

**MARKING SCHEME**

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| 1. | Max value = 3.45x9.85-2.65x2.95 = 26.165  Min value = 3.35x9.75-2.75x3.05 = 24.275  Working value = 3.4x9.8-2.7x3.0 = 25.22  Error = ½ (26.165-24.275) = 0.945  % error = 0.945 x 100 =  25.22  = 3.747% | M1  M1  M1  A1 | |  |
| 2. | 3(2x-1) = 8x-1  6x-3 = 8x-1  -2x = 2  x = -1 | M1  A1 | |  |
| 3. | A = P 1 + r n    100  = 200,000 1 + 7 4    100  = 200,000 (1.3107960)  = Sh. 262159.20  I = 262159.20 – 200000 = Sh.62,159 | M1  A1  B1 | | For correct substitution |
| 4. | (√2 +√3) (√6 + √3)  (√6 - √3) (√6 + √3)  √12 + √6 + √18 + 3  6 – 3  2√3 + √6 + 3√2 + 3  3 | M1  M1  A1 | | For multiplication by conjugate surd.  For rationalisation |
| 5. | 30\_ - 30 = ½  x – 2 x    30x – 30(x - 2) = ½  x(x - 2)  x(x – 2) = 120  x2 – 2x – 120 = 0  x2 – 2x + (1/2 x – 2)2 = 120 + -2 2  2  x2 - 2x + 1 = 121  (x - 1)2 = 121  x – 1 = + √121  x – 1 = + 11  x=12 or x=-10 | M1  A1  M1  A1 | | For quadratic equation  For both |
| 6. | 12th term = ar11  10th term = ar9  ar11 = 9  ar9 1  r 11-9 = 9  r2 = 9  r = + 3  r = 3 or -3 | M1  A1 | |  |
| 7.  ii. | (2 – ¼ x)5 = 25 + (24)(5)(-1/4x)2 +  10(22)(-1/4x)3+ 5(2)(-1/4x)4 + (-1/4x)5  =32 – 20x + 5x2 – 5/8x3 + 5/128x4 – 1/1024 x5  1.965 = 32 - 20(0.16) + 5(0.16)2 – 5/8 (0.16)3 +5/128(0.16)4 – 1/1024(0.16)5  =28.925 | B1  M1  A1 | |  |
| 8. | a) QW x QX = QY x QZ  11 x 6 = 4(a+4)  4a +16 = 66  4a = 50  a = 25  b) QS2 = QY x QZ  = 4(4+12.5)  QS = √66  = 8.124 | M1  A1  M1  A1 | |  |
| 9. | x(x-1) – 3x(x+1) = 0  x2 – x – 3x2 – 3x = 0  -2x2 -4x = 0  -2x (x + 2) = 0  x = 0 or x = -2 | M1  M1  A1 | | Det = 0  Factors  For both |
| 10. | s – sr = 1 - rn  a  rn = 1 – s-sr  a  n log r = log 1 – s - sr  a  n = log 1 – s – sr or  a  log r  log a – s + sr  a  log r | M1  A1 | |  |
| 11. | Men hrs land days  18 8 1 12  24 12 ¾ ?  18/24  x 8/12 x ¾ x 12  4 ½ days | M1  M1  A1 | |  |
| 12. | No log  0.8465 1.9277  +  12.14 1.0842  1.0119  214.5 2.3314  -  9.067 0.9574  1.3740  1.0119  -  1.3740  1.96379 x ¼  8.119 x 10 -1 1.9095  = 0.8119 | M1  M1  M1  A1 | | All logs correct  Addition and subtraction  Multiplication and division  C.A.O |
| 13. | x f cf  45 – 50 2 2  51 – 56 10 12  57 – 62 11 23  63 – 68 20 33  69 – 74 6 39  75 – 80 1 40 | B1 | |  |
| ¼ x 50 =12.5th = 56.5 + 12.5 – 12 6  11  = 56.77kg  ¾ x 50 = 37th ;    62.5 + 37.5 – 23 6  20  = 66.85kg  Quartile deviation = ½ (66.85 – 56.77)    = 5.04 | | B1  B1 | For both quartiles | |
| 14. | P = KQ3  √R  P1 = K (1.2Q)3  √0.64R  = 1.728KQ3  0.8√R  = 2.16 KQ3  √3    2.16 – 1 x 100  1  = 116% | M1  M1  A1 | |  |
| 15. | Let cos x be y  8y2 – 2y – 1 = 0  4y + 1) (2y – 1) = 0  y = - ¼ or ½  cos x = ¼ => x = 75.52  angle in 2nd and 3rd quadrant  . : . x = 104.48, 255.52  Cosx = ½ => x = 600  Angle in 1st and 4th quadrant.  x = 600, 3000  .:. x = 104.48, 255.520, 600 3000 | M1  A1  B1 | | For obtaining both a acute angles 75.520 and 600  All must be correct |
| 16. | AB = 1 - 0 = 1        5 3 2  BC = 4 - 1 = 3        11 5 6  KAB = BC  K ½ = 3      6  K = 3  .:. 3AB = BC    AB//BC and B is common | B1  B1  B1 | | For both expressions |
| 17. | a. i) OB = p +q  ii) AD = 3/5 (5q) – p  3q – p  iii) CB = -sq + p + q  = -4q + p  b. OX = rOB  = r(p + q) = rp + rq  OX = p + k (3kq – pk    rp + rq = p + 3kq – pk  r = 1 – k  r = 3k  k = 3k  k = ¼  r = 1 - ¼ = ¾ | B1  M1  A1  M1  A1  B1  B1  B1  M1  A1 | | For both |
| 18. | a) 25 = x + 15  10 x  25x = 10x + 150    15x = 150    x = 10  ½ ( √252 + 252 ) = 17.68  H = √252 – 17.682 = 17.68  ½ √102 + 102  = 7.071  h = √102 – 7.0712 = 7.071cm  Height of frustrum = 17.68 – 7.071  = 10.6cm  b) i)  r  25  17.68    25  R  Ѳ Cos Ѳ = 17.68 = 0.7072  17.68  25  Ѳ = 450.00  ii)  17.68  Ѳ  12.5  Tan Ѳ = 17.68 = 1.414  12.5  Ѳ = 54.74  ͠\_\_ 54.70  c) 1/3 x 625 x 17.68 – 1/3 x 100 x 7.071  3,683.3 – 235.7  = 3,447.6cm3 | B1  M1  A1  M1  A1  M1  A1  M1  M1  A1 | |  |
| 19. | a) Taxable income = 21,000 + 9000  p.a = sh. 30,000  30000 x 12 = K₤ 18,000 p.a  12  2 x 3900 = 7,800  3 x 3900 = 11,700  4 x 3900 = 15,600  5 x 3900 = 19,500  7 x 2400 = 16,800  71,400  15/100 x 2000 = 300  Total relief p.a = (300 + 1056) 12  = sh. 16,272  Tax paid 71400 – 16272 = sh. 55, 128  P.A.Y.E 55128 = sh 4594  12  b) Total deductions = 4594 +2000 + 2000 + 2500 = sh. 11,094  per month  Net salary = 30,000 – 11,094    = sh. 18,906 | B1  B1  B1  B1  B1  B1  B1  M1  M1  A1 | |  |
| 20. | i) 7/200 x 50 + 19/400 x 30  1.75 + 1.425  = 3.175  ii) 3.175 x 100  80  = 3.96875%  iii) let the masses be x  19/400 x + 7/200 (50 – x) 100 = 4  50  1.25 x + 1.75 100 = 4  50  1.25 x + 175 = 200  1.25x = 25    x = 25  1.25  x = 20  x > 20 | M1  M1  A1  M1  A1  M1  M1  M1  A1  B1 | |  |
| 21. | W  5/10  6/11 W B  7/12 W 5/10  W  5/11 B 6/10  4/10 B  5/12  7/11 W 6/10  B W  4/11 B 4/10  7/10 B  3/10 W  B  b) i) (7/12 x 6/11 x 5/10) + (7/12 x 5/11 x 6/10) + (5/12 x 7/11 x 6/10)  = **21/44**  ii) (7/12 x 5/11 x 4/10) + (5/12 x 7/11 x 4/10) + (5/12 x 4/11 x 7/10)  = **7/22**  iii) (5/12 x 4/11 x 7/10) + (5/12  x 7/11 x 4/10) + (7/12 x 5/11 x 4/10) + (5/12  x 7/11  x 6/10) + (7/12 x 5/10 x 6/10) + (7/12 x 6/11 x 5/10) + (7/12 x 6/11 x 5/10)  = **427/440** | M1  A1  M1  A1  M1  A1 | |  |
| 22. | c) a b -5 -3 -5 5 3 5  c d -2 -2 -5 -2 -2 5  a = -1, b = 0, c = 0, d = 1  -1 0  0 1  d) Reflection in y – axis (x = 0)  e) A111 2 = d d = 4 units parallel to x-axis  2  A111 (0, -2)  B111 (2, -2)  C111 2 = d d = 10  5  :. C111 (-5+10, -5) = C111(5, -5) | B1  B1  B1  M1  M1  A1  B2  B1  B1 | | Correctly draw ABC  FOR 4A1B1C1  For all coordinates of A111, B111, C111  For at least one method.  For all coordinates of A111, B111 and C111 |
| 23  a)  b)  c i)  ii) | x 0 40 80 120 160 200 240  2sin(x+200) 0.7 **1.7** 2.0 **1.3** 0.0 **-1.3** -2.0  √3 cos x 1.7 1.3 **0.3** -0.9 **-1.6** -1.6 **-0.9**      x = 300 or 2080 + 2    2 – 1.7 = 0.3 | B2  B1  B0  S1  P1  C1  P1  C1  B1  B1 | | For all values correct  For one value wrong.  More than one value wrong. |
| 24.  a)  i)  ii)  b)  c) | Distance 270 x 12  = 3240nm  In km, = 3240 x 1.853  = 6003.72  600 x 14 = 840nm  3240 – 840 = 2400nm  240  60  = 400E.  54 x 4 = 216 minutes  = 3 hrs 36 mins.  9.13 – 3 hrs 36 mins  = 5.37 pm. | M1  A1  M1  A1  M1  M1  A1  M1  M1  A1 | |  |