| Q | **Working** | **Answer** | **Mark** | **Notes** |
| --- | --- | --- | --- | --- |

| 1 | (a) |  | 2.84 × 109 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  | 0.000 25 | 1 | B1 |  |
|  |  |  |  |  |  | **Total 2 marks** |

| 2 | (a) |  | 5y3(3y + 4u) | 2 | B2  (B1 | for 5y3(3y + 4u)  for 5y(3y3 + 4uy2)  or 5y2(3y2 + 4uy)  or y2(15y2 + 20uy)  or y3(15y + 20u)  or 5y3(…) where there is only one mistake in the brackets) |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) | oeor oeor oe |  | 3 | M1 | for removal of fraction in a correct equation |
|  |  | e.g. or oeor |  |  | M1 | for terms in x on one side and numbers on the other side in an equation, allow correct rearrangement of their equation in the form ax + b = cx + d |
|  |  |  | 2.75 |  | A1 | (dep on M1) oe e.g. or |
|  |  |  |  |  |  | Total 5 marks |

| 3 | (a) |  | 16*x*12*y*20 | 2 | B2 | B1 for an answer in the form *axnym*  with 2 correct from  *a* = 16, *n* = 12, *m* = 20 |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b)(i) | (*x* ± 9)(*x* ± 4) |  | 2 | M1 | for (*x* ± 9)(*x* ± 4)  **or** for (*x* + *a*)(*x* + *b*)  where *ab* = −36 or *a* + *b* = 5 |
|  |  |  | (*x* + 9)(*x* – 4) |  | A1 |  |
|  | (ii) |  | –9, 4 | 1 | B1 | ft from (b)(i) |
|  |  |  |  |  |  | **Total 5 marks** |

| 4 | (a) | 0.6 × 0.9 |  | 2 | M1 | oe |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 0.54 |  | A1 | oe e.g. , 54% |
|  | (b) | 0.6 × 0.1 (= 0.06)  **or** 0.4 × 0.25 (= 0.1)  **or** 0.4 × 0.75 (= 0.3) |  | 3 | M1 | oe |
|  |  | 0.6 × 0.1 + 0.4 × 0.25  **or** 1 − (0.4 × 0.75) – “0.54” |  |  | M1 | oe, ft their answer from (a) |
|  |  |  | 0.16 |  | A1 | oe e.g. , 16% |
|  |  |  |  |  |  | **Total 5 marks** |

| 5 | (a) | 8*x*² + 20*x* – 6*x*² + 9*x* | 2*x*² + 29*x* | 2 | M1 | 3 correct terms or all 4 terms condoning incorrect signs |
| --- | --- | --- | --- | --- | --- | --- |
|  | A1 |  |
| (b) | eg  or  or 5 + *n* ˗ 6 = 13 | 14 | 2 | M1 | Use of 1 rule of indices or a correct linear equation in *n* |
|  | A1 | Accept |
| (c)(i) | 7*t* – 2*t* < 7 + 8 oe eg 5*t* < 15 oe | *t* < 3 | 2 | M1 | Terms in *t* on one side and number terms the other side – may be in an equation or the incorrect inequality sign or an answer of  *t* = 3 or eg *t* ≥ 3 |
|  |  | A1 |  |
| (ii) |  | open circle at *t* = 3 and a line with an arrow to the left | 1 | B1ft | ft their inequality  Allow a line without an arrow if it reaches to at least −5, with an arrow it can be any length |
|  |  |  |  |  |  | **Total 7 marks** |

| 6 |  | **or****or** |  | 3 | M1 | for multiplying 2*x* by a bracket with both terms correct **or** the 2 brackets with at least 3 out of 4 terms correct or at least 2 out of 3 terms correct |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **or**  **or** 2*x*(*x*2 – 5*x* − 3*x* + 15) = 2*x*3 – 10*x*2 − 6*x*2 + 30*x*  **or** |  |  | M1 | (dep) for multiplying the product of 2*x* and the 1st bracket (ft from the 1st stage) by the 2nd bracket and getting at least 3 out of 4 terms correct  **or** multiplying the product of the 2 brackets (ft from the 1st stage) by the 2*x*, and getting at least 3 out of 4 or 2 out of 3 terms correct |
|  |  |  |  |  | A1 |  |
|  |  |  |  |  |  | **Total 3 marks** |

| 7 | (a)(i) |  | Correct line | 1 | B1 | For *x* = 1.5 drawn |
| --- | --- | --- | --- | --- | --- | --- |
| (ii) | Correct line | 1 | B1 | For *y* = *x* drawn |
| (iii) | Correct line | 1 | B1 | For *x* + *y* = 6 drawn |
| (b) |  | Correct region | 1 | B1 | dep on B3 for correctly indicating the region **R**  accept unlabelled or unshaded if clear. Shading can be ‘in’ or ‘out’. |
|  |  |  |  |  |  | **Total 4 marks** |

| 8 | (i) |  | 21, 27 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (ii) |  | 21, 23, 24, 25, 27, 29 | 1 | B1 |  |
|  |  |  |  |  |  | **Total 2 marks** |

| 9 |  | 3, 7, 8, 8 and one of  4 or 5 or 6 | 3 | B3 | For a list of 5 correct numbers  (B2 for a list of 5 numbers with 2 of: median of 7, mode of 8, range of 5  B1 for a list of 5 or 6 numbers with 1 of:  median of 7, mode of 8, range of 5) |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Total 3 marks** | |

| 10 | (b) |  |  | 4 | M1 | for removing square root |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | M1 | for multiplying by denominator and expanding in a correct equation |
|  |  |  |  | M1ft | for gathering terms in *c* on one side and other terms the other side  ft their equation dep on 2 terms in *c* and two other terms |
|  |  |  |  | A1 | or |
|  |  |  |  |  |  | **Total 4 marks** |

| 11 | (a) | oe or  oe |  | 2 | M1 | condone correct gradient embedded in an equation e.g. *y* = −3*x* + *c*  **or** expression e.g. −3*x*  **or** for an answer of 3 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | −3 |  | A1 |  |
|  | (b) |  |  | 1 | B1 | accept 0.25 or oe |
|  |  |  |  |  |  | **Total 3 marks** |

| 12 |  |  |  | 2 | B2 | (B1 for 12 870 000 or correct unsimplified product or  with at least 1 of *m*, *n* or *p* correct or for  ) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Total 2 marks** |

| 13 |  | **or** |  | 3 | M1 | for expressing both fractions correctly with a common denominator. |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **or** |  |  | M1 | for removing brackets in a single fraction with a correct denominator. Allow denominator to be expanded. Allow one error in the expansion of the numerator. |
|  |  |  |  |  | A1 | accept oe |
|  |  |  |  |  |  | **Total 3 marks** |

| 14 | (a) |  |  | 3 | B3 | For all sections completed correctly  (B2 for 5 or 6 sections correct (excl x),  B1 for 3 or 4 sections correct (excl x) ) |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) | 2x + 6 + x + 2 + 4 + 9 + 9 + 11 = 80  (80 – 6 – 2 – 4 – 9 – 9 – 11 ) ÷ 3 |  | 3 | M1ft | ft their Venn diagram  A correct equation to find x or subtracting all numerical values from 80 and dividing by 3 or other fully correct method to find x with all sections completed |
|  |  | x = 13 |  |  | A1 | correct value for x |
|  |  |  | 38 |  | B1 | their 2x + 12 |
|  |  |  |  |  |  | Total 6 marks |

| 15 |  | (definition of part: there are 3 parts: one part is the number, one part the letter *t* and one part the letter *w*  Definition of terms: there are 6 terms: 2 number terms, 2 terms in *t* and 2 terms in *w*) |  | 3 | M1  indep | Fully correct cancellation of any two parts of their fraction at any stage of working | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | M1  indep | correctly apply the negative power to the whole of their bracket (all parts or all terms)  **or**  correctly square all parts or terms of their bracket  **or**  correctly apply the negative power AND square of at least two parts (maybe 4 terms) of their bracket | | | |
|  |  |  | 4*t*4*w*² | A1 | Allow (2*t*²*w*)² after the correct answer | | | |
|  |  | **ALTERNATIVE** |  |  |  | |  | | |
|  |  |  | 4*t*4*w*² | 3 | M2 | 2 correct terms (M1 for 1 correct term) | | | |
|  |  |  | A1 | Allow (2*t*²*w*)² after the correct answer | | |  |
|  |  |  |  |  |  | | | **Total 3 marks** | |

| 16 |  | 13 − 4 |  | 2 | M1 | For selecting 4 and 13 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 9 | A1 |  |
|  |  |  |  |  |  | **Total 2 marks** |

| 17 |  | E.g. or |  | 3 | M1 | for rationalising the denominator by multiplying numerator and denominator by (or ) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | oror or |  |  | M1 | (numerator may be expanded or denominator may be 4 terms which need to be all correct) |
|  |  |  |  |  | A1 | or for stating a = 2 and b = 3  for  from correct working  dep on M2 |
|  |  |  |  |  |  | Total 5 marks |

| 18 |  | e.g. **or** **or**  **or** |  | 3 | M1 | for a correct expansion with at least 3 out of 4 terms correct oe  or all 3 terms correct |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | *x* = 19 |  | A1 | (dep on M1) for *x* = 19 |
|  |  |  | *y* = 3 |  | B1 | for *y* = 3 |
|  |  |  |  |  |  | **Total 3 marks** |

| 19 | (a) |  | 1 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
| (b) | oe |  | 3 | M1 |  |
|  | 32 × 10124 **or** 3 × 10125 + 0.2 × 10125 **or**  30 × 10124 + 2 × 10124 |  | M1 | oe ‘correct’ answer in incorrect form. |
|  |  | 3.2 × 10125 | A1 |  |
|  |  |  |  |  |  | **Total 4 marks** |

| 20 |  |  |  |  | 5 | M1 substitution of linear equation into quadratic | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | e.g. oe  allow  oe | e.g.  oe  allow  oe |  |  | A1 (dep on M1) writing the correct quadratic expression in the form  *ax*2 + *bx* + *c* (= 0)  allow *ax*2 + *bx* = *c* | |
|  |  | e.g.  (*y* = )  e.g.  oe | e.g.  (*x* =)  e.g. |  |  | M1 (dep on M1) for a complete method to solve their 3-term quadratic equation (allow one sign error and some simplification – allow as far as  or) | |
|  |  | *y* =  oe and *y* = 4 | *x* = −7 and *x* = −2 |  |  | A1 (dep on M1) both *x*-values  **or** both *y*-values | |
|  |  |  | | *x =* −2,*y =* oeand*x =* −7,*y =* 4 |  | A1 (dep on first M1) must be paired correctly | |
|  |  |  | |  |  |  | **Total 5 marks** |

| 21 |  | =oe **or** =oe **or**=oe **or** =oe  **or** =oe **or** =oe |  | 6 | M1 | for finding  **or**  **or**  **or**  **or**  **or** |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | e.g. = oe **or** =  oe  **or**  =  oe **or**  = oe |  |  | M1 | for finding **or**  **or**  **or** |
|  |  | e.g.  oe **or**  oe  **or**  oe **OR**  oe  **or**  oe **or**  oe |  |  | M1 | for finding  **or**  **or**  **or** |
|  |  | e.g.  oe **or**  oe  **or**  oe **or**  oe |  |  | M1 | for setting up an equation for  **or** |
|  |  | **or** |  |  | M1 | for finding  or *t* for either  **or** |
|  |  |  | 4 : 1 |  | A1 | cao (dep on M3) |
|  |  |  |  |  |  | **Total 6 marks** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Edexcel averages: scores of candidates who achieved grade:** | | | | | | | | |
| **Qn** | **Paper** | **Question** | **Mean score** | **Max score** | **Mean %** | **ALL** | **9** | **8** | **7** | **6** | **5** | **4** | **3** | **U** |
| **1** | 1H | Q06 | 1.70 | 2 | 85 | 1.70 | 1.99 | 1.92 | 1.88 | 1.76 | 1.62 | 1.22 | 0.80 | 0.29 |
| **2** | 1H | Q05 | 3.82 | 5 | 76 | 3.82 | 4.89 | 4.80 | 4.39 | 3.82 | 3.07 | 1.82 | 1.12 | 0.10 |
| **3** | 1H | Q09 | 3.74 | 5 | 75 | 3.74 | 4.92 | 4.70 | 4.36 | 3.59 | 2.98 | 1.66 | 1.00 | 0.34 |
| **4** | 1H | Q14 | 3.47 | 5 | 69 | 3.47 | 4.91 | 4.63 | 4.35 | 3.32 | 1.96 | 0.86 | 0.58 | 0.07 |
| **5** | 2H | Q05 | 5.18 | 7 | 74 | 5.18 | 6.61 | 6.15 | 5.70 | 4.99 | 4.47 | 3.07 | 1.86 | 0.51 |
| **6** | 1H | Q12b | 2.00 | 3 | 67 | 2.00 | 2.82 | 2.61 | 2.39 | 2.00 | 1.20 | 0.60 | 0.33 | 0.01 |
| **7** | 2H | Q04 | 2.63 | 4 | 66 | 2.63 | 3.91 | 3.56 | 3.02 | 2.16 | 1.52 | 0.88 | 0.45 | 0.22 |
| **8** | 1H | Q04 | 1.37 | 2 | 69 | 1.37 | 1.86 | 1.74 | 1.47 | 1.23 | 1.02 | 0.69 | 0.42 | 0.11 |
| **9** | 2H | Q02 | 1.98 | 3 | 66 | 1.98 | 2.72 | 2.45 | 2.18 | 1.67 | 1.61 | 1.12 | 0.46 | 0.16 |
| **10** | 2H | Q14b | 2.24 | 4 | 56 | 2.24 | 3.79 | 3.15 | 2.43 | 1.58 | 0.90 | 0.41 | 0.14 | 0.06 |
| **11** | 1H | Q13 | 1.66 | 3 | 55 | 1.66 | 2.74 | 2.29 | 1.78 | 1.23 | 0.87 | 0.25 | 0.26 | 0.04 |
| **12** | 2H | Q09 | 1.02 | 2 | 51 | 1.02 | 1.74 | 1.37 | 1.14 | 0.63 | 0.49 | 0.27 | 0.18 | 0.01 |
| **13** | 1H | Q12a | 1.57 | 3 | 52 | 1.57 | 2.72 | 2.17 | 1.66 | 1.14 | 0.69 | 0.21 | 0.03 | 0.00 |
| **14** | 2H | Q16 | 3.05 | 6 | 51 | 3.05 | 5.00 | 4.33 | 3.07 | 2.30 | 1.47 | 0.80 | 0.31 | 0.09 |
| **15** | 2H | Q11 | 1.58 | 3 | 53 | 1.58 | 2.59 | 2.03 | 1.51 | 1.25 | 0.93 | 0.56 | 0.33 | 0.06 |
| **16** | 2H | Q12 | 1.00 | 2 | 50 | 1.00 | 1.59 | 1.24 | 1.00 | 0.86 | 0.64 | 0.32 | 0.17 | 0.01 |
| **17** | 1HR | Q15b | 1.74 | 3 | 58 | 1.74 | 2.73 | 1.99 | 1.20 | 0.65 | 0.14 | 0.11 | 0.00 | 0.00 |
| **18** | 1H | Q18 | 1.19 | 3 | 40 | 1.19 | 2.37 | 1.55 | 1.13 | 0.73 | 0.39 | 0.15 | 0.04 | 0.01 |
| **19** | 2H | Q06 | 1.58 | 4 | 40 | 1.58 | 2.77 | 1.83 | 1.46 | 1.14 | 0.89 | 0.67 | 0.46 | 0.24 |
| **20** | 1H | Q19 | 1.29 | 5 | 26 | 1.29 | 3.48 | 1.49 | 0.69 | 0.32 | 0.11 | 0.03 | 0.00 | 0.00 |
| **21** | 1H | Q23 | 0.91 | 6 | 15 | 0.91 | 2.32 | 1.26 | 0.51 | 0.18 | 0.05 | 0.01 | 0.03 | 0.00 |
|  |  |  | **44.72** | **80** |  | **44.72** | **68.47** | **57.26** | **47.32** | **36.55** | **27.02** | **15.71** | **8.97** | **2.33** |

**Suggested grade boundaries**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade** | **9** | **8** | **7** | **6** | **5** | **4** | **3** |
| Mark | 73 | 63 | 52 | 42 | 32 | 21 | 12 |