**MECS JOINT EXAMINATION**

**MATHEMATICS**

Form 4

Paper 2

**MARKING SCHEME**

**SECTION I**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **WORKING** | **MARKS** | **GUIDELINES** |
|  | |  |  | | --- | --- | | No. | Log | | 24.36  0.066547  1.48  10-1x9.045  0.9045 | 1.3867  -2.8231  0.2098  0.1703  X 2  0.3406  0.2098  0.3406  -1.8692x  =-1.9564 |   = 0.9045 | M1  M1  M1  A1 | 🗸logs All  🗸 Addn & Subtr  🗸Attempt to divided by 3 |
|  |  | 4 |  |
|  |  | M1  M1  A1 |  |
|  |  | 3 |  |
|  |  | M1  M1  A1 |  |
|  |  | 3 |  |
|  | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | X | -2 | -1 | 0 | 1 | 2 | 3 | 4 | | y | 5 | 2 | 1 | 2 | 5 | 10 | 17 |   Area = ( 5 + 17 + 2(2 + 1 + 2 + 5 + 10)  = 31 sq. Units | M1  M1  A1 |  |
|  |  | 3 |  |
|  | 2  2  2 | M1  M1  A1 | (squaring on both sides) |
|  |  | 3 |  |
|  | C:\Users\Nzambia\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\sunshine.jpg | B1  B1  B1  B1 | Construction of 300  Complete triangle  L1 is perpendicular bisector of PQ  L2 is the perpendicular bisector of QR |
|  |  | 3 |  |
|  | a) A 5 + -3, 5 + -1  2 2  A (1, 2)      b) (x - a)2 + (y - b)2 = r2  (5 - 1)2 + (5 - 2)2 = r2  42 + 32 = 52  radius 5 units  (x - 1)2 + (y - 2)2 = 52  x2 - 2x + 1 + y2 - 4y + 4 = 25  x2 - 2x + y2 - 4y - 20 = 0 | B1  M1  A1 |  |
|  |  | 3 |  |
|  |  | M1  M1  A1 |  |
|  |  | 3 |  |
|  | (a) - =  Required time  or 3 hrs 20 min  (b) - - =  Required time  7 hrs | M1  A1  M1  A1 |  |
|  |  | 4 |  |
|  | i) 15 - 5(3x) + 13 x 10 (3x)2 - 12 x 10 (3x)3  1 - 15x + 90x2 - 270x3    ii) (0.97)5 = (1 - 0.03)5  3x = 0.03  x = 0.01  (0.97)5 = 1 - 15(0.01) + 90(0.01)2 - 270(0.01)3 = 0.8587 | M1  A1  M1  A1 |  |
|  |  | 4 |  |
|  | cos 4x =  cos-1 = 60o  x = 30o, 127.5o, 150o | M1  M1  A1 |  |
|  |  | 3 |  |
|  | = 225,000 | M1  M1  A1 |  |
|  |  | 3 |  |
|  | dy/dx = 3x2-8x+2  y = x3-4x2+2x+c  At x =2 y=-2  - 2 = 8-16+4+c  C=2  y = x3- 4x2 + 2x+2 | M1  M1  A1 |  |
|  |  | 3 |  |
|  |  | M1  M1  A1 | For conjugate |
|  |  | 3 |  |
|  | *x* + y = 24  *x*2 + y2 = 144  *x*2 – (24 –*x* )2 = 144  *x*2 – [576 -48*x* + *x*2] = 144  *x*2 -576 + 48*x* – *x*2 = 144  48*x* = 720  *x* =15  y = 24 -15  =9  The two numbers are 9 and 15 | M1  M1  A1 |  |
|  |  | 3 |  |
|  | 37,**37,39**,40,40,41,**43,44**,44  Q1 =  Q3 =  Interquartile range =  = 5.5 | M1  M1  A1 |  |
|  |  | 3 |  |

**SECTION II**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **WORKING** | **MKS** | | **GUIDELINES** | |
|  | a) taxable income  42000+13000-42000 x 10/100 = 42000+13000-3150  = sh. 51850  b) 9860 x 10/100 = 986  9860 x 15/100 = 1479  9860 x 20/100 = 1972  9860 x 25/100 = 2465  9860 x 30/100 = 2958  2550 x 35/100 = 892.50  =10752.50    Total less relief 1062  sh.8352.50 pm  c)  Net salary = 51850-8352.50  sh.43497.50 | M1  A1  M1  M1  M1  M1  M1  A1  M1  A1 | |  | |
|  |  | 10 | |  | |
|  | (a) Sin < CDE =  <CDE = 34.23o  (b) (i) AC =  = = 12.81  (ii) DE = = 6.61 cm  AE = =  = 11.99  Tan <CAE =  <CAE = 20.57o  (b) (i) MB = =   = 10.77 cm  (ii)Sin <CBM =  <CBM = 21.8o | M1  A1  M1  A1  M1  M1  A1  M1  A1  M1  A1 | |  | |
|  |  | 10 | |  | |
|  | a) i)   1. i)     ii) | B1  M1  A1  M1  A1  B1  M1  A1  M1  A1 | |  | |
|  |  | **10** | |  | |
|  | a)    b) P(BL) or P(ML) or P(OL)  =  =  =  c) P(BL) or P(OL)    d) P(Not late to school) = 1 – P(Late to school)  = 1 -  = | B1  B1  M1  A1  M1  A1  M1  A1  M1  A1 | |  | |
|  |  | 10 | |  | |
|  | 1. Let the carrots be x, potatoes y and the total profit be p.   The inequalities that represents this information are:  x + y = ≤ 50  40x + 60y ≤ 2400  x ≥ 0. and  y ≥ 0  maximum profit✓  P= 30x + 40y = 30( 30) + 40 ( 20)  = sh 1700✓ | B1  B1  B1  B1  M1  A1 | |  | |
|  |  | 10 | |  | |
|  | (a) a + d = 8    d = 3  ∴ a = 5   1. 2nd = 8   10th = 5 + 9 × 3 = 32  42nd = 5 + 41 × 3 = 128  ∴GP is 8, 32, 128, - - - -  a = 8, r = 4  nth term of G.P = arn – 1  ∴10th term = 8(4)9  = 2097152  (c)      = 2796200 | M1  M1  A1  M1  M1  M1  A1  M1  M1  A1 | |  | |
|  |  | 10 | |  | |
|  | a) (i) **QR** = **QP** + **PR**  = - **b** + **c**  (ii) **PM** = **PQ** + **QM**  = **b** +  =  (iii) **RL** = **RQ** + **QL**  = **b** – **c** –  =  (b) **PX** = h (  …….. (i)  Also **PX** = **PR** + **RX**  = **c** + k (**b** – **c**)  = (1 – k) **c**  Equating equations (i) to (ii) and comparing  coefficients of vectors b and c,  K = and  Solving the above eqtns simultaneously  h=1-h  h =  h =   1. RX =   LX:XR = 1:8 | B1  B1  B1  M1  M1  M1  M1  A1  B1 | |  | |
|  |  | 10 | |  | |
|  | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 0o | 20o | 40o | 60o | 80o | 100o | 120o | 140o | 160o | 180o | | 2 sin 2x | 0 | **1.28** | 1.97 | **1.73** | 0.68 | -0.68 | -1.73 | **-1.97** | -1.29 | 0.00 | | 3 cos (x+45o) | 2.12 | 1.27 | **0.17** | -0.78 | **-1.72** | -2.46 | **-2.90** | **-2.99** | -2.72 | -2.12 |   c) y = 2 sin 2x  Amplitude = 2  Period = 1800  y = 3 cos(x + 450)  Amplitude = 3  Period = 360o   1. 2 sin 2x – 3 cos ( x + 450) = 0   X = 20O  44140E0E | | | | |
|  |  | | 10 | |  |