| 1 | (b) | (−5)² − 4 × −5 oe e.g. 25 + 20 |  | 2 | M1 | for a correct substitution |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 45 |  | A1 |  |

| 2 | (c) | 5*x* – 3 = 4(2*x* + 3) oe **or**  oe |  | 3 | M1 | for correctly removing the denominator, condone missing brackets |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | e.g. 5*x* – 8*x* = 12 + 3 **or** −3*x* = 12 + 3**or** 8*x* – 5*x* = −12 − 3 **or** 3*x* = −12 – 3 **or**  **or** |  |  | M1 | for a correct rearrangement with terms in *x* on one side and numbers on the other,  allow correct rearrangement of their equation in the form *ax* + *b* = *cx* + *d* |
|  |  |  | −5 |  | A1 | dep on at least M1  SCB2 for an answer of  *x* = −2 coming from 5*x* – 3 = 8*x* + 3  **or** *x* = 5 coming from 5*x* – 3 = 2*x* + 12 |
|  |  |  |  |  |  | **Total 3 marks** |

| 3 | (a) |  | 0 | 1 | B1 | condone |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  | −2 | 1 | B1 | condone |
|  |  |  |  |  |  | **Total 2 marks** |

| 4 |  | e.g. 35*x* + 10*y* = 27.5 **or** 21*x* + 6*y* = 16.5 6*x* − 10*y* = 34 21*x* − 35*y* = 119  41*x* = 61.5 41*y* = −102.5  e.g.  or  oe |  | 4 | M1 | for a correct method to eliminate *x* or *y*:  coefficients of *x* or *y* the same **and** correct operator to eliminate selected variable (condone any one arithmetic error in multiplication)  **or** writing *x* or *y* in terms of the other variable and correctly substituting. |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | *x* = 1.5 **or** *y* = −2.5 |  | A1 | oe, dep on M1 |
|  |  |  |  |  | M1 | (dep on 1st M1) for a correct method to find other variable by substitution of found variable into one equation  **or** for repeating the above method to find the second variable. |
|  |  |  | *x* = 1.5 **and** *y* = −2.5 |  | A1 | oe, dep on M1 |
|  |  |  |  |  |  | **Total 4 marks** |

| 5 | (a) |  |  | 2 | M1 | for (*x* ± 6)(*x* ± 7) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | (*x* + 6)(*x* − 7) |  | A1 | for (*x* + 6)(*x* − 7) or (*x* − 7)(*x* + 6)  isw roots given if candidate solves the quadratic = 0 |
|  | (b) | 3*x* – 8*x* < 3 – 15 or 15 – 3 < 8*x* – 3*x* |  | 3 | M1 | accept as equation or with the wrong inequality sign. |
|  |  | – 5*x* < – 12 or 12 < 5*x* |  |  | M1 | accept as equation or with the wrong inequality sign. |
|  |  |  | *x* > 2.4 |  | A1 | Accept 2.4 < *x* or  oe  allow (−,2.4)  award M1 M1 A0 for 2.4 with = sign or no inequality or incorrect inequality sign. |
|  |  |  |  |  |  | **Total 5 marks** |

| 6 |  |  |  | 3 | M1 | for multiplying 2 brackets with at least 3 out of 4 terms correct |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | M1 | (dep) for multiplying the product of the first 2 brackets (ft from the 1st stage) by the 3rd bracket, and getting at least 3 out of 6  or 4 out of 8 terms correct |
|  |  |  |  |  | A1 |  |
|  |  | **Alternative** |  |  |  |  |
|  |  |  |  |  | B2  (B1 | for at least 6 out of 8 terms correct    for 4 or 5 out of 8 correct terms) |
|  |  |  |  |  | A1 |  |
|  |  |  |  |  |  | **Total 3 marks** |

| 7 | (a) |  | 9, 28, 45, 63, 76, 80 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  |  | 2 | B2 | for a correct cf graph with points at ends of intervals and joined with a curve or line segments  If not B2 then B1 for 5 or 6 of their points (ft from a table with only one arithmetic error) at ends of intervals and joined with a curve or line segments  **OR** for 5 or 6 points plotted correctly at ends of intervals not joined  **OR** for 5 or 6 of their points from table plotted consistently within each interval (not at upper ends of intervals) at their correct heights and joined with a curve or line segments |
|  | (c) | e.g. reading across from 40 and reading down |  | 2 | M1 | ft reading from a cf graph provided method is shown |
|  |  |  | 35 - 38 |  | A1 | ft from their cf graph |
|  |  |  |  |  |  | **Total 5 marks** |

| 8 |  | e.g. |  | 3 | M1 | for  expressed as an improper fraction |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | e.g.  **OR**  oe |  |  | M1 | correct cancelling or multiplication of numerators and denominators without cancelling |
|  |  | e.g. **or**   **or** | shown |  | A1 | dep on M2, for conclusion to  from correct working – either sight of the result of the multiplication e.g.  oe must be seen  **or** correct cancelling prior to the multiplication to  NB: use of decimals scores no marks |
|  |  |  |  |  |  | **Total 3 marks** |

| 9 | (a) |  | 33.75 | 1 | B1 | oe eg 33.750 |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) |  | 33.85 | 1 | B1 | allow  or 33.849r or “33.8499…”  do NOT allow 33.879 without indication of recurring “9” |
|  |  |  |  |  |  | **Total 2 marks** |

| 10 | (a) (i) |  | 40 | 2 | B1 | cao (may be written on the diagram) |
| --- | --- | --- | --- | --- | --- | --- |
|  | (ii) |  | Angles in same segment (are equal) |  | B1 | **or** angles at the circumference from the same arc of the circle  **or** angles on the same arc of the circle  **Alternatively**: (two applications of) Opposite angles of a cyclic quadrilateral sum to 180o |
|  | (b) |  | 140 | 1 | B1 | cao (may be written on the diagram) |
|  |  |  |  |  |  | **Total 3 marks** |

| 11 | (a) |  | (−4.5) 3 4.5 (3) 1.5 (3) 10.5 | 2 | B2  (B1 | for all correct  for any two correct)  No points in table but correctly plotted on grid, award mark |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) | (−3, −4.5) (−2,3) (−1,4.5) (0,3) (1,1.5) (2,3) (3,10.5) | Smooth curve | 2 | B2  (B1 | for a correct smooth curve. Points or curve passing through correct values within half a small square.  for at least 5 points plotted correctly; ft from table for plotting only provided B1 awarded in part (a)) |
|  | (c) |  |  | 2 | M1 | for drawing  with two correct points plotted and intersection with curve.  **or** for stating  **or** for  seen |
|  |  |  | −2.3 to −2.4 |  | A1 | ft their curve dep on M1 **and** line  drawn |
|  |  |  |  |  |  | **Total 6 marks** |

| 12 |  | **or** |  | 4 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **or**  **or** |  |  | M1 |  |
|  |  | **or** |  |  | M1 | for factorising *n*2 from a suitable expression.  or |
|  |  |  |  |  | A1 | Accept  Penalise |
|  |  |  |  |  |  | **Total 4 marks** |

| 13 | (a) | or |  | 3 | M1 | for a correct equation with a constant  Do not allow constant = 1 | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 30 × 0.52 = *k* or 30 = or *k* = 7.5 or *k* = |  |  | M1 | dep on M1 for correct substitution in a correct equation | M2 for *k* = 7.5 or *k* = |
|  |  |  |  |  | A1 | for or  SCB2 for or or or | |
|  | (b) |  | 750 | 1 | B1 | cao | |
|  |  |  |  |  |  | **Total 4 marks** | |

| 14 |  |  |  | 2 | M1 | Arcs on *BC*, *AB* and arcs from these points meeting **or** for bisector without arcs |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Correct bisector |  | A1 | must see correct arcs |
|  |  |  |  |  |  | **Total 2 marks** |

| 15 |  | or |  | 4 | M1 | for factorising the expression to find *b* or *b* = −3 stated or shown clearly in answer. |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | or c = –2  or |  |  | M1 | or for *c* shown clearly in answer. |
|  |  | or |  |  | M1 | fully correct method. |
|  |  |  |  |  | A1 | for  oe |
|  |  |  |  |  |  | **Total 4 marks** |

| 16 | (a) | (f(2.6) =) 5 × 2.6 – 7 (= 6) **or**  oe |  | 2 | M1 | for finding f(2.6) **or** gf(*x*) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 3 |  | A1 |  |
|  | (b) | **or**  oe |  | 3 | M1 |  |
|  |  | 25*x* = 9(*x* + 4) oe |  |  | M1 | for removing the denominator  (*x* + 4) in a correct equation |
|  |  |  | 2.25 |  | A1 | oe |
|  | ALT (b) | fg(*x*) = 2  g(*x*) = f−1(2) (=9/5) and attempt at f−1 or f−1(2) |  |  | M1 |  |
|  |  | *x* = g−1(“9/5”) |  |  | M1 |  |
|  |  |  | 2.25 |  | A1 | oe |
|  | (c) | **or** |  | 3 | M1 |  |
|  |  | e.g. 4*y* = *x*(5 – *y*) **or** e.g. 4*x* = *y*(5 – *x*) |  |  | M1 | for a correct rearrangement and factorising |
|  |  |  |  |  | A1 | oe e.g. |
|  |  |  |  |  |  | **Total 8 marks** |

| 17 |  | or |  | 6 | M1 | for substituting linear equation into the quadratic equation |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | or |  |  | A1 | for a correct equation in the form *ax*2 + *bx* + *c* = 0 or *ax*2 + *bx* = –*c* or equations of the same form but in *y* |
|  |  | or  or  or |  |  | M1ft | For solving *their* 3 term quadratic equation using any correct method.  If factorising, allow brackets which expanded give 2 out of 3 terms correct (if using formula or completing the square allow one sign error and some simplification – allow as far as eg  or eg  oe  or eg  oe |
|  |  |  |  |  | A1 | for both pairs of coordinates  oe eg  accept coordinates listed as pairs, ie *x*1, *y*1, *x*2, *y*2 |
|  |  |  |  |  | M1 | dep on M1 for finding length of *AB* |
|  |  |  |  |  | A1 | dep M3 |
|  |  |  |  |  |  | **Total 6 marks** |

| 18 |  |  | *BDF* = 70° | 4 | B1 | may be marked on diagram |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Alternate segment theorem |  | B1 | reason, the angle between a tangent and a chord is equal to the angle subtended in the alternate segment |
|  |  |  | *EFB* = 180 – (70 + 40) = 70opposite angles in a cyclic quadrilateral |  | B1 | Angle *EFB* with reason, opposite angles in a cyclic quadrilateral sum to 180o |
|  |  |  | *CBF* = *EFB* alternate angles therefore *EF* is parallel to *ABC* |  | B1 | conclusion, alternate angles are equal |
|  |  |  |  |  |  | **Total 4 marks** |

| 19 |  | or  or |  | 5 | M1 | for finding or or or |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | eg  and  or eg  and  or eg  and  or eg  and  or eg  and  or eg  and |  |  | M2 | for writing eg or or or in two different ways in terms of **a** and **b**  (M1 for writing eg or or or in one way)  These may be written as eg in place of |
|  |  | eg  and  (from 1st)  or eg  and  (from  2nd)  or eg  and  (from )  or eg  and  (from  1st)  or eg  and  (from  2nd)  or eg  and  (from ) |  |  | M1 | dep M3 for writing a pair of equations using their variables.  (1st) leads to  (2nd) leads to  leads to  (1st) leads to  (2nd) leads to  leads to |
|  |  |  | 4 : 5 |  | A1 | cao |

| 20 |  | 122= 24 × 32 **or** 2 × 122 = 25 × 32  oe **or** |  | 5 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | 184*n* = (2 × 32) 4*n*  **or**  24*n* × 32×4*n* |  |  | M1 |  |
|  |  | 3*n*² − 14*n* – 5 (= 0) |  |  | A1 |  |
|  |  | e.g. (3*n* + 1)(*n* – 5)(= 0) |  |  | M1 | for solving their 3 term quadratic equation using any correct method - if factorising, allow brackets which expanded give 2 out of 3 terms correct (if using formula or completing the square allow one sign error and some simplification – allow as far as e.g.  oe) |
|  |  |  |  |  | A1 | Allow −0.33 or better for |
|  |  |  |  |  |  | **Total 5 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** | Expressions and formulae | 1.69 | 2 | 85 | 1.69 | 1.99 | 1.94 | 1.80 | 1.64 | 1.27 | 0.57 | 0.00 |
| **2** | Linear equations | 2.70 | 3 | 90 | 2.70 | 2.98 | 2.88 | 2.75 | 2.74 | 2.35 | 2.11 | 0.33 |
| **3** | Powers and roots | 1.67 | 2 | 84 | 1.67 | 1.96 | 1.79 | 1.73 | 1.49 | 1.38 | 1.03 | 0.33 |
| **4** | Simultaneous linear equations | 3.31 | 4 | 83 | 3.31 | 3.95 | 3.85 | 3.42 | 2.89 | 2.38 | 1.39 | 0.67 |
| **5** | Inequalities | 4.04 | 5 | 81 | 4.04 | 4.89 | 4.59 | 4.07 | 3.77 | 2.61 | 1.96 | 1.11 |
| **6** | Algebraic manipulation | 2.35 | 3 | 78 | 2.35 | 2.96 | 2.68 | 2.38 | 2.04 | 1.69 | 0.64 | 0.11 |
| **7** | Statistical measures | 3.89 | 5 | 78 | 3.89 | 4.75 | 4.43 | 3.95 | 3.68 | 2.68 | 1.53 | 0.22 |
| **8** | Fractions | 2.21 | 3 | 74 | 2.21 | 2.64 | 2.30 | 2.36 | 2.17 | 1.62 | 1.11 | 0.33 |
| **9** | Degree of accuracy | 1.31 | 2 | 66 | 1.31 | 1.89 | 1.55 | 1.32 | 0.79 | 0.58 | 0.18 | 0.00 |
| **10** | Angles, lines and triangles | 1.93 | 3 | 64 | 1.93 | 2.46 | 2.21 | 1.98 | 1.45 | 1.16 | 0.93 | 0.11 |
| **11** | Graphs | 3.78 | 6 | 63 | 3.78 | 4.78 | 3.87 | 3.57 | 3.17 | 2.95 | 2.25 | 1.11 |
| **12** | Algebraic manipulation | 2.47 | 4 | 62 | 2.47 | 3.78 | 3.17 | 2.15 | 1.40 | 0.55 | 0.25 | 0.11 |
| **13** | Proportion | 2.22 | 4 | 56 | 2.22 | 3.49 | 2.60 | 1.79 | 1.24 | 0.83 | 0.36 | 0.00 |
| **14** | Construction | 1.09 | 2 | 55 | 1.09 | 1.68 | 1.33 | 0.89 | 0.55 | 0.50 | 0.11 | 0.00 |
| **15** | Quadratic equations | 1.95 | 4 | 49 | 1.95 | 3.51 | 2.15 | 1.50 | 0.64 | 0.18 | 0.18 | 0.00 |
| **16** | Function notation | 4.31 | 8 | 54 | 4.31 | 7.42 | 5.18 | 1.40 | 1.17 | 0.32 | 0.44 | 0.00 |
| **17** | Quadratic equations | 2.49 | 6 | 42 | 2.49 | 5.11 | 2.61 | 1.08 | 0.53 | 0.14 | 0.11 | 0.00 |
| **18** | Geometrical reasoning | 0.97 | 4 | 24 | 0.97 | 1.97 | 1.02 | 0.48 | 0.09 | 0.13 | 0.07 | 0.00 |
| **19** | Vectors | 0.67 | 5 | 13 | 0.67 | 1.37 | 0.74 | 0.35 | 0.04 | 0.04 | 0.00 | 0.00 |
| **20** | Powers and roots | 1.37 | 5 | 27 | 1.37 | 3.28 | 1.02 | 0.31 | 0.06 | 0.06 | 0.00 | 0.00 |
|  | **TOTAL** | **46.42** | **80** | **58** | **46.42** | **66.86** | **51.91** | **39.28** | **31.55** | **23.42** | **15.22** | **4.43** |

**Suggested grade boundaries**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade** | **9** | **8** | **7** | **6** | **5** | **4** | **3** |
| Mark | 60 | 46 | 36 | 28 | 19 | 10 | 2 |