Card matching activity involving General Motion

A card matching activity is one of the simplest types of activity to produce yourself, needing no specific software to build. Using a table in Word works well (with fixed cell sizes) but remember to mix the cards up on the pages if you aren't going to cut everything out yourself.

Card matching activities promote pacey learning and provide a lot of practise and, when well-organised, can promote collaborative working.

In the activity below students are asked to work on producing solutions to two questions. Cards containing parts of each solution are given to the students and they have to organise the cards to create a coherent solution. There may be additional cards that are not required or it may be that students feel that a step is missing from the solution and they can then fill that in on a blank card.

Extension: When students have finished they could choose a question from their textbook, or make up their own, and write the parts of the solution on to cards. They could add 3 or 4 cards that are red herrings, but look as if they might be part of the problem, and give the set to their neighbour to see if they go about the problem in the same way.

Recording results: It may be that it would be good for students to stick down a full solution on some poster paper and annotate it with their reasoning. Solutions could then be compared by others in the class.

Instructions: The solutions to the two questions on these cards are mixed up. All you have to do is arrange them in the correct order. There may be extra cards that are not part of the problem. Other cards are left blank for you to add your own explanations or intermediate steps.

Question 1: At time t the velocity of an object is given by $v = \begin{pmatrix} t(t-1) \\ (t+1)(t-1) \end{pmatrix}$. Given that it starts from the point with position vector $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$, find its displacement and acceleration when $t = 3$.

Question 2: An object starts from the origin with velocity $\begin{pmatrix} 2 \\ -6 \end{pmatrix}$ and after t seconds its acceleration is given by $a = \begin{pmatrix} 2t \\ 2t-1 \end{pmatrix}$. Find its displacement and velocity at the moment when it is moving parallel to the vector $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$.

$$t = 3, \quad \mathbf{a} = \begin{pmatrix} 5 \\ 6 \end{pmatrix}$$

$$t = 3, \quad \mathbf{v} = \begin{pmatrix} 6 \\ 8 \end{pmatrix}$$

$$\mathbf{v} = \begin{pmatrix} t^2 + 2 \\ t^2 - t - 6 \end{pmatrix}$$

	$$\mathbf{r} = \begin{pmatrix} \frac{t^3}{3} + 2t \\ \frac{t^3}{3} - \frac{t^2}{2} - 6t \end{pmatrix}$$
$$\mathbf{v} = \begin{pmatrix} t^2 + 2 \\ (t-3)(t+2) \end{pmatrix}$$	
$$t = 3, \quad \mathbf{v} = \begin{pmatrix} 11 \\ 0 \end{pmatrix}$$	$$t = 3, \quad \mathbf{r} = \begin{pmatrix} 15 \\ -\frac{27}{2} \end{pmatrix}$$
	$$t = 3, \quad \mathbf{a} = \begin{pmatrix} 6 \\ 5 \end{pmatrix}$$
$$\mathbf{r} = \frac{1}{6}\begin{pmatrix} 2t^3 - 3t^2 + 12 \\ 2t^3 - 6t + 6 \end{pmatrix}$$	

$\mathbf{r} = \begin{pmatrix} \frac{t^3}{3} - \frac{t^2}{2} + c_1 \\ \frac{t^3}{3} - t + c_2 \end{pmatrix}$	$t = 3, \quad \mathbf{r} = \begin{pmatrix} 6\frac{1}{2} \\ 7 \end{pmatrix}$
	$\mathbf{a} = \begin{pmatrix} 2t - 1 \\ 2t \end{pmatrix}$
$\mathbf{v} = \begin{pmatrix} t(t-1) \\ (t+1)(t-1) \end{pmatrix}$	
	$\mathbf{a} = \begin{pmatrix} 2t \\ 2t - 1 \end{pmatrix}$
Finished? Then choose a question from your textbook (or make up your own!) and write the parts of the solution on to cards. Add 3 or 4 cards that are red herrings, but look as if they might be part of the problem, then give the set to your neighbour to see if they go about the problem in the same way you did.	

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