| 1 |  | 19.3 × 150 |  | 2 | M1 | for 19.3 × 150 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 2895 |  | A1 | for 2895 |
|  |  |  |  |  |  | ***Total 2 marks*** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **2** | (a) |  | 3 < *w* ≤ 4 | 1 | B1  |
|  | (b) | (12 × 2.5) + (16 × 3.5) + (9 × 4.5) + (2 × 5.5) + (1 × 6.5)**or** 30 + 56 + 40.5 + 11 + 6.5 (= 144) |  | 4 | M2 for at least **4** correct products added (need not be evaluated) **or**If not M2 then awardM1 for consistent use of value within interval (including end points) for at least **4** products which must be added**or**correct midpoints used for at least **4** products and not added |
|  |  | [(12 × 2.5) + (16 × 3.5) + (9 × 4.5) + (2 × 5.5) + (1 × 6.5)] ÷ 40 **or**‘144’ ÷ 40 |  |  | M1 dep on at least M1Allow division by their Σ*f* provided addition or total under column seen |
|  |  |  | 3.6 |  | A1 oe |
|  | (c) |  |  | 2 | M1 for  where 0 < *a* < 40 or  where *b* > 3 where *a* and *b* are integers |
|  |  |  |  |  | A1 0.075 oe |
|  |  |  |  | **Total 7 marks** |
| 3 |  | 1 – (0.24 + 0.31) (= 0.45)Or(0.24 + 0.31) × 180 (= 99) |  | 4 | M1 | or for a correct equation for missing values eg*x* + 0.24 + 2*x* + 0.31 = 1 oe(can be implied by 2 probabilities that total 0.45 in table if not contradicted in working space) |
|  |  | ‘0.45’ ÷ 3 (= 0.15)Or‘0.45’ × 180 (= 81)Or180 − 99 (= 81) |  |  | M1 | (or 0.15 correctly placed in table as long as not contradicted) |
|  |  | ‘0.15’ × 180Or‘81’ ÷ 3 |  |  | M1 | or for an answer of   |
|  |  |  | 27 |  | A1 |  |
|  |  |  |  |  |  | ***Total 4 marks*** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **4** | (a) |  | 0.000 78 | 1 | B1 |
|  | (b) | 22 500 000 oe e.g. 22.5 × 106 **or** 2.25 × 10*n**n* ≠ 7 |  | 2 | M1 |
|  |  |  | 2.25 × 107 |  | A1 |
|  |  |  |  | **Total 3 marks** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **5** |  | cos 63 =  **or** sin 27 = **or****or** oe |  | 3 | M1 for a correct trigonometric ratio | M2 for  oe**and**  oe |
|  |  | (*PQ* =) **or** (*PQ* =) **or**  |  |  | M1 for a correct rearrangement for *PQ* |
|  |  |  | 53.5 |  | A1 Accept 53.5 - 53.53 |
|  |  |  |  | **Total 3 marks** |

| 6 | (a) |  |  | 2 | B1 | for and on the first branch(0.65 and 0.35) |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Correct probabilities on the tree diagram |  | B1 | for on the second branch(accept 2 dp or better 0.6315..., 0.3684..., 0.6842..., 0.3157...) |
|  | (b) | oe only |  | 2 | M1 | ft from (a) as long as probabilities less than 1 |
|  |  |  |  |  | A1 | for  oe or 0.11… (at least 2 dp) |
|  |  |  |  |  |  | ***Total 4 marks*** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **7** |  | 120 ÷ (3 + 5) (= 15) |  | 6 | M1  | M2 for(= 45) **or** (= 75) oe |
|  |  | ‘15’ × 3 (= 45) **or** ‘15’ × 5 (= 75) |  |  | M1  |
|  |  | ‘45’ ÷ 3 (= 15) **or** ‘45’ ÷ 3 × 2 (= 30)  |  |  | M1  |
|  |  | ‘75’ ×  (= 48) **or** ‘75’ ×  (= 27) |  |  | M1  |
|  |  | E.g. (‘45’ ÷ 3 × 2) + (‘75’ × ) oe **or**‘27’ + ‘30’ **or**(‘75’ – ‘48’) + (‘45’ – ‘15’) |  |  | M1 for a complete method  |
|  |  |  | 57 |  | A1 |
|  |  |  |  | **Total 6 marks** |

| *8* | *(a)* | 545 – 500 ( = 45) **or** 592 – 545 ( = 47) |  | 4 | M1  | may be seen as part of a calculation |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |   |  |  | M1 | for one correct expression (allow 8 or 8.7 from a correct expression for 8.6 throughout) |
|  |  |    |  |  | M1 | for both correct expressions **or** having found “9%” finds 109% of 545: 1.09 × 545(=594.05) or 9% of 545 (49.05) or having found “8.6%” finds 108.6% of 500: 1.086 × 500(=543) or 8.6% of 500 (43) |
|  |  |  | No, 9(%) and 8.6(%)  |  | A1 | for no oe, 9% and 8.6% seen or no oe and 9% and 594.05 or 8.6% and 543 orNo, 49.05 > 45 or No 594.05 > 592 oe |
| **Alternative mark scheme for 8(a)** |
|  |  |   |  | 4 | M3 | for both correct expressions which should lead to 109 **or** 1.09 **and** 108.6 **or**1.086(allow 108 or 108.7 from correct working for 108.6 or 1.08 or 1.087 from correct working for 1.086 throughout)(if not M3 then award M2 for one of these expressions) |
|  |  |  |  |  |
|  |  |  | No, 109(%) and 108.6(%) |  | A1  | oe eg no and 1.09 and 1.086 |
|  | *(b)* | 952 ÷ 85 × 100 oe (=1120) |  | 3 | M1  | for a method to find price before discount | M2 for |
|  |  | 0.15 × “1120” or “1120” – 952 oe |  |  | M1  | for a correct method to find discount |
|  |  |  | 168 |  | A1 |  |
|  |  |  |  |  |  | ***Total 7 marks*** |

| 9 |  |  **Litres per amount of money and then conversion** |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | *l*/$ |  |  | M1 | Number of litres per $ for D |
|  |  | *l*/k |  |  | M1 | Number of litres per Krone for A |
|  |  | A: *l*/$ to *l*/k ‘1.1168’ ÷ 6.57 (= 0.1699..)orD: *l*/k to *l*/$ ‘0.168’ × 6.57 (= 1.103..) |  |  | M1 | *l*/$ to *l*/k for A or *l*/k to *l*/$ for D |
|  |  |  | Arctic Oil and relevant figures |  | A1 for Arctic Oil with 1.1168… and 1.10376… **or** 0.168 and 0.1699.. |
|  |  | **Conversion then litres per amount of money** |  |  |  |
|  |  | or 770 000 × 6.57(= 505 8900) |  |  | M1  | Changing Krone to $ or $ to Krone |
|  |  | or    |  |  | M1 | Litres per Krone or litres per $ for D |
|  |  | or    |  |  | M1 | Litres per Krone or litres per $ for A |
|  |  |  | Arctic Oil and relevant figures |  | A1 for Arctic Oil with 1.1168… and 1.10376… **or** 0.168 and 0.1699.. |
|  |  | **Cost per litre then conversion** |  |  |  |
|  |  |    |  |  | M1 | Price per litre in Krone for D |
|  |  |  |  |  | M1 | Price per litre in $ for A |
|  |  | ‘5.952’ ÷ 6.57(=0.9059..) or ‘0.895’ × 6.57(= 5.882..) |  |  | M1 | Conversion of Krone to $ or $ to Krone |
|  |  |  | Arctic Oil and relevant figures |  | A1 | For Arctic Oil with 5.952 and 5.882 **or** 0.895 and 0.9059 |

| 9 |  | **Conversion then cost per litre** |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | or 770 000 × 6.57(= 505 8900) |  |  | M1 | Changing Krone to $ or $ to Krone |
|  |  | or   |  |  | M1 | Cost per litre in Krone or cost per litre in $ for D |
|  |  |  or    |  |  | M1 | Cost per litre in $ or cost per litre in Krone for A |
|  |  |  | Arctic Oil and relevant figures |  | A1 | For Arctic Oil with 5.952 and 5.882 **or** 0.895 and 0.9059 |
|  |  | **Comparing equal amounts** |  |  |  |  |
|  |  |   |  |  |  | M1 | Multiplier for same amount of D as A or same amount of A as D |
|  |  | ‘2.047..’×2500 000 K(=5119047.619..)K | ‘2.047..’ × 770 000 $(=376046.511..)$ |  |  | M1 | Cost of equal amount of D as A or A as D  |
|  |  | ‘5119047.619’÷6.57= 779154.88…$ or770 000×6.57=5058900 K | ‘376046.511..’× 6.57=2470625.58..K or2500 000÷6.57 = 380517..$ |  |  | M1 | Converts so can compare costs – either K to $ or original A to K or$ to K or original D to $ |
|  |  |  |  | Arctic Oil and relevant figures |  | A1 | Arctic Oil and 779154.. or with 2470625..(figures may be rounded)OrArctic Oil with 5119047… and 5058900 or with 376046.. and 380517 |
| Students may compare other equal amounts – please use the scheme that best fits their method and award marks appropriately. |
|  |  |  |  |  |  ***Total 4 marks*** |

| 10 |  | 50 × 60 (= 3000) or 50 ÷ 1000 (= 0.05 or ) or50 × 60 × 60 (= 180 000) or oror1000 ÷ 60 ÷ 60 (= 0.27777…. or ) |  | 3 | M1 | for 50 with at least one of ÷ 1000 or × 60 oror 1000 ÷ 60 ÷ 60 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  oe eg 50 ÷ |  |  | M1 | (dep) for a complete method |
|  |  |  | 180 |  | A1 | for 180(SCB1 for both conversion factors correct but applying them wrongly eg ) |
|  |  |  |  |  |  | ***Total 3 marks*** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **11**  | (a) |  or  |  | 2 | M1 for a correct method to find one coordinate **or** for one coordinate correct **or** for (−1.5, 9) |
|  |  |  | (9, −1.5) |  | A1 Accept (9, −)  |
|  | (b) |  | −3 | 1 | B1 |
|  | (c) |  | No with reason | 1 | B1 No (oe) and e.g. line goes through (100, −298) or (101.3..), −302) or  or (3 × 100) – 302 = −2 not (+)2 |
|  |  |  |  |  | **Total 4 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **12** |  | 6000 × 1.0152 (= 6181.35) **or**6000 + (0.015 × 6000) + (0.015 × (6000 + ‘90’)) (= 6181.35) **or** (1.015)2 (= 1.030225) **or** |  | 3 | M1 for working out the total amount after **two** years **or** working out the compound interest multiplier after two years **or** working out the compound interest multiplier after three years |
|  |  | 6311.16 ÷ ‘6181.35’ (= 1.021) (×100) **or**(= 1.021) (×100) **or**   ‘1.05186’ ÷ ‘1.030225’ (= 1.021) (×100) |  |  | M1 (dep on M1) for a complete method to find the compound interest multiplier (×100) |
|  |  |  | 2.1 |  | A1 awrt 2.1 |
|  |  |  |  | **Total 3 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **13** |  |   oe **or** 56 ÷ 0.14 (= 400) |  | 4 | M1 for using the given formula correctly |
|  |  |  **or**  (=20) |  |  | M1 for a method to find *w* |
|  |  | ‘20’ × ‘20’ × ‘20’ oe |  |  | M1 (dep on M2) for a method to find the volume of the cube |
|  |  |  | 8000 |  | A1 |
|  |  |  |  | **Total 4 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **14** |  | (*AH* =) (= ) **or**(*FH* = *GE* =)  (=  ) |  | 4 | M1 for working out *AH* or *FH* or *GE* |
|  |  | E.g.sin *AHF* = **or** tan *AHF* = **or**  cos *AHF* =  **or**sin *FAH* =  **or** cos *FAH* =  **or** tan *FAH* =  |  |  | M1 for a correct method for finding angle *AHF* **or** finding angle *FAH*Allowcos *AHF* = oe **or**sin *AHF* =oe |
|  |  | E.g.**or** **or**  **or** **or** **or**  |  |  | M1 for a complete methodAllowoe **or**oe |
|  |  |  | 30.2 |  | A1 for 30.2 – 30.3 |
|  |  |  |  | **Total 4 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **15** | (a) | (0.5 ×) 9.3 × 14.7 × sin106 **or** (9.3 × cos 16) × 14.7 **or**(9.3 × sin 74) × 14.7 |  | 2 | M1 for applying the area of a triangle formula using correct values (to find half of the area of the parallelogram) **or** for a correct method to find the area of the parallelogram  |
|  |  |  | 131 |  | A1 awrt 131 |
|  | (b) | (*GE*2 =) 9.32 + 14.72 – 2 × 9.3 × 14.7 × cos106  |  | 3 | M1 for the correct use of the cosine rule |
|  |  | 377(.9….) **or** 378 **or** 86.49 + 216.09 + 75.3… **or** 302.58 + 75.3…. |  |  | M1 (dep on M1)for the correct order of operations |
|  |  |  | 19.4 |  | A1 for 19.4 – 19.5 |
|  |  |  |  | **Total 5 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **16** |  | 58.35 or 58.45 or19.5 or 20.5 or3.55 or 3.65 |  | 3 | B1 for any correct boundAccept for 58.45 orfor 20.5 orfor 3.65 |
|  |  |  (= 27.4366...) |  |  | M1 for correct substitution into  where  58.4 < *a*UB ≤ 58.45 **and** 19.5 ≤ *c*LB < 20 **and** 3.55 ≤ *d*LB < 3.6 |
|  |  |  | 27.44 |  | A1 from correct workingallow 27.4 – 27.5 |
|  |  |  |  | **Total 3 marks** |

| 17 |  | Angle *CAD* = 28° or angle *ACB* = 32° or angle *ACD* = 90° or angle *ABD* = 90° |  | 4 | M1 |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 30° |  | A1 | For a correct answer of 30 |
|  |  | **Angles** in the **same segment** areequal,**angle** in a **semicircle** is 90° (or **angle** at centre is **double** angle at **circumference** oe) angles in a **triangle** add up to **180°**/**angles** in a **triangle****isosceles** triangle**alternate** anglesvertically **opposite angles (or vertically opposite)****angles** at a **point****opposite angles** in a **cyclic quad**rilateralangle between **tangent** and **radius (diameter)****alternate segment** theorem**angles subtended** by the **same arc(**or **chord**) at the **circumference** (or **on the circle)** |  |  | B2 | Dep on M1 for all correct reasons for their method used(if not B2 then award B1(dep on M1) for a correct circle theorem reason) |
|  |  |  |  |  |  | ***Total 4 marks*** |

**

| 18 |  | oe |  | 6 | M1 | for substituting into volume formula for cone correctly and equating to 1600 |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | eg  or   |  |  | M1 | dep for correct rearrangement of volume formula for *r*  |
|  |  |    |  |  | M1 | Dep on M2 correct method to find slant height of cone (radius of sector) |
|  |  | 2 × *π* × “7.817…” (= 49.1196…) **or**  |  |  | M1 | for using oe using figures from correct method**or**for using  using figures from correct method |
|  |  |  **or**  |  |  | M1 | for using arc length = **or**for using area of sector =  |
|  |  |  | 107° |  | A1 | for 107° – 108° |
|  |  |  |  |  |  | ***Total 6 marks*** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **19** | oe **or** oe **or**oe |   | 4 | M1 for finding *BBB* **or** *OOO* **or***LLL* | M3 foroe |
|  | oe **or** oe **or** oe **or**  oe **or** oe **or**  oe **or** oe**or**oe or  oe |  |  | M1 for finding the following in any order*BOO* **or** *BBO* **or** *LLB* **or** *LLO* **or** *LBB* **or** *LOO* **or** *LOB***or** *LLX* **or** *LXX* **(***X* = not *L*) |
|  | oe **or**oe **or**oe |  |  | M1 for a complete method |
|  |  |  |  | A1 for  oe e.g.or 0.29(464...) |
|  |  |  |  | **Total 4 marks** |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Practice Papers Set 12 – 2H-3H** | **Edexcel averages: scores of candidates who achieved grade:** |
| **Qn** | **Paper** | **Question** | **Skill tested** | **Max score** | **Mean %** | **ALL** | **9** | **8** | **7** | **6** | **5** | **4** | **3** |
| **1** | **2H** | Q09 | Measures | 2 | 82 | 1.64 | 1.99 | 1.95 | 1.86 | 1.74 | 1.52 | 1.34 | 1.15 |
| **2** | **1H** | Q04 | Probability | 7 | 78 | 5.49 | 6.92 | 6.74 | 6.40 | 5.96 | 5.29 | 4.26 | 3.33 |
| **3** | **2H** | Q06 | Probability | 4 | 75 | 2.99 | 3.93 | 3.83 | 3.64 | 3.26 | 2.94 | 2.04 | 1.35 |
| **4** | **1H** | Q06 | Standard form | 3 | 78 | 2.33 | 2.93 | 2.82 | 2.69 | 2.51 | 2.21 | 1.85 | 1.53 |
| **5** | **1H** | Q09 | Trigonometry and Pythagoras' Theorem | 3 | 71 | 2.12 | 2.92 | 2.84 | 2.69 | 2.40 | 1.96 | 1.34 | 0.55 |
| **6** | **2H** | Q14 | Probability | 4 | 63 | 2.50 | 3.88 | 3.57 | 3.27 | 2.62 | 1.79 | 1.15 | 0.80 |
| **7** | **1H** | Q05 | Ratio and proportion | 6 | 65 | 3.92 | 5.71 | 5.29 | 4.79 | 4.40 | 3.55 | 2.29 | 1.34 |
| **8** | **2H** | Q08 | Percentages | 7 | 65 | 4.54 | 6.64 | 6.19 | 5.39 | 4.74 | 3.88 | 2.68 | 1.85 |
| **9** | **2H** | Q12 | Applying number | 4 | 63 | 2.50 | 3.69 | 3.25 | 2.92 | 2.58 | 2.15 | 1.63 | 1.09 |
| **10** | **2H** | Q10 | Measures | 3 | 60 | 1.81 | 2.85 | 2.43 | 2.13 | 1.71 | 1.42 | 1.15 | 0.73 |
| **11** | **1H** | Q01 | Graphs | 4 | 53 | 2.11 | 3.66 | 3.38 | 2.72 | 1.96 | 1.34 | 0.78 | 0.50 |
| **12** | **1H** | Q11 | Percentages | 3 | 56 | 1.69 | 2.76 | 2.44 | 2.03 | 1.64 | 1.35 | 0.91 | 0.54 |
| **13** | **1H** | Q13 | Measures | 4 | 52 | 2.08 | 3.76 | 3.28 | 2.61 | 1.91 | 1.32 | 0.72 | 0.49 |
| **14** | **1H** | Q19 | Trigonometry and Pythagoras' Theorem | 4 | 43 | 1.73 | 3.86 | 3.36 | 2.29 | 1.24 | 0.43 | 0.14 | 0.05 |
| **15** | **1H** | Q14 | Trigonometry and Pythagoras' Theorem | 5 | 44 | 2.19 | 4.35 | 3.81 | 2.78 | 2.03 | 0.97 | 0.51 | 0.22 |
| **16** | **1H** | Q16 | Degree of accuracy | 3 | 42 | 1.26 | 2.70 | 2.33 | 1.61 | 0.99 | 0.47 | 0.19 | 0.09 |
| **17** | **2H** | Q13 | Circle properties | 4 | 39 | 1.55 | 2.96 | 2.40 | 1.77 | 1.42 | 1.01 | 0.64 | 0.36 |
| **18** | **2H** | Q26 | 3D shapes and volume | 6 | 33 | 1.96 | 4.64 | 3.33 | 2.31 | 1.42 | 0.75 | 0.40 | 0.14 |
| **19** | **1H** | Q18 | Probability | 4 | 25 | 1.00 | 2.88 | 1.89 | 1.03 | 0.48 | 0.21 | 0.02 | 0.00 |
|  |  |  | **TOTAL** | **80** | **57** | **45.41** | **73.03** | **65.13** | **54.93** | **45.01** | **34.56** | **24.04** | **16.11** |

**Suggested grade boundaries**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade** | **9** | **8** | **7** | **6** | **5** | **4** | **3** |
| Mark | 69 | 60 | 50 | 40 | 29 | 20 | 16 |