Task J

Controlling Journeys using equations
Part 2 - Crab Velocity

In this activity our characters are moving up and down. We already know how to calculate their speeds but there is a bit more to it. We will need to use their velocities to write the equations for their journeys accurately.

Velocity is speed but with direction.
+ (positive) for upwards or forwards and - (negative) for downwards or backwards.

Open Investigation 10 Activity 10.2
Our crab characters, Bettina (blue) and Rory (red) move up and down - above the water (climbing rocks) and below it (diving).
- Positive positions are above the water line.
- Negative positions are below the water line.

Play the simulation. Do not reveal the Equation window.

1. What is the same about Bettina's and Rory's journeys?

2. What is different about their journeys?

3. Complete the following information for Rory and Galileo (green).
   - Bettina's speed: 1 m/s
   - Bettina's velocity: -1 m/s
   - Rory's speed: A
   - Rory's velocity: B
   - Galileo's speed: C
   - Galileo's velocity: D

   You may have noticed that Rory has a velocity of +1 m/s and a start position of -12 m.

4. Predict the equation for Rory's motion.

5. Predict the equations for each of the other characters by completing the table below.

<table>
<thead>
<tr>
<th>Speed</th>
<th>Velocity</th>
<th>Start position</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bettina</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Galileo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penelope</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orlando</td>
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<td></td>
</tr>
</tbody>
</table>


7. What is the same and what is different about Galileo, Penelope and Orlando's motions?
In each of the following scenarios, the crab is travelling for exactly 10 seconds.

A. A crab starts at the water level and goes up.
   - **Graph:**
   - **Equation:**

B. A crab starts above the water level and goes down.
   - **Graph:**
   - **Equation:**

C. A crab starts above the water level, and ends above the water level.
   - **Graph:**
   - **Equation:**

D. A crab starts from below the water level and stays at the same level.
   - **Graph:**
   - **Equation:**

E. A crab starts above the water level, and ends below the water level.
   - **Graph:**
   - **Equation:**

F. A crab starts from below the water level, goes up, and ends above the water level.
   - **Graph:**
   - **Equation:**

Now check your equations by editing the equations of the crabs’ motion in Activity 10.2. Are your sketches correct? If not try again.