**KENYA HIGH EXAMINTIONS 2021**

**121/2**

**MATHEMATICS PAPER 2MARKING SCHEME**

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| 1. | No. Log  0.7214 2.8582  20.37 0.3090  1.1672 x  69.8 1.7224  1.8439  3.8785  7.560 x 10-3 | M1  M1  A1 | ✔ Logs  ✔ x, - |
| 2. | Co-ordinates of mid-point M:  OM = (OP + OQ)  = = =  Hence M  Gradient of PQ = =  Equation of bisector of PQ at  = 6  y – 7.5 = 6x -6  y = 6x + | M1  M1  A1 | ✔ Co-ordinate M  ✔ Equating to ||⊥ gradient  ✔eqn |
| 3. | A.S.F = , L.S.F = =  V.S.F = =  = , v = 68.175cm3 | M1  A1 | ✔ VSF  ✔Vol accept to 4 sf |
| 4. | x 800 = 696 (selling point)  B.P x = 696, B.P = KSh. 580 | B1  B1 | ✔ S.P  ✔ B.P |
| 5. | C:\Users\Nzambia\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\17.jpg | L1  L1  L1  B1 | For ✔ y < x + 4 plotting & shading  For ✔ Plotting & shading y ≤ 6 – x  For ✔ plotting y ≥ 2  For ✔ identification of R |
| 6. | - x 100  x 100  = x 100 = 33% increase | M1  M1  A1 | ✔  ✔FactorisingOv |

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| 7. | Log (5x + 75) – Log (2x – 9) = Log32  Log = Log32  = 9  5x + 75 = 9(2x – 9)  156 = 13x  x = 12 | M1  M1  A1 | ✔eqn in logs  ✔ Logs removed (all)  ✔ Value of x |
| 8. | 2a = 2(3i – 2j + 3k  = 6i – 4j + 6k  3b = 3(2i – 4j – 3k)  = 6i – 12i – 9k  2a – 3b = 8j + 15k  |2a – 3b) =  = 17 | M1  M1  A1 | ✔ 2a and 2b values  ✔ calculation of magnitude  ✔ Ans |
| 9. | A3 =  A3b + A3x = bx  x(b – A3) = A3b  x =  Substituting for A = 2 and b = 6,  =  = -24 | M1  M1  A1 | ✔ Removal of  ✔ Simplification  ✔Eqn |
| 10. | (a) 6(XC) = 5 x 4.8  XC = = 4cm  (b) 8 x (8 + 4 + 6) = BT2  BT = = 12cm | M1  A1  A1 | ✔Eqn  ✔ XC  ✔Eqn  ✔ BT |
| 11. | Adding: =  Multiply by conjugate:-  ∙  =  = 6 +10  2 + |  |  |
| 12. | (a) y = kx + cx2  45 = 20k + 400c  60 = 24k + 576c  270 = 120k + 2400c  300 = 120k + 2880c  c = =  45 = 20k + , k = 1  hence  y = x +  (b) 75 = x +  + 16x – 1200 = 0  x =  x = -43.56 or 27.56 | M1  M1  A1 | ✔ Substitution  ✔ c, k  ✔eqn |
| 13. | = a6 + 6a5(-x)1 + 15a4(-x)2 + 20a3)-x)3  a6 – 6a5x + 15a4x2 – 20a3x3  (a – x)6 = 2.996 = (3-0.01)6  a = 3, x = 0.01 hence  36 – 6 x 35x (0.01) + 15 x 34 (0.01)2 – 20 x 33 x (0.01)3  729 – 14.58 + 0.1215 – 0.00054  = 714.54096  = 714.541 | M1  A1 | ✔ Expansion  ✔ Simplification in a, x  CAO |
| 14. | Third piece  Max length: 3.05 – (1.25 + 0.935)  = 0.865m  Min length: 2.95 (1.35 + 0.945)  = 0.655m  Hence  0.655 to 0.865m | B1  B1  B1 | ✔ Expression for max length  ✔ Exp. For min length  ✔ Identify of upper & lower limit. (Accept given as range |
| 15. | 1kg of Tamu mixed with x kg of Chungu  (70 x 1) + (64 x x) = 68 x (1 + x)  70 + 64x = 68 + 68x  x =  Tamu: Chungu = 1: x = 1:  = 2:1 | M1  A1 | Alternative Formula  ✔eqn to find x Tamu Chungu  70 64    68  4 2 |
| 16. | + 8x + + +  = 1 + +  (x + 4)2 + (y – 1)2 = 18  Centre of circle (-4, 1)  Radius of circle =  or 4.243 | M1  M1  A1 | ✔eqn  ✔Eqn of circle expressed  ✔ Centre & Radius |
| 17. | C:\Users\Nzambia\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\18.jpg  (b) (i) = x + x  = + = =  (ii) x x + x  = +  =  = | B2  M1  A1  M1 | ✔ All (B1 ✔ one arm |
| 18. | (a) Det = 32 – 35  = - 3  P-1 = -  (b) (i) 8b + 14m = 47600  10b + 16m = 57400  =  or  =  (ii) =  =  =  Bag of beans cost Sh. 3500  Bag of maie cost Sh. 1400  (c) x 3500 = 4025  8 x 4025 = 32400  47600 – 32400 = 15400  ∴1400m = 15400  m = 11 bags  Ratio 8:11 | B1  B1  M1  A1  M1  M1  A1  B1  B1  B1 | ✔ Accept  Both |
| 19.  20. | (a) = 38000 + 14000 + 8500 + 3300  = 62800  K£ 37680 p.a.  (b) 1st K£ 600 🡪 6000 x 2 = 12000  Next £6000 🡪6000 x 3 = 18000  Next £6000 🡪 6000 x4 = 24000  Next £6000 🡪 6000 x 5 = 30000  Next £6000 🡪 6000 x 6 = 36000  Next £6000 🡪 6000 x 7 = 42000  Rem. £ 1680 🡪 1680 x 8 = 13440  Tax due p.a. = Sh. 175440  Less relief Sh. 18000  Tax paid = Sh. 157440  (c) (i) Tax paid per month =  = 13,120  Total deductions  = 13120 + 320 + 1000 + 2000 + 500  = 23940  (ii) Net salary = 62800  - 23900  38,900   1. =   =  =  -1 = 4 – 2x  x = 2.5   1. Common ratio =   =  =  =   1. a =   =  = 729  S4 = 729  = 729  = 729  = 729 x x  = 1080 | M1  A1  M1  M1  M1  A1  M1  A1  M1 | ✔ Taxable income in Sh/m  (can be implied in accuracy mark)  ✔Values in just 4 slabs  ✔ Subtracting relief  ✔ Addition  ✔ Ans |
| 21. | (a) (i) Fraction filled in 1 hr by PtQ  = + =  Time taken to fill tank = = 1 hrs  (ii) Fraction filled in 1 hr by P, Q & r  = - =  Time taken to fill = = 18 hours  (b) (i) Fraction filled by 9.00 a.m  P 🡪 x 1 hr =  Q 🡪 x hrs =  Both P and Q 🡪 +  =  (ii) Fraction to be filled =  Time taken = x 18  = 12 hrs  Time taken for taken to fill up  = 0900  1230  2130 hrs  or 9.30 p.m | M1  A1  M1  A1  M1  M1  A1  M1  A1 |  |

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| 22. | (a) (i) ON = OP + PN  = P + PQ  = p + q - p  = p + q  (ii) PM = PO + OM  =-p + q  (b) (i) OX = hON  = h  = hp + hq  OX = OP + PX  = P + kPM  = P + k (-p + )  = p – kP + q  = (1 – k)p + kq  hp + hq = (1 – k)p + kq  = 1 – k………. (i)  h = k …………...(ii)  From (ii) h = k  Subt in (i)  x k = 1 – k  k =  h =  (ii) PX : XM = :  = 5 : 4 | M1  A1  M1A1  B1  B1  M1  M1 | Equating eqns  For extracting coefficients |
| 23. | (a) ∠QRS = 900 (Subst. by the remainder)  ∠ PRS = 90 – 70 = 200  (b) ∠POQ = 2 x 700 = 1400  ∠at centre is twice ∠ at circumference  (c) ∠RQP = = 550( Base angles of a Δ)  ∠RQP and ∠PSE are supplementary (cyclic  quadrilateral)  ∴∠PSR = 180 – 55 = 1250  ∠ QSR = 125 – 70  = 550  (d)∠PSQ = ∠PRQ = 700 (Subst. by same arc)  ∠QSP = ∠SPO = 700 (base angles of isoscles Δ)  Reflex ∠POS = 360 – 40  = 3200 |  | B1  B1  B1  B1  B1 |

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| 24. | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | x | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | | y | -5 | 15 | 19 | 13 | 3 | -5 | -5 | 9 | | | |
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|  | (c) (i) x = -4.85  x = -0.7  x = 1.5  (ii) x3 + 4x2 – 5x – 5 = -4x – 1  x3 + 4x2 – x – 4 = 0  y = x3 – 4x2 – 5x = 5  0 = x3 – 4x2 – x – 4  y = -4x – 1  x 0 1  y -1 -5  x = -4  x = 1 |  |  |
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