**The Bridge to A level**

**Diagnosis**

**Mark Scheme**



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Section** | **Question** | **Answer** | **Marks** | **Notes** |
| 1 | 1 | -2, -4 | M1  A1 | (x ± 2)(x ± 4) |
|  | 2 | y = 3 or y = 4 cao  x = ± or x = ± 2 cao | M1  A1  B2 | For (y-3)(y+4) oe eg use of quad form  y = 3 or y = 4 cao  B1 for two roots correct or ft ‘their’ y  B2 for cao |
|  | 3(i) | (x – 3)2 - 7 | B1  M1A1 | (x – 3)2  -7 |
|  | 3(ii) | (3,-7) | B1 | ft from part (i) |
|  |  |  |  |  |
| 2 | 1 | v = cao www | B3 | Award M1 for a correct first constructive  step, M2 for v2 = oe |
|  | 2 | r = | B3 | Award M2 for r3 = , M1 for cube root  of ‘their’ r3 |
|  | 3 | C = oe | M1  M1  M1  A1 | PC + 4P = C  4P = C – PC  4P = C(1 – P) |
|  |  |  |  |  |
| 3 | 1 | (0.3,1.9) | M1  A1A1 | for substitution or for rearrangement  one mark each coordinate |
|  | 2 | ( | M1  A1A1 | for substitution or for rearrangement  one mark each coordinate  Note: award B2 if roiunded to 1dp or worse |
|  | 3 | ( or (-1,-2) or answer given as x=, y= | M1  M1  A1A1 | substituting linear into non-linear  forming quadratic in x  one mark for each set of solutions |
|  |  |  |  |  |
| 4 | 1(i) | 7 | M1  A1 | 9-2 |
|  | 1(ii) | + | M1  M1  A1 | multiplying top and bottom by 3 +  if one (or none) error only |
|  | 2(i) | 30√2 | M1  A1 | for √8 = 2√2 or √50 = 5√2 |
|  | 2(ii) | + | M1  M1  A1 | multiplying top and bottom by 6 +  denominator = 11 (or 33) |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5 | 1(i) | 1 | B1 |  |
|  | 1(ii) | a8 | B1 |  |
|  | 1(iii) |  | B1  B1  B1 | 3b  a3  inverse |
|  | 2(i) | ±5 | M1  A1 | for or seen |
|  | 2(ii) | 8x10y13z4  (or 23x10y13z4) | B3 | B2 for 3 elements correct  B1 for 2 elements correct |
|  |  |  |  |  |
| 6 | 1(i) | Grad AB = 1  Grad BC = -1  product of gradients = -1 hence perp | M1  M1  C1 |  |
|  | 1(ii) | 10 | M1  A1 | Use of pythagoras |
|  | 2 | y = -4x + 19 cao  Midpoint (4,3)  verifying on line x + 2y = 10 | M1  M1  A1  B1  C1 | calculating m  using (y -7) = m(x-3) |
|  |  |  |  |  |
| 7 | 1 | Cubic the correct way up  -1, 2 and 5 indicated on x-axis  10 indicated on y-axis | G1  G1  G1 |  |
|  | 2 | Negative quadratic curve  Intercept (0,9)  Through (3,0) and (-3,0) | G1  G1  G1 |  |
|  | 3 | Any correct y value calculated  (0,5), (1,1), (2,-1), (3,-1), (4,1) and (5,5) calculated  Above points plotted  Smooth parabola through the points | B1  B1  G1  G1 |  |
|  |  |  |  |  |
| 8 | 1 | y = (x – 2)2 - 4 | B2 | M1 if y omitted, or for y = (x + 2)2 - 4 |
|  | 2(i) | Translation of  () | B1  B1 |  |
|  | 2(ii) | y = f(x – 2) | B2 | B1 for y = f(x + 2) |
|  | 3(i) | Translation of  () | B1  B1 |  |
|  | 3(ii) | sketch of parabola right way up  min at (0,-4) and graph through (-2,0) and (2,0) | B1  B1 |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 9 | 1(i) | 15.5 | M1  A1 | Use of Pythagoras |
|  | 1(ii) | x = 75.5° | M1  A1 | (cos x = ) correct ratio and substitution |
|  | 2 | √8 or 2√2 (but not ± √8) | M1  M1  A1 | Use iof pythagoras  use of tan Ɵ = opp / adj |
|  | 3 | Smooth curve between y = 1 and y = -1  (90,0) and (270,0)  (0,1), (180,-1), (360,1) | G1  G1  G1 |  |
|  |  |  |  |  |
| 10 | 1(i) | 9.0 or 8.96 or 8.960 | M1  M1  A1 | for use of cosine rule  for square-rooting ‘their’ 80.2(8) |
|  | 1(ii) | 13.3 or better (13.2577..) | M1  A1  A1 | use of ‘their’ 0.5 x 4.1 x 6.6 x sin 108  correct values  ans |
|  | 2 | BC = 384 (or better)  Total length = 1034m  (or better) | M1  M1  A1  A1 | recognisable attempt at cosine rule  BC2 = 3482 + 3022 – 2x348x302xcos72  BC = 383.86…..  Total length = BC + 650 ft |
|  |  |  |  |  |
| 11 | 1a) |  | A1 |  |
|  | 1b) | , | A1 |  |
|  | 1c) |  | A1 |  |
|  | 2 |  | M1  M1  M1  A1 | Multiplying out denominators  Forming a single quadratic  2 critical values |
|  | 3 |  | M1  M1  A1 | Factorising quadratic  Critical values |
|  |  |  |  |  |
|  |  |  |  |  |
| 12 | 1a) | ( n + 1 ) and ( n + 2 ) | A1 | Both correct |
|  | b) | = 3n + 3  = 3 ( n + 1 )  3 is a factor so the sum is a multiple of 3 | M1  M1  A1 | Adding expressions and simplifying result  Factorising  Conclusion with reason |
|  | 2 | 2n + 1 is an odd number  ( 2n + 1 )2 = 4n2 + 4n + 1  4n2 + 4n = 4 ( n2 + 1) = even  so 4n2 + 4n + 1 is odd | M1  M1  A1 | Expression for odd number  Square expression  Explanation |
|  | 3 | =  which is always even as is a multiple of 2 | M1  M1  A1 | Factorise  Simplify  Explanation |
|  |  |  |  |  |
|  |  |  |  |  |
| 13 | 1(a) | -3h+2f+g | B1 | OA - OB |
|  | 1(b) | - (6**h** + 2**f** + **g**) oe | M1  A1 | PO = PA+AO |
|  | 2 | BA = 3DC so lines are parallel | M1  M1  A1 | Expression for BA  Expression for DC  Concluding statement |
|  | 3 | QA and QM are both multiples of 2**j** – **k** so are parallel and have Q as a common point so are collinear | M1  M1  A1 | QA = 1/3 (2**j – k**) oe  QM = ½ (2**j** – **k**) oe  Concluding statement |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| 14 | 1 | NP x =  ND x =  PN x =  PD x =  DN x =  DP x =  P(two different types) =  Or (alternative solution)  NN x =  PP x =  DD x =    P(two the same type) = 1 – = | M1  M1  A1  M1  M1  A1 | Multiplying each probability  Adding their probabilities  Correct solution  Multiplying probability of same types  Subtracting their answer from 1  Correct solution |
|  | 2 | 0.75 x 0.7 = 0.525 or 0.25 x 0.9 = 0.225  0.525 + 0.225  =0.75 | M1  M1  A1 | Multiplying probabilities for both situations  Adding probabilities |
|  | 3a | or 0.95 | A1 |  |
|  | 3b | = or 0.04 | A1 |  |
|  | 3c | = or 0.03 | M1  A1 | Allow M1 for = or 0.03 |
|  |  |  |  |  |
| 15 | 1a | FD= 2.5 and 1.2  Plot on graph | M1  A1 | FD = Frequency / class width |
|  | 1b | FD x class width  15 and 36 | M1  A1 | Both answers required |
|  | 2a | 1.0, 3.7, 4.0, 1.5  Correct histogram drawn | A1  A1  M1  A1 | Frequency density calculated  1 mark for 3 correct  Mark awarded for 2 correct bars  All correct |
|  | 2b | 300 – 240 = 60 mins  90 | M1  A1 | Calculation to find the class width |
|  |  |  |  |  |