Physics > Big idea PFM: Forces and Motion > Topic PFM4:Measuring and calculating motion > Key concept PFM4.3: Velocity-time graphs

Key concept (age 14-16)
PFM4.3: Velocity-time graphs

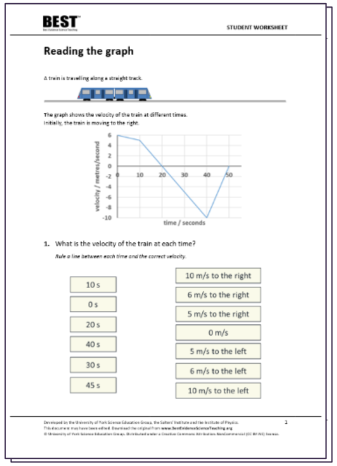
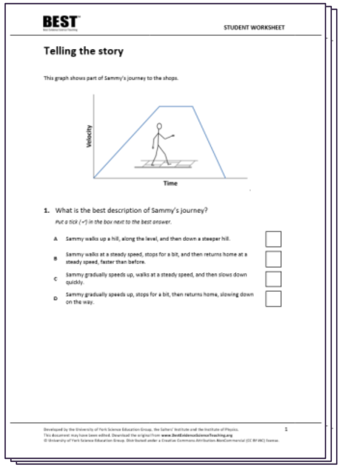
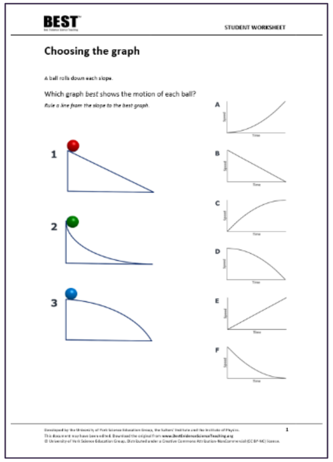
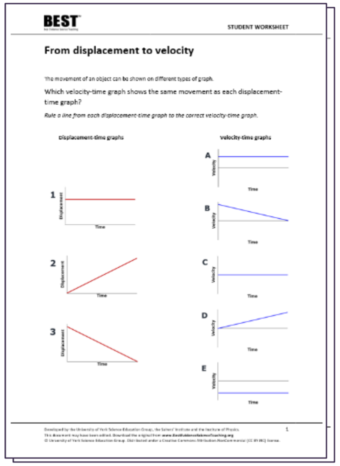
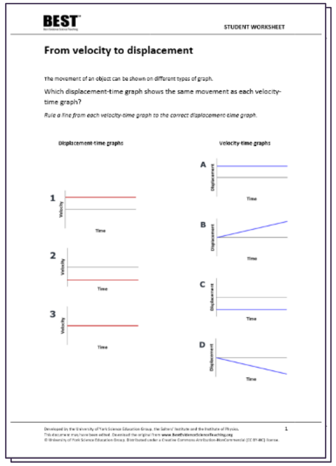
Progression toolkit: Velocity-time graphs

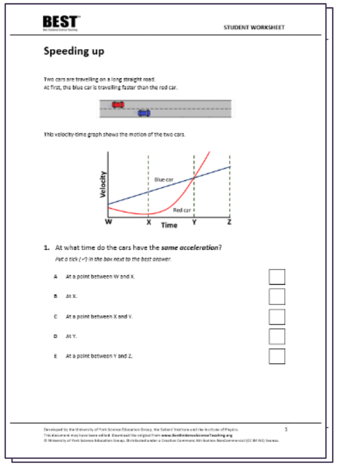
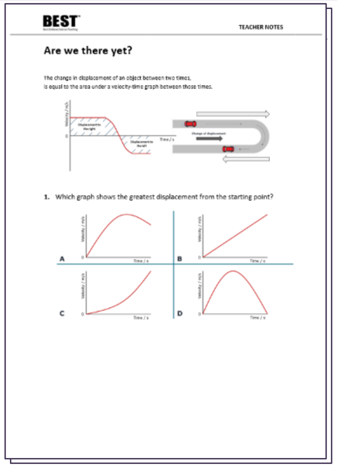
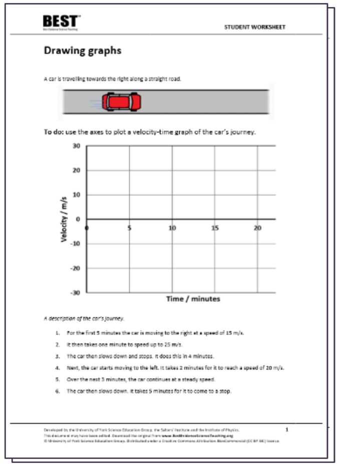
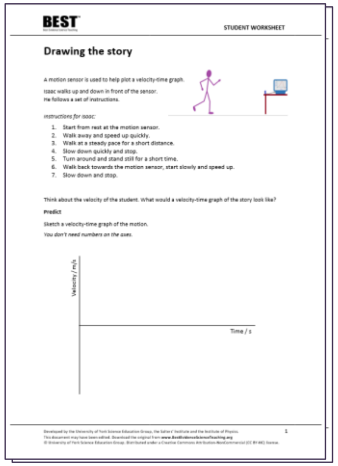
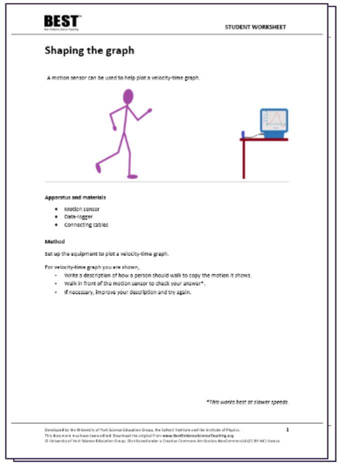
Learning focus	A velocity-time graph of an object moving in one dimension can be read to find the object's velocity at any moment of time. The gradient of the graph at a given time gives the object's acceleration; and the area under the graph between any two times gives the change in the object's displacement, or the distance it has travelled.				
As students' conceptual understanding progresses they can:	CONCEPTUAL PROGRESSION → Read values of speed or velocity off a speed-time or velocity-time graph, and interpret the meaning of a negative velocity. **P**	Describe the motion of an object from a velocity-time graph, and identify the velocity-time graph from a description of motion.	Identify the velocity-time graph corresponding to a given displacement-time graph, and vice versa.	Calculate, and explain how to work out, the acceleration of an object from the gradient of a velocity-time graph.	Calculate, and explain how to work out, the change in displacement of an object, or the distance it has travelled, from the area under a velocity-time graph.
Diagnostic questions	Reading the graph	Telling the story Choosing the graph	From displacement to velocity From velocity to displacement	Speeding up	Are we there yet?
Response activities	Drawing graphs	Drawing the story Shaping the graph	Translating motion graphs	Using the gradient	Calculating displacement

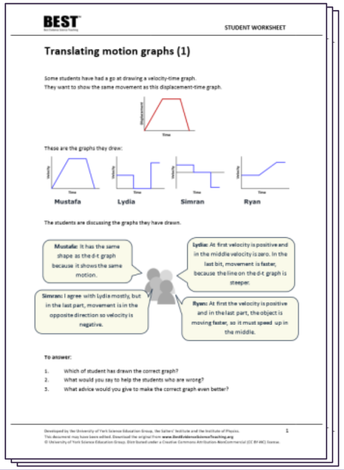
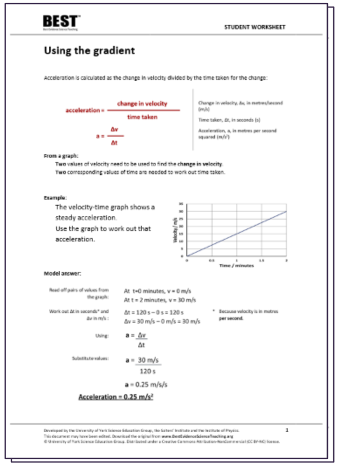
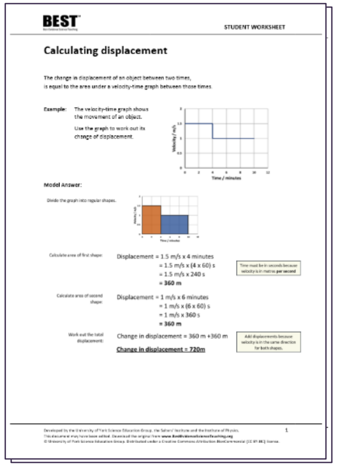
Key:

P Prior understanding from earlier stages of learning

B Bridge to later stages of learning

Reading the graph	Telling the story	Choosing the graph	From displacement to velocity	From velocity to displacement
				
Linking ideas	Simple multiple choice	Linking ideas	Linking ideas	Linking ideas

Speeding up	Are we there yet?	Drawing graphs	Drawing the story	Shaping the graph
				
Simple multiple choice	Simple multiple choice	Application and practice	PEOE	Application and practice

Translating motion graphs	Using the gradient	Calculating displacement
 BEST STUDENT WORKSHEET Translating motion graphs (1)	 BEST STUDENT WORKSHEET Using the gradient	 BEST STUDENT WORKSHEET Calculating displacement
Talking heads	Application and practice	Application and practice