| 1 |  | 3.4 or or or  or 204 oe |  | 3 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | 433.5 ÷ 3.4 or 433.5 ÷or 433.5 ÷or oe |  |  | M1 | for use of speed = distance ÷ time  Allow 433.5 ÷ 3.24 (= 133.796…) for this mark only |
|  |  |  | 127.5 |  | A1 | oe allow 128 |
|  |  |  |  |  |  | **Total 3 marks** |

| 2 |  | 0.024 × 50 000 (= 1200) oe or 1.024 × 50 000 (= 51 200) oe or  1.0242 × 50 000 (= 52 428.8) oe or 0.024 × 50 000 × 3 (= 3600) oe 0.024 × 50 000 × 3 + 50 000 (= 53 600) oe |  | 3 | M1 |  | M2 for  50 000 × 1.0243 |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 0.024 × (50 000 + ‘1200’) (= 1228.8) oe **and**0.024 × (50 000 + ‘1200’ + ‘1228.8’) (= 1258.2912) **or**  ‘1200’ + ‘1228.8’ + ‘1258.2912’ (= 3687.(0912))  **or**  1.024 × ‘52 428.8’ |  |  | M1 | for completing method to find total amount in the account |
|  |  |  | 53 687 |  | A1 | accept 53 687 – 53 688 | |
|  |  |  |  |  |  | accept (1 + 0.024) or  as equivalent to 1.024 throughout | |
|  |  |  |  |  |  | **Total 3 marks** | |

| **3** | (a) |  | Pacific | 1 | B1 | Accept 1.357 × 105 |
| --- | --- | --- | --- | --- | --- | --- |
|  | (b) | 1.119 × 105 – 1.797 × 104 |  | 2 | M1 | Accept 111 900 – 17 970 oe  or 93 930 or −93 930 |
|  |  |  | 9.393(0) × 104 | A1 | Accept (±) 9.393(0) × 104  or (±) 9.39 × 104 or (±) 9.4 × 104 |
|  |  |  |  |  |  | **Total 3 marks** |

| **4** |  | 0.5 ×  × 62 ( = 56.54…) **or** 12 × 6 ( = 72)  **or**  × 62 oe |  | 3 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | “72” – “56.54…” |  | M1 | dep M1 for a complete method |
|  |  |  | 15.5 | A1 | 15.4 to 15.5 |
|  |  |  |  |  |  | **Total 3 marks** |

| 5 |  | (5 – 2) × 180 ÷ 5 (= 108) **or** 360 ÷ 5 (= 72) |  | 5 | M1 | for method to find an interior or exterior angle of a pentagon |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | (6 – 2) × 180 ÷ 6 (= 120) **or** 360 ÷ 6 (= 60) |  |  | M1 | for method to find an interior or exterior angle of a hexagon |
|  |  | 360 – 108 – 120 (= 132) **or** 60 + 72 (= 132) **or** (180 – ‘120’) + (180 – ‘108’) |  |  | M1 | dep on M2 for a correct method to find angle *EDI* using correct figures |
|  |  | 360 – ‘72’ – ‘60’ – ‘132’ (= 96) |  |  | M1 | for a complete method to find angle *x* |
|  |  |  | 96 |  | A1 | dep on correct working |
|  |  |  |  |  | Note: | Angles may be seen on diagram throughout |
|  |  |  |  |  |  | **Total 5 marks** |

| 6 | a | (*x* =) 270 ÷ (12 × 5) (= 4.5) oe |  | 3 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | *π* × ‘4.5’2 × 2 × ‘4.5’ (= 182.25*π* oe) |  |  | M1 | ft dep on M1 |
|  |  |  | 573 |  | A1 | accept 572 − 573 |
|  | b |  | 1 000 000 | 1 | B1 | or (1 × ) 106 or (one or 1) million oe |
|  |  |  |  |  |  | **Total 4 marks** |

| **7** |  | (11 × 3) + (8 × 5) + (6 × 7) + (5 × 9) (= 160)  (= 33 + 40 + 42 + 45 = 160) |  | 4 | M1 | Correct numerical products using midpoints (allowing one error) with intention to add.  May be seen in table. |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | “160” + *x* = 4. 25 × (11 + 8 + 6 + 5 + *x*) oe  or  or “160” + *x* = 4.25 × “30” + 4.25*x* |  | M1 | dep M1 for correct equation ft *their* 160. |
|  |  | “160” – “127.5” = 4.25*x* – *x*  or 32.5 = 3.25*x* |  | M1 | Isolating *x* and number terms |
|  |  |  | 10 | A1 | dep 1st M1 |
|  |  |  |  |  |  | **Total 4 marks** |

| 8 | a |  | 8, 23, 40, 68, 101, 120 | 1 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | b |  |  | 2 | M1 | ft from table for at least 5 points plotted correctly at end of interval  **or**  ft from sensible table for all 6 points plotted consistently within each interval in the **freq table** at the correct height |
|  |  |  | Correct cf graph |  | A1 | accept curve or line segments  accept graph that is not joined to (0,0) |
|  | c |  | 17 – 20 | 1 | B1 | ft their cf graph |
|  | d | E.g.Reading at 23 minutes (= *a*) **and** then(120 – *a*) ÷ 120 × 100 |  | 2 | M1 | ft from their cf graph  readingoff at 23 minutes and a method to work out 120 minus this value as a percentage of 120 |
|  |  |  | 25(%) – 29(%) |  | A1 | ft from their cf graph  dep on M1 seen |
|  |  |  |  |  |  | **Total 6 marks** |

| 9 |  | *a* = 7 |  | 4 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | oe **or** *b* = 10 |  |  | M1 | ft their value of *a* **or**  for setting up an equation for *b*  **or** *b* = 10 |
|  |  | oe or(*c* =) 9 × 4 – (2 × their *a* + their *b*) oe |  |  | M1 | for a calculation involving *c* using their values **or**  for a calculation leading to *c* using their values |
|  |  |  | 7, 10, 12 |  | A1 |  |
|  |  |  |  |  |  | **Total 4 marks** |

| 10 | a |  | Correct number line | 2 | B2  B1 | for a fully correct number line e.g. shaded circle at −2, unshaded circle at 1 and a line drawn between them  for a shaded circle at −2 **or**  an unshaded circle at 1 **or**  circles at −2 and 1 with line in between but shading incorrect |
| --- | --- | --- | --- | --- | --- | --- |
|  | b |  | −3, −2, −1, 0, 1, 2 | 2 | B2  B1 | fully correct values with no extras  for 5 correct values and none incorrect **or**  all 6 correct values with no more than one additional incorrect value |
|  |  |  |  |  |  | **Total 4 marks** |

| **11** |  | *x* × 1.05 = 1.26 oe  eg (*x* =) 1.26 ÷ 1.05 oe  (= 1.2) | or 30 × 1.26 (= 37.80) | or 30 ÷ 1.05 (= 28.57) |  | 3 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 30 ×“1.2” | "37.80” ÷ 1.05 | “28.57…” × 1.26 |  | M1 |  |
|  |  |  | | | 36 | A1 | cao  If no marks awarded,  SC B1 for one operation used correctly, even with another incorrect operation.  eg oe  or  oe  or  oe |
|  |  |  | | |  |  |  | **Total 3 marks** |

| **12** | (a) | | g(3) = – 7  **or** f(3 – 10) = (3 – 10)2 + 6  **or**  oe |  | | | 2 | | M1 | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | |  | 55 | | | A1 | |  |
|  | (b) | | (*x* – 10)2 + 6 = *x*2 + 6 |  | | | 3 | | M1 | | Using f(*x* – 10) and setting equal to *x*2 + 6 |
|  |  | | *x*2 – 10*x*  – 10*x*  + 100 oe |  | | | M1 | | for (*x* – 10)2 expanded correctly. |
|  |  | |  | 5 | | | A1 | | dep 1st M1 |
|  |  | |  |  | | |  | |  | | **Total 5 marks** |
| 13 |  | or oe or oe or oe or oe | | |  | 5 | | M1 | | or use of sine rule or cosine rule to find  angle (*x*) of the apex or angle *y* | |
|  |  | (== 4.898...) or (= 91.169…) oe or  (= 91.169…) oe or  (= 91.169…) oe or | | |  |  | | M1 | | for complete method to find height of triangle or the angle (*x*) of the apex  **and**  (= 4.898...) or  (= 4.898...)  **or**  **and**  (= 4.898...) or  (= 4.898...) | |
|  |  | E.g. (=  = 84.494...) **or** (=  = 84.494...) **or**  (=  = 84.494...) | | |  |  | | M1 | | for method to find the total area of the pentagon allow answers in the range  84.49 – 85 | |
|  |  | E.g.‘84.494’ ÷ 16 (= 5.28...) or (= 5.28...) | | |  |  | | M1 | | for method to find the number of tins required using their area | |
|  |  |  | | | 6 |  | | A1 | | dep on at least M2 | |
|  |  |  | | |  |  | |  | | **Total 5 marks** | |

| **14** |  | oe or oe  or  or  oe  **or**  oe or  ( = 460.25..)  **and** oe |  | 3 | M1 | for a correct expression involving “*h*” |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | “*h*” = 500 × sin 23° oe  **or** |  | M1 |  |
|  |  |  | 195. 4 | A1 | 195 – 195.4 |
|  |  |  |  |  |  | **Total 3 marks** |

| 15 |  | 7.75, 7.85, 3.35, 3.45, 13.5, 14.5 |  | 3 | B1 | for sight of a correct upper or lower bound  Accept  for 3.45 or  for 7.85 or  for 14.5 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | (*k* =) |  |  | M1 | for correct substitution into    where  **and**  **and** |
|  |  |  | 3 |  | A1 | accept 3.0 |
|  |  |  |  |  |  | **Total 3 marks** |

| 16 |  | E.g. 28 ÷ 2 (= 14) **or** 1cm2 = 2 students |  | 5 | M1 | for method to find the frequency density for the first bar **or** any correct value on the fd axis **or** can be implied by a correct frequency (30 or 24 or 36) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | 2 × 20 (= 40)  1 × 30 (= 30)  1 × 24 (= 24)  3 × 12 (= 36)  **or**  40, 30, 24, 36 |  |  | M1 | for method to find the missing frequencies (at least 3 correct) |
|  |  | 1 × 28 + 3 × ‘40’ + 4.5 × ‘30’ + 5.5 × ‘24’ + 7.5 × ‘36’ (= 685) or  28 + 120 + 135 + 132 + 270 (= 685) |  |  | M1 | (indep ft) for a method to find the total (mid value × frequency) for at least **4** products using **their** values in the table (need not be evaluated)  Allow consistent use of end points for at least **4** products which must be added |
|  |  | ‘685’ ÷ (28 + ‘40’ + ‘30’ + ‘24’ + ‘36’) (= 4.335...) or  ‘685’ ÷ 158 (= 4.335...) |  |  | M1 | (dep on previous M1) |
|  |  |  | 4.34 |  | A1 | accept 4.33 - 4.34 |
|  |  |  |  |  |  | **Total 5 marks** |

| **17** |  | 360 – 40 (= 320) or  oe  **or** (= 6.28...) |  | 4 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | (=  **=** 50.26...)  **or**  – “6.28” (= 50.26) |  | M1 |  |
|  |  | “50.26” + 2 × 9 |  | M1 | complete method to find perimeter |
|  |  |  | 68.3 | A1 | 68.2 to 68.3 |
|  |  |  |  |  |  | **Total 4 marks** |

| 18 |  | *BFD* = 39° | *BED* = 39° |  | 4 | B1 |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | *BDE* = 180 – (18 + 39) | *EBD* = 18° **and** *BDE* = 180 – (18 + 39) |  |  | M1 |  |
|  |  |  | | 123 |  | A1 |  |
|  |  |  | |  |  | B1 | dep on M1  for all correct circle theorems relevant for their method e.g.  alternate segment theorem **and** opposite angles in a cyclic quadrilateral sum to 180o  **or**  alternate segment theorem **and** angles in same segment are equal |
|  |  |  | |  |  |  | **Total 4 marks** |

| **19** |  | 0.85 × *x*2 = 1.0285 **or** 85 × *x*2 = 102.85 oe  or (*x*2 = ) 1.0285 ÷ 0.85 **or** (*x*2 =) 102.85 ÷ 85 oe  **or** 1.21 oe |  | 4 | M2 | for a correct equation using their chosen letter or value in place of letter,  or a correct division or 1.21 seen  otherwise:  (M1 for either 0.85 or 1.0285 seen) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **or** oe  **or** (*x* =) 1.1(0) |  | M1 | for a correct expression or value for *x* |
|  |  |  | 10 | A1 |  |
|  |  |  |  |  |  | **Total 4 marks** |

| **20** |  | 75 × 2 (=150) |  | 5 | M1 | “150” for *AOC* may be seen on diagram. |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | oe (= 1.309*r*2 or ) |  | M1 | dep 1st M1 |
|  |  | 0.5 × sin (“150”) × *r*2 oe (= 0.25*r*2) |  | M1 | dep 1st M1  a complete method to find the area of triangle *OAC* in terms of *r* |
|  |  | eg oe  or |  | M1 | correct equation in *r*2 or rearranged to make *r*2 or *r* the subject. |
|  |  |  | 13.7 | A1 | accept 13.7 – 13.8 |
|  |  |  |  |  |  | **Total 5 marks** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Edexcel averages: scores of candidates who achieved grade:** | | | | | | | | |
| **Qn** | **Mean score** | **Max score** | **Mean %** | **ALL** | **9** | **8** | **7** | **6** | **5** | **4** | **3** | **U** |
| **1** | 2.74 | 3 | 91 | 2.74 | 2.99 | 2.97 | 2.83 | 2.63 | 2.23 | 1.65 | 0.70 | 0.57 |
| **2** | 2.56 | 3 | 85 | 2.56 | 2.92 | 2.79 | 2.68 | 2.19 | 1.66 | 1.16 | 0.57 | 0.29 |
| **3** | 2.63 | 3 | 88 | 2.63 | 2.90 | 2.73 | 2.60 | 2.42 | 2.22 | 2.02 | 1.50 | 0.86 |
| **4** | 2.51 | 3 | 84 | 2.51 | 2.97 | 2.84 | 2.53 | 2.21 | 1.62 | 0.75 | 0.18 | 0.00 |
| **5** | 3.94 | 5 | 79 | 3.94 | 4.87 | 4.66 | 4.03 | 3.39 | 1.89 | 1.00 | 0.22 | 0.00 |
| **6** | 3.09 | 4 | 77 | 3.09 | 3.82 | 3.49 | 3.11 | 2.58 | 1.96 | 0.67 | 0.17 | 0.14 |
| **7** | 2.99 | 4 | 75 | 2.99 | 3.94 | 3.66 | 3.00 | 1.74 | 0.85 | 0.31 | 0.23 | 0.00 |
| **8** | 4.37 | 6 | 73 | 4.37 | 5.48 | 4.86 | 4.11 | 3.50 | 2.10 | 1.46 | 0.78 | 0.14 |
| **9** | 2.87 | 4 | 72 | 2.87 | 3.78 | 3.28 | 2.73 | 2.06 | 1.27 | 0.47 | 0.13 | 0.14 |
| **10** | 2.86 | 4 | 72 | 2.86 | 3.56 | 3.07 | 2.61 | 2.42 | 1.83 | 1.31 | 1.04 | 0.00 |
| **11** | 2.05 | 3 | 68 | 2.05 | 2.66 | 2.20 | 1.84 | 1.50 | 1.11 | 0.88 | 0.50 | 0.29 |
| **12** | 3.41 | 5 | 70 | 3.41 | 4.80 | 4.11 | 2.97 | 1.50 | 0.91 | 0.48 | 0.14 | 0.00 |
| **13** | 3.17 | 5 | 63 | 3.17 | 4.51 | 3.79 | 2.76 | 1.91 | 1.08 | 0.20 | 0.00 | 0.00 |
| **14** | 1.78 | 3 | 59 | 1.78 | 2.53 | 2.00 | 1.63 | 0.86 | 0.44 | 0.23 | 0.14 | 0.00 |
| **15** | 1.76 | 3 | 59 | 1.76 | 2.59 | 1.98 | 1.48 | 0.81 | 0.36 | 0.20 | 0.04 | 0.00 |
| **16** | 3.02 | 5 | 60 | 3.02 | 4.48 | 3.53 | 2.36 | 1.39 | 0.65 | 0.55 | 0.00 | 0.00 |
| **17** | 2.20 | 4 | 55 | 2.20 | 3.35 | 2.31 | 1.53 | 1.05 | 0.42 | 0.31 | 0.27 | 0.14 |
| **18** | 2.06 | 4 | 52 | 2.06 | 3.27 | 2.30 | 1.49 | 0.74 | 0.30 | 0.36 | 0.13 | 0.00 |
| **19** | 1.47 | 4 | 37 | 1.47 | 2.83 | 1.14 | 0.47 | 0.26 | 0.19 | 0.23 | 0.00 | 0.00 |
| **20** | 1.64 | 5 | 33 | 1.64 | 3.33 | 1.24 | 0.43 | 0.17 | 0.04 | 0.06 | 0.00 | 0.00 |
|  | **53.12** | **80** | **66** | **53.12** | **71.58** | **58.95** | **47.19** | **35.33** | **23.13** | **14.30** | **6.74** | **2.57** |

**Suggested grade boundaries**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade** | **9** | **8** | **7** | **6** | **5** | **4** | **3** |
| Mark | 65 | 53 | 41 | 29 | 19 | 10 | 5 |