

FORM ONE EXAMINATION
KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)

MATHEMATICS (121)

October 2016

MARKING SCHEME

<p>1. $2700 = 2 \times 1350$ $= 2 \times 2 \times 675$ $= 2 \times 2 \times 3 \times 3 \times 75$ $= 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5$ $= 2^2 \times 3^3 \times 5^2$</p>	M1 A1																													
<p>2. The third number is given by $12n(n - \text{positive interger})$</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <tbody> <tr><td>2</td><td>12n</td><td>24</td><td>60</td></tr> <tr><td>2</td><td>6n</td><td>12</td><td>30</td></tr> <tr><td>2</td><td>3n</td><td>6</td><td>15</td></tr> <tr><td>3</td><td>3n</td><td>3</td><td>15</td></tr> <tr><td>5</td><td>n</td><td>1</td><td>5</td></tr> <tr><td>n</td><td>n</td><td>1</td><td>2</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td></tr> </tbody> </table> <p>$2^3 \times 3 \times 5 \times n = 360$ $n = \frac{360}{120} = 3$ $3^{\text{rd}} \text{ no} = 12 \times 3 = 36$</p>	2	12n	24	60	2	6n	12	30	2	3n	6	15	3	3n	3	15	5	n	1	5	n	n	1	2	1	1	1	1	M1 B1 A1	
2	12n	24	60																											
2	6n	12	30																											
2	3n	6	15																											
3	3n	3	15																											
5	n	1	5																											
n	n	1	2																											
1	1	1	1																											
<p>3. Let $r = 0.185185$ $1000r = 185.185185$ $1000r - r = 185$ $999r = 185$ $r = \frac{185}{999} = \frac{5}{27}$</p>	M1 M1 A1																													
<p>4. $\frac{0.18 \times 1.05 \times 0.32}{4.5 \times 0.06 \times 0.98} = \frac{18 \times 105 \times 32}{45 \times 6 \times 98 \times 10}$ $= \frac{3 \times 7 \times 16}{3 \times 49 \times 10}$ $= \frac{16}{70}$ $= 0.2286$</p>	M1 M1 A1	<p>Multiply num/denominator by 10^7</p> <p>performing cancellations</p> <p>ans in decimal (correct to 4sf)</p>																												

<p>5. If 2 litres cover 16km 1 litre covers 8km 320km require $\frac{320}{8} = 40$ ltrs Extra diesel required = $40 - 25.5$ = 14.5 litres</p>	<p>M1 M1 A1</p>	<p>for consumption within 320km</p>
<p>6. $-24 \div 3 + 4 \times 25 - 8 \div 4 \times 10 - 1$ = $\frac{-24}{3} + 100 - \frac{8}{4} \times 10 - 1$ = $-8 \times 100 - 20 - 1$ = $100 - 29$ = 71</p>	<p>M1 M1 A1</p>	<p>BODMAS</p>
<p>7. $\frac{1}{2} = \frac{3x+y}{2x+2y}$ = $\frac{1}{2} - \frac{3x+y}{2(x+y)}$ = $\frac{x+y - (3x+y)}{2(x+y)}$ = $\frac{x+y - 3x - y}{2(x+y)}$ = $\frac{-2x}{2(x+y)} = \frac{-x}{x+y}$</p>	<p>M1 M1 M1 A1</p>	<p>removing 2 from the brackets common denominator removing bracket correctly</p>
<p>8. No of men increases in the ratio 10:8 No of days reduce in the ratio 8:10 No of working hours reduces in the ratio 6:12 No of days increases in the ratio 12:6 No of days taken = $7.5 \times \frac{8}{10} \times \frac{12}{6}$ = 12 days</p>	<p>M1 M1 A1</p>	
<p>9. Circle of wheel = $2\pi r$ = $2 \times \frac{22}{7} \times \frac{21}{2}$ = 22×3 = 66cm ∴ in 1 minute the point moves through $66 \times 1200 = 79200$cm Speed = $\frac{79200 \text{cm}}{60 \text{s}}$ = 1320cm/s</p>	<p>M1 M1 M1 A1</p>	<p>finding circ of the wheel distance covered in 1 minute expression of speed</p>
<p>10. Mass of acid = $200 \times 1.08 = 216$g Mass of alcohol = $300 \times 0.8 = 240$g Total mass of the mixture = $216 + 240 = 456$g Volume of the mixture = $200 + 300 = 500$cm³ Density of the mixture = $\frac{456}{500}$ = 0.912g/cm³</p>	<p>M1 M1 M1 M1</p>	

<p>11. $0.3418^2 = (3.148 \times 10^{-1})^2$ $= 3.148^2 \times 10^{-2}$ $= 11.68 \times 10^{-2}$ $= 0.1168$</p>	<p>M1 M1 A1</p>	<p>standard form squaring correct ans</p>
<p>12. $x + 2y = 5$ (i) $3x - 2y = 7$ (ii) in eqn (i) $x = 5 - 2y$ substitute $x = 5 - 2y$ in (ii) $3(5 - 2y) - 2y = 7$ $15 - 6y - 2y = 7, 15 - 8y = 7, -8y = -8,$ Dividing by $-8 \rightarrow y = 1$ $x = 5 - 2 \times 1 = 5 - 2 = 3$ $y = 1, x = 3$</p>	<p>B1 A1</p>	
<p>13. $4.24 \text{ UK£} = 120.2 \times 4.25$ $= \text{Ksh } 510.85$ $\frac{510.85 \times 100}{550}$ $= 92.882\%$</p>	<p>B1 B1 A1</p>	
<p>14. $\frac{\theta}{360} \times 3.142 \times 60 \times 60 = 33$ $\therefore \theta = \frac{33 \times 360}{3.142 \times 60 \times 60}$ $\theta = 1.05^\circ$</p>	<p>M1 M1 A1</p>	
<p>15. Let their ages be son = x yrs father x + 20yrs Presently 12 yrs ago Son was (x - 12) yrs Father (x + 20) - 12yrs = x + 8yrs $= 6(x - 12)$ $x + 8 = 6(x - 12)$ $6x - 72 = x + 8$ $5x = 80$ $x = 16$ Son 16 yrs Father $16 + 20 = 36$ yrs</p>	<p>B1 B1 A1</p>	<p>expressing father's age in two ways for the son father's Age</p>
<p>16. Wife's share = $\frac{1}{6} \times 116580$ $= \text{Ksh } 19430$ Daughter's share from father $= \frac{2}{6} \times 116580$ $= \text{Ksh } 38860$ Daughter' share for mother $= \frac{1}{2} \times 19430 = 9715$ Finally got Kshs (38860 + 9715) $= \text{ksh } 48575$</p>	<p>B1 M1 A1</p>	

SECTION II

17. $y = 7 - 3x$

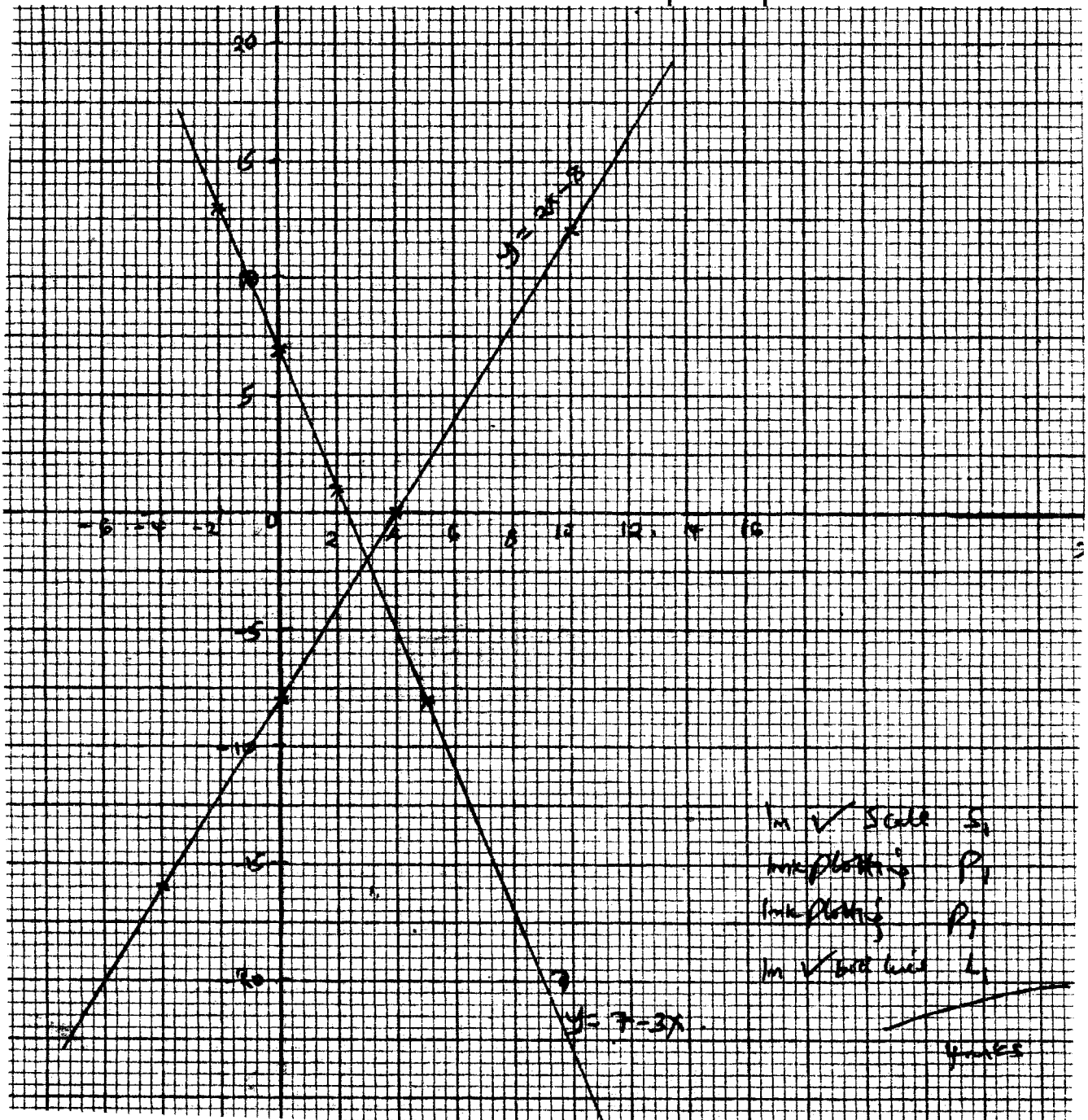
x	-2	-1	0	1	2	3	4	5
y	13	10	7	4	1	-2	-5	-8

$y = 2x - 8$

x	-4	-2	0	2	4	6	8	10
y	-16	-12	-8	-4	0	4	8	12

c) The two lines intersect at the point (3, -2)
 \therefore Solution is $x = 3, y = -2$

- B2 for all entry
- B1 for any 4 entries
- B2 for all entries
- B1 for any 4 entries
- B1 co-ordinate
- B1 solution



18. a) Area of all walls including doors and windows

$$= 6.5 \times 3 \times 2 + 4.8 \times 3 \times 2$$

$$= 39 + 28.8$$

$$= 67.8\text{m}^2$$

$$\text{Area of doors} = 2 \times 1.02 \times 2 = 4.08\text{m}^2$$

$$\text{Area of windows} = 0.9 \times 0.6 \times 4 = 2.16\text{m}^2$$

Total area of doors and windows

$$= 4.08 + 2.16 = 6.24\text{m}^2$$

Area of walls covered with planks

$$= 67.8 - 6.24$$

$$= 61.56\text{m}^2$$

Area of floor and ceiling

$$= 6.5 \times 4.8 \times 2$$

$$= 62.4\text{m}^2$$

Total area covered = 61.56 + 62.4

$$= 123.96\text{m}^2$$

b) No of planks used = $\frac{123.96}{1.8 \times 0.15}$

$$= 459.1$$

$$\approx 460$$

c) Cost of planks = 460 x 45.50

$$= \text{sh } 20930$$

M1 exp of area

M1 for both

M1 for exp and addition

A1

M1

A1

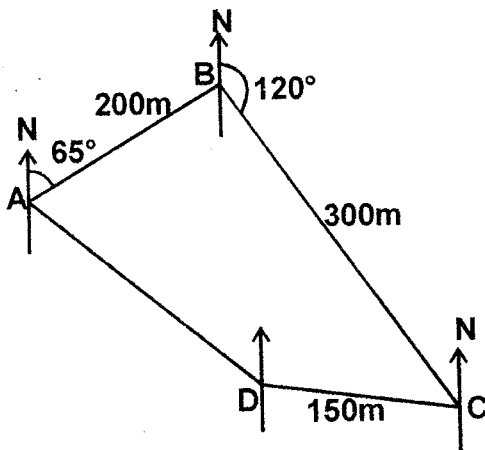
M1 expression

A1

M1 expression

A1

19. a) Sketch

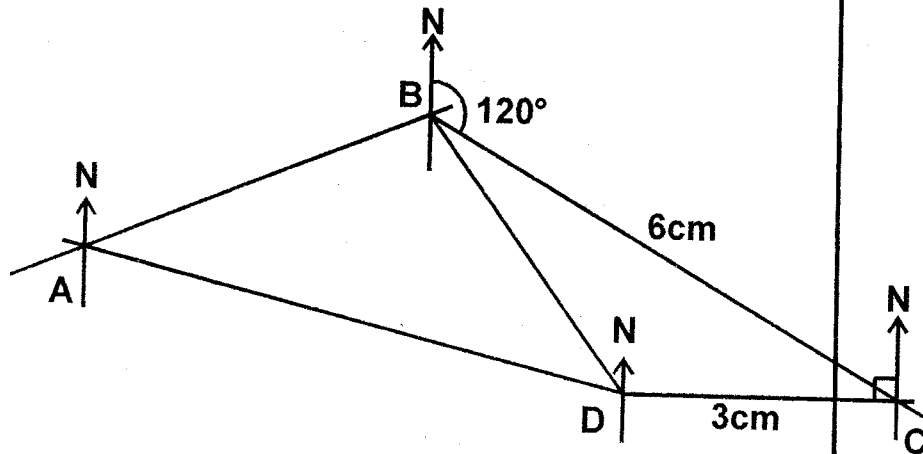


Scale 1cm rep 50m

$$AB = \frac{200}{50} = 4\text{cm} \quad BC = \frac{300}{50} = 6\text{cm} \quad CD = \frac{150}{50} = 3\text{cm}$$

B1 for sketch

b)



c) i) $AD = 5.9 \times 50 = 295 \pm 5m$
 $\angle NAD = 103^\circ$
 Bearing of D from A is $103^\circ \pm 1^\circ$

ii) $BD = 3.6 \times 50 = 180 \pm 5m$
 $\angle NDB = 36^\circ$
 Bearing of B from D = $360^\circ - 36^\circ$
 $= 324^\circ \pm 1^\circ$

20. a) Profit = 25% of 1200
 $= \frac{25}{100} \times \text{sh } 1200$
 $= \text{sh } 300$

Selling price = B.P + Profit
 $= \text{sh } 1200 + \text{sh } 300$
 $= \text{sh } 1500$

b) Discount = 10% of sh 9500
 $= \frac{10}{100} \times \text{sh } 9500$
 $= \text{sh } 950$

Discount price
 $= \text{sh } 9500 - \text{sh } 950$
 $= \text{sh } 8550$

- B1 suitable scale
- B1 All N - lines parallel
- B1 $\angle NAB = 65^\circ$ and B located
- B1 Drawing $\angle NBC = 120^\circ$ and C located
- B1 Drawing $\angle NCD = 90^\circ$ and D located
- B1 for distance
- B1 for bearing
- B1 distance
- B1 bearing

- B1 profit
- B1 stating the selling price
- A1
- B1
- B1
- A1

<p>c) Total value of vehicle sold $= \text{sh } 1500000 + \text{sh } 750000 + \text{sh } 200000$ $= \text{sh } 2450000$</p> <p>Commission $= \text{sh } \frac{7}{100} \times 2450$ $= \text{sh } 171500$</p>	<p>M1 B1</p> <p>M1 A1</p>	
<p>21. a) $0.7564 = 75.64 \times 10^{-2}$</p> <p>$\sqrt{0.7564} = \sqrt{75.64} \times \sqrt{10^{-2}}$ $= 8.697 \times 10^{-1}$ $= 0.8697$</p> <p>b) $5(x + 4) + 4(x + 5) + 2(x - 10) + (x - 20) = 360$ $5x + 4x + 2x + x + 20 + 20 - 20 - 20 = 360$ $12x = 360^\circ$ $x = 30^\circ$</p> <p>Interior angles are $170^\circ, 140^\circ, 40^\circ, 10^\circ$</p> <p>Exterior angles are $180^\circ - 170^\circ = 10^\circ$ $180^\circ - 140^\circ = 40^\circ$ $180^\circ - 40^\circ = 140^\circ$ $180^\circ - 10^\circ = 170^\circ$</p> <p>c) Numerator $= \frac{3}{4} + \frac{12}{7} \div \frac{4}{7} \times \frac{7}{5}$ $= \frac{3}{4} + \frac{12}{7} \times \frac{3}{4} = \frac{3}{4} + \frac{9}{7}$ $= \frac{57}{28}$</p> <p>Denominator $= (\frac{10}{7} - \frac{5}{8}) \times \frac{2}{3} = \frac{45}{56} \times \frac{2}{3}$ $= \frac{15}{28}$</p> <p>$\therefore \frac{57}{28} \times \frac{28}{15} = \frac{57}{15} = 3\frac{4}{5}$</p>	<p>M1</p> <p>B1 A1</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>M1 A1</p>	<p>no $1 \leq y < 100$ with the power of 10 being even</p> <p>correct square root</p> <p>all correct</p> <p>numerator</p> <p>denominator nu/deno</p>