**JULY/AUGUST EXAM 2018**

MARKING SCHEME

MATHEMATICS PAPER 2

121/2

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| NO | WORKING | MARK | REMARKS |
| 1 |

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| No | log |
| 723.9Tan 81.23  | 2.8597$\overbar{1}.9744$ + |
|  | 2.8341 |
| 3423 | 3.5345 - |
|  | $$\overbar{1}.2996$$ |
|  | $$\frac{\overbar{4}+3.2996}{4}$$ |
| 6.6819 x 10-1 | $$\overbar{1}.8249$$ |

= 0.66819 | M1M1M1A1**04** | All logs+ and –÷ |
| 2 |  Upper limits 9.75 , 3.75 Lower limits 9.65 , 3.65 Maximum quotient 9.75÷3.65=2.67 Minimum quotient 9.65÷3.75=2.57 Actual quotient 9.7÷3.7=2.62 (2.67-2.57)÷2= 0.05(0.05÷2.62)×100= 1.908% | M1M1A1**03** | for both limits correctfor AE allow for max-actual or Actual-minCAO |
| 3 |  2sinӨ=sinӨ cosӨ cosӨ= sinӨ = 1  2sinӨ 2 Ө=600, 3000 | M1A1B1**03** |  |
| 4 |  | M1M1A1 | RationalisationCorrect simplification |
| 5 | -15 – 8 = -23$$\frac{1}{23}\left(\begin{matrix}-5&4\\2&3\end{matrix}\right)=\left(\begin{matrix}\frac{-5}{23}&\frac{4}{23}\\\frac{2}{23}&\frac{3}{23}\end{matrix}\right)$$ | B1B1 | CAO |

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|  | $$\frac{1}{23}\left(\begin{matrix}-5&4\\2&3\end{matrix}\right)\left(\begin{matrix}-3&4\\2&5\end{matrix}\right)\left(\begin{matrix}x\\y\end{matrix}\right)=\frac{1}{23}\left(\begin{matrix}-5&4\\2&3\end{matrix}\right)\left(\begin{matrix}6\\19\end{matrix}\right)$$$$\left(\begin{matrix}1&0\\0&1\end{matrix}\right)\left(\begin{matrix}x\\y\end{matrix}\right)=\left(\begin{matrix}2\\3\end{matrix}\right)$$$$x=2 and y=3$$ | M1A1**03** |  |
| 6 |  Maize -x and Millet - y$$\frac{44x+56y}{x+y}=54$$ 44x + 56y = 54x +54y -10x = -2y$$\frac{x}{y}= \frac{1}{5}$$ Therefore x:y = 1:5  | M1M1A1**03** | Attempt to solve |
| 7 | $$x^{2}+y^{2}+3x-4y=\frac{11}{4}$$$$\left(x+1.5\right)^{2}+\left(y-2\right)^{2}=\frac{11}{4}+4+\frac{9}{4}$$$\left(x+1.5\right)+\left(y-2\right)=3$ Centre (- 1.5,2) ,radius 3  | M1M1A1**03** |  |
| 8 | $$x+21\geq -6x x+8>3x$$$$-3\leq x x<4$$$$-3\leq x<4$$$$-3,-2,-1,0,1,2,3$$ | M1A1B1**03** | For correct evaluation |
| 9 | 3200 x 12 = 3840030,000 - 10,000 = 20,00038,400 = 20,000 (1 + R/100)12  1.92 = (1 + R/100)12 1.05586510 = 1 + R/100  0.05586510 = R/100 R = 5.587%  | M1M1A1**03** |  |
| 10 | $$\left[x^{3 }-3x^{2}+3x\right]$$ = (1)3-3x(1)2+3x(1) =1-3+3 =1 | M1M1A1**03** | Allow correct substitution  |
| 11 | $$n^{3}=\frac{yx^{2}h}{m-h}$$$$n^{3}m=yx^{2}h+n^{3}h$$$$h\left(yx^{2}+n^{3}\right)=n^{3}m$$$$h=\frac{n^{3}m}{yx^{2}+n^{3}}$$ | M1M1A1**03** | √ removal of cubeCollection of terms in h |

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| 12 |  | M1M1A1**03** |  |
| 13 | $$\frac{27+27r^{3}}{2} =185$$ 27+27r3 = 370 r3 =$\frac{343}{27}$ r = $\frac{7}{3}$ | M1M1A1**03** |  |
| 14 | $\frac{3x^{2}}{3}-\frac{8px}{3}+\frac{12}{3}=0 $ $x^{2}-\frac{8}{3}Px+4=0$ $(-\frac{8p}{3})^{2}$= 4 $P^{2}=\frac{36}{64}$ $$P= \pm \frac{6}{8}or\frac{3}{4}$$ | M1M1 A1 **03** | Dividing by 3 |
| 15 | 1. $ 2-7∙2^{6}x+21∙2^{5}x^{2}-35∙2^{4}x^{3}+35∙2^{3}x^{4}$

$$ 2-448x+672x^{2}-560x^{3}+280x^{4}$$$$\left(2 – x\right)= 1.98 ⟹x=0.02$$$$ 2-448(0.02)+672(0.02)^{2}-560(0.02)^{3}+280(0.02)^{4}$$= -6.696 | B1B1M1A1**04** | Allow for all the expansionCorrect value of x CAO |
| 16 | 102 + (r - 4)2 = r2  100 + r2 - 8r + 16 = r2  116 = 8r r = 14.5  | M1M1A1**03** | Correct use of pythegorus CAO |

**SECTION B**

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| NO | WORKING | MARK | REMARKS |
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| Class | x | T= (x -45.5) | f | ft | ft2 | cf |
| 21-3031-4041-5051-6061-7071-80 | 25.535.545.555.565.575.5 | -20-100102030 | 151117421 | -300-1100404030 | 600011000400800900 | 152643474950 |
|  |  |  | 50 | -300 | 9200 |  |

1. 31-40

 | B1B1 M1A1 B1M1A1B1M1A1**10** | For ft columAlso allow 40 years For ✓ft2 columnFor ✓ c.f column |
| 18 |

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| 2sin(2x+30)o |  | **1.00** |  | **-1.00** | **-1.73** | **-1.00** |  |
| 4cos2x | **-3.46** |  | **-3.46** | **-4.00** |  |  | **3.46** |

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| 18 | i) Amplitude of  ii) Period 1800 i.e. 1. Solve

 X = 300, 1200 |  |

 | B2B1S1P1C1P1C1B1B1 B1**10** | For all √At least 6 √ |

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| 19 | 1. **PQ** =
2. **OY** =
3. **QX** =

c) OT : TY = 9 : 4  | B1 B1B1 M1 M1 M1 M1 A1 A1 B1**10**  |  |

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| 20Locus  | (e) 3.9 ± 0.1 cmLocus Locus  | B1B1B1B1B1B1B1B1B1B1 |  for PR for 600∆PQRBisectorsCircleBisector <PQR for SArcCorrect shaded / labelled region |
| 21 | $EG=\sqrt{8^{2}+6^{2}}$xCBP$$=10 cm$$$MV=\sqrt{15^{2}-5^{2}}=200$MPX$$θ$$2.8284 cm$$ =14.14 cm$$$$MP=\frac{14.14}{5}=2.828 cm$$$$tanθ=\frac{2.828}{4}$$$θ=35.26^{0}$VG$$θ$$17.145N$$Tanθ=\frac{17.14}{5}$$$$θ=73.74^{0}$$ | B1M1A1M1M1A1M1A1 |  |

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| 21 | $$Volume=\left(3×6×8\right)+(\frac{1}{3}×8×6)$$$$Volume=406.24cm^{3}$$ | M1A1 |  |
| 22 | $$\left(\begin{matrix}0&1\\-1&0\end{matrix}\right)\left(\begin{matrix}-5&-1&-3\\1&1&4\end{matrix}\right)=\left(\begin{matrix}1&1&4\\5&1&3\end{matrix}\right)$$$$A^{/}\left(1,5\right)B^{/}\left(1,1\right)C^{/}(4,3)$$D:\TORO\2222.pngRotation of -900 about (0,0)1. A” (-5,-1), B” (-1,-1), C” (-3, -4)

$$\left(\begin{matrix}a&b\\c&d\end{matrix}\right)\left(\begin{matrix}-5&-1&-3\\-1&-1&-4\end{matrix}\right)=\left(\begin{matrix}-5&-1&-3\\1&1&4\end{matrix}\right)$$$$-5a-b=-5-5c-d=1$$$$-a-b=-1-c-d=1$$$$\left(\begin{matrix}1&0\\0&-1\end{matrix}\right)$$ | M1A1B1B1L1B1B1M1B1 B1**10** |  for √ ∆ABCfor √ ∆A’B’C’line y = -xfor perpendicular lines seen.for √ ∆A’’B’’C’’Centre, Direction and angle of rotationcorrect coordinates given  |

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| 23 | $$P\left(sleeps and admits\right)=\left(\frac{4}{5}×\frac{3}{4}×\frac{1}{5}\right)+\left(\frac{1}{5}×\frac{1}{4}×\frac{1}{5}\right)$$$=\frac{13}{100}$ or 0.13 $$P\left(sleeps and doesn^{'}t admit\right)=\left(\frac{4}{5}×\frac{3}{4}×\frac{4}{5}\right)+\left(\frac{1}{5}×\frac{1}{4}×\frac{4}{5}\right)$$$=\frac{52}{100}$ or 0.52 $$P\left(doesn^{'}t sleep and admit\right)=\left(\frac{4}{5}×\frac{1}{4}×\frac{2}{5}\right)+\left(\frac{1}{5}×\frac{3}{4}×\frac{2}{5}\right)$$$=\frac{14}{100}$ or 0.14$$P\left(doesn^{'}t sleep and not admit\right)=\left(\frac{4}{5}×\frac{1}{4}×\frac{3}{5}\right)+\left(\frac{1}{5}×\frac{3}{4}×\frac{3}{5}\right)$$$=\frac{21}{100}$ or 0.52  | B1B1M1A1M1A1M1A1M1A1**10** | Allow decimals |

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| 24 |  | M1M1A1B1 B1M1M1A1M1A1B1 | For equating Or equivalentFor both valuesFor bothAccept if c is missing Accept 32.33or equivalent |