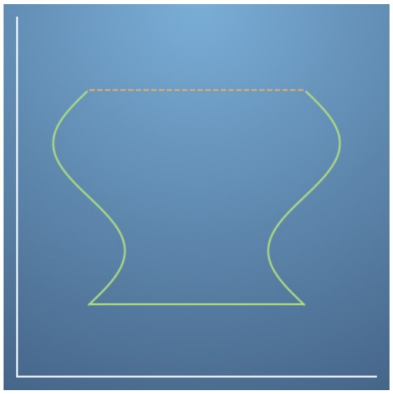
Congratulations! You passed! Next Item

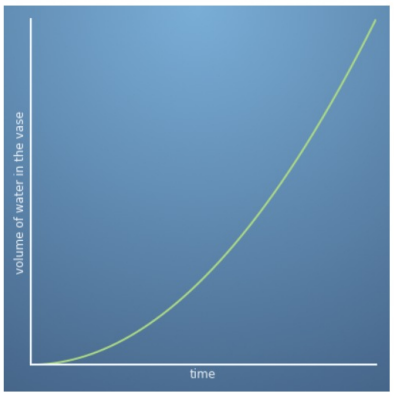
1 / 1 point

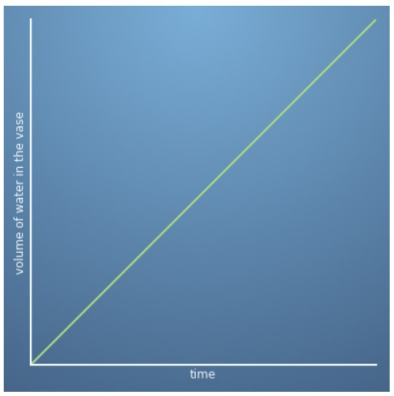
1. In this quiz you will get a refresher in functions - in particular, matching a description of a function to the graph of the function.

Water is poured **at a constant rate** into a vase with the following shape:

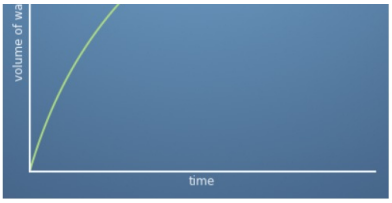


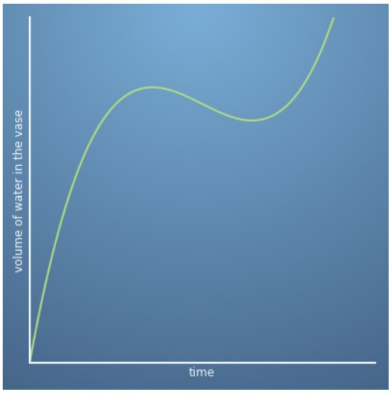
If the vase is never full, which graph best describes how the volume of water in the vase changes with time?





Correct
Well done! As water flows in at a constant rate, the volume increases at a constant rate, so the graph is just a straight line.

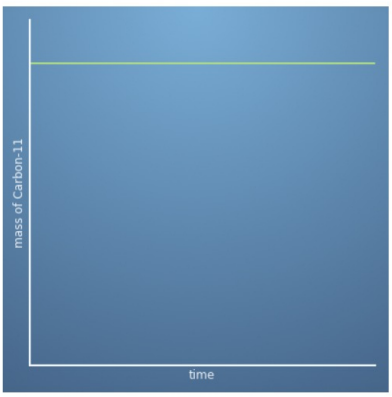


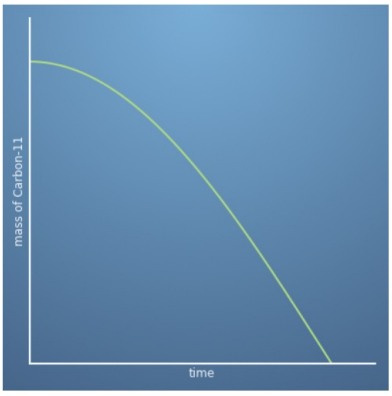


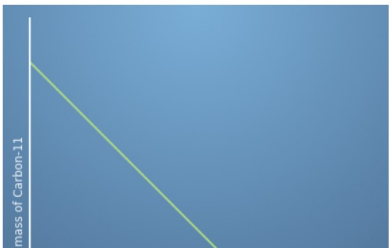
✔

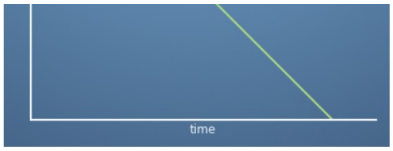
1 / 1 point

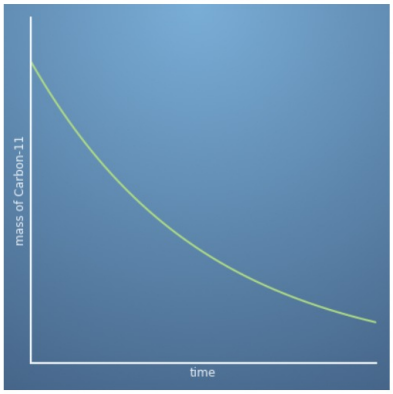
2. A sample of Carbon-11 has a half life of approximately 20 minutes (that is, after 20 minutes, the mass of Carbon-11 remaining will have halved). If we start with a sample of 100g, which graph best describes how the mass of carbon-11 changes with time?











Correct
Carbon-11 decays at an exponential rate.

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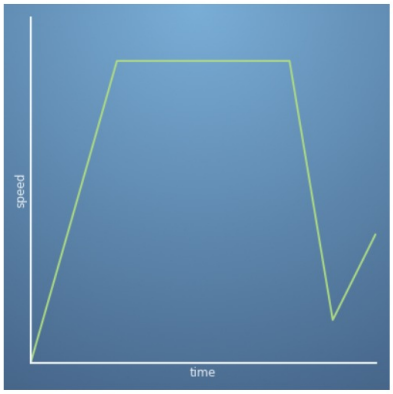
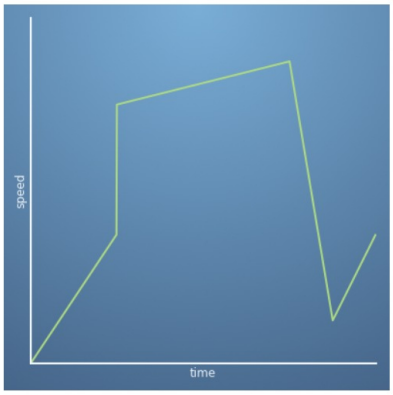
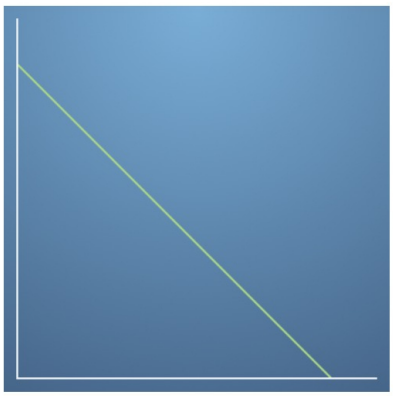
1 / 1 point

3. A person jumps out of a plane. After 4 seconds, the person reaches terminal velocity. After a further 8 seconds, the person deploys their parachute, and decelerates sharply for 4 seconds before starting to accelerate again. Which graph best describes the person's speed against time?



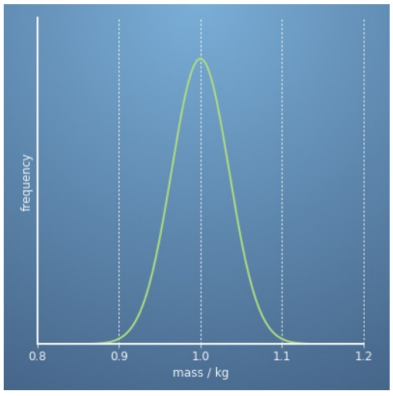
Correct
Speed is constant at terminal velocity.



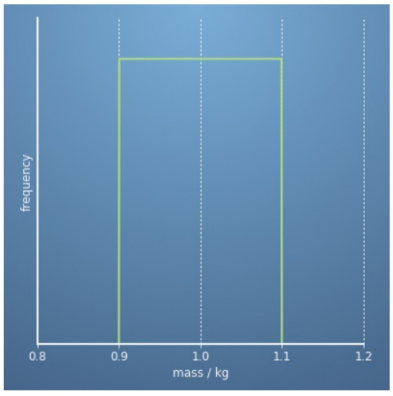


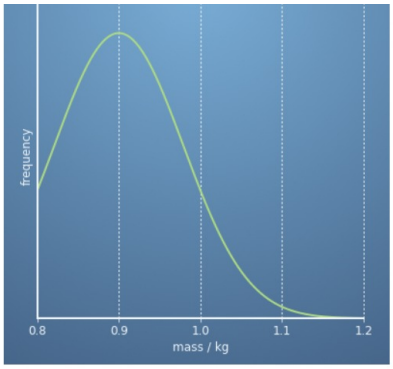
1 / 1 point

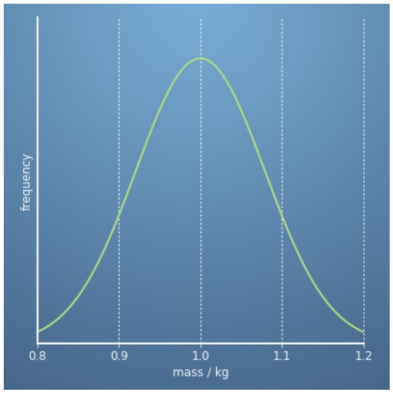
4. Bags of flour labelled 1kg from a supermarket are weighed. What does the frequency-weight graph approximately look like?



Correct
The weights can be approximated by a bell-curve, called the "Normal Distribution".

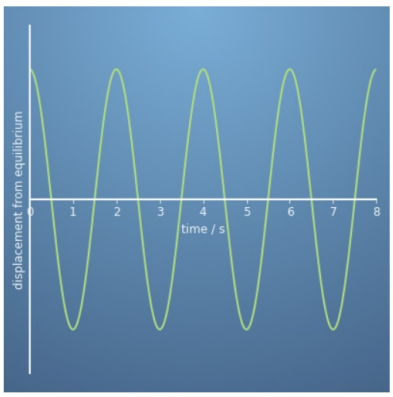






1 / 1 point

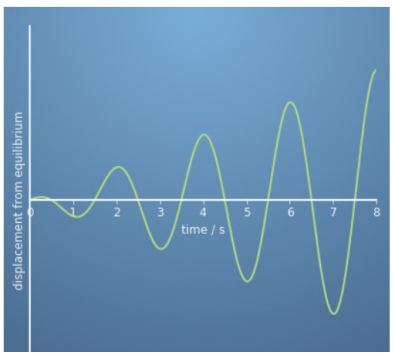
5. A pendulum swings with a frequency of 0.5 Hz. Assuming negligible air resistance, which graph is a plausible description of its horizontal displacement from the equilibrium as a function of time?

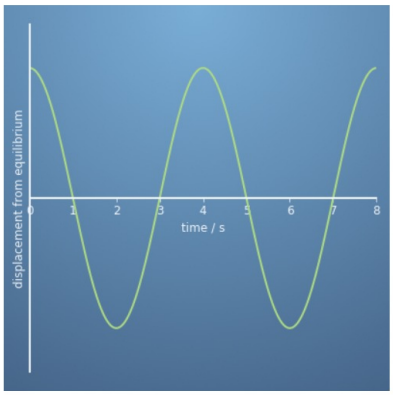


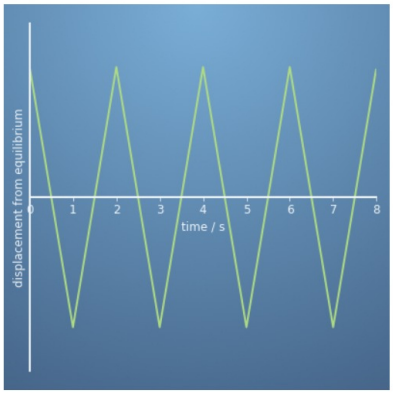
Correct

This is called a simple harmonic oscillator - that is, we model the movement of the pendulum through time as a simple sine wave, with some amplitude (determined by the maximum distance of the pendulum to the equilibrium point) and some frequency (determined by the period of the swing).

Because the pendulum swings with a frequency of 0.5 Hz, this is the same thing as saying that in one second, the pendulum completes half of a full cycle, or equivalently, that it takes 2 seconds to complete a full revolution.




displacement from equilibrium
0
1
2
3
4
5
6
7
8
time / s


displacement from equilibrium
0
1
2
3
4
5
6
7
8
time / s