling price was Ksh $36\ 000 \times \frac{88}{100}$</p> <p style="padding-left: 40px;">= Ksh 31 680</p> <p>Cost price was Ksh $31\ 680 \times \frac{100}{120}$</p> <p style="padding-left: 40px;">= Ksh 25 344</p>	<p>M1</p> <p>M1</p> <p>A1</p>	
		3	

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16

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Centre P
Angle of rotation, -71°

B1 at least 2 perpendicular bisector

B1

B1

3

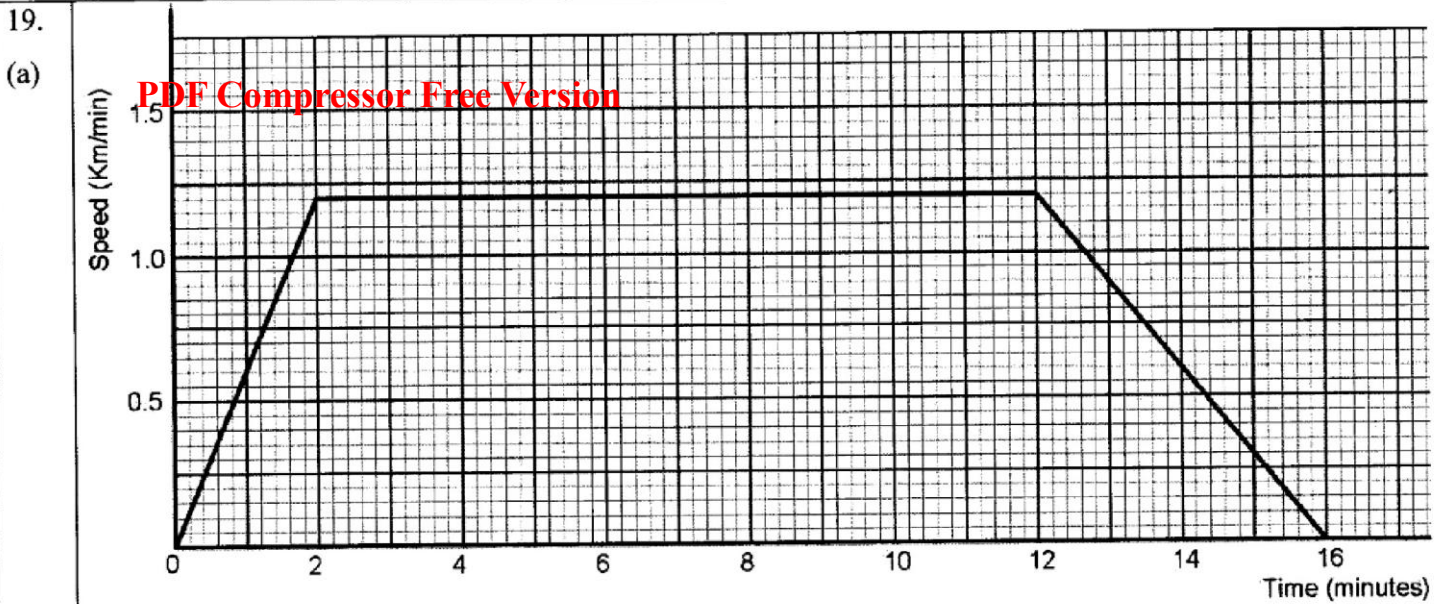
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17	<p>(a)</p> <p>PDF Compressor Free Version</p> $\frac{100}{100} \times (400000 - 250000) +$ $\frac{7.5}{100} \times (525000 - 400000) + 60000$ $= 6000 + 9375 + 60000$ $= \text{Ksh } 75\,375$ <p>(b) $94500 = 60000 + 6000 + x$</p> $x = 28500$ <p>Value of goods for commission of Ksh 28500</p> $= \frac{28500}{7.5} \times 100$ $= \text{Ksh } 380\,000$ <p>Total sale = $250000 + 150000 + 380000$</p> $= \text{Ksh } 780\,000$	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	
		10	

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18.	$y + 2x = 4$		
(a)	$-y + 3x = 1$		
	$5x = 5$	M1	
	$x = 1$	A1	
	$y + 2 = 4 \Rightarrow y = 2$		
	T(1,2)		
	Grad		
	$\frac{-2-2}{3-1} = \frac{-4}{2} = -2$	B1	
	$\frac{y-2}{x-1} = -2$	M1	
	$y = -2x + 4$	A1	
(b)	Grad = -2		
	$\frac{y-4}{x-5} = -2$	M1	
	$\Rightarrow y - 4 = -2x + 10$		
	$y = -2x + 14$	A1	
(c)	Grad = $\frac{1}{2}$	B1	
	$\frac{y-2}{x-1} = \frac{1}{2}$	M1	
	$y - 2 = \frac{1}{2}(x - 1)$		
	$2y - 4 = x - 1$		
	$-x + 2y = 3$	A1	
		A1	
		10	

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Scale

Acceleration part

Constant acceleration.

Deceleration

S1

B1

B1

B1

(b)

(i)

$$\frac{1}{2} \times 4 \times 1.2 \times 1000\text{m}$$

$$= 2400\text{m}$$

M1

A1

(ii)

$$\frac{1}{2} \times 2 \times 1.2 + 1.2 \times 10 + \frac{1}{2} \times 4 \times 1.2\text{km}$$

$$= 15.6\text{km}$$

M1

or equivalent

A1

(iii)

$$\text{Average speed} = \frac{15.6}{\frac{4}{15}\text{h}}$$

$$= 58.5\text{km/h}$$

M1

A1

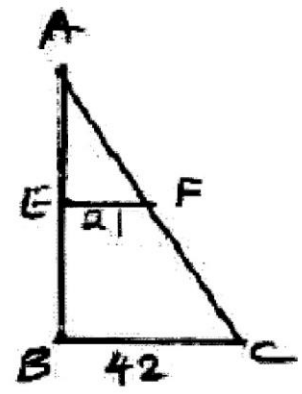
10

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20. (a)			
(i)	Area of $A+C = (x-y)(x-y) + y^2$	B1	
(ii)	Area of $B+D = y(x-y) + y(x-y)$ $= 2y(x-y)$	M1 A1	
(iii)	$(x-y)^2 + y^2 + 2y(x-y)$ $= (x-y)(x-y) + y^2 + 2yx - 2y^2$ $= x^2 - 2yx + y^2 + y^2 + 2yx - 2y^2$ $= x^2$	M1 A1	
(b)	$2(x-2) + 2(x-2)$ $= 4x - 8$	M1 A1	
(c)	$25c^2 - 16 = (5c)^2 - 4^2$ $= (5c+4)(5c-4)$	B1	
(d)	$5024^2 - 4976^2 = (5024+4976)(5024-4976)$		
(i)	$= 10000 \times 48$ $= 480000$	B1	
(ii)	$8.96^2 - 1.04^2 = (8.96+1.04)(8.96-1.04)$ $= 10 \times 7.92$ $= 79.2$	B1	
		10	

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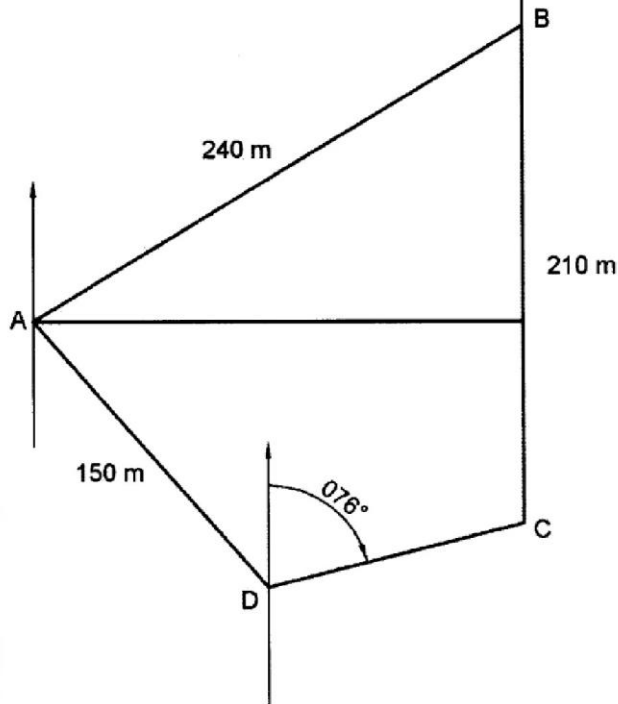
21. (a)	<p>Area of the base of the cuboid</p> <p>$= 8 \times 6 \text{ cm}^2 = 48 \text{ cm}^2$</p> <p>Area of 4 faces of the side of the cuboid</p> <p>$= (2 \times 8 \times 3 + 2 \times 6 \times 3) \text{ cm}^2$</p> <p>$= 48 + 36 \text{ cm} = 84 \text{ cm}^2$</p> <p>Total $48 + 84 = 132 \text{ cm}^2$</p>	M1	
(b)	<p>Consider faces VEF and VHG use Hero's formula:-</p> <p>$S = \frac{1}{2}(13 + 13 + 8) = 17 \text{ cm}$</p> <p>Area of VEF and VHG</p> <p>$= 2\sqrt{17(17-13)(17-13)(17-8)} \text{ cm}$</p> <p>$= 2\sqrt{17 \times 4 \times 4 \times 9}$</p> <p>$= 98.96 \text{ cm}^2$</p> <p>Consider faces VFG and VEH</p> <p>$S = \frac{1}{2}(13 + 13 + 6) = 16 \text{ cm}$</p> <p>Area of VFG</p> <p>$= 2\sqrt{16(16-13)(16-13)(16-6)}$</p> <p>$= 2\sqrt{16 \times 3 \times 3 \times 10}$</p> <p>$= 75.90 \text{ cm}^2$</p> <p>Area of triangular faces</p> <p>$98.96 + 75.90$</p> <p>$= 174.86 \text{ cm}^2$</p>	B1	
(c)	<p>Surface area of the solid</p> <p>$= 132 + 174.86$</p> <p>$= 306.86 \text{ cm}^2$</p>	M1	
		A1	
		10	

<p>22. (a)</p> <p>PDF Compressor Free Version</p> <p>(b)</p> <p>(c)</p>	<p>Vertical height of small cone:</p> $\frac{AE}{40} = \frac{21}{42} \Rightarrow AE = 20\text{cm}$ <p>Volume of frustum</p> $= \frac{1}{3} \times \frac{22}{7} \times 42^2 \times 40 - \frac{1}{3} \times \frac{22}{7} \times 21^2 \times 20$ $= 73920 - 9240$ $= 64680\text{cm}^3$ <p>Volume of cylindrical part</p> $= \frac{22}{7} \times 21^2 \times 30$ $= 41580\text{cm}^3$ <p>Volume of hemispherical part</p> $= \frac{1}{2} \times \frac{4}{3} \times \frac{22}{7} \times 21^3$ $= 19404\text{cm}^3$ <p>Total volume</p> $= 64680 + 41580 + 19404$ $= 125\,664\text{ cm}^3$	<p>B1</p> <p>M1 M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>10</p>	
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23. (a)

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(b)

(i) Distance $CD = 3.7 \times 30$
 $= 111 \text{ km}$

Bearing of C from D = 076°

(ii) Distance of A to the west of B

$= 6.9 \times 30$
 $= 207 \text{ km}$

(c)

$$\tan \theta = \frac{18}{150}$$

$$= 0.12$$

$$\theta = \tan^{-1} 0.12$$

$$= 6.84^\circ$$

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B1 Position of B

B1 Position of C

B1 Position of D

B1 Complete Diagram
 ABCD

B1

B1

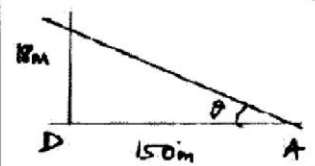
M1

A1

M1

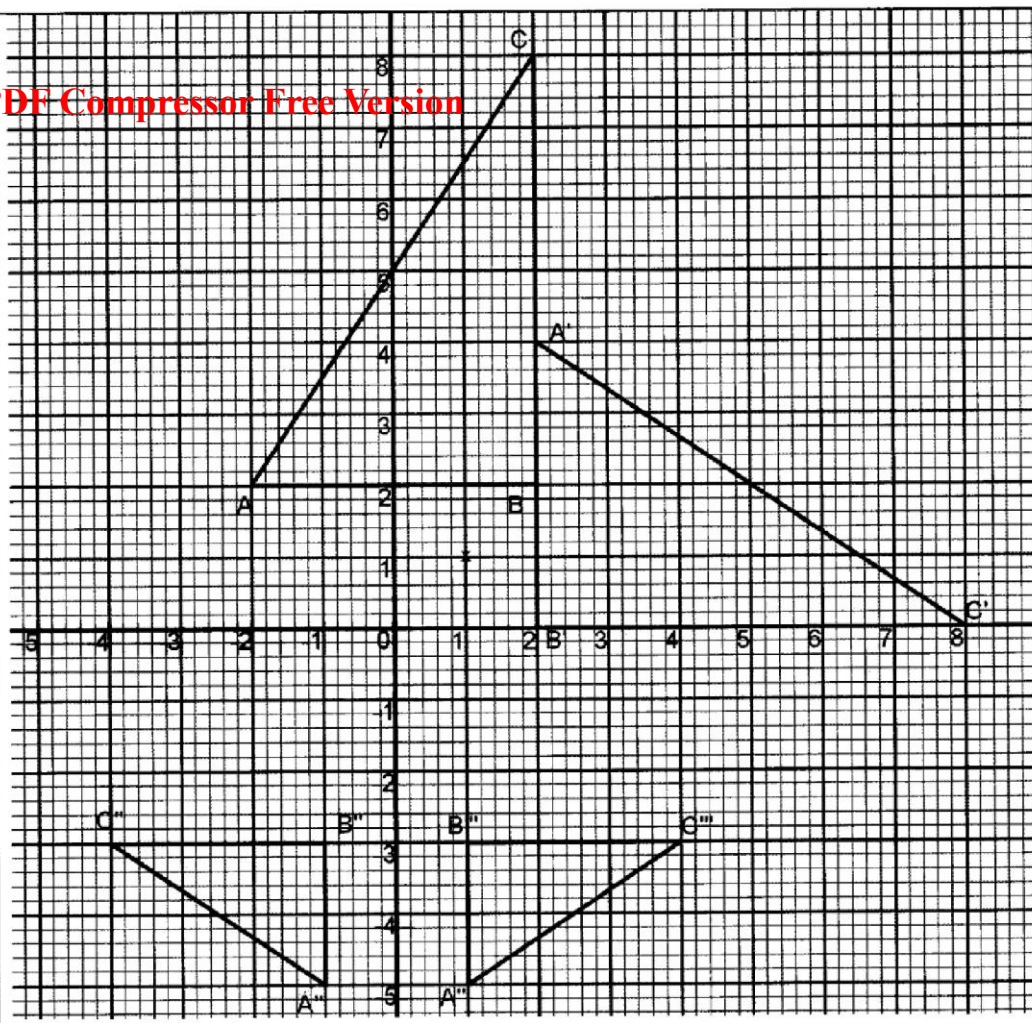
A1

10



24
(a)

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ΔABC correctly drawn
 $A'B'C'$ correctly plotted
 $\Delta A'B'C'$ drawn

(b)(i)
(ii)

$\Delta A''B''C''$ drawn
 enlargement
 scale factor, $-\frac{1}{2}$ centre (0, 2)

(c)

$\Delta A'''B'''C'''$ drawn

(d)(i)
(ii)

Directly congruent
 Oppositely congruent

B1
 B1
 B1

B1
 B1
 B1
 B1

s.f
 centre

B1

B1
 B1

10