| 1 |  | 20 – 5*x* (= 7 – 3*x*) |  | 3 | M1 | for expansion of bracket |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | E.g. 20 – 7 = −3*x* + 5*x* or  −5*x* + 3*x* = 7 – 20 |  |  | M1 | ft from a 4-term equation  for a correct process of isolating terms in *x* on one side of the equation and numbers on the other side |
|  |  |  | 6.5 oe |  | A1 | dep on M1 awarded and from correct working |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2 |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | ***x*** | −2 | −1 | 0 | 1 | 2 | 3 | | ***y*** | 15 | 11 | 7 | 3 | −1 | −5 |   (−2, 15) (−1, 11) (0, 7) (1, 3) (2, −1) (3, −5) | Correct line between  *x* = −2  and *x* = 3 | 3 | B3 | for a correct line between  *x* = −2 and *x* = 3  (B2 for a correct straight line segment through at least 3 of (−2, 15) (−1, 11) (0, 7) (1, 3) (2, −1) (3, −5)  **or**  for all of (−2, 15) (−1, 11) (0, 7) (1, 3) (2, −1) (3, −5) plotted but not joined)  (B1 for at least 2 correct points stated (may be in a table) **or** plotted **or** for a line drawn with a negative gradient through (0, 7) **or** for a line with a gradient of −4) |
|  |  |  |  |  |  | **Total 3 marks** |

| 3 | a |  | *g*10 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | b |  | *k*7 | 1 | B1 |  |
|  | c |  | 9*c*2*d*8 | 2 | B2 | B1 for 2 out of 3 terms correct in a product |

| 4 |  | **Elimination**  E.g.        or | **Substitution**  E.g.    or    or    or |  | 4 | M1 | for a correct method to eliminate *x* or *y*: coefficients of *x* or *y* the same **and** correct operation to eliminate selected variable (condone 1 arithmetical error)  **or**  for correctly writing *x* or *y* in terms of the other variable and correctly substituting |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | |  |  | A1 | dep on M1 for *x* = 4 or *y* = −3 |
|  |  | E.g. 7*x* – 2 ×−3 = 34 | |  |  | M1 | dep on M1 for substitution of found variable  **or**  repeating the steps in first M1 for the second variable |
|  |  |  | | *x* = 4*y* = −3 |  | A1 | cao  A correct answer without working scores no marks |
|  |  |  | |  |  |  | **Total 4 marks** |

| 5 |  | 4*x* > 2 – 7 oe |  |  | M1 | accept as an equation or with wrong inequality sign. |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | *x* > −1.25 | 2 | A1 | oe allow (−1.25, (+))  Note: award M1A0 for an answer on the answer line of −1.25 with no sign or the incorrect sign eg *x* = −1.25,  *x* < −1.25 |
|  |  |  |  |  |  | **Total 2 marks** |

| 6 |  |  |  |  | M1 | for *y* = 3*x* + *c* oe **or** *y* = *mx* – 2 oe **or** 3*x* – 2 **or** eg *L* = 3*x* – 2 **or** *y* = 3(*x* ± *a*) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | *y* = 3*x* − 2 | 2 | A1 | oe eg *y* – 4 = 3(*x* – 2)  *y* – 1 = 3(*x* – 1)  *y* – *a* = 3(*x* – *b*) where (*a*, *b*) is any  coordinate on the line |
|  |  |  |  |  |  | **Total 2 marks** |

| 7 | (a) |  | 2, 4, 6, 12 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (c) |  |  | 2 | M1 | for  with *a* < 14 **or**  with *b* > 3 **or**  for 3 and 14 used with incorrect notation e.g. 3 : 14 |
|  |  |  |  |  | A1 | for  oe **or**  0.214(…) |
|  |  |  |  |  |  | **Total 3 marks** |

| 8 | (a) |  | oe | 2 | B1 | correct probabilities for spinner **A** |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | oe |  | B1 | correct probabilities for spinner **B** |
|  | (b) | **or**  **or**  **or** oe |  | 3 | M1 | ft from (a)  provided 0 < probability <1 |
|  |  | **or**  **or** oe |  |  | M1 | ft from (a) for a complete method |
|  |  |  |  |  | A1 | oe |
|  |  |  |  |  |  | **Total 5 marks** |

| 9 |  |  |  | 2 | M1 | for any **correct** partial factorisation with at least 2 factors, one of which must be a letter **or** the correct common factor with no more than 1 error inside the bracket |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 8*m*2 *g*3(2*m* + 3*g*2) |  | A1 |  |

| 10 | a |  | 4*e*10 | 2 | B2 | (B1 for 4*ek* **or** *ke*10) |
| --- | --- | --- | --- | --- | --- | --- |
|  | b | A correct first step eg  **or**  **or**  **or**  **or** **or** **or** |  |  | M1 | or for 16*yp* where *p* ≠ −4 |
|  |  |  |  | 2 | A1 |  |
|  | c | eg**or**  eg 4(4*x* – 2) – 3(5 – 3*x*) = 12 × 6 **or**  eg **or**  eg  oe |  |  | M1 | for clear intention to multiply **all** terms by 12 or a multiple of 12    **or** to express LHS as two fractions over 12 or a multiple of 12 or as a single fraction with a denominator of 12 or a multiple of 12  (if expanded numerator, allow one sign error) |
|  |  | eg |  |  | M1 | expanding brackets and multiplying both sides by denominator with no more than one sign error |
|  |  | eg 16*x* + 9*x* = 72 + 8 + 15 |  |  | M1 | for correct rearrangement of a correct equation with terms in *x* isolated |
|  |  |  | 3.8 | 4 | A1 | oe, award full marks for a correct answer if at least M1 scored |
|  |  |  |  |  |  | **Total 8 marks** |

| 11 |  | *xy* + 3*y* = 5 – 2*x* oe |  |  | M1 | multiplying both sides by (*x* + 3) and expanding the brackets correctly |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | e.g. *xy* + 2*x* = 5 – 3*y* |  |  | M1 | ft dep on 2 terms on left and (5 – 2*x*) on right, for collecting all *x* terms on one side and non-*x* terms on the other side |
|  |  | eg *x*(*y* + 2) = 5 – 3*y* |  |  | M1 | ft, dep on 2 terms in *x*, for factorising for *x* |
|  |  |  |  | 4 | A1 | oe allow  as answer so long as previously seen |
|  |  |  |  |  |  | **Total 4 marks** |

| 12 |  | **or** oe |  | 3 | M1 | (NB. Not for )  Constant of proportionality must be a symbol such as *k* | M2 for  oe |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **or** *k* = 6.5 × 42 **or** *k* = 104 |  |  | M1 | For substitution of *F* and *v* into a correct formula | |
|  |  |  |  |  | A1 | Award 3 marks if is on the answer line and the value of *k* = 104 is found | |
|  |  |  |  |  |  | **Total 3 marks** | |

| 13 |  | e.g. *x* =  and 100*x* =  **or** 10*x* =  and 1000*x* = |  |  | M1 | e.g. two decimals that when subtracted give a finite decimal (must show understanding of recurring figures by ‘dot’ or at least 2 lots of 18 or 81 after the decimal point). Algebra required, use of any letter. |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | 99*x* = 67.5, *x* =  =  **or** 990*x* = 675, *x* = =  oe | show | 2 | A1 | dep for completing the ‘show that’ arriving at given answer from correct working. |
|  |  |  |  |  |  | **Total 2 marks** |

| 14 | (a)(i) |  | 122 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (a)(ii) |  | reason | 1 | B1 | (dep on a correct answer or a correct method seen for (i))  Opposite angles in a cyclic quadrilateral sum to 180o |
|  | (b) | 360 – 2 × 58 or 2 × ‘122’ |  | 2 | M1 | ft from (a) |
|  |  |  | 244 |  | A1 |  |
|  |  |  |  |  |  | **Total 4 marks** |

| 15 |  | or |  |  | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **or** **or** **or** |  |  | M1 | (numerator may be expanded or denominator may be 4 terms which need to be all correct) |
|  |  |  |  | 3 | A1 | dep on M2  for  **or** from correct working |
|  |  |  |  |  |  | **Total 3 marks** |

| 16 |  | 3*y*(2*y* + 1) – *y*2 = 8 **or** **or**    oe | oe |  |  | M1 | correct first step eg substitution by  eg *x* = 1 + 2*y* or *y* =  to get an equation in a single variable  **or**  writing 2nd equation with *x* the subject and substituting into 1st  **or**  multiplying 2nd equation by 3*y* and subtracting from 1st oe |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | eg 5*y*2 + 3*y* – 8 (= 0) | eg 5*x*2 – 4*x* – 33 (= 0) |  |  | A1 | for a correct simplified quadratic |
|  |  | (5*y* + 8)(*y* – 1) (= 0) or | (5*x* + 11)(*x* – 3) (= 0) or |  |  | M1ft | dep on M1 for solving their 3 term quadratic equation using any correct method (allow one sign error and some simplification – allow as far as) or if factorising, allow brackets which expanded give 2 out of 3 terms correct) |
|  |  | *y* =  and *y* = 1 (both) | *x* =  and *x* = 3 (both) |  |  | A1 | dep on first M1 |
|  |  |  | | *x* = , *y* =  *x* = 3, *y* = 1 | 5 | A1 | oe dep on first M1  Must be paired correctly |
|  |  |  | |  |  |  | **Total 5 marks** |

| 17 |  | **or** | **or** |  |  | M1 | replacing 81 with 34 **or** 93*x*with (32)3*x*(or 36*x*)  **or** replacing 81 with 92 **or** 3*x*with (90.5)*x*  (in an equation) |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | eg 4 + 6*x* = *x* or 4 = *x* – 2(3*x*) oe | eg 2 = 0.5*x* – 3*x* oe |  |  | M1 | a correct equation using powers |
|  |  |  | | −0.8 | 3 | A1 | oe, dep on at least M1 |
|  |  |  | |  |  |  | **Total 3 marks** |

| 18 |  | = −**a** + **b** or  = **a** − **b** |  |  | M1 | Correct diagram (condone missing vector labels or arrows – with *C* on line segment *OA* and  *D* on line segment *OB*) **OR** for finding  or  - may be seen as part of later working |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | = (−**a** + **b**) or= ( **a** – **b**)oe |  |  | M1 | Method to find  or |
|  |  |  | Correct vectors and conclusion including parallel and trapezium | 3 | A1 | eg (*AB*) and  (*CD*) are parallel therefore *ABDC* is a trapezium |
|  |  |  |  |  |  | **Total 3 marks** |

| 19 |  | (3*x* + 2)(2*x* – 4) < 3*x* + 27oe eg 6*x*2 – 8*x* – 8 < 3*x* + 27 |  |  | M1 | condone incorrect symbol |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | eg 6*x*2 – 11*x* – 35 < 0 |  |  | M1 | expanding and rearranging to get a correct 3 term quadratic, condone incorrect symbol |
|  |  | (2*x* – 7)(3*x* + 5) (= 0) or |  |  | M1 | first step to find the critical values dep on M1 for solving their 3 term quadratic using any correct method (allow one sign error and some simplification – allow as far as the equivalent of ) or if factorising, allow brackets which expanded give 2 out of 3 terms correct) |
|  |  |  |  |  | A1 | oe the positive critical value only or both critical values (if both they must be correct) |
|  |  |  | 2 *< x* < | 5 | A1 | accept 2 *< x* < may be seen as two separate inequalities *x*  > 2 (*x <* 2) **and** *x* < |
|  |  |  |  |  |  | **Total 5 marks** |

| 20 |  |  |  |  | M1 | for either  (3*x* + 2)(3*x* – 2) **or** (3*x* + 2)(*x* – 5) | M2 for  = |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | M1 | for  (3*x* + 2)(3*x* – 2) **and**  (3*x* + 2)(*x* – 5) |
|  |  | E.g. of denominators **or**  **or**  **or**  **or** **or**  **or** **or**  **or** |  |  | M1 | (indep) ft their fractions for use of a correct common denominator for 2 fractions with **algebraic** denominators  NB: fractions need not be simplified | |
|  |  | **or** **or****or** oe |  |  | M1 | for a **correct** fraction with a **correct** **quadratic** denominator – may or may not be expanded which leads to a correct answer | |
|  |  |  |  | 5 | A1 | acceptoe; if denominator is expanded then it must be correct | |
|  |  |  |  |  |  | **Total 5 marks** | |

| 21 | a | 5 – (*x* ± *q*)2 + 9 oe **or** *p* − (*x* – 3)2 oe  **or**  *p* − *q*² +2*qx* − *x*² and one of  2*q* = 6 **or** *p* – *q*2 = 5 |  |  | M1 | may be seen in working eg –[(x – 3)² − 9 −5]  **or**  expanding *p* – (*x* – *q*)² correctly and equating one of the coefficient of *x* or the constant term |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 14 – (*x* – 3)2 | 2 | A1 | fully correct  SCB1 for (*x* – 3)² − 14 |
|  | b | e.g. (*x* – 3)2 = 14 – *y*  [or (*y* – 3)2 = 14 – *x*] |  |  | M1 | correct steps to isolate their bracket  ft from (a) dep on expression in form ±*p* ± (*x* – *q*)2 |
|  |  | *x* = 3 ±  [or *y* = 3 ±  ] |  |  | M1 | complete method to find *y* in terms of *x* or *x* in terms of *y*.Condone + for ±  ft from (a) dep on expression in form ±*p* ± (*x* – *q*)2 |
|  |  | (f−1(*x*) =) 3 − |  |  | M1 | for the correct inverse |
|  |  |  |  |  | M1 | method to solve 0 < 3 −  or a lower bound of 5 clearly shown, eg *x* > 5 as part of the answer |
|  |  |  | 5 < *x* ≤ 14 | 5 | A1 | cao |
|  |  |  |  |  |  | **Total 7 marks** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **Edexcel averages: scores of candidates who achieved grade:** | | | | | | | |
| **Qn** | **Skill tested** | **Mean score** | **Max score** | **Mean %** | **ALL** | **9** | **8** | **7** | **6** | **5** | **4** | **3** |
| **1** | Linear equations | 12.65 | 3 | 88 | 2.65 | 2.99 | 2.93 | 2.88 | 2.74 | 2.58 | 2.29 | 1.63 |
| **2** | Graphs | 2.42 | 3 | 81 | 2.42 | 2.94 | 2.85 | 2.76 | 2.60 | 2.34 | 1.76 | 0.70 |
| **3** | Use of symbols | 3.26 | 4 | 82 | 3.26 | 3.94 | 3.83 | 3.63 | 3.26 | 2.96 | 2.41 | 1.84 |
| **4** | Simultaneous linear equations | 2.89 | 4 | 72 | 2.89 | 3.94 | 3.76 | 3.40 | 3.06 | 2.27 | 1.35 | 0.49 |
| **5** | Inequalities | 1.53 | 2 | 77 | 1.53 | 1.92 | 1.83 | 1.70 | 1.58 | 1.42 | 1.05 | 0.66 |
| **6** | Graphs | 1.19 | 2 | 60 | 1.19 | 1.92 | 1.82 | 1.55 | 1.06 | 0.52 | 0.24 | 0.05 |
| **7** | Set language and notation | 2.04 | 3 | 68 | 2.04 | 2.65 | 2.44 | 2.28 | 2.01 | 1.69 | 1.40 | 1.01 |
| **8** | Probability | 3.17 | 5 | 63 | 3.17 | 4.69 | 4.25 | 3.64 | 3.02 | 2.15 | 1.47 | 0.78 |
| **9** | Algebraic manipulation | 1.16 | 2 | 58 | 1.16 | 1.76 | 1.56 | 1.31 | 1.09 | 0.81 | 0.48 | 0.12 |
| **10** | Linear equations | 4.59 | 8 | 57 | 4.59 | 7.43 | 6.34 | 5.12 | 3.62 | 2.92 | 1.67 | 0.77 |
| **11** | Expressions and formulae | 2.09 | 4 | 52 | 2.09 | 3.76 | 3.25 | 2.41 | 1.40 | 0.88 | 0.25 | 0.12 |
| **12** | Ratio and proportion | 1.56 | 3 | 52 | 1.56 | 2.79 | 2.31 | 1.78 | 1.22 | 0.67 | 0.29 | 0.00 |
| **13** | Decimals | 0.80 | 2 | 40 | 0.80 | 1.52 | 1.23 | 0.85 | 0.52 | 0.27 | 0.12 | 0.02 |
| **14** | Circle properties | 1.55 | 4 | 39 | 1.55 | 2.87 | 2.19 | 1.68 | 1.10 | 0.67 | 0.38 | 0.23 |
| **15** | Powers and roots | 1.19 | 3 | 40 | 1.19 | 2.65 | 1.89 | 1.11 | 0.49 | 0.28 | 0.11 | 0.02 |
| **16** | Quadratic equations | 1.73 | 5 | 35 | 1.73 | 4.16 | 2.43 | 1.42 | 0.74 | 0.32 | 0.11 | 0.06 |
| **17** | Powers and roots | 1.03 | 3 | 34 | 1.03 | 2.55 | 1.48 | 0.82 | 0.31 | 0.18 | 0.04 | 0.01 |
| **18** | Vectors | 0.94 | 3 | 31 | 0.94 | 2.21 | 1.34 | 0.77 | 0.47 | 0.20 | 0.08 | 0.06 |
| **19** | Inequalities | 1.37 | 5 | 27 | 1.37 | 3.11 | 1.93 | 1.12 | 0.81 | 0.35 | 0.13 | 0.03 |
| **20** | Algebraic manipulation | 1.41 | 5 | 28 | 1.41 | 3.54 | 2.09 | 1.02 | 0.47 | 0.24 | 0.10 | 0.01 |
| **21** | Function notation | 0.81 | 7 | 12 | 0.81 | 2.57 | 0.91 | 0.35 | 0.14 | 0.04 | 0.01 | 0.00 |
|  | **TOTAL** | **49.38** | **80** | **62** | **39.38** | **74.91** | **60.66** | **48.60** | **37.71** | **28.76** | **19.74** | **11.61** |

**Suggested grade boundaries**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade** | **9** | **8** | **7** | **6** | **5** | **4** | **3** |
| Mark | 68 | 55 | 43 | 33 | 25 | 16 | 9 |