Kinematics - Velocity and Displacement Time Graphs Exam Questions MS (from OCR MEI 4761)

Q1, (Jan 2006, Q1)

(i)	$\frac{-15}{6} = -2.5$ so -2.5 m s^{-2}	M1 A1	Use of $\Delta v / \Delta t$. Condone use of v/t. Must have - ve sign. Accept no units.	2
(ii)	$\frac{1}{2} \times 10 \times 4 = 20$ m	M1 A1	Attempt at area or equivalent	2
(iii)	Area under graph is $\frac{1}{2} \times 5 \times 5 = 12.5$ (and -ve) closest is $20 - 12.5 = 7.5$ m	M1 A1	May be implied. Area from 4 to 9 attempted. Condone missing –ve sign. Do not award if area beyond 9 is used (as well). cao	2
				6

Q2, (Jan 2007, Q1)

either			
	M1	Attempt at area. If not trapezium method at least one part area correct. Accept equivalent.	
70V obtained	A1	Or equivalent – need not be evaluated.	
So 70V = 1400	M1	Equate **their** 70V to 1400. Must have attempt at complete areas or equations.	
and V = 20	A1	cao	
or	M1	Attempt to find areas in terms of ratios (at least one correct)	
	A1	Correct total ratio – need not be evaluated. (Evidence may be 800 or 400 or 200 seen).	
	M1	Complete method. (Evidence may be 800/40 or 400/20 or 200/10 seen).	
V = 20	A1	cao [Award 3/4 for 20 seen WWW]	
			4

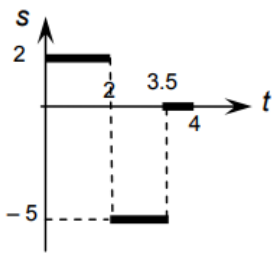
Q3, (Jun 2012, Q1)

(A)		False	M1	**Notice** that the runner may have returned to his starting place or may not; the graph does not contain the information to tell you which is the case. **Accept** statements only if they are true and relevant, e.g.: There is no information about direction of travel There is no evidence to suggest he has turned round Distance is given by the area under the graph but this is not the same as displacement Speed is not a vector and so the area under the graph says nothing about the direction travelled It just (or only) shows speed-time
		This is a speed-time graph not one for displacement-time	A1	
				Do not accept statements that are, or may be, untrue: eg The particle moves only in the positive direction **Do not accept** statements that are true but irrelevant: eg The distance travelled is the area under the graph **Condone** This is a speed time graph not one for distance-time
(B)		True	B1	Ignore subsequent working
(C)		True	B1	Ignore subsequent working
(D)		False	M1	
		The area under the graph is 420 not 400	A1	Accept area up to time 55 s is 400 m The calculation in the false example must be correct
			[6]	

Q4, (Jun 2009, Q1)

(i)	$0.5\times8\times10=40$ m		M1	Attempt to find whole area or … If *suvat* used in 2 parts, accept any t value $0\le t\le8$ for max. 2
(ii)			A1	cao
	$0.5\times5(T-8)=10$		M1	$0.5\times5\times k=10$ seen. Accept ±5 and ±10 only. If *suvat* used need whole area; if in 2 parts, accept any t value $8\le t\le T$ for min.
			B1	Attempt to use $k = T - 8$.
	$T = 12$		A1	cao. [Award 3 if $T = 12$ seen] 3
(iii)	40 – 10 = 30 m		B1	FT **their** 40. 1
			6	

Q5, (Jan 2010, Q1)

1 (i)	$0 < t < 2$, $v = 2$ $2 < t < 3.5$ $v = -5$	B1 B1	Condone '5 downwards' and ' – 5 downwards'	2
(ii)			Condone intent – e.g. straight lines free-hand and scales not labelled; accept non-vertical sections at $t = 2$ & 3.5.	
		B1	Only horizontal lines used and 1st two parts present. BOD t-axis section. One of 1st 2 sections correct. FT (i) and allow if answer correct with (i) wrong	
		B1	All correct. Accept correct answer with (i) wrong. FT (i) only if 2nd section –ve in (i)	2
(iii)	(A) upwards; (B) and (C) downwards	E1	All correct. Accept +/- ve but not towards/away from O Accept forwards/backwards. Condone additional wrong statements about position.	1
				5