

## Journey times to alien worlds

### Key Stage 3

**Topics covered:** speed, distance, time, light-years, standard form, extrasolar planets

Watch the video "Are there aliens?", <https://vimeo.com/122515138>



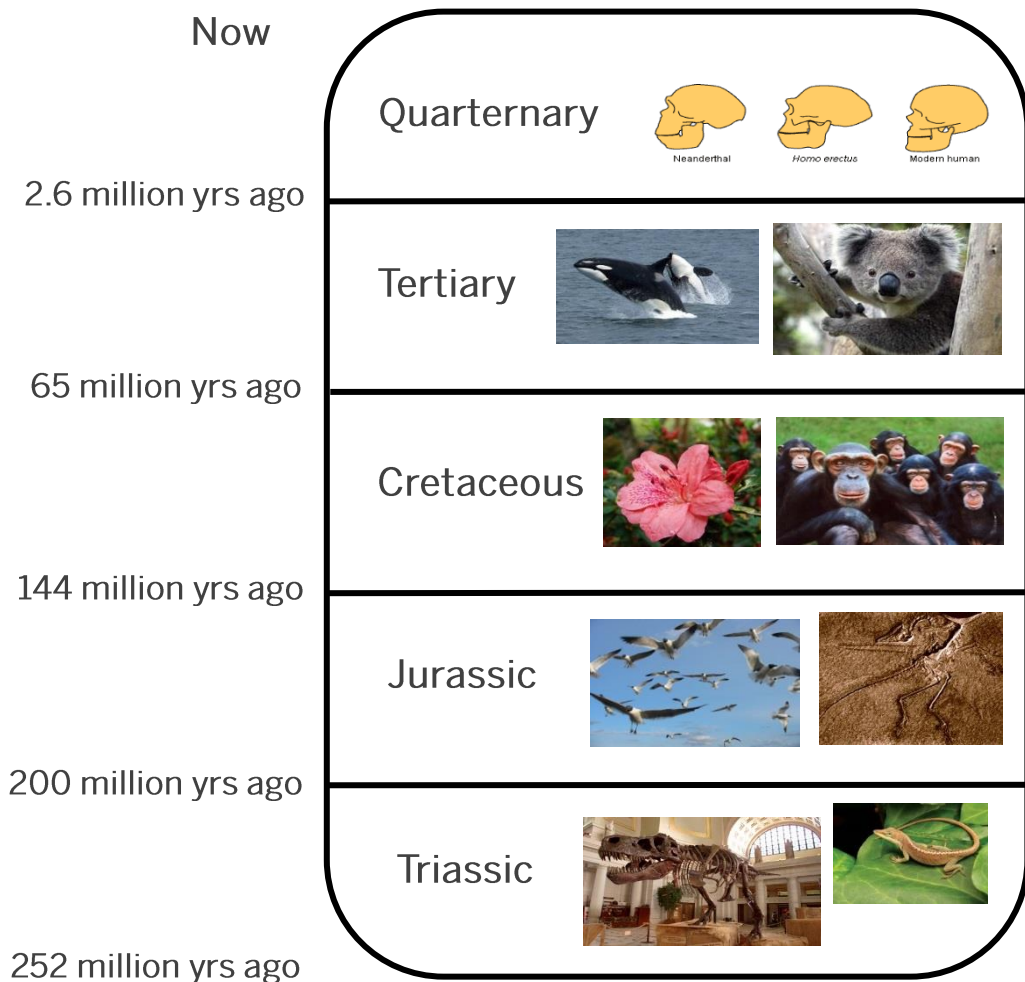
The first extrasolar planets were discovered in 1992. Since then potentially thousands have been discovered and they are tens or hundreds of light-years away. Imagine you set off on a journey to each of the 6 planets below, travelling at the maximum launch speed of a space shuttle,  $s = 28\,000$  km/h.

$$D = st \quad (1)$$

$D$  = distance (km);  $s$  = speed (km/h);  $t$  = time (hours)

Extrasolar Planet	Distance from Earth (light-years)
XO-2b	484
Corot 3b	2211
HAT-P-11b	126
Corot 14b	4316
GJ 1214b	42
XO-3b	842

1. Convert the distance to each planet into kilometres. 1 light-year is the distance that light travels in a year =  $9.5 \times 10^{12}$  km. So 2 light-years =  $2 \times (9.5 \times 10^{12} \text{ km}) = 1.9 \times 10^{13}$  km.
2. Calculate the journey time to each of the 6 planets using equation 1. Rearrange equation 1 to make  $t$  the subject of the equation. Convert your journey times from hours to years.
3. If hypothetical aliens from each of those planets landed in Greenwich Park today, how long ago would they have had to set off? Use your answers from question 2 and write the name of the planet in the correct period in the diagram below.



## Journey times to alien worlds: **ANSWERS**

### Key Stage 3

1. Distances of the extrasolar planets in kilometres (table below)
2. Journey times in years (table below)
3. Journey time vs geological period of Earth (table below)

<b>Extrasolar Planet</b>	<b>Distance from Earth (kilometres)</b>	<b>Journey time (years)</b>	<b>Geological period</b>
XO-2b	$4.6 \times 10^{15}$	18.6 million	Tertiary
Corot 3b	$2.1 \times 10^{16}$	84.8 million	Cretaceous
HAT-P-11b	$1.2 \times 10^{15}$	4.7 million	Tertiary
Corot 14b	$4.1 \times 10^{16}$	167 million	Jurassic
GJ 1214b	$4.0 \times 10^{14}$	1.62 million	Quarternary
XO-3b	$8.0 \times 10^{15}$	32.4 million	Tertiary