NEWTONS LAW MS

QUESTION 1

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	a single force that has the same effect as all the forces combined	accept all the forces added / the sum of the forces / overall force	1
a)ii)	constant speed (in a straight line) or constant velocity	do not accept stationary	1
b)	3 m/s^2	allow 1 mark for correct substitution into transformed equation accept answer 0.003 gains 1 mark answer = 0.75 gains 1 mark	2 1
c)	as speed increases air resistance increases reducing the resultant force	accept drag / friction for air resistance	1 1
Total marks			7

QUESTION 2

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	96 newton or N	allow 1 mark for correct substitution ie 80 × 1.2 allow Newton do not allow n	2+1
b)i)	direction		1
b)ii)	velocity and time are continuous (variables)	answers must refer to both variables accept the variables are continuous / not categoric accept the data / 'it' is continuous accept the data / 'it' is not categoric	1
b)iii)	C velocity is not changing	the 2 marks for reason may be scored even if A or B are chosen	1 1

	forces must be balanced or resultant force is zero	accept speed for velocity accept speed is constant (9 m/s) accept not decelerating accept not accelerating accept reached terminal velocity accept forces are equal accept arrows are the same length / size do not accept the arrows are equal	1
Total marks			8

QUESTION 3

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	120		1
a)ii)	20	accept 140-their (a)(i) provided answer is not negative	1
a)iii)	as speed increases drag force / water resistance / friction / D increases (until) D = 140 N or (until) D = T	forces balance is insufficient	1 1 1
b)i)	(average) speed (of swimmer)		1
b)ii)	any two from: ▢ more data ▢ force may vary (a lot) / change ▢ give more reliable average	accept results for data do not accept more accurate data ignore references to anomalies ignore accurate / precise	2
b)iii)	examples of acceptable responses: ▢ most / some females produce smaller forces ▢ most / some males produce larger forces ▢ some females swim as fast as males but use a smaller force ▢ most of the faster swimmers are male ▢ most of the slower swimmers are female ▢ range of the (average) speed of males is smaller than the range of the (average) speed of females	do not accept all females produce smaller forces do not accept all males produce larger forces do not accept all males swim faster do not accept all females swim slower	1

	☐ range of the (average) force of the males is greater than the range of the (average) force of the females		
b)iv)	exert maximum (hand) force (throughout the swim / stroke)	accept (any method to) increase (hand) force practise more is insufficient	1
Total marks			10

QUESTION 4

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	4.2	2 marks for correct substitution and transformation, ie 1155/275 allow 1 mark for correct resultant force with a subsequent incorrect method, ie 1155 allow 1 mark for an incorrect resultant force with a subsequent correct method, eg answers of 7.27 or 10.34 gain 1 mark	3
b)i)	YES any two from: • data (from police files) can be trusted • data answers the question asked • large sample used NO any two from: • the sample is not representative • the sample size is too small • accident files do not indicate age / experience of riders	marks are for the explanation 2 allow a conclusion can be made from the data an answer YES and NO can score 1 mark from each set of mark points	2
b)ii)	more accidents with motorbikes up to 125 cc even though there are fewer of these bikes than bikes over 500 cc		1 1
c)i)	increases the time taken to stop decreases rate of change in	accept increases collision time accept reduces acceleration /	1 1

	momentum	deceleration accept F = Δmv/Δt reduces momentum is insufficient	
	reduces the force (on the rider)		1
c)ii)	YES any sensible reason, eg: • cannot put a price on life / injury • fewer (serious) injuries • reduces cost of health care / compensation NO any sensible suggestion, eg: • money better spent on … • total number of riders involved is small	the mark is for the reason accept may save lives accept reduces risk of injury needs to be specific	1
Total marks			11