**MATHEMATICS PAPER 2**

**MARKING SCHEME**

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|  | WORKINGS | MARKS | REMARKS |
| 1. | Maximum area ⇒ 8.65 x 5.35 = 46.2775Actual area ⇒ 8.6 x 5.3 = 45.58Minimum area ⇒ 8.55 x 5.25 = 44.8875Absolute error = 46.2275 – 44.8875 2% error = 0.695 x 100%  45.58 = 1.525% | M1M1A1A1A1 | Or equivalent |
|  |   | 03 |  |
| 2. | √ 3/2\_\_\_\_\_ 1 +√ 3√ 3\_\_\_ = √ 3(2-2√ 3) 2 + 2√ 3 (2 + 2 √3 ) (2-2√3)-2/8√3 + 3/4= 3/4 – 1/4 √3 | M1M1B1 | conjugatefor -2/8 √ 3 + 3/4 in simplified form. In the form a + b√ c |
|  |  | 03 |  |
| 3.  | < OCT = 38o< TOC = 102o< CTB = 51o | B1B1B1 | Alternate |
|  |  | 03 |  |
| 4. | 70x + 55y = 65(x +y)5x = 10yx : y = 2:1 | M1A1 | 1. 55

 10 21:1 5 |
|  |  | 02 |  |
| 5.  | (x – 3/2)2 + (y +5/2)2 = 16/4Center = (9,t) = (3/2 – 5/2) = (1.5, -2.5)r = √ 16/4 = 2Orx2 + y2 – 3x + 5y + 9/2 = 0x2 + y2 + 29x + 2fy + c = 0-2g = -3 -2f = 5G = 3/2 f = -5/2Radius r =√ (f2 + g2 - c) = 25/4 + 9/4 – 9/2r = √ 16/4 = 2 | M1A1B1 | Completing the square/Any other methodCentre(1.5 -2.5) or radius 2. For radius |
|  |  | 03 |  |
| 6.  | (a) (1 + 1/4x)4(14 + 4x 1/4x) + 6 (1/4x)2 + 4(1/4x)3 + (1/4x)4 1 + 1/x + 3/8x2 + 1/6x3 + 1/6x4 b) 1 + 1/-10 + 3/8(-10)2+ 1/16(-10)3+ 1/64(-10)4 = 0.903689063 = 0.9037 | M1A 1M1A1 |  |
|  |  | 04 |  |
| 7.  | 60000 x 8xt = 14400 100 T = 3 years. P x 5 x 3 = 12000 100 P = 80,000  | B1M1A1 |  |
|  |  | 03 |  |
| 8.  | P(q + 3r) = 2q – rPq + 3pr = 2q – rPq -2q = -r – 3prQ(p-2)= -r -3pQ= -r -3p or r + 2p P – 2 2 – p | M1M1A1 |  |
|  |  | 03 |  |
| 9.  | Let p be point (x, y, z) x 3 4 1/3 y + 2/3 2 = 5  Z -4 -2 P(6,11,2)10p1 = √ (6)2 + (11)2 + (2)2= √ 161 = 12.69 units | B1M1A1 |  |
|  |  | 03 |  |
| 10.  | Log72 + log7 (3x-4) = log7 9849 (x - 4) = 983x – 4 = 23x = 6X = 2 | M1M1A1 | Expressing 2 in log form to base 7 Dropping logs. |
|  |  | 03 |  |
| 11.  | 31 = 65 + 17d ⇒ 17d = -34 d = -2 T8 = 65 + 7(-2) = 65 – 14 = 51 | B1M1A1 |  |
|  |  | 03 |  |
| 12. | Let L and K be constants. P=LQ + K √Q30 = 9L + √9K14 = 162 + √16 K2K + 62 = 202K + 8L = 7-2L = 13 L = -13/2K + 3(-13/2) = 10 K = 10/1 + 392 = 59/2P = -13/2Q = 59/2 √QP = -13/2 x 36 + 59/2 x √36P = -234 + 177 = -57 | M1 M1A1B1 | For one equationAttempt to eliminate one unknown.For both constants. |
|  |  | 04 |  |
| 13. |  |  |  |
|  | People Huts days7 5 30 9 277 x 30/27 x 9/5 = 14 people  | M1A1 |  |
|  |  | 02 |  |
| 14. | (a) d = 180/360 x 2 x 6370 x 22/7 Cos 40o = 1/2 x 22/7 x 2 4879.7 = 15336.2 km(b) 100/360 x 2 6370 x 22/7= 11122.2 | M1A1M1A1 | R=6370 Cos 40o=4879.7**1000****400****400** |
|  |  | 04 |  |
| 15.  | Determinant = -3-2 =-5 -1 -1 1/5 1/5-1/5  -2 3 = 2/5  -3/5 Inverse  1/5 1/5 3 1 x = 1/5 1/5 42/5 -3/5 2 -1 y 2/5 -3/5 11 0 x 1 01 y = 1 Point of intersection = (1,1) | B1M1A1 |  |
|  |  | 03 |  |
| 16. | (1-x)(1 +x) = 1 – x 1 + x 3∫ (1-x)dx-2 3X – x2/2 + c -2 3 - 32 /2 + c – 2 – (-2)2 + c 2= 3 – 4.5 + c - -2 + 2 + c-1.5 + c – c = -1.5  | B1M1M1A1 | For the integralSubstitution. |
| 17.  |

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| Marks | Mp(x) | d(x-A) | Fd | D2 | Fd2 |  |
| 10-19 | 2 | 14.5 | -40 | -80 | 1600 | 3200 |
| 20-2930 –3940 –4950-5960-6970-7980-8990-99 | 6101624201282 | 24.534.544.554.564.574.584.594.5 | -30-20-10010203040 | -180-200-160020024024080 | 90040010001004009001600 | 5400400016000200480072003200 |
|  |  |  |  | 140 |  | 31400 |

Mean = A + Σfd Σf= 54.5 + 140/100 = 55.9(b) Variance= 31400/100 – (140/100)2 = 312.04(c) standard varaitaion = √variance √ 312.04 = 17.06 | B1B1B1B1M1M1A1M1A1 | Correct values-Column(d)Correct – values –Column (fd)Correct values-column(d2)Correct values column(fd) |
| 18.  | (a) P(WWR or WBR or BBR or BWR)(4/12 X 3/11 X 5/10) + 4/12 X 3/11 X 5/10+ (3/12 x 2/11 x 5/10 + (3/12 x 4/11 x 5/10))= 2/11(b) (i) 5/12 x 4/11 x 3/10 = 1/22(ii) P(RWB or RBW or WBR or WRB or BWR or BRW)(5/12 x 4/11 x 3/10) + (5/12 x 3/11 X 4/10) + (4/12 x 3/11 x 5/10)= 6/52 = 3/11(c) P(BBB or BBW or BWB or BWW or WWW or WWB or WBW OR WBB)(3/12 x 2/11 x 1/10)+(3/12x2/11x4/10)+(3/12x4/11x2/10)+(3/12x4/11x3/10 )+(4/12x3/11x2/10)+(4/12x3/11x3/10) +(4/12x3/11x2/10)=7/44(d) P(BBB or WWW or RRR)(3/12x2/11x1/10)+(4/12x3/11x2/10)+(5/12 x 4/11x3/10)= 1/220 + 1/55 + 1/55 = 9/220 | M1A1M1A1M1A1M1A1A1 |  |
|  |  |  |  |
| 19.  | (a) 6/10 =l/8 +L12 = LBase area = 102 = 100Area of 4Δs = 4√25(25-20)(25-20)(25-20) = 4√25 x 5 x 5x 15 = 4√ 9375T.S.A of the pyramid = 100 + 387.28 = 487.28cm2Area of the slanting edges of thr small pyramid = 4√15(3)(3)(9) = 139.44Surface of the solid frustrum = 487 .28 +36-139.44* 383.84

(b) Volume  18.71 19.36 5Volume = 1/3 x 100 x 18.71 = 62.61L.S.F = 3/5 ⇒ V.S.F 27/125Fraction representing Frustrum = 98/125∴Volume of the frustrum = 98/125 x 623.61  = 488.91(c)  18. 71 19.36  5tanα=18.71 5 α = 75.03o | B1B1M1A1M1A1B1M1A1 | Identification of angle |
|  |  | 10 |  |
| 20.  | 3C411CE2 | B1B1B1B1B1B1B1B1B1B1 | AC = 5.8 ±0.1cm√ 60o constructed√6.5cm and 5cm drawn√ Δ completed√ 120o constructed√ Besection of <s at A and BLocus of PLocus of R |
|   |  | 10 |  |
| 21. | (a) Tax on 1st ksh 9680 = 9680 x 10/100 = kshs. 968Tax on 2nd kshs. 9120 = 9120 x 15/100= kshs 1368Tax on rem kshs. 5400 = 5400 x 20/100= ksh 1080Total tax = 968 + 1368 + 1080 = kshs. 3416(b) Tax paid= 3416-(1056 + 2400 x 15/100) = kshs. 2000(c) Increase in tax paid = 2000 x 36.3= kshs. 726Increase in earnings= kshs. 726 x 100/20= ksh. 3630% increase = 3630 x 100 24200 | M1M1M1A1 M1A1M1M1 M1A1 |  |
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|  |  | 10 |  |
| 22 |

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| X | -150o | -120 | -30o | 30 | 90 | 120o | 180o |
| Sin x | -0.5 | -0.87 | -0.5 | 0.5 | 1.0 | 0.87 | 0.0 |
| 2 sin (x-30) | 0 | -1.0 | 0 | 0 | 1.73 | 2.0 | 1.0 |

(b)(c) (i) y = 2sin(x- 30o) Amplitude = 3units Period = 360o(ii) SinX = 2Sin (x – 30o) X = -126o cr 51.50 ±1o(iii) +30 0 Translation | B2P1 √C1√P1√C1√B1B1B2 | All √ B1 atleast 11 values√Plotting of Y = Sin xCaO Plotting of Y= 2 Sin (x-30)CaoFor bothFor both  |
|  |  | 10 |  |
| 23  | GRAPH 3(a) (i) 3x + 2 1/2y ≤ 600 (ii) x ≤ 100 (iii) Y ≥ 80, x ≥ 0(b) line 3x + 2 1/2y ≤ 600 | B1B1B1B1√B1√B1√B 2√B2 √ |  |
|  |  | 10 |  |
| 23 |

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| 21 | $$\left(i\right)The length EH^{2}=25^{2}-7^{2}=576 $$$$⇛EH=\sqrt{576}$$$$=24cm$$$$\left(ii\right)∠GBH=∠FAE⇛Sin∠BAE=\frac{24}{25}$$$$=0.96 $$$$∠BAE=73.74^{0}$$$$hence ∠GBH=∠FAE=2×73.74^{0}=147.48^{0}$$$$\left(iii\right) \frac{147.48}{360}×\frac{22}{7}×3.5×2=9.012 cm $$$$ \frac{212.52}{360}×\frac{22}{7}×10.5×2=38.962 cm $$$$Length=\left(9.0127+38.962+24+24\right)cm$$$$=95.9747cm$$$$=95.97cm to 2 d.p.$$ | M1M1A1M1A1B1B1B1M1A1 |

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| 24 |

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| 17 | (a) (i) =  +   =  +  = (ii)  =  +  = - +  = (b)(i)  = k = 1. = t  +

  =  + t  (c )     (d)    | B1B1B1B1B1M1A1B1M1A1 | Or using ratio theorem. graphFor bothFor attempt to solve for t or s |

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