Q	Answer	Mark	Comments
1 a i	Median = 23	M1 A1	Evidence of rank order
a ii	IQR = 29 – 21 = 8	B1 B1 A1	Either quartile correct Correct subtraction
b	The median would remain the same. The interquartile range would decrease.	B1 B1	
2 a	14	B1	
b	8.4	B1	Accept value within the range 8 – 8.5
c	10.5	B1	Accept value within the range 10 – 11
d	Males have a higher median score (16.5 for males, compared to 14 for females) Interquartile ranges / spreads for males and females are very similar (8.4 for males and 8.3 for females).	B1 B1 Special case: If both observations are correct and no values given, award B1	Valid comparison of median (values should be stated) Valid comparison of interquartile range (Accept 'equal spread' (or equivalent))
3 a i	Evidence of mid-interval values being used: (16.5, 17.5, 18.5, 19.5, 20.5) Mean = 18.725	M1 A1	Mean (accept rounded value to 3 sf or better)
a ii	$\sqrt{\frac{42212}{120} - 18.725^2}$ s.d. = 1.068… = 1.07	M1 A1	Use of correct formula with 18.725 or their **a** s.d. (accept rounded value to 3 sf or better)
b	Assuming the distribution in the class $19 \leq m < 20$ is uniform, half the mice in this class have mass greater than 19.5 16 + 15 = 31 P(mass greater than 19.5 g) $= \frac{31}{120}$	R1 A1	Assumption that the masses are uniformly distributed along this interval. Also accept $\frac{30}{120}$ or 0.25

c	The common house mouse has, on average, greater mass. and common house mice have a greater spread of masses than field mice.	B1 B1	
4 a	0.3	B1	
b	0.75	B1	
c	Independent if P(C) × P(H) = P(C and H) $(0.35+0.1)\times(0.1+\text{"0.3 or their a"}) = 0.18$ $(\neq 0.1)$ Not independent	M1 A1	Use of condition for independence with numbers correctly substituted. Or equivalent calculation. Must show working to be awarded this mark
5 a	Opportunity sampling	B1	
b	H_0: $p = 0.4$ H_1: $p < 0.4$ Use of B(20, 0.4) $P(X \leq 5) = 0.1256$ 0.1256 > 0.05 so not in critical region, do not reject H_0 No significant evidence that the candidate has less than 40% support.	B1 M1 A1 A1 A1	For both Stated or relevant value seen Must see use of 0.05 'In context' conclusion
6 a	$144 \text{ km h}^{-1} = 144\times\frac{1000}{3600} \text{ m s}^{-1} = 40 \text{ m s}^{-1}$ $0^2 = 40^2 + 2\times a\times 200$ $a = -4 \text{ m s}^{-2}$	B1 M1 A1	Conversion to m s^{-1} Use of $v^2 = u^2 + 2as$ with correct values substituted
b	$200 = 40t + \frac{1}{2}\times -4\times t^2$ $t = 10 \text{ s}$	M1 A1	Use of $s = ut + \frac{1}{2}at^2$ with correct values substituted
7	Resultant = $2\mathbf{i} + 6\mathbf{j}$ Magnitude = $\sqrt{2^2+6^2} = \sqrt{40}$ N Direction = $\tan^{-1}\left(\frac{6}{2}\right) = 71.6°$	M1 M1 A1 M1 A1	Accept decimal equivalent (6.32 N or better)

8	$T - 550g = -1.2 \times 550$ $T = -660 + 5500$ $T = 4840\,\text{N}$	M1 M1 A1	Correct use of $F = ma$ considering directions of forces and acceleration Accept 5000 N or 4800 N since g is given to 1 s.f.
9 a	$v = \frac{\text{d}s}{\text{d}t} = \frac{\text{d}}{\text{d}t}\left(-2t^3 + t^2 + 6t\right)$ $v = -2t^2 + 2t + 6$	M1 A1	Attempt to differentiate expression for s
b	$v = 6\ \text{km h}^{-1}$	B1	
c	$v = -2t^2 + 2t + 6 = 0$ at max distance $3t^2 - t - 3 = 0$ Solve for t using formula, completing the square or calculator $t = 1.18$ (ignore -0.85) $s = -2(1.18)^3 + (1.18)^2 + 6(1.18)$ $s = 5.19$ km	M1 A1 M1 A1 M1 A1	Set $v = 0$ and form a three term quadratic Or equivalent expression (3 terms only) Substitute $t = 1.18$ into s
10 a	For P: $74.8 - T = 2 \times 2$ $T = 70.8\,\text{N}$ For Q: $70.8 - wg = 2w$ $w = \frac{70.8}{11.8}$ $w = 6$ kg	 M1 A1 M1 A1	 Use of $F = ma$ for P Use of $F = ma$ for Q
b	Use of $s = ut + \frac{1}{2}at^2$ $6 = 0 + t^2$ $t = 2.45$ s	M1 M1 A1	 Correct values substituted
c	Friction between P and the table can be ignored	B1	Award mark for correct explanation