**MOMALICHE 4 CYCLE 8**

**MATHEMATICS 121/1**

**MARKING SCHEME**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1. | Numerator9 ÷ - 3 + $\frac{5}{2}$ x $\frac{3}{-5}$-3 - $\frac{3}{2}$ = - $\frac{9}{2}$Denominator$\frac{1}{2}$ + $\frac{15}{4}$ x $\frac{4}{3}$= 5$\frac{1}{2}$$\frac{N}{D}$ = $\frac{-9}{ 2}$ ÷ $\frac{11}{2}$= $\frac{-9}{ 2 }$ x $\frac{2}{11}$= $\frac{-9}{11}$ | M1 ✓ Numerator M1 For denominatorA1 | 4 | $\frac{dy}{dx}$ = 2x – 1 y = $x^{2}$ - x + c5 = 1 – 1 + c c = 5y = $x^{2}$ - x + 5 | M1 Partial integration with cM1 ✓ Attempt to substituteequationA1 |
|  |  | 03 Marks  |  |  | 3 Marks |
| 2. | 3y = -2x + 9 y = -2/3 x + 3 g=$\frac{-2}{3}$ $g=\frac{7-a}{a-13}=\frac{-2}{3}$  -2a + 26 = 21 – 3a  a = -5  | B1M1 ✓ Equation formedA1 | 5 | 2x$\left(3^{4}\right)$ x $3^{3x}$ = $3^{6}$ $3^{2x}$$3^{8x}$ x $3^{3x}$ = $3^{6}$ $ 3^{2x}$$3^{11x}$ x $3^{3x}$ = $3^{6}$ $3^{2x}$9x = 6x = $\frac{2}{3}$ | M1 Equation expressed in based 3M1 Expressing powersA1 |
|  |  | 3 marks |  |  | 3 Marks |
| 3. | 7x – 4 ≤ 9x + 2 ..(i)9x + 2 < 3x + 14(ii) Solving (i)7x – 4 ≤ 9x + 2-2x ≤ 6x ≥ -3Solving equation (ii)9x + 2 < 3x + 146x < 12x < 2Combining (i) and (ii)-3 ≤ x < 2 -3 – 2 -1 0 1 2 Integral values are-3, -2, -1, 0, 1 | ✓Solving equation (ii)✓Solving equation (ii)✓B1 Solution represented on number line✓A1 Integral values | 6. | 6480 = 24 x 34 x 5 7200 = 25 x 32 x 52  GCD = 24 x 32 LCM = 25 x 35 x 52 x 73 x$=\frac{2^{9} x3^{7} x 5^{2}x 7^{3}}{2^{5}×3^{4}×5^{2}}$  Third number: 24 x 33 x 73 = 148,176 | M1M1A1 |
| 7. | Cost of the car in USD = 5000 + $\frac{20}{100}$ x 5000= 5000 + 1000= USD 6000If 1USD = 105 yen ? = 80,325$\frac{80325}{105}$ = 765 USDTotal cost in US$ = 6765Amount needed in KSh.KSh. 63 x 6765KSh. 426,195 | M1 ✓ Cost obtainedM1A1 |
|  |  | 4 marks |  |
| 8 | 5 x $\frac{1}{8.29 x10^{-2}}$ - 14 x $\frac{1}{5.81 x 10^{-1}}$5 x 0.126 x $10^{2}$ - 14 x 0.1721 x 10= 60.3 – 24.094= 36.206 | M1M1A1 |  |  | 3 marks |
| 14. | A.S.F = $\frac{750}{120}$ = $\frac{25}{4}$L.S.F = $\sqrt{\frac{25}{4}}$ = $\frac{5}{2}$3V.S.F = $\left(\frac{5}{2}\right)$ = $\frac{125}{8}$V.S.F = $\frac{125}{8}$ = $\frac{V}{400cm^{2}}$V = $\frac{125}{8}$ x 400 = 6250cm3Volume in litres = $\frac{6250}{1000}$= 6.25L | M1 L.S.FM1A1 |
|  | 4 Marks |  |  | 3 Marks |
| 9. | $\frac{a}{12 -a}$ = $\frac{x}{3x}$ = $\frac{1}{3}$3a = 12 – a4a = 12A = 3cm∴TB = 3cm | M1M1A1 | 15 | ∠SPQ = 900∠TSP = 900 – 560 = 340∠PSQ = 900 – 280 = 620∠PRQ = ∠PSQ (Subtd by same chord)∠PRQ = 620 | B1B1 |
|  |  | 3marks |  |  | 2Marks |
| 10. |  | B1 correct image B1 ✓correct labelling | 16. | (x – 3)2 – (3x – 9) (x + 3 (x – 3)x2 – 6x + 9 – 3x + 9 (x + 3) (x – 3)x2 – 9x + 18(x + 3) (x – 3)(x – 3) (x – 6)(x + 3) (x – 3)x – 6x + 3 | M1M1A1A1 |
|  |  | 3 Marks  |  |
| 11. | $\frac{12}{2}$ = 1.2 x kk = $\frac{6}{1.2}$ = 5Length in cm Frequency7.5≤ x ≤ 9.5 129.5 ≤ x ≤ 11.5 5 x 1.6 = 1611.5≤x ≤ 15.5 5 x 0.8 x 4 = 1615.5≤ x ≤ 21.5 5 x 2 x 6 = 60 | B1 ✓Constant B1B1 |  |
|  |  | 3 Marks |  |  | 10 Marks |
| 12. | Let $Log\_{2}$x = y $y^{2}$ - 3y – 4 = 0(y – 4) (y + 1 ) = 0y = 4 or y = -1$Log\_{2}$x = 4 and $Log\_{2}$x = 1x = 16 or x = $\frac{1}{2}$ | M1 ✓Quadratic equationM1 ✓FactorizationA1 For both values of yB1 for both values of x | 17. | (a) 250 x 14 x 2 x 2 = 14000 Net profit = 14000 – 6000 = KSh. 8000(b) 8000 x 25 = 200,000 = 190,000(c) Saving: $\frac{40}{100}$ x 190,000 = 76000Remaining profit = $\frac{36}{100}$ x 190,000 = 68,400Muthoka’s share$\frac{45,600}{3}$ + $\frac{2}{9}$ x 68,400 = 30,400(d) 475,000 x 3 x 100 95= 1,500,000 | M1 ✓ProfitA1B1 ✓ProfitM1 ✓Equation for equal shareA1M1 ✓Expression of M uthoka’s shareA1M1M1A1 |
|  |  | 4 Marks  |
| 13. | 8t + 6s = 41604t + 12s = 40004t + 3s = 2080-t + 3s = 10003t = 1080t = 360s = 213$\frac{1}{3}$Trouser = Sh. 360Shirt = Sh. 213.33 | M1 ✓ Simultaneous equations formedM1 ✓Attempt to eliminateA1 For both |
|  |  | 3 Marks |  |  | 10 Marks |
| 18. | i) (4000 x 12) +(1100 x 12)= Sh. 61,200 (ii) 1st slab 4200 x2= 8400  2nd slab 3800 x 3 = 11400 3rd slab 4600 x 5 = 23000 42800 4th slab x 6 = (61,200 – 42800) = K₤ 3066.70 = Taxable income  (12600 + 3066.70 = K₤ 15666.7 (iii) $\left(\frac{15666.7 x 20}{12}\right)$ - 10800= KSh. 15,311.20(iv) 26111.20 – 4000Sh. 22,311.20 | M1A1 or 5100 x 2M11st to 3rd slab4th slabM1M1A1M1A2 M1 | 19. | (a)

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| x | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| 2x2 | 128 | 98 | 72 | 50 | 32 | 18 | 8 | 2 | 0 | 2 | 8 | 18 | 32 |
| 5x | -4 | -35 | -30 | -25 | -20 | -15 | -10 | -5 | 0 | 5 | 10 | 15 | 20 |
| -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 |
| y | 76 | 51 | 30 | 13 | 0 | -9 | -14 | -15 | -12 | -5 | 6 | 21 | 40 |

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|  |  B1 – For half + correct values B1B1 for all values.(b) (i) 2x2 + 5x – 12 = y 2x2 + 5x – 12 = 0 0 = yx = -4 or 1.5 (b)(ii) = 2x2 + 5x- 12 x -30 = -3x2 – 7x + 3 x 2-3y = -6x2 – 15x + 36 0 = -6x2 – 14x + 6  -3y = -x - 30y = $\frac{1}{3}$ x + 10x = -4.7 or 2.3 | GraphB1B1B1B1 |
|  |  | 3 Marks |
| 20 | (a) $\frac{1}{2}$ x 30h+ $\frac{1}{2}$x40h+60h = 209095h = 2090h = 22m/smax speed = $\frac{22 x 3600}{1000}$= 79.2 km/h(b) a = $\frac{22}{30}$ = $\frac{11}{30}$(c) $\frac{1}{2}$ x 20 x 11 = $\frac{220}{2}$= 110m(d) Time for half journey$\frac{1}{2}$ x 22 (30 + t + t) = $\frac{1}{2}$ x 209011 (30 + 2t) = 1045330 + 22t = 104522t = 919t = 32.5 | M1A1 B1M1A1 v 0.7333 m/s accept km/hM1 A1M1 M1 A1FTQ | 21 | (a) 400 – Angle subtended by the same  arc: MN(b) 250 – Diameter of a circle subtends  900 at the circumference of a circle.(c) 650 – Alternate segment theorem  (∠LNP is alternate to ∠LKN)(d) 100 – Sum of angles in a triangle  add up to 180(e) 500 – Alternate segment theorem or  sum of angles in a straight line add  up to 1800.  | B1 ✓AngleB1 ✓ReasonB1 ✓AngleB1 ✓ReasonB1 ✓AngleB1 ✓ReasonB1 ✓AngleB1 ✓Reason |
| 22 |  | 23. | PSOQRT |  |
|  |  |
|  | (a) 2$πr^{2}$ = 2 x $\frac{22}{7}$ x 35 x 35 = 7700cm260x354(b) (c) $\frac{60+x}{x}$ = $\frac{35}{14}$120 + 2x = 5xx = 40cmSlant height= 60 + 40 =100cm(c)$πRL$ - $πrl$$\frac{ 22}{7}$ x 35 x 100 - $\frac{22}{7}$ x 14 x 40 11000 – 1760 = 9240cm2Base area ($πr^{2}$) = $\frac{22}{7}$ x 14 x 14 = 616cm2Total surface area7700 + 616 + 9240 = 17,556cm2 | B1 ✓Area M1 ✓ExpressionM1✓ Equation M1A1✓Equation for slant height✓AccuracyM1 ExpressionM1M1M1A1 |
|  | OS = $\frac{1}{3}$OP QT = $\frac{3}{4}$OS OR = $\frac{1}{3}$OQ(i) SR = SO + OR = $\frac{1}{3}$P + $\frac{1}{3}$Q= $\frac{1}{3}$(Q – P)(ii) QS = QO + OS= Q + $\frac{1}{3}$P= $\frac{1}{3}$P – Q(iii) PT = PS + ST= -$\frac{2}{3}$P + $\frac{1}{4}$(-QS)= -$\frac{2}{3}$p + $\frac{1}{4}$ (Q - $\frac{1}{3}$P)=-$\frac{2}{3}$p + $\frac{1}{4}$q - $\frac{1}{12}$p=-$\frac{9}{12}$p + $\frac{1}{4}$q = $\frac{1}{4}$q - $\frac{3}{4}$p(iv) TR = TQ + QR= $-\frac{3}{4}$ QR - $\frac{2}{3}$Q= -$\frac{3}{4}$($\frac{1}{3}$p – q) - $\frac{2}{3}$Q= -$\frac{1}{4}$p + $\frac{3}{4}$q - $\frac{2}{3}$q = - $\frac{1}{4}$P + $\frac{1}{12}$Q= $\frac{1}{12}$Q - $\frac{1}{4}$PPT = $\frac{1}{4}$Q - $\frac{3}{4}$PTR = $\frac{1}{12}$Q - $\frac{1}{4}$P∴ PT = 3TR or $\frac{1}{3}$PT = RTCommon point TPT is a multiple of TRPT = 3TRHence PTR are collinear | B1M1A1M1A1M1A1M1 (both seen)M1 (both seen)A1 conclusion |
|  |  | 10 Marks |
| 24 | (a) Initial acceleration is at t = 0$V=\frac{ds}{dt}$ = - 6$t^{2}$ + 3t + 3a = $\frac{dv}{dt}$ = -12t + 3when t = 0, a =[ 0 + 3∴ a = 3m/s2(b) (i) at rest V = 0-6$t^{2}$ + 3t + 3 = 0(2t + 1) (t-1) = 0t = -$\frac{1}{2}$ or t = 1 (t = -$\frac{1}{2}$ not applicable)(ii) S = -$2t^{3}$ + $\frac{3}{2}t^{2}$ + 3tWhen t =m 1, s = -2$(1)^{3}$ + $\frac{3}{2}$ $(1)^{2}$ + 3 (1)2.5M(c) When velocity is maxium, a = 0-12t + 3 = 0 t = $\frac{1}{4}$Max v = -6 $\left(\frac{1}{4}\right)^{2}$ + 3$\left(\frac{1}{4}\right)$ + 3 = 3.375 m/s | M1 M1A1M1M1A1 for t = 1M1 SubstitutionA1M1For substitutionA1 |
|  |  | 10 Marks  |  |  |  |

 NO. 19