

Marking Scheme

SECTION I:

Answer all the questions in this section in the spaces provided for each

1. Evaluate  $\frac{-4\{(-4+-15+5)+-3-4+2\}}{8+-7+3--5}$  (3marks)

$$N \Rightarrow -4\{-7-5\} \Rightarrow -4(-12) = 48 \quad \checkmark M1$$

$$D \Rightarrow -12+3+5 \Rightarrow -4 \quad \checkmark M1$$

$$\Rightarrow \frac{48}{-4}$$

$$= -12 \quad \checkmark A1$$

3

2. Use squares, cubes and reciprocal tables to evaluate, to 4 significant figures, the expression:  $\frac{1}{\sqrt[3]{27.56}} + \frac{3}{(0.071)^2}$  (3marks)

$$\Rightarrow \sqrt[3]{27.56} = 3.020$$

$$\Rightarrow (7.1 \times 10^{-2}) = 50.41 \times 10^{-4} \quad \checkmark M1$$

$$\Rightarrow \frac{1}{3.02} + \frac{3}{5.041 \times 10^{-3}}$$

$$= (0.3311 \times 1) + (3 \times 0.1984 \times 10^3) \quad \checkmark M1$$

$$0.3311 + 595.2$$
$$\approx 595.5 \quad \checkmark A1$$

3

3. Use substitution method to solve the simultaneous equations:  $3x - 2y = 7$  and  $5x + y = 3$  (3marks)

$$3x = 7 + 2y \Rightarrow x = \frac{7+2y}{3}$$

$$5\left(\frac{7+2y}{3}\right) + y = 3 \quad \checkmark M1$$

$$5(7+2y) + 3y = 9$$

$$13y = -26$$

$$y = -2 \quad \checkmark A1$$

$$x = \frac{7-4}{3} = 1 \quad \checkmark A1$$

3

4. The interior angle of a regular polygon with  $3x$  sides exceeds the interior angle of another regular polygon having  $x$  sides by  $40^\circ$ . Determine the value of  $x$ . (3marks)

$$\Rightarrow \text{Ext. 1} = \frac{360}{3x} \Rightarrow \text{Int. 1} = 180 - \frac{360}{3x} \checkmark M1$$

$$\Rightarrow \text{Ext. 2} = \frac{360}{x} \Rightarrow \text{Int. 2} = 180 - \frac{360}{x}$$

$$\Rightarrow 180 - \frac{360}{3x} - 180 + \frac{360}{x} = 40 \checkmark M1$$

$$\Rightarrow 1080 - 360 = 120x$$

$$120x = 720$$

$$x = 6 \checkmark A1$$

3

5. A man is now three times as old as his daughter. In twelve years' time he will be twice as old as his daughter. Find their present ages. (3marks)

Man  $\rightarrow 3x$  Daughter  $\rightarrow x$

$$3x + 12 = 2(x + 12) \checkmark M1$$

$$3x - 2x = 24 - 12$$

$$x = 12 \checkmark A1$$

Daughter  $\rightarrow 12$  years old

Man  $\rightarrow 36$  years old.  $\checkmark B1$

3

6. Two similar cylinders have diameters of 7cm and 21cm. If the larger has a volume of  $6237\text{cm}^3$ . Find the height of the two cylinders (take  $\pi = 22/7$ ) (3marks)

$$V.S.F = 1:27 \checkmark B1$$

$$\text{Vol of Smaller} = \frac{1}{27} \times 6237 = 231$$

$$\text{Smaller} \Rightarrow \frac{22}{7} \times \frac{7^2}{4} \times h = 231 \checkmark M1$$

$$h = \frac{231 \times 7 \times 4}{22 \times 7^2} = 6\text{cm}$$

height of the larger

$$6 \times 3 = 18\text{cm} \checkmark A1$$

Smaller  $6\text{cm}$  }

3

7. Simplify the following expression by reducing it to a single fraction.

$$\frac{2x-3}{3} - \frac{x-2}{2} - \frac{x-1}{4}$$

$$\Rightarrow \frac{4(2x-3) - 6(x-2) - 3(x-1)}{12} \quad \checkmark M1$$

$$\Rightarrow \frac{8x - 12 - 6x + 12 - 3x + 3}{12} \quad \checkmark M1$$

$$\Rightarrow \frac{-x + 3}{12} \quad \checkmark A1$$

(3marks)

3

$$\frac{3-x}{12}$$

8. A trader sold an article at 15% discount to a customer who paid sh 510 for it. What was the marked price of the article?

$$\Rightarrow \frac{100 \times 510}{85} \quad \checkmark M1$$

$$= \text{Sh. } 600 \quad \checkmark A1$$

(2marks)

2

9. A number  $y$  is such that, when divided by 32, when divided by 40 and when divided by 24, the remainder is 21. Find the number  $y$ .

L. C. M.

2	32	40	24
2	16	20	12
2	8	10	6
2	4	5	3
2	2	5	3
2	1	5	3
3	1	5	1
5	1	1	1

$\checkmark M1$

$$= 2^5 \times 3 \times 5 = 480 \quad \checkmark A1$$

$$y = 480 + 21 \quad \checkmark M1$$

$$= 501 \quad \checkmark A1$$

(4marks)

4

10. Use logarithms to evaluate:

(4marks)

$$\frac{43.25 \times 0.9371}{\sqrt{2.64} + 8.43}$$

Number	Std Form	Logarithm
43.25	$4.325 \times 10^1$	1.6360
0.9371	$9.371 \times 10^{-1}$	1.9717 +
		1.6077
2.64	$2.64 \times 10^0$	0.4216 $\times \frac{1}{2}$
8.43	$8.43 \times 10^0$	= 0.2108
		0.9258
		1.2850
<u>210.2</u>	$2.102 \times 10^2$	2.3227

M1 ✓ logs read.

M1 ✓ + and -

M1 ✓  $\times \frac{1}{2}$

A1

4

11. A line is drawn through point (3,5) perpendicular to line  $2y + x = 3$ . Find the equation of the line. (3marks)

$$y = -\frac{x}{2} + \frac{3}{2} \Rightarrow m_1 = -\frac{1}{2} \Rightarrow m_2 = 2 \quad \checkmark B1$$

$$\Rightarrow \frac{y-5}{x-3} = 2 \quad \checkmark M1$$

$$y-5 = 2x-6$$

$$y = 2x-1 \quad \checkmark A1$$

3

12. Without using a calculator, evaluate. (3marks)

$$N \Rightarrow \frac{7}{4} + \frac{3}{2} \times \frac{15-4}{6} \quad \checkmark M1$$

$$\Rightarrow \frac{7}{4} + \frac{11}{4} = \frac{18}{4}$$

$$D \Rightarrow \frac{15}{8} \times 2 \quad \checkmark M1$$

$$= \frac{15}{4}$$

$$\Rightarrow \frac{18}{4} \times \frac{4}{15}$$

$$= \frac{18}{15}$$

$$= 1\frac{1}{5} \quad \checkmark A1$$

3

4 | 2 | 3 | 2

13. A map is drawn using a scale of 1:200000. Find the actual area represented on the map by a rectangle 2cm by 2.5cm, giving your answer in  $\text{km}^2$ . (3marks)

$$\begin{aligned}
 &1 \text{ cm rep } 2 \text{ km} \\
 &1 \text{ cm}^2 \text{ rep } 4 \text{ km}^2 \\
 &\text{Area} = 2 \times 2.5 = 5 \text{ cm}^2 \\
 &\text{In } \text{km}^2 \Rightarrow 5 \times 4 = 20 \text{ km}^2 \quad \checkmark \text{ M1}
 \end{aligned}$$

3

14. Three Craftsmen takes  $10\frac{1}{2}$  hours to wire a building. How many Craftsmen working at the same rate will complete the work in  $5\frac{1}{4}$  hours? (3marks)

$$\begin{aligned}
 &\frac{10.5 \times 3}{5.25} \quad \checkmark \text{ M1 M1} \\
 &= 6 \text{ Craftsmen.} \quad \checkmark \text{ A1}
 \end{aligned}$$

3

15. Awour uses one third of her farm for coffee, one quarter for tea and two fifths of the remainder for mixed farming. She still has 6 hectares of unused land. Find the size of her farm. (3marks)

$$\begin{aligned}
 &\frac{3}{5} \left[ 1 - \left( \frac{1}{3} + \frac{1}{4} \right) \right] = \frac{1}{4} \quad \checkmark \text{ M1} \\
 &6 \times \frac{4}{1} \quad \checkmark \text{ M1} \\
 &= 24 \text{ ha.} \quad \checkmark \text{ A1}
 \end{aligned}$$

3

16. A certain alloy is prepared using 6kg of copper, 2kg of Zinc, and 0.5kg of Tin.

- (a) What percentage of the compound is Tin? (2marks)

$$\begin{aligned}
 &\left( \frac{0.5}{6+2+0.5} \right) \times 100 \quad \checkmark \text{ M1} \\
 &= 5\frac{16}{17} \% \quad \checkmark \text{ A1}
 \end{aligned}$$

5.882%

- (b) Find the ratio of copper to tin? (2marks)

$$\begin{aligned}
 &6 : 0.5 \quad \checkmark \text{ M1} \\
 &\Rightarrow 12 : 1 \quad \checkmark \text{ A1}
 \end{aligned}$$

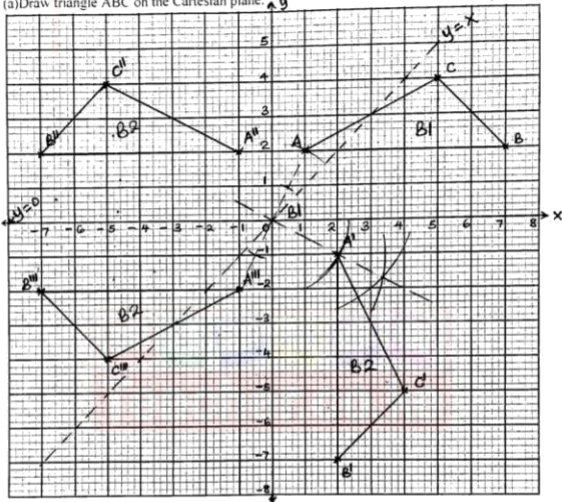
4

## SECTION II

*Answer all questions in the spaces provided.*

17. A triangle has vertices  $A(1,2)$ ,  $B(7,2)$ , and  $C(5,4)$ .

(a) Draw triangle  $ABC$  on the Cartesian plane. (1 mark)



(b) Construct triangle  $A'B'C'$  the image of triangle  $ABC$  under rotation of  $90^\circ$  clockwise about the origin. (3 marks)

(c) Draw triangle  $A''B''C''$ , the image of triangle  $A'B'C'$  under a reflection in the line  $y = x$ . state the coordinates of  $A''$ ,  $B''$  and  $C''$  (3 marks)

$$A''(-1, 2) \quad B''(-7, 2) \quad C''(-5, 4) \quad \checkmark \quad B1$$

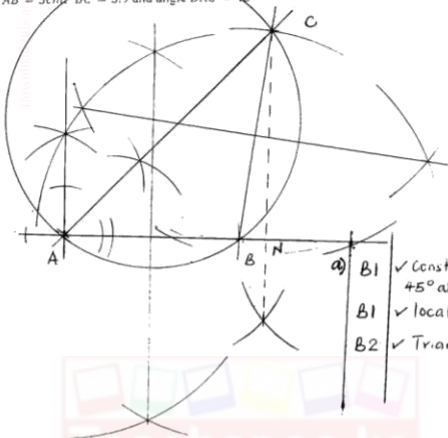
(d) Triangle  $A'''B'''C'''$  is the image of triangle  $A''B''C''$  under reflection in the line  $y = 0$ . Draw triangle  $A'''B'''C'''$  and state the coordinates of its vertices. (3 marks)

$$A'''(-1, -2) \quad B'''(-7, -2) \quad C'''(-5, -4) \quad \checkmark \quad B1$$

10

6 | 2 7 5 2

18. (a) Using a ruler and a pair of compasses only, construct triangle ABC in which  $AB = 5\text{cm}$ ,  $BC = 5.9$  and angle  $BAC = 45^\circ$  (4marks)



- a) B1 ✓ Construction of  $45^\circ$  at A.  
 B1 ✓ location of C  
 B2 ✓ Triangle drawn.

- (b) Draw the circumcircle of the triangle touching point A, B and C. (3marks)  
 (c) By taking AB as the base, find the area of the triangle. (3marks)

$$CN = 5.8 \pm 0.1$$

$$A = \frac{1}{2} \times 5 \times 5.8 \checkmark M1$$

$$= 14.5 \text{ cm}^2 \checkmark A1$$

- b) B1 ✓  $\perp$  of any side  
 B1 ✓ location of Centre  
 B1 ✓ Circle drawn.
- c) B1 ✓ Perpendicular dropped from C to AB.  
 M1  
 A1  
 10

19. (a) A straight line  $L_1$  whose equation is  $9y - 6x = -6$  meets the  $x$ -axis at  $Z$ . Determine the coordinate of  $Z$ . (3marks)

$$\begin{aligned} y &= 0 \\ -6x &= -6 \\ x &= 1 \quad \checkmark B1 \\ Z(1, 0) &\quad \checkmark B1 \end{aligned}$$

- (b) A second line  $L_2$  is perpendicular to  $L_1$  at  $Z$ . Find the equation of  $L_2$  in the form  $ax + by = c$  where  $a$  and  $b$  are integers. (2marks)

$$\begin{aligned} m_{L_1} &= \frac{2}{3}, \quad m_{L_2} = -\frac{3}{2} \\ \frac{y-0}{x-1} &= \frac{-3}{2} \quad \checkmark M1 \\ \Rightarrow 2y &= -3x + 3 \\ \Rightarrow 3x + 2y &= 3 \quad \checkmark A1 \end{aligned}$$

- (c) A third line  $L_3$  passes through the point  $(2, 5)$  and is parallel to  $L_1$ . Find

- i. The equation of  $L_3$  in the form  $ax + by = c$ , where  $a$ ,  $b$  and  $c$  are integers. (2marks)

$$\begin{aligned} \Rightarrow \frac{y-5}{x-2} &= \frac{2}{3} \quad \checkmark M1 \\ \Rightarrow 2x - 4 &= 3y - 15 \\ 2x - 3y &= -11 \quad \checkmark A1 \end{aligned}$$

Accept  
 $-2x + 3y = 11$

- ii. The coordinate of point  $R$  at which  $L_2$  intersects  $L_3$  (3marks).

$$\begin{aligned} 3x + 2y &= 3 \\ 2x - 3y &= -11 \\ \Rightarrow \frac{6x + 4y = 6}{6x - 9y = -33} & \quad \checkmark M1 \\ \frac{13y}{y} &= \frac{39}{-33} \quad \checkmark M1 \\ y &= 3, \quad x = -1 \quad \checkmark A1 \text{ for both.} \\ R(-1, 3) &\quad \checkmark B1 \end{aligned}$$

10



20. Wanyonyi spent sh. 10,500 to buy a number of shirts and trousers from wholesaler at sh.150 per shirt and sh.300 per trouser. Atandi bought the same number of shirts and trouser from another wholesaler where he paid 20% more for a shirt and 10% less for a trouser. Atandi spent sh. 300 more than Wanyonyi.

a) Determine the number of shirts and trousers each man bought?

(4marks)

Let the number of shirts be  $x$  and trousers be  $y$ .

$$150x + 300y = 10500 \quad \checkmark M1$$

$$180x + 270y = 10800$$

$$\Rightarrow \begin{array}{l} 3x + 6y = 210 \\ 6x + 9y = 360 \end{array} \Rightarrow \begin{array}{l} 6x + 12y = 420 \\ 6x + 9y = 360 \end{array} -$$

$$\cdot \quad \frac{3y = 60 \quad \checkmark M1}{y = 20 \quad \checkmark A1}$$

$$\therefore x = 30 \quad \checkmark A1$$

b) Wanyonyi sold all the clothes at a profit of 50% per shirt and 30% per trouser. How much profit did he make?

(3marks)

$$\Rightarrow (1.5 \times 150 \times 30) + (1.3 \times 300 \times 20) \quad \checkmark M1$$

$$= \text{Sh. } 14550$$

$$\text{Profit} \Rightarrow 14550 - 10500 \quad \checkmark M1$$

$$= \text{Sh. } 4,050 \quad \checkmark A1$$

c) Atandi sold all his clothes at profit of 45% per shirts and 60% per trouser. Calculate the percentage profit he made on the sale of all clothes?

(3marks)

$$(1.45 \times 180 \times 30) + (1.6 \times 270 \times 20) \quad \checkmark M1$$

$$= \text{Sh. } 16470$$

$$\% \text{ Profit} \Rightarrow \frac{16470 - 10800}{10800} \times 100 \quad \checkmark M1$$

$$= 52.5\% \quad \checkmark A1$$

10

9 | 7 | 3 | 3

21. A bus left Kampala on Wednesday evening and traveling to Mombasa according to the travel time table below arriving there on Friday.

Kampala	Departure	2015h
Malava	Arrival	0430h
	Departure	0655h
Nakuru	Arrival	1325h
	Departure	1455h
Nairobi	Arrival	1840h
	Departure	2030h
Mombasa	Arrival	0500h

Calculate:

a) The time taken by the bus to travel from.

i. Kampala to Malava.

$$2015h - 0430h = 8h\ 15min. \checkmark B1$$

(1mark)

ii. Malava to Nakuru.

$$1325h - 0655h = 6h\ 30min \checkmark B1$$

(1mark)

iii. Nakuru to Nairobi.

$$1840 - 1455h = 3h\ 45min \checkmark B1$$

(1mark)

iv. Nairobi to Mombasa.

$$2030h - 0500h = 8h\ 30min \checkmark B1$$

(1mark)

b) The total travelling time between Kampala and Mombasa.

$$8 \cdot 15 + 6 \cdot 30 + 3 \cdot 45 + 8 \cdot 30 \checkmark M1$$

$$= 27h \checkmark A1$$

(2marks)

c) The total stoppage time during the whole journey.

$$2 \cdot 25 + 1 \cdot 30 + 1 \cdot 50 \checkmark M1$$

$$= 5h\ 45min. \checkmark A1$$

(2marks)

d) The average speed for the whole journey given that the distance between Kampala and Mombasa is 1965km.

$$= \frac{1965}{27 + 5\frac{3}{4}} \checkmark M1 \Rightarrow \frac{1965}{32\frac{3}{4}}$$

$$= 60 \text{ km/hr} \checkmark A1$$

(2marks)

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