For mark scheme with alternative versions and examiners’ notes, please see the full pdf document of AS Mathematics SAMs on the Edexcel website.

| **Qn** | | **Scheme** | | **Marks** | |
| --- | --- | --- | --- | --- | --- |
| **1.** (a) | | Systematic (sample) | | B1 cao | |
| (b) | | In LDS some days have gaps because the data was not recorded | | B1 | |
| (c) | | =  = 18.7, *σt*  =  [=] | | M1 | |
| = 5.5054… (awrt 5.51) (Accept use of *st* =  = 5.6484…) | | A1 (4) | |
|  | |  | | **(4 marks)** | |
| **2.** | | 17 + 45 +  × 9 [ = 65] | | M1 | |
| (7 – 8) 14 or (16 – 20 ) 5 [Values may be seen in the table] | | M1 A1 | |
| Percentage of motorists is | | M1 | |
| = 67.7% | | A1 (5) | |
|  | |  | | **(5 marks)** | |
| **3.** (a) | | *p* = [1 – 0.75 – 0.05] = 0.20 | | B1 (1) | |
| (b) | | *q* = 0.15 | | B1 ft | |
|  | | P(*A*) = 0.35, P(*T*) = 0.6 and P(*A* and *T*) = 0.20 P(*A*) × P(*T*) = 0.21 | | M1 | |
|  | | 0.20 ≠ 0.21, therefore *A* and *T* are **not** independent | | A1 (3) | |
| (c) | | P(not [*A* or *C*]) = 0.45 | | B1 (1) | |
|  | |  | | **(5 marks)** | |
|  | |  | |  | |
| **4.** (a) | | IQR = 2.3 and 20.6 ≥ 2.4 + 1.5 × 2.3 (= 5.85) (Compare correct values) | | B1 (1) | |
| (b) (i) | | e.g. it is a piece of data and we should consider all the data | | B1 | |
| (ii) | | e.g. it is an extreme value and could unduly influence the analysis  or it could be a mistake | | B1 (2) | |
| (c) | | e.g. “as humidity increases rainfall increases” | | B1 (1) | |
| (d) | | e.g. a 10% increase in humidity gives rise to a 1.5 mm increase in rainfall  or represents 0.15mm of rainfall per percentage of humidity | | B1 (1) | |
| (e) (i) | | Not a good method since only uses 11 days from one location in one month. | | B1 | |
| (ii) | | e.g. she should use data from more of the UK locations and more of the months  or using a spreadsheet or computer package she could use all of the available UK data | | B1 (2) | |
|  | |  | | **(7 marks)** | |
| **5.** (a) | | P(*X* ≥ 16) = 1 – P(*X* ≤ 15) | | M1 | |
| = 1 – 0.949077… (awrt 0.0509) | | A1 (2) | |
| (b) | | H0 : *p* = 0.3, H1 : *p* ≠ 0.3 (Both correct in terms of *p* or **) | | B1 (1) | |
| (c) | | [*Y* ~ B(20, 0.3)] sight of P(*Y* ≤ 2) = 0.0355 or P (*Y* ≤ 9) = 0.9520 | | M1 | |
| Critical region is {*Y* **≤** 2} and {*Y* ≥ 10} | | A1 A1 (3) | |
| (d) | | [0.0355 + ( 1 – 0.9520)] = 0.0835, i.e. 8.35% | | B1 ft (1) | |
| (e) | | Assuming that the 20 customers represent a random sample, then 12 is in the critical region so the manager’s suspicion is supported | | B1 ft (1) | |
| (f) | | e.g. (e) requires the 20 customers to be a random sample or independent, and the members of the scout group may invalidate this so binomial distribution would not be valid (and conclusion in (e) is probably not valid) | | B1 (1) | |
|  | |  | | **(9 marks)** | |
|  | |  | |  | |
| **6.** | | Using distance = total area under graph  (e.g. area of rectangle + triangle or trapezium or rectangle – triangle) | | M1 | |
|  | | *D = UT +* *Th* , where *h* is height of triangle | | A1 | |
|  | | Using gradient = acceleration to substitute *h* = *aT* | | M1 | |
|  | | *D* = *UT* + *aT* 2 (\*) | | A1 | |
|  | |  | | **(4 marks)** | |
| **7.** (i) | | Using a correct strategy for solving the problem by setting up two equations in *a* and *u* only and solving for either | | M1 | |
| Equation in *a* and *u* only | | M1 | |
| 22 = 2*u* + *a* × 22 | | A1 | |
| (ii) | | Another equation in *a* and *u* only | | M1 | |
| 126 = 6*u* + *a* × 62 | | A1 | |
| 5 m s–2 | | A1 | |
| 6 m s–1 | | A1 ft | |
|  | | **(7 marks)** | |
|  | |  | |  | |
| **8.** (a) | | Substitution of both *t* = 0 and *t* = 10 | | M1 | |
| *s* = 0 for both *t* = 0 and *t* = 10 | | A1 | |
| Explanation ( *s* > 0 for 0 < *t* < 10) since | | A1 (3) | |
| (b) | | Differentiate displacement *s* with respect to *t* to give velocity, *v* | | M1 | |
| *v* = (4*t* 3 – 60*t* 2 + 200*t*) | | A1 | |
| Interpretation of ‘rest’ to give *v* = (4*t* 3 – 60*t* 2 + 200*t*) = *t*(*t* – 5)(*t* – 10) = 0 | | M1 | |
| *t* = 0, 5, 10 | | A1 | |
| Select *t* = 5 and substitute into *s* | | M1 | |
| Distance = 62.5 m | | A1 ft (6) | |
|  | |  | | **(9 marks)** | |
| **9.**(a)(i) | | Equation of motion for *A* | | M1 | |
|  | | *T* – 12.7 = 2.5*a* | | A1 | |
| (ii) | | Equation of motion for *B* | | M1 | |
|  | | 1.*5g* – *T* = 1.5*a* | | A1 (4) | |
| (b) | | Solving two equations for *a* | | M1 | |
|  | | *a =* 0.5 | | A1 (2) | |
| (c) | | 1 =  0.5 *t*2 | | M1 | |
|  | | *t =* 2 seconds | | A1 ft (2) | |
| (d) | | Not very appropriate for valid reason, e.g. string will have mass and this will affect the tension, string may stretch and this will affect the acceleration. pulley may not be smooth and this will affect the tension | | B1 | |
| (e) | | Valid improvement in model. e.g. do not model ball *B* as a particle but give its dimensions so distance it falls changes; do not model pulley as being small so string not parallel to table; do not model resistance as being constant | | B1 (2) | |
|  | |  | | **(10 marks)** | |