MATHEMATHEMATICS FORM 3

MARKING SCHEME PAPER 2

|  |  |  |  |
| --- | --- | --- | --- |
| No. |   |  |   |
| 1. | a = 2r = 5L = 1250Sn = a$\left(\frac{r^{n}-1}{r-1}\right)$Tn = a$r^{n-1}$ 1250 = 2 x $5^{n-1}$125 x 10 = 2 x $5^{n-1}$$5^{3}$ x $5^{1}$ = $5^{n-1}$$5^{4}$ = $5^{n-1}$⇒ 4 = n – 15 = nS5 = 2 $\left(\frac{5^{5}-1}{5-1}\right)$= 2$\left(\frac{3125-1}{4}\right)$= 2 x $\frac{3124}{4}$= 1562 | M1A1 |  |
| 2 | $$P=KQR^{2}$$$$P=K\left(2Q\right)(\left(\frac{1}{2}R\right)^{2}$$$$P=2×\frac{1}{4} P$$$$P=\frac{1}{2} P$$P decrease by 50% | M1M1A1 |  |
| 3. | QU x RU = SU x TUSU = $\frac{QU x RU}{TU}$= $\frac{11 x 6 }{4}$= 16.5cm | M1M1A1 |  |
| 4. | Det = 6 + 25 = 31M-1 = $\frac{1}{31}\left[\begin{matrix}2&5\\-5&3\end{matrix}\right]$$\left[\begin{matrix}X\\Y\end{matrix}\right]$ = $\frac{1}{31}\left[\begin{matrix}2&5\\-5&3\end{matrix}\right]\left[\begin{matrix}-9\\16\end{matrix}\right]$ = $\frac{1}{31}\left[\begin{matrix}62\\93\end{matrix}\right]$$\left[\begin{matrix}X\\Y\end{matrix}\right]$ = $\left[\begin{matrix}2\\3\end{matrix}\right]$ | B1M1M1A1 |  |
| 5. | (3X –Y)(X-Y)9X2 – Y2 = (3X –Y)(3X+Y)$$\frac{(3X –Y)(X-Y)}{\left(3X-Y\right)(3X+Y)}$$$$\frac{X-Y}{3X+Y}$$ | M1M1A1 |  |
| 6. | h = $\frac{5\sqrt{3}}{2Sin60}$ = 5cmArc length = $\frac{120}{360}$ x 2 x 3.142 x5= 10.5cm |  |  |
| 7. | $\frac{2\sqrt{3}}{\left(\sqrt{3}+\sqrt{2}\right)}$ $\frac{(\sqrt{3}-\sqrt{2)}}{(\sqrt{3}-\sqrt{2)}}$= $\frac{2\sqrt{3}x\sqrt{3}-2\sqrt{3}x\sqrt{2}}{\left(\sqrt{3}\right)^{2}-\left(\sqrt{2}\right)^{2}}$= $\frac{2x3-2\sqrt{6}}{3-2}$= $\frac{6-2\sqrt{6}}{1}$ = 6 - 2$\sqrt{6}$ | M1M1A1 |  |
| 8. | Mean – of six$\frac{n}{2}$, $\frac{n}{2}+1$32, xMedian 36 = $\frac{32+x}{2}$72 = 32 + x 72 - 32 = x 40 = xMean mark = 24 + 28 + 32 + 40 + 48 + 50 6 x = 37 | M1M1A1 |  |
|  |  | 3 Marks |  |
| 9. | Absolute error= $\frac{Max-Working+Working-Min}{2}$= $\frac{20.05x 25.05-19.95 x 24.95}{2}$= $\frac{4.5}{2}$2.25% error = $\frac{Absolute}{Actual}$ x 100= $\frac{2.25}{20.0 x 25.0}$ x 100= 0.45% | M1 |  |
| 10. | $\frac{9.2}{Sin C}$ = $\frac{7.9}{Sin 48}$Sin C = $\frac{9.2 Sin 48}{7.9}$ Sin C = 0.8654C = 59.93 = 59.9 A1 | M1 |  |
| 11. | $$\frac{5X+75}{9}=2X-9$$$$5X+75=18X-81$$$$13X=156$$$$X=12$$ | M1M1A1 |  |
| 12. | 2x – 3y = -6-3y = -2x – 6y = $\frac{2}{3}$x + 2Gradient = $\frac{2}{3}$Tan x = $\frac{2}{3}$ = 0.6667x = 33.70θ = 180 – 33.70= 146.30 | B1B1B1 |  |
| 13. | $\sqrt{q}$ = r$\sqrt{1-as^{2}}$q = r2 (1 – as2)q = r2 – r2as2r2as2 = r2 – q= $\frac{r^{2}-q}{r^{2}-a}$S = ± $\sqrt{\frac{r^{2}- q}{r^{2}a}}$ | M1M1A1 |  |
| 14. | C:\Documents and Settings\samuel\Local Settings\Temporary Internet Files\Content.Word\5.jpg14 | B1B1B1 |  |
|  | C:\Documents and Settings\samuel\Local Settings\Temporary Internet Files\Content.Word\8.jpg |  |  |
| 16. | Ext.angle = $\frac{360}{5}$ ∠BTC = 180 – (72 + 72)= 360 | M1A1 |  |
| **SECTION 2** |
| 17. | (a) Modal : 16 – 200 (b)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mass (kg) | f | Mid pts(x) | Fx | Cf |
| 1-5 | 2 | 3 | 6 | 2 |
| 6-10 | 3 | 8 | 24 | 5 |
| 11-15 | 6 | 13 | 78 | 11 |
| 16-20 | 8 | 18 | 144 | 19 |
| 21-25 | 3 | 23 | 69 | 22 |
| 26-30 | 2 | 28 | 56 | 24 |
| 31-35 | 1 | 33 | 33 | 25 |
|  | Σf=25 |  | Σfx= 410 |  |

Mean = $\frac{410}{25}$= 16.41. Cf2,5,11,19,22,24,25

13th – Class 16 – 20Median = 15.5 + $\frac{2}{8}$ x 5= 16.75 | B1M1✓M1✓A1M1A1B1B1M1A1 | Mid pointsfxΣfxMay be impliedMedian class |
|  |  | 10 |  |
| 18.60θAB153.2 Tower h 21.02  Tan θ = $\frac{21.02}{153.2}$ θ = Tan-1 0.1372= = 7.8120 or (70,49’)6060AB200h Tower h (tower) = 200 tan60= 200 x 0.1051= 21.02  | (a) BACD2002005003100650650Bearing 1800 + 650 = 2450$\frac{BC}{Sin 50}$ = $\frac{200}{Sin 65^{0}}$BC = $\frac{200 X 0.766}{0.9063}$= 169.0m(b) $\frac{BD}{200}$ = Sin500 BD = 200 x 0.766= 153.2 | B1B1M1A1M1A1M1A1M1A1 | Sketch |
|  |  | 10 |  |
| 19. | (a) Distance covered by car = 500kmTime = $\frac{500}{100}$ hrs= 5 hoursArrival time ⇒ 9.30 + 5 hours= 2.30 p.m(b) Lorry took ⇒ 6 hrs 15 mins Lorry’s speed = $\frac{250}{6.25}$ km/hr 40 km/hr Relative speed ⇒ 100 – 40 = 60 km/hr(c) Lorry’s Distance⇒ (12.5 – 8.15) x 40km/hr= 160kmCar’s distance = (12.5 – 9.30) x 100km/h= 275kmDistance btn = 160 – 25= 135km | M1A1M1A1M1A1B1B1M1A1 | Accept 1430h |
| 20. | . a) T6 = p + 5c T5 = p + 4d B1 p + 4d = p + 5c M1 4d = 5c d = 5/4c A1 b) p + 3d - (p + 3c) = 11/2 M1 3d - 3c = 11/2 15/4c - 3c = 11/2 3/4c = 3/2 = c = 2 A1 d = 21/2 B1 accept 5/2 c) S5 = 6/2 (24 + 5 x 2) M1 S5 = 1/2n(2p + 10) = 2.5(2p + 10) = 5p + 25 (6p + 30) - (5p + 25) = 10 M1 p + 5 = 10 p = 5 A1 |  |  |
|  |  |  |  |
| 21.C:\Users\karumandi\Pictures\2017-07-08\002.jpg |  |  |  |
| 22. | (a) = 38000 + 14000 + 8500 + 3300 = 62800 $\frac{62800 x 12}{20}$ K£ 37680 p.a.(b) 1st K£ 600 🡪 6000 x 2 = 12000Next £6000 🡪 6000 x 3 = 18000Next £6000 🡪 6000 x4 = 24000Next £6000 🡪 6000 x 5 = 30000Next £6000 🡪 6000 x 6 = 36000Next £6000 🡪 6000 x 7 = 42000Rem. £ 1680 🡪 1680 x 8 = 13440Tax due p.a. = Sh. 175440Less relief Sh. 18000Tax paid = Sh. 157440(c) (i) Tax paid per month = $\frac{157440}{12}$= 13,120Total deductions = 13120 + 320 + 1000 + 2000 + 500= 23940(ii) Net salary = 62800 - 23900 38,900 | M1A1M1M1M1A1M1A1 | ✓ Taxable income in Sh/m (can be implied in accuracy mark)✓ Values in just 4 slabs✓ Subtracting relief✓ Addition✓ Ans  |
| 23. | Let the No. of goats be xLet the No. of bulls be y$\frac{2000}{1000}x $ + $\frac{15000}{1000}y $ = $\frac{190000}{1000}$2x + 15y = 190………(i)2(2000x) + (y – 3)15000 = 190,000-5000 4000x + 15000y – 45600 = 185,000$\frac{4000}{1000}x $+ $\frac{15000}{100}y$ = $\frac{230,000}{100}$ 4x + 15y = 230 ………………………….(ii) 4x + 15y = 230 (Elimination substitution2x + 15y = 1902x = 40 x = 202x + 15y = 190 but x = 202(20) + 15y = 19015y = 190 – 4015y = 15015 15y = 10∴x = 20 goats and y = 10 bulls(b) Profit per goat $\frac{25}{100}$ x 2000 = 500Profit per bull $\frac{30}{100}$ x 15000 = 4,500Goat 20 x 500 = 10,000Bulls 10 x 4500 = 45,000Total profit = 10,000 + 45,000 = 55,000/= | M1M1A1M1M1M1M1M1A1 |  |
| 24. | (a) y = 2x2 – 3x – 5

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| x | -2 | -1 | 0 | 1 | 2 | 3 |
| 2x2 | 8 | 2 | 0 | 2 | 8 | 18 |
| -3x  | 6 | 3 | 0 | -3 | -6 | -9 |
| -5 | -5 | -5 | -5 | -5 | -5 | -5 |
| y | 9 | 0 | -5 | -6 | -3 | 4 |

(b) (i) Roots = -1 and 2.5 (ii) 2x2 – x – 3 = 0 2x2 – 3x – 5 = y -2x – 2 = y Line = y = -2x – 2Roots x = -1 and 1.5 ± 0.1 | B2S1P1C1B1M1A1B1B1 | TableScale PlottingSmooth curveLine drawnFor both |
|  | 31XY |  |  |
|  |  |  |  |

