**FORM 4 2022**

**121/2**

**MATHS**

**PAPER 2**

**MARKING SCHEME**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | |  |  |  | | --- | --- | --- | | No | s.f. | Log | | 45.3 | 4.53 x 101 | 1.6651 | | 0.0067 | 6.97x 10-3 | 8432 | |  |  | 1.5083 | | 0.534 | 5.34 x 10-1 | .7275 | |  |  | 7808  3 | | 0.845 | 8.45 x 10-1 | 9269 | | M1  M1  M1  M1 | All logs correct  Operations + &−  Division by three  Answer even if in standard form |
|  |  | 04 |  |
| 2. | a)  =1-3x+  b) -= -0.02  x= 0.04  = 1-3++  = 1.11392 | M1  A1  M1  A1 | Attempt to expand simplification. |
|  |  | 04 |  |
| 3. | 550,000 = 800000  0.9106=1-  r=8.942 | M1  M1  A1 |  |
|  |  | 03 |  |
| 4. | A.S.F= Determinant of the matrix  =x-12  6=+3x-12  X= -6 or 3  X=3 | M1  A1  B1 |  |
|  |  | 03 |  |
| 5. | =  =  = 4+ 6 | B1  M1  A1 | Accept Equivalent |
|  |  | 03 |  |
| 6 | C:\Documents and Settings\Administrator\My Documents\My Pictures\Picture\Picture 288.jpg  OD = OA +  =  =  =  8i + 4j + 6k  Coordinates of D are; (8, 4, 6) | M1  M1  A1 | Expression of OD  Simplification |
|  |  | 03 |  |
| 7 | Z α Z =  Z1 =  = = 1.6Z  = % change (%  = 60% | M1  M1  A1 |  |
|  |  | 03 |  |
| 8 | Required time =  = 3 or 3 hours 20 mins  Required time =  = 7 hrs. 30mins or 7 ½ | M1  A1  M1  A1 |  |
|  |  | 04 |  |
| 9 | X= 400  =Tan  =Tan 60 | M1  A1  B1 |  |
|  |  | 03 |  |
| 10 | Log x+  Log x + p log y=px log Q  Log x=px log Q- p log y  Log x= p  = p | B1  B1  B1 |  |
|  | . | 03 |  |
| 11 | Midpoint  Length=  Radius =5units  X2+y2-10y+20=0 | B1  B1  A1 |  |
|  |  | 03 |  |
| 12 | P(R) bag A =  P(R) bag B =  = | M1  M1  A1 | C:\Documents and Settings\Administrator\My Documents\My Pictures\Picture\Picture 289.jpg |
|  |  | 03 |  |
| 13 | a) a, a+d, a+5d  4+4d+d2=4+10d  4d+d2=10d  d(4+d)=10d  4+d=10  d=6  b) r= (6+2)  8  =4 | M1  A1  B1 |  |
|  |  | 03 |  |
| 14 | V== 16t – 6t2  V= 16t-6t2  16(2) – 6(4)  32-24  =8 | M1  A1 |  |
|  |  | 02 |  |
| 15 | 4.05 2.15  Limits 4.1 2.2  4.15 2.25  Maximum area 4015x2.25=9.3375  Actual area 4.1x2.2=9.02  Minimum area 4.05x2.15=8.7075  A.e =  = 0.315  = 3.492 | B1  B1  A1 | For✓ three areas  Accept equivalent |
|  |  | 03 |  |
| 16 | (a) 72 x 1000  3600  =20mls  (b) L + 80 = 15  20  L = 300 - 80  =220m | B1  B1  B1 |  |
|  |  | 03 |  |
| 17 | a) Frequency of modal class = 15   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | d | f | t | ft | Ft2 | | 9 | -9 | 4 | -3 | -12 | 36 | | 12 | -6 | 7 | -2 | -14 | 28 | | 15 | -3 | 11 | -1 | -11 | 11 | | 18 | 0 | 15 | 0 | 0 | 0 | | 21 | 3 | 8 | 1 | 8 | 8 | | 24 | 6 | 5 | 2 | 10 | 20 | | 27 | 9 | 3 | 3 | 9 | 27 | |  |  |  |  |  |  |   i)Mean() = 18+ x3  = 18-  = 17.434  ii) Variance =s2=32  =9  =21.7548  iii) Standard deviation =  =  = 4.664 | B1  B1  B1  B1  B1  A1  B1  B1  A1  B1 | For ✓ x values  for✓ft values  ✓ Ft2 values |
|  |  | 10 |  |
| 18 | a) sin<CDE =  CDE= sin-1  = 34.230  b)i AC=  = 12.81  ii) DE=82-4.52=6.61cm  AE=  =  = 11.99  Tan CAE =  CAE = 20.570  c)i MB =  =  = 10.77  ii) Sin CBM =  CBM = 21.80 | B1  B1  B1  B1  B1  B1  B1  B1  B1  B1 |  |
|  |  | 10 |  |
| 19 | a) Shortest distance  i) in kilometres  = x2  30+30 = 600  = 6673.3  ii) in nautical mile (nm)  60x 66  = 3600nm  b) = 6hrs  c) Time difference at Q = 180x4= 720hrs  = 12hrs  Distance via parallel latitude  = 60x1800cos 60  = 5400nm  Time of travel = = 9hrs  Time at P =1000hrs  Time at Q = 100+1200+900  3100-2400  = 0700hrs Tuesday | M1  M1  A1  M1  A1  B1  M1  M1  M1  A1 |  |
|  |  | 10 |  |
| 20 | (a)i) AC=AO+0C  =-p+q  =q-p  ii) OB=OA+AB  =**p+**  iii) BC=BO+OC  = -p-+q  =  b(i) OX=h(P+  = hp +  OX=OA+AX  =p+t(q-p)  = (1-t)p+tq  hp+  hp=1-t  h=1-  h=  t=  ii) OB=BX  7 :-3 | B1  B1  B1  B1  B1  B1  B1  B1  B1  A1 |  |
|  |  | 10 |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 21  **TETRAHEDRON** | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2  **CUBE** | 3 | 4 | 5 | 6 | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | 4 | 5 | 6 | 7 | 8 | 9 | 10 |   a) i) P(6) = =  ii) P(Total of odd) = =  iii) P(6 or 9) =  P(6) =  P(9) =  +  =  b) P( win)  P( loss)  C:\Documents and Settings\Administrator\My Documents\My Pictures\Picture\Picture 285.jpg  P(wins atleast once) P(WW) + P(WL)+P(LW)  () +() +()  + + = | B2  B1  B1  B1  B1  B2  B1  A1 |  |
|  |  | 10 |  |
| 22 | a)i) Y-Intercept is 2  ii)  =0  (1,0)(-1,4)  ii) 0 1 2   * 0 +   \_\_\_\_  (1,0) minimum  -2 -1 0  + - -  (-1,4) maximum  b)  C:\Documents and Settings\Administrator\My Documents\My Pictures\Picture\Picture 286.jpg | B1  B1  B1  B1  B1  B1  B1  B1  B1  B1 | For minimum point  Turning point  For maximum point  Turning point |
|  |  | 10 |  |
| 23 | 1. =1200   (n-20)(n+15)=0  n=20   1. Original contribution   =3600  Final contribution  = 4800  =33.3% | M1  M1  A1  M1  M1  A1  M1  M1  A1 |  |
|  |  | 10 |  |
| 24 | |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 0 | 15 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 165 | | 3sinx | 0 | 0.78 | 1.50 | 2.12 | 2.60 | 2.90 | 3.00 | 2.90 | 2.60 | 2.12 | 1.5 | 0.78 | | 4cos(2x + -10) | 3.94 | 3.76 | 2.57 | 0.69 | -1.37 | -3.06 | -3.94 | -3.76 | -2.57 | -0.69 | +1.37 | 3.06 | | | |

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