*MARKING SCHEME*

## SUNSHINE SECONDARY SCHOOL

## FORM 1 MATHEMATICS 121/1 END TERM TWO EXAMINATIONS

## JULY 2019

TIME: 2 ½ HOURS

NAME: ……………………………………… ADM. NO: ……………………

CLASS…………………… DATE: ………………………..

### INSTRUCTIONS

- Write your name, Adm No, class and date in the spaces provided above.
- This paper contains two sections: section 1 and section 2.
- Answer all the questions in section 1 and 2.
- All working and answers must be written on the question paper in the spaces provided below each question.
- Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
- Marks may be given for correct working even if the answer is wrong.
- KNEC mathematical tables may be used

### Section I

| Questions | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Total |
|-----------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|-------|
| Marks     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |       |

### Section II

| Questions | 17 | 18 | 19 | 20 | 21 | TOTAL |
|-----------|----|----|----|----|----|-------|
| Marks     |    |    |    |    |    |       |

GRAND
TOTAL

This paper consists of 12 printed pages

1

## SECTION 1 (50 marks)

1. Evaluate: $\dfrac{-8 \times -8 + 6}{-3 + (-8) \div 2 \times 4}$

BODMAS

$(-8 \times -8) + 6$

$N \Rightarrow = 64 + 6 = 70 \ M_1$

$\Delta \Rightarrow -3 + (-8) \div 2 \times 4$

$-3 - (8 \div 2) \times 4$

$= -3 - (4 \times 4)$

$-3 - 16 = -19 \ M_1$

$\dfrac{N}{\Delta} = \dfrac{70}{-19}$  (3 marks)

$= -3\frac{13}{19}$ or

$-3.6842 \ A_1$   ③

2. A number k is formed by writing all the prime numbers between 0 and 10 in ascending order. Another whole number p is formed by writing all the square numbers between 0 and 10 in ascending order. Find k-p.  (3 marks)

$K \Rightarrow 2357 \ B_1$

$P \Rightarrow 149 \ B_1$

$K - P =$

$2357 - 149$

$= 2208 \ A_1$   ③

3. Evaluate using squares and square root tables: $(0.072)^2 + \sqrt{4451}$  (3 marks)

$(0.072)^2 = (7.2 \times 10^{-2})^2$

$= 7.2^2 \times 10^{-4}$

$51.84 \times \dfrac{1}{10000}$

$= 0.005184 \ M_1$

$\sqrt{44.51 \times 10^2}$

$= 44.5 \rightarrow 6.6708$

$+ \dfrac{7}{6.6715}$

$6.6715 \times 10 = 66.715 \ M_1$   ③

$0.005184 + 66.715$

$= 66.720184 \ A_1$   9

4. A tourist arrived in Kenya with US Dollars 3000 which he exchanged into Kenya shillings. He spent Ksh.100, 000 on hotel accommodation and Ksh.80, 000 on travel and other expenses. He changed the remaining money into sterling pounds. Calculate how much money in sterling pounds that he remained with using the following rates. (Leave your answer to the nearest 1£)

| | Buying(Kshs) | Selling(Kshs) |
|---|---|---|
| 1 US dollar($) | 100.00 | 101.00 |
| 1 Sterling pound(£) | 120.27 | 120.00 |

(3 marks)

KEFOSE

FOKEBU.

$3000 \times 100 =$

kshs. $300,000$ M1

$100,000 + 80,000$

$= kshs. 180,000$

$300,000 - 180000$

$= kshs. 120,000$ M1

$\dfrac{120000}{120}$

$\dfrac{12\cancel{0}}{12} £1000$ A1

③

5. Evaluate: $\dfrac{\frac{5}{6} of \left(4\frac{1}{3} - 3\frac{5}{6}\right)}{\frac{5}{12} \times \frac{3}{25} + 1\frac{5}{9} \div 2\frac{1}{3}}$

(3 marks)

N → BODMAS

$\dfrac{13}{3} - \dfrac{23}{6} = \dfrac{26-23}{6} = \dfrac{3}{6}$

$= \dfrac{1}{2}$

$\dfrac{5}{6} \times \dfrac{1}{2} = \dfrac{5}{12}$ M1

D → $\dfrac{14}{9} \div \dfrac{7}{3} = \dfrac{\overset{2}{14}}{\cancel{9}_3} \times \dfrac{3}{\cancel{7}} = \dfrac{2}{3}$

$\dfrac{5}{12} \times \dfrac{3}{25} = \dfrac{1}{20}$

$\dfrac{1}{20} + \dfrac{2}{3} \quad \dfrac{3+40}{60} = \dfrac{43}{60}$ M1

$\dfrac{N}{D} = \dfrac{5}{12} \times \dfrac{\overset{5}{60}}{43} = \dfrac{25}{43}$ A

③

6. A camera which is marked at Ksh 2400 is sold to a consumer after allowing him a 10% discount. By so doing the trader still makes a profit of 20% on the cost of the camera. Determine the cost price of the camera.

(3 marks)

$\dfrac{90}{100} \times 2400 = kchs. 2,160$ M1

$= kshs. 1800$ A1

$\dfrac{120}{120} \times 2160$ M1

③

3

9.

7. Convert $2.\dot{4}\dot{5}$ into a fraction in its simplest form.

(3 marks)

$r = 2.4545....$

$10r = 24.545...$ $B_1$

$100r = 245.45...$

$100r - r = 245.45 - 2.45$

$= 99r = 243$

$\dfrac{99r}{99} = \dfrac{243}{99}$ $B_1$

$r = 2\dfrac{5}{11}$ $A_1$ ③

8. Show that 8260439 is exactly divisible by 11, using test of divisibility. (3 marks)

8 2 6 0 4 3 9

$B_1$

$8 + 6 + 4 + 9 = 27$

$2 + 0 + 3 = 5$ $B_1$

$\overline{\phantom{00}} $
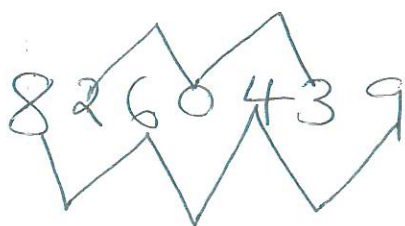
$22$

$\dfrac{22}{11} = 2$ $B_1$

Hence divisible by 11. ③

9. 2000 cm³ of milk of density 0.9g/cm³ were added to 1200 cm³ of water of density 1g/cm³.
Calculate the density of the mixture. (4 marks)

$M_1 = 0.9 \text{g/cm}^3 \times 2000$

$1,800g$ $M_1$

$M_2 = (1200 \times 1) =$

$1200g$ $M_1$

Density of the mixture $=$

$\dfrac{M_1 + M_2}{V_1 + V_2}$ ④

$\dfrac{1800g + 1200g}{2000 + 1200}$

$M_1$

$1800g + 1200g = 3000g$

$3200 \text{cm}^3$

$= 0.9375$ OR $\dfrac{10}{}$ $A_1$

$15/11, 9/a^3$

10. Solve the equation. $\frac{y+3}{3} + \frac{y}{2} = \frac{10y}{3}$ leaving answer as a fraction (3 marks)

$$^2\cancel{6} \times \left(\frac{y+3}{3}\right) + \left(\frac{y}{2}\right)^{\times \cancel{6}^3} = \left(\frac{10y}{3}\right)^{\times \cancel{6}^2}$$

$LCM = 6.$        $M_1$

$2(y+3) + 3y = 20y$

$2y+6 + 3y = 20y$

$\frac{15y}{15} = \frac{\cancel{6}^2}{15}^{} \cdot \frac{2}{5}$    $M_1$

$= \frac{2}{5}$   $A_1$

③

11. 18 men take 15 days to dig 6 hectares of land. Find how many men are required to dig 8 hectares in 12 days. (3 marks)

| Men | Days | Ha |
|---|---|---|
| 18 | 15 | 6 |
| ? | 12 | 8 $M_1$ |

$\frac{15}{12} \times \frac{8}{\cancel{6}} \times 18$ $= 30$   $M_1$

$= 30\,days$   $A_1$

③

12. Write in figures and give the place value and total value of the third digit in the number; three million, seventy nine thousand, seven hundred and fifty nine (3marks)

$3,0\underline{7}9,759$   $B_1$

$PV = Ten\ thousands$   $B_1$

$TV = 80,000$   $B_1$

③

9

13. Solve the simultaneous equations below

$$3x - 2y = 7$$
$$5x + y = 3$$

$$y = -2 \qquad \text{(3 marks)}$$

$$5(3x - 2y = 7)$$
$$3(5x + y = 3)$$

$$3x - 2(-2) = 7$$

$$3x + 4 = 7 \quad \text{in}$$

SSS

$$15x - 10y = 35 \quad M$$
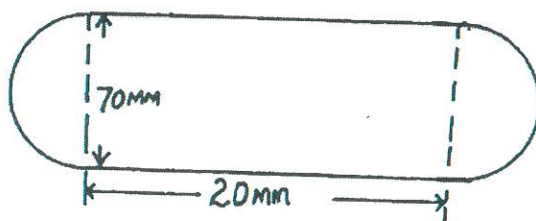$$15x + 3y = 9$$

$$\frac{3x}{3} = \frac{3}{3}$$

③

$$\frac{-13y}{-13} = \frac{26}{13}$$

$$x = 1$$

A, (for both values of
x and y).

14. The figure below (not drawn to scale) shows the cross-section of a metal bar of length 3 metres. They are equal semi circles.

$$52.5 cm^2 = \cancel{A}.$$

$$V = 52.5 \times 300 cm$$

$$15750 cm^3 . M$$



70mm

20mm

$$\begin{array}{c|c} & M \\ \hline D & V \end{array}$$

$$m = D \times V.$$

Determine the mass of the metal bar in kilograms if the density of the metal is 8.87g/cm³.

$$\text{Volume} = C.S.A \times \text{length}.$$

(4 marks)

$$8.87 \times 15750.$$

$$C.S.A = \frac{1}{2}\pi r^2 \times 2 + (7 \times 2)$$

$$= \frac{1}{2} \times \frac{22}{7} \times \cancel{0.2mm} \times \cancel{2}.$$

④

$$139,702.5g$$

$$\frac{22}{7} \times (3.5)^2 = 38.5 cm^2$$

$$\frac{139,702.5g}{1000}$$

A1

$$38.5 + 14 = 52.5 cm^2$$

$$= 139.7025 kg$$

15. Peter started his trip on Monday at 8.30 a.m. If the trip took him a total of 7 hours and 13 minutes, at what time did he complete the trip? Give your answer in 24 hour clock system

(3 marks)

$$\Delta \cdot T = 8:30 \text{ a.m}.$$

$$= 1543 \text{hrs} \quad A_1$$

$$T \cdot T = 7\text{hrs } 13 \text{ minutes. } M_1$$

$$A \cdot T = \Delta \cdot T + T \cdot T.$$

$$\begin{array}{r} 8:30 \\ 7:13 \quad m \\ \hline 15:43 \end{array}$$

③

16. Four light signals are programmed at intervals of 40 seconds, 50 seconds, 60seconds and 75 seconds. What is the earliest time they will give out light signals simultaneously if the last time they did this was at 8.15a.m?

(3 marks).

| 2 | 40 | 50 | 60 | 75 |
|---|----|----|----|----|
| 2 | 20 | 25 | 30 | 75 |
| 2 | 10 | 25 | 15 | 75 |
| 3 | 5  | 25 | 15 | 75 |
| 5 | 5  | 25 | 5  | 25 |
| 5 | 1  | 5  | 1  | 5  |
|   | 1  | 1  | 1  | 1  |

$$LCM = 2^3 \times 3 \times 5^2 \quad m_1$$

$$= 600 \text{seconds}$$

$$\frac{600}{60} = 10 \text{ minutes}.$$

$$\begin{array}{r} 8:15 \text{ a.m } M_1 \\ + \quad 10 \\ \hline 8 \quad :25 \end{array}$$

$$= 8:25 \text{ a.m } A_1$$

③

6

## SECTION 2 (50 marks)

17. A train left Mombasa on Monday evening and travelled to Kisumu according to the travel time table below. The train arrived in Kisumu on Wednesday morning of the same week.

| Mombasa | dep. | 1930 h |
|---|---|---|
| Mtito Andei | arr. | 0250 h |
| | dep. | 0335 h |
| Nairobi | arr. | 1050 h |
| | dep. | 1240 h |
| Nakuru | arr. | 1900 h |
| | dep. | 2015 h |
| Kisumu | arr. | 0900 h |

(a) Determine the time the train took to travel between          (4 marks)

(i)   Mombasa and MtitoAndei

$$(2400 - 1930) = 4:30 + 2:50 = 7hrs \; 20minute \quad B \quad ①$$

(ii)  MtitoAndei and Nairobi

$$1050 - 0335 = 7hrs \; 15minutes \; B_1 \quad ①$$

(iii) Nairobi and Nakuru

$$1900 - 1240 = 6hrs \; 20minutes \; B_1 \quad ①$$

(iv)  Nakuru and Kisumu

$$(2400 - 2015) + 9:00 = 12hrs \; 45minutes \; B_1 \quad ①$$

(b) Calculate the total time for the whole journey.          (4 marks)

Stoppage time at Mtito Ndei = 0335 - 0250 = 45min
" " Nairobi = 1240h - 1050 = 1hr 50min
" " Nakru 2015 - 1900 = 1hr 15min
Total stopage time = 45 + 1hr 50m + 1hr 15 = 3hrs 50min
Travelng time from MBS to Ksm
7hs 20 + 7hs 15 + 6hrs + 20 + 12hrs 45 = 33hrs 40m
Time for whole journey = 33h 40min + 3hrs 50 = 37hrs 30min

(c) Given that the railway road distance between Mombasa and Kisumu is 1 200 km, calculate the average speed of the train          (2 marks)

$$A \cdot S = \frac{1200h}{37.5} = 32km/h \quad ②$$

8

10

18. Copy and complete the tables (i) and (ii) below for the functions $y = 7 - 3x$ and $y = 2x - 8$ respectively

(a)  (i)  $y = 7 - 3x$                                                                (2 marks)
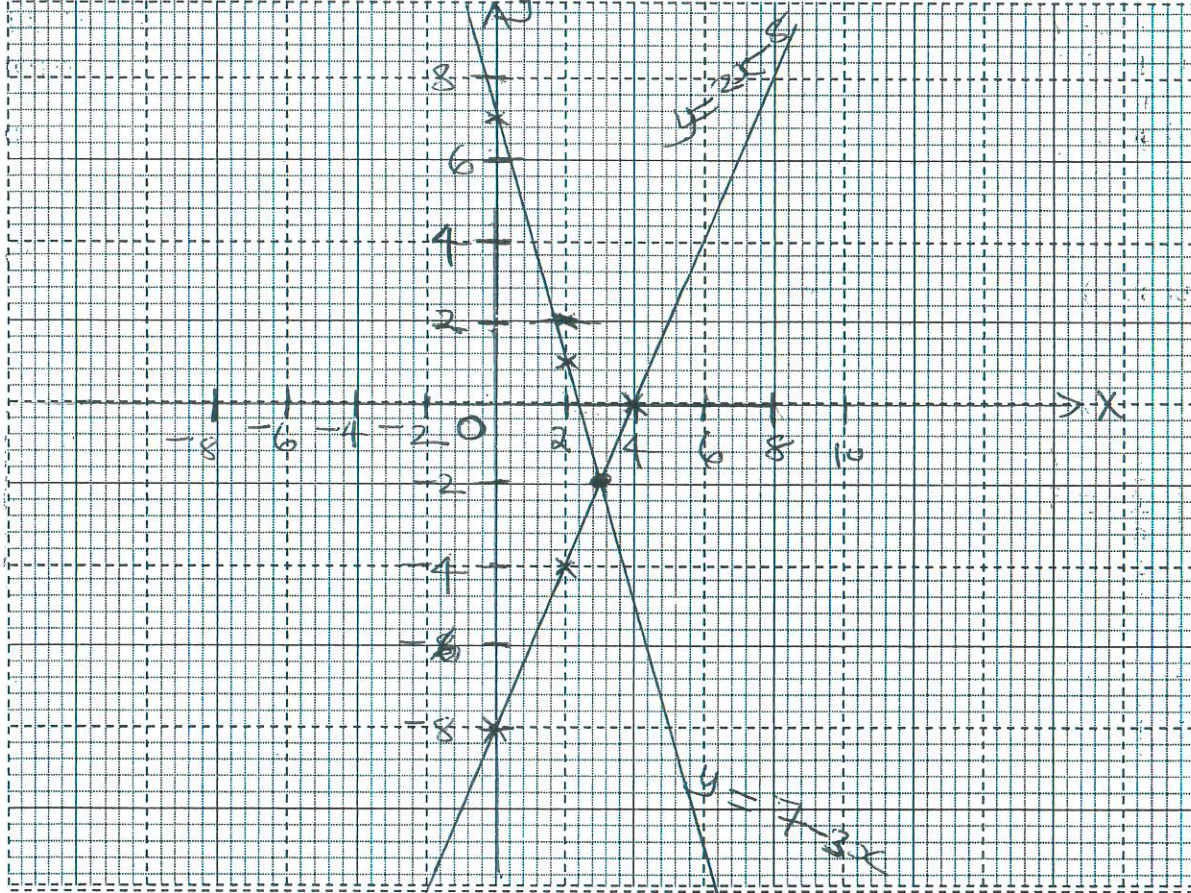
| x | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
|---|----|----|----|----|----|----|----|----|
| y | 13 | 10 | 7 | 4 | 1 | -2 | -5 | -8 |

$B_7$
$B_1$

(ii)  $y = 2x - 8$                                                                   (2 marks)

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

$B_1$
$B_1$

(b)  On squared paper and on the same grid draw the graph of $y = 7 - 3x$ and $y = 2x - 8$ (4marks)



(c) . What is the nature of the two graphs you have drawn?

(1 mark)

Linear $B_1$

(d) . State the coordinates of point of intersection of the graph drawn above        (1 mark)

$(3, -2)$ $B_1$

9

19. Tom and Joseph decided to start a business. Tom contributed sh 40000 and Joseph contributed sh 64000. The two men agreed that in any year 20% of the profit shall be divided equally between them and 30% of the remaining profit will be used to meet the cost for running the business the following year. They also agreed to share the rest of the profit in the ratio of their contributions. The profit made after first year was sh 86400.

a) How much money did they set aside towards the cost of running the business for the second year? (2 marks)

$$\frac{30}{100} \text{ of } \frac{80}{100} = \frac{2400}{10000} \quad M_1$$

$$= \frac{12}{50} \times 86,400$$

② 

$$= kshs. \ 20,736 \quad A_1$$

b) How much did Joseph receive at the end of the first year? (4 marks)

$$\frac{20}{100} \times 86400$$

$$= kshs. \ 17,280$$

$$\frac{}{2} \quad M_1$$

$$= kshs. \ 8,640$$

Remainder =

$$86,400 - (20,736 + 17280)$$

$$= kshc. \ 48,384 \quad M_1$$

T: J =

40000 : 64000

5 : 8 .   ④

$$\frac{8}{13} \times 48384 \quad M_1$$

$$= 29,774.80$$

$$= 29,774.80 + 864$$

$$\cancel{38,414.80} \quad A_1$$

c) Tom bought goats with his share of the profit. If each goat costs sh 1850, how many goats did he buy? (4 marks)

$$\frac{5}{13} \times 48384 = 18,609.20 \quad M_1$$

$$18,609.20 + 8640 \quad M_1$$

$$= kshs. \ 27,249.20$$

$$= 14 \ goats \ A_1 \quad 4$$

$$\frac{27,249.20}{1850} \quad M_1$$

10

20 (a). The volume of a closed cylinder of radius 7cm is 1540$cm^3$. Take $\pi = \frac{22}{7}$ .calculate its height and total surface area. (5 marks).

$$V = \pi r^2 h .$$

$$1540 cm^3 = \frac{22}{7} \times (7)^2 \times h . \quad M_1$$

$$\frac{1540}{154} \qquad \frac{22}{7} \times 49 = 154h$$

$$10cm = h \quad M_1$$

$$T \cdot S \cdot A = 2\pi r^2 + 2\pi r h .$$

$$= 2\pi r (r+h) \quad M_1$$

$$\left[ 2 \times \frac{22}{7} \times 7 \right] \left[ 7 + 10 \right)$$

$$\qquad\qquad\qquad M_1$$

$$44 \times 17$$

$$= 7.48 cm^2 \quad A_1$$

⑤

b). The figure below represents a closed cuboid ABCDEFGH with a rectangular base.AB = 12cm, BC = 5cm and CH = 15cm.Calculate the surface area of the cuboid. (5 marks)



$$T \cdot S \cdot A = 630 cm^2 \quad A$$

⑤

$$12 \times 5 \times 2 = 120 cm^2 \quad M_1$$

$$5 \times 15 \times 2 = 150 \quad M_1$$

$$12 \times 15 \times 2 = 360 \quad M_1$$

$$(120 + 150 + 360) cm^2 \quad M_1$$

10

11
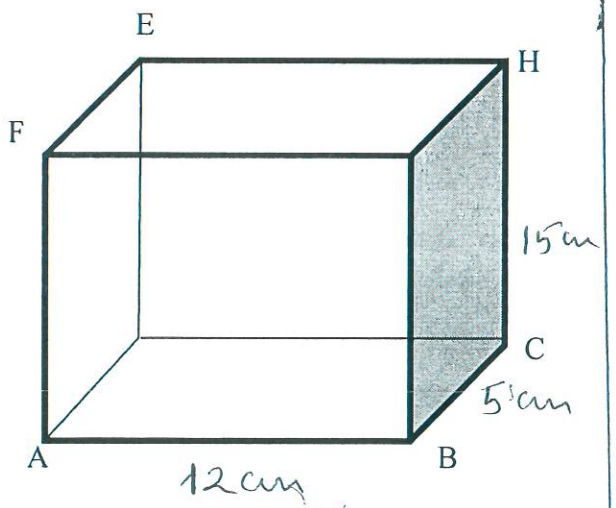
21. Simplify the following expression

    i.   $\dfrac{2m-am-2y+ay}{2m+2y-am-ay}$              (3 marks)

$$m(2-a) - y(2-a)$$
$$= (m-y)(2-a) \; M_1$$
$$\underline{\hspace{4cm}}$$
$$2m+2y-am-ay$$

$$2(m+y) - a(m+y) \;\;(3)$$
$$= (2-a)(m+y) \; M_1$$
$$\dfrac{(m-y)(2-a)}{(2-a)(m+y)} = \dfrac{m-y}{m+y}$$

    ii.   $\dfrac{pr+r^2}{p} - \dfrac{pr+r^2}{r}$              (3 marks)

$$\dfrac{r(pr+r^2) - p(pr+r^2)}{pr}$$

$$= \dfrac{pr^2 + r^3 - p^2 r - pr^2}{pr} \; M_1$$

③

$$= \dfrac{r^3 - p^2 r}{pr} = \dfrac{r(r^2-p^2)}{M_1 \; pr}$$

$$= \dfrac{r^2 - p^2}{p} \; A_1$$

    iii.   $\dfrac{am-ay+bx-by}{a+b}$              (2 marks)

$$a(x-y) + b(x-y)$$
$$= (a+b)(x-y) \; M_1$$

$$\dfrac{(a+b)(x-y)}{(a+b)} \;\;(2)$$

$$= x-y \; A_1$$

    iv.   If a = 2, b = 3 and c = -5. Evaluate : 2ab – c      (2 marks)

②

$$(2 \times 2 \times 3) - (-5) \; B_1$$

$$12 + 5$$

$$= 17 \; B_1$$

10

12