**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 |  |
|  | Error = x 0.1 = + 0.05cm  Actual length = 12.5 + 24.5 + 12.9 + 10.1 = 60.0  Max length = 12.55 + 24.55 + 12.95 + 10.15  = 60.20  Min length = 12.45 + 24.45 + 12.85 + 10.05  = 59.80  A.E. = Max – Min = 60.20 – 59.80  2 2  P.E. = 0.2 x 100  60  = 0.3% | M1  M1  A1 |  |
|  |  | 3 |  |
|  | X R = 4.8 x 5  6  = 4  QT2 = PT x RT  QT2 = 18 x 8  QT =  QT = 12cm | 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 |  |
|  | log (3x + 9) = log 33 + log 100  log (3x + 9) = log 2700  3x + 9 = 2700  3x = 2691  3x = 2691  3 3  x = 897 | M1  M1  A1 |  |
|  |  | 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 | A1  M1  A1 |  |
|  |  | 3 |  |
|  | Determinmant = 2 – 12 = –10  = 10  10x 12.5 = 125 cm2 | M1  M1  A1 |  |
|  |  | 10 |  |
|  | Tap A Tap B  1/8 x 2 = 1/4 1/10 x 1 = 1/10    1 + 1 = 10 + 4 = 7  4 10 40 20    Remaining part 13  20  in a minute 1 + 1 = 9  8 10 40    13 x 40 = 26 = 28/9 min  20 9 9  or  time = 2 min 53 sec. | M1  M1  A1 |  |
|  |  | 3 |  |
|  | 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 |  |
|  |  | 3 |  |
|  | cos 4x =  cos-1 = 60o  x = 30o, 127.5o, 150o | M1  M1  A1 |  |
|  |  | 3 |  |
|  | P = 300,000 - 75000  = 225,000  A = 225,000 x 1.151.25  = 225,000 x 1.151.25  15  225000 x 1.190 = 267950  15 15  = Ksh.17863 | 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 |  |
|  | 36,37,37,**39**,40,40,41,**43**,44,44,47,**52**,58,61,70  Q1 = 39  Q3 = 52  Interquartile range =  = 13 | M1  M1  A1 | Arranging in ascending or descending order |
|  |  | 4 |  |

**SECTION II**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **WORKING** | **MKS** | | **GUIDELINES** | |
|  | a) taxable income  35750 + 12500 = 48250= sh.48250  b) 9860 x 10/100 = 986  9860 x 75/100 = 1479  9860 x 20/100 = 2976  9860 x 25/100 = 2465  8810 x 30/100 = 2643  9545    Total less relief 1062  sh.8483pm  c) WCPS = 2/100 x 35750 = 715  Total deduction  (8483 + 715 + 1325 + 480) = 11000  Net salary = 48250  - 11000  sh.37250 p.m | M1  A1  M1  M1  M1  M1  A1  M1  M1  A1 | |  | |
|  |  | 10 | |  | |
|  | PH2 = 4.52 + 82    = 20. 25 + 64 = 9.2  FC = FH2 + HC2  = 9.22 + 62 = 10.97cm  b). i).tanθ = 6/9.2  tan θ = 0.6522  θ = 330  F  10.97cm  6  9.2cm H  ii). Tan θ = 8/4.5  Al  Tan θ 1.7750  θ = 60.600  8cm  Q  4.5cm  c). Cosine rule  62 =102+82-2x8x10 cos θ  36 = 100 +64 -160 Cosθ  36 = 164 -160 cos θ  Cos θ = 128/16  Cos θ =0.8  = 36.91 | M1  A1  M1  A1  M1  M1  A1  M1  M1  A1 | |  | |
|  |  | 10 | |  | |
|  | 1. 10/360 x 2 x 22/7 x 6370   = 1112km     1. i) 110 x 60   = 6600nm    ii) 180 x 60 x cos 350  = 8850nm.   1. 420 = 6600   T1  T1 = 6600  420  = 15hr 43min  420 = 8850  T2  T2 = 21h 4min  T2 – T1 = 21hr 4min – 15hr 43min  = 5hrs 21min | M1  A1  M1  A1  M1  A1  M1  M1  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) (i) nth term = a + (n – 1)d  Last term = -5 + (n – 1)d = 135  (n – 1)d = 140  Sum of nth term = n/2(2a + (n – 1)d  n/2(-10 + 140) = 975  n/2  x 130 = 975  n = 975 x 2  130  n = 15  Alternatively.  Sum =  =  =  =     1. nth term = a + (n – 1)d   -5 - 14d = 135  14d = 140  d = 10   1. s = 27, a = 36   s = a + ar + ar2  27 = 36 + 36r + 3r2  3 = 4 + 4r + 4r2  4r2 + 4r + 1 = 0  (2r + 1)2  = 0  r = | M1  M1  M1  A1  M1  M1  M1  A1  M1  A1  M1  M1  M1  A1 | |  | |
|  |  | 10 | |  | |
|  | a)  (i) =  (ii)  =  = or =  (b)  =  ==  =    Then 1-t= and  2-2t=n 5n=6t      10-10t=6t  10=16t therefore,  n===   1. BF=tBD |  | |  | |
|  |  | 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** | -1.28 | 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 | |  |