**ASUMBI GIRLS HIGH SCHOOL**

**TERM 2 – DECEMBER 2021**

**FORM 4 - MATHEMATICS PAPER 1**

**MARKING SCHEME**

|  |  |  |  |
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| NO. | WORKING | MARKS | COMMENTS |
| 1 | 5 x6 +(-76) $÷$ 4 +27$÷3$ -15$÷ 3 $x (-4)= 30 + (-19) + 9 -5 x-4= $\frac{20}{20} $= 1 | M1M1A1  **3** | For numeratorFor denominator |
| 2 | 2268= 22 x 34 x 7X = 22 x34 x 72 = 7 22 x34 x7 | B1M1 A1 **3** |  |
| 3 | Amt in Ksh = 5000 x 114.2 = 571000Remainder = 571000-276100 = 303900Amt in Euros = 303900 101.30 = 3000 Euros | M1M1A1  **3** |  |
| 4 | 2x2 + 3x -2 = (2x -1)( x+ 2) X3-4x x( x2 -4) *= (2x -1)( x+ 2)* *x( x -2)( x + 2)* = 2x - 1 X( x- 2) | M1M1A1  **3** | Factorizing numeratorFactorizing denominatorSimplified expression |
| 5 | 179 - 3 = 176234 – 3 = 231176 = 24 x 11234 = 3 x 7 x 11 GCD = 11Number of pieces = $\frac{176}{11}$ + $\frac{231}{11}$ = 16 + 21  = 37 | B1M1A1 **3** |  For GCD |
| 6 | 1. - $\left(\frac{1}{3}\right)$n = $\frac{242}{243}$

$\left(\frac{1}{3}\right)$n  = 1 - $\frac{242}{243}$ = $\frac{1}{243}$ $\left(\frac{1}{3}\right)$n = $\left(\frac{1}{3}\right)$5$∴$ n =5 | M1M1A1  **3** |  |
| 7 | $\frac{4-y}{4}$ - $\frac{9-2y}{3}= \frac{1}{2}$3(4-y) – 4(9-2y) =612-3y -36 +8y = 65y =30Y=6 | M1M1A1 **3** | For removal of denom.* Opening of brackets

c.a.o. |
| 8 |  | B1B1B1B1 **4** | For locus (i)For locus (ii)For locus (iii)For the region |
| 9 | $\frac{1}{0.325}$ = $ \frac{1}{3.25×10^{-1}}$ = 0.3077$×10^{1}$ = 3.077$\frac{\sqrt{0.25}}{0.325}$ = 0.5$×3.077$ = 1.5385 = 1.5 | B1M1A1 **3** | For reciprocal with evidence of working |
| 10 | External area = 20.1 × 2.2 = 44.22Internal area = 19.1 × 1.2 = 22.92Area of path = 44.22 – 22.92 = 21.3 $m^{2}$ | M1A1 **2** | 0.50.5  |
| 11 | $× + ×$ +60 = 180$°$2X = 120˚ X = 60˚Exterior =60No. of sides = $\frac{360}{60}$ = 6 sides | M1M1A1 **3** |  |
| 12 |  | B1B1B1  **3** | Sides Broken linesShape of solid |
| 13 | Total = 42×24 = 1008Total with abs = 1008-65 = 943Average = $\frac{943}{23}$ =41  | M1M1 A1 **3** |  |
| 14 | $γ $= $\frac{2x}{3}$ + $\frac{2}{3}$ Gradient = $\frac{-3}{2}$ $\frac{γ-2 }{x--3}$ = $\frac{-3}{2}$ 2($γ$-2) = -3(x+3) 2$γ$ – 4 = -3x – 9 3x + 2$γ$ = -5 | B1M1A1 **3** |  |
| 15 | B = $A^{2}$ + $C^{-1}$ = $\left(\begin{matrix}4&3\\-1&2\end{matrix}\right)$ $\left(\begin{matrix}4&3\\-1&2\end{matrix}\right)$ + $\left(\begin{matrix}-2&-7\\1&3\end{matrix}\right)$ = $\left(\begin{matrix}13&18\\-6&1\end{matrix}\right)$ + $\left(\begin{matrix}-2&-7\\1&3\end{matrix}\right)$ = $\left(\begin{matrix}11&11\\-5&4\end{matrix}\right)$ | B1M1 M1 A1  **4** | For $c^{-1}$- Squaring A- Addition |
| 16 | 1. AC = 7.2km
2. Bearing 273˚
 | B1B1B1B1 **4** | For BFor C |
| 17a  b   c  d | X = 100-78 = 22Modal class 35-44

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  x | $$f$$ | $$cf$$ | $$d$$ | $$fd$$ |
| 15-24 | 19.5 | 6 | 6 | -40 | -240 |
| 25-34 | 29.5 | 14 | 20 | -30 | -420 |
| 35-44 | 39.5 | 24 | 44 | -20 | -480 |
| 45-54 | 49.5 | 14 | 58 | -10 | -140 |
| 55-64 | 59.5 | 22 | 80 | 0 | 0 |
| 65-74 | 69.5 | 10 | 90 | 10 | 100 |
| 75-84 | 79.5 | 6 | 96 | 20 | 120 |
| 85-94 | 89.5 | 4 | 100 | 30 | 120 |
|  |  | 100 |  |  | -940 |

Median = 44.5 + $\frac{50-44}{14}$ × 10 = 44.5 + $\frac{6}{14}$ × 10 = 44.5 + 4.29 = 48.79Mean = $\frac{∑fd}{Σ\_{f}}$ + A = 59.5 - $\frac{940}{100}$ = 50.1 | M1A1B1B1B1B1M1A1M1A1 **10**  | For vcfFor $fd$For $\sum\_{}^{}fd$ = -940 |
| 18a  b c |  AC = $\sqrt{24^{2}+18^{2}}$ = 30cmAO = $\frac{1}{2}$ × 30 = 15H = $\sqrt{36^{2}- 15^{2}}$ = $\sqrt{1071}$ = 32.73V = ($\frac{1}{3}$ × 24 × 18 × 32.73) – ($\frac{1}{3}$ × 8 × 6 × $\frac{32.73}{3}$) = 4713.12 – 174.56 = 790.68 =790.7$X $= $\sqrt{36^{2}- 12^{2}}$ = $\sqrt{1152}$ = 33.94S.A = $\frac{1}{2}$ × 24 × 33.94 × 4 + 24×16 = 2061 $cm^{2}$ | M1M1 A1M1M1 M1A1M1 M1A1 **10** | -For volume of big pyramid-For volume of small pyramid-For difference-Area of $Δ$-Sum of areas |
| 19a b c | FH = $\sqrt{10^{2}+ 10^{2}}$ = $\sqrt{200 }$ = 14.14HM = $\sqrt{5^{2}+ 14.14^{2}}$ = $\sqrt{225}$ = 15 cm˂ between HM & ABCD= ˂ between HM & EFGH$\tan(θ)$ = $\frac{5}{14.14}$ $θ$ = 19.47˚$\sin(α)$ = $\frac{5}{15}$ $α$ = 19.47˚$<$ between HM & MC = 2 × 19.47 = 38.94˚ | M1 A1M1A1M1A1M1A1M1A1 **10** |  |
| 20a  b c d e |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 |
| y | 13 | 18.75 | 26 | 34.75 | 45 | 56.75 | 70 | 84.75 | 101 | 118.75 | 138 |

Area = $\frac{1}{2}$ × 1 × $\left[13+138+2\left(26+70+45+101\right)\right]$ = 317.5 sq. unitsArea = 1$\left[18.75+34.75+56.75+84.75+118.75\right]$ = 313.75 sq. unitsExact area =$\int\_{1}^{6}3X^{2}+4X+6 dx$ =$\left[X^{3}+2X^{2 }+6X+c\right]\_{1}^{6}$ = 315 sq. units% error = $\frac{317.5-315}{315}$ × 100 = 0.7935% | B1M1A1M1A1M1A1M1A1  **10** | B1 for any 5 correct |
| 21a b  c | $A^{-1}$ = $\left(\begin{matrix}3&-4\\-2&3\end{matrix}\right)$$\left(\begin{matrix}90&120\\200&300\end{matrix}\right)$ $\left(\genfrac{}{}{0pt}{}{X}{Y}\right)$ = $\left(\genfrac{}{}{0pt}{}{36000}{850000}\right)$ $Δ$ = 27000-24000=3000$\frac{1}{3000}\left(\begin{matrix}300&-120\\-200&90\end{matrix}\right)\left(\begin{matrix}90&120\\200&300\end{matrix}\right)\left(\genfrac{}{}{0pt}{}{X}{Y}\right)$=$ \frac{1}{3000}\left(\begin{matrix}300&-120\\-200&90\end{matrix}\right)\left(\genfrac{}{}{0pt}{}{36000}{850000}\right)$$\left(\genfrac{}{}{0pt}{}{X}{Y}\right)$=$\frac{1}{3000}\left(\genfrac{}{}{0pt}{}{6000000}{4500000}\right)$ =$\left(\genfrac{}{}{0pt}{}{2000}{1500}\right)$Cost of 1 bag of beans sh. 2000Cost of 1 bag of rice sh. 1500Cost of 1 bag of beans =2000 ×$ \frac{4}{5}$ = 1600Cost of 1 bag of rice = 1500 ×$\frac{120}{ 100}$ = 1800He 2 1600 × 20 + 1800 × 30 = sh. 86000 | B1M1B1 M1M1A1B1M1M1A1 **10** |  |
| 22a b c d | Distance travelled = 48 × $\frac{1}{4}$ = 12km B to C =70-12 = 58 kmTime taken between C and D = $\frac{30}{45}$ = $\frac{2}{3}$hrs = 40minsTotal time = $\frac{88+12}{50}$ = 2Hrs Distance between C and D = 58Km Time = $\left(2hrs-55mins\right)$+ 7mins = 1hr 12minsSpeed = 48$\frac{1}{3}$ Km/hTime = $\frac{100}{54}$ × 1 = 1$\frac{23}{27}$hrs  | M1A1M1A1M1M1M1A1M1A1 **10** |  |
| 23a  b c | **i) PQ** = **q – p****ii) PM = PO + OM** **= -P +** $\frac{1}{2}$**Q****iii) ON = OP + PN** **= P +** $\frac{2}{3}$**PQ** **= P +** $\frac{2}{3}\left(q-p\right)$ **= P +** $\frac{2}{3}$**q -** $\frac{2}{3}$**p** **=** $\frac{1}{3}$**p +** $\frac{2}{3}$**q****i) OX =** m **ON** **=** $\frac{1}{3}$m **P +** $\frac{2}{3}$m **q****ii) OX = OP + PX** **= p + n PM** **= p + n(-P +** $\frac{1}{2}$**q)**$\frac{1}{3}$**mP +** $\frac{2}{3}$**mq = (1-n)p +** $\frac{1}{2}$**nq**$\frac{1}{3}$**m = 1-n**$\frac{2}{3}$**m =** $\frac{1}{2}$**n . n =** $\frac{4}{3}$**m**$\frac{1}{3}$**m = 1 -** $\frac{4}{3}$**m**$\frac{5}{3}$**m = 1****m =** $\frac{3}{5}$**n =** $\frac{4}{3}$ **.** $\frac{3}{5}$ **=** $\frac{4}{5}$**Ratio** $\frac{3}{5}$ **: 1 = 3:5** | B1B1B1B1B1M1M1A1B1B1 **10** |  |
| 24a b | $w$ = $\frac{28}{X}$Area = $\left(x-1\right)\left(\frac{28}{x}-1\right)$ = $\frac{3600}{200}$$\left(x-1\right)$ $\left(\frac{28}{x}-1\right)$ = 18 28 – $x$ - $\frac{28}{x}$ + 1 – 18 = 0 -$x$ - $\frac{28}{x}$ + 11 = 0 $x^{2}$ + 28 - 11$x$ = 0$x^{2}$ - 11$x$ + 28 = 0$x^{2}$ - 7$x$ - 4$x$ + 28 = 0$x\left(x-7\right)$ - 4$\left(x-7\right)$ = 0 $\left(x-7\right)$ $\left(x-4\right)$ = 0$x$ = 7 or $x$ = 4Length = 7mArea not previously covered = 28 – 18 $m^{2}$ = 10 $m^{2}$Cost = 10 × $\left(200+150\right)$ = 10 × 350 = sh. 3500 | B1B1M1 M1M1M1A1M1M1A1 **10** | For 28For $\frac{28}{X}$For $\frac{3600}{200}$ and area  Accept alt |
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|  |  |  |  |