Exo-planets

Fact sheet 1

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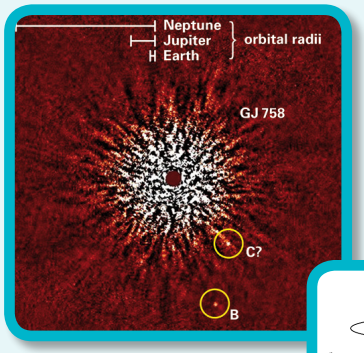
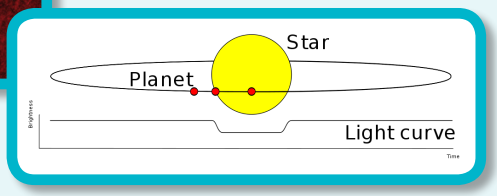
An exo-planet or extra-solar planet is a planet orbiting a star other than our Sun.



'Direct imaging'



'Transit method'

Finding exo-planets isn't easy

- Sometimes planets can be seen going around stars, but only if they are big and not too close to their star. This is called the 'direct imaging' method.
- As a planet passes in front of its star, the star gets a bit dimmer. Astronomers can measure this change in light. This is called the 'transit method'.
- A star will wobble as a planet goes around it, because of the planet's gravity. Astronomers can measure this wobble. This is called the 'radial velocity' method.

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Fact sheet 2

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Distances between stars and their planets are measured in Astronomical Units, or AU. The distance between the Sun and the Earth is 1AU.

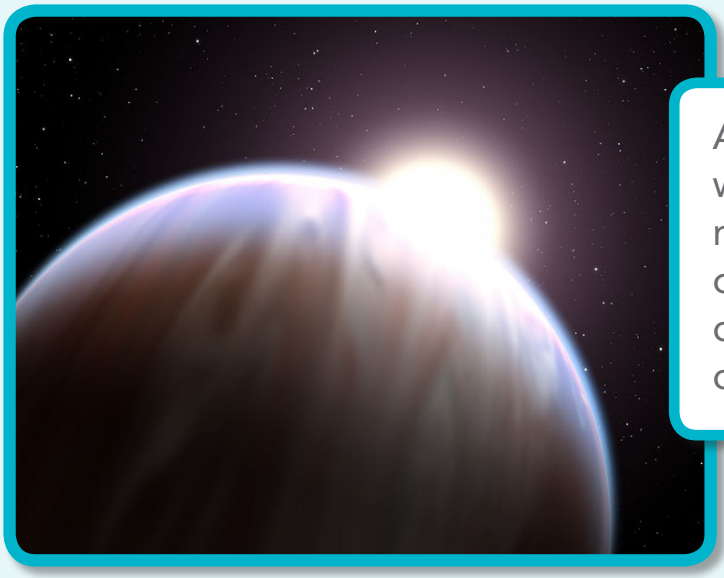
1AU

The 'Goldilocks Zone' or 'Habitable Zone' is the region around a star where there could be liquid water – not too hot and not too cold.

We can calculate where the habitable zone is using this equation:

Inner edge = √L x 0.7
Outer edge = √L x 1.5

L is the luminosity, or brightness, of the star compared to that of the Sun.



A 'Super-Earth' planet is one which has a mass between the mass of the Earth and the mass of Jupiter. This type of planet could be a rocky planet or it could be made of gas.

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Data sheet

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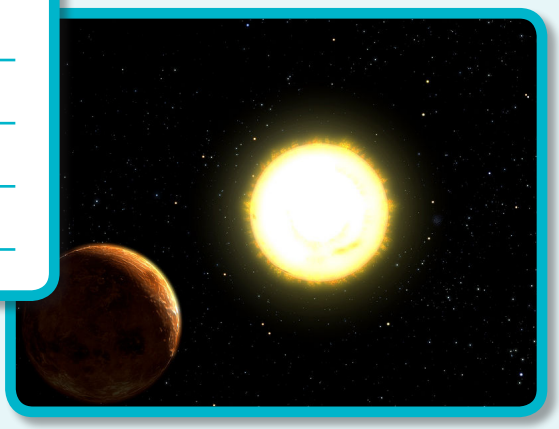
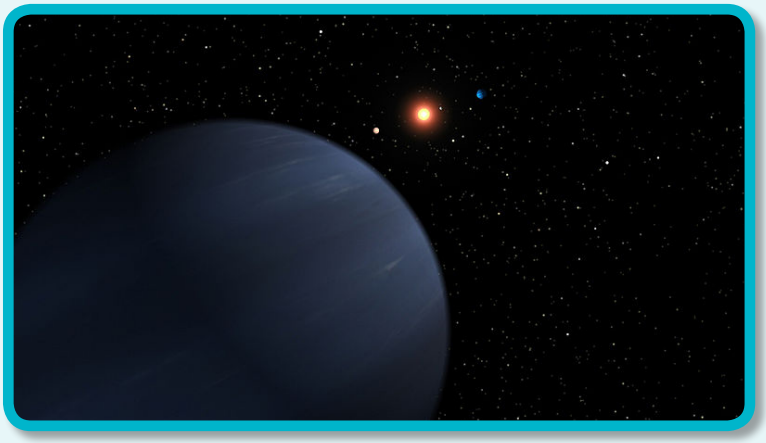
The Star:

Distance from Earth:	44 light years
Mass:	0.95 Suns
Type of star:	Yellow dwarf
Luminosity (L):	0.63



The Planets:

Name	Distance (AU)	Mass	Orbit	Type
e	0.04	11 Earths	2.8 days	Super Earth
b	0.12	262 Earths	14.6 days	Gas Giant
c	0.24	54 Earths	43.9 days	Gas Giant
f	0.78	46 Earths	260 days	Gas Giant
d	5.77	1219 Earths	5218 days	Gas Giant



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Data sheet

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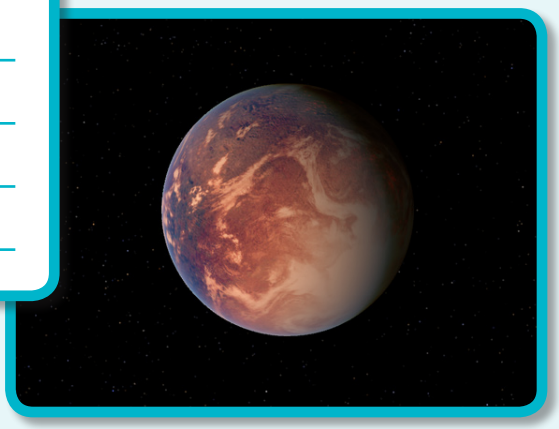
The Star:

Distance from Earth:	20.3 light years
Mass:	0.31 Suns
Type of star:	Red dwarf
Luminosity (L):	0.013



The Planets:

Name	Distance (AU)	Mass	Orbit	Type
e	0.03	2.5 Earths	3.1 days	Super-Earth
b	0.04	23 Earths	5.4 days	Gas Giant
c	0.07	7.9 Earths	12.9 days	Super-Earth
d	0.22	10.4 Earths	66.8 days	Super-Earth

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HR 8799

Data sheet

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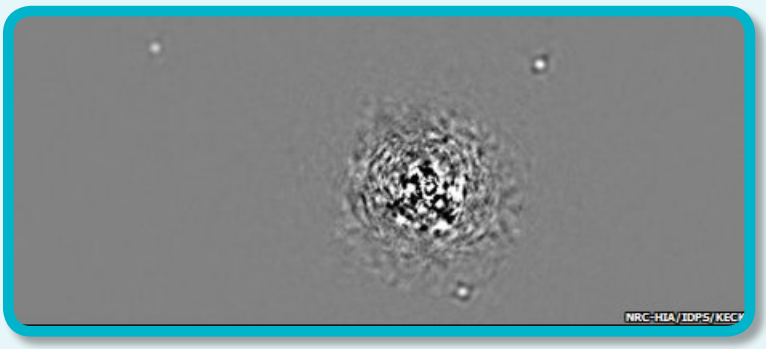
The Star:

Distance from Earth:	129 light years
Mass:	1.47 Suns
Type of star:	Yellow dwarf
Luminosity (L):	4.9

The Planets:

Name	Distance (AU)	Mass	Orbit	Type
d	24	3178 Earths	100 years	Gas Giant
c	38	3178 Earths	190 years	Gas Giant
b	68	2224 Earths	460 years	Gas Giant



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Upsilon Andromedae

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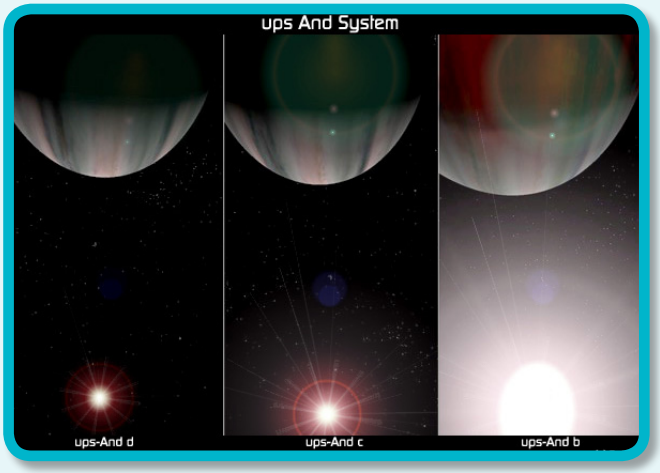
The Star:

Distance from Earth:	44 light years
Mass:	1.28 Suns
Type of star:	Yellow-white dwarf
Luminosity (L):	3.4

The Planets:

Name	Distance (AU)	Mass	Orbit	Type
b	0.06	213 Earths	4.6 days	Gas Giant
c	0.83	610 Earths	241 days	Gas Giant
d	2.53	1313 Earths	1278 days	Gas Giant



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Our Solar System

Data sheet

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The Star:

Distance from Earth:	8 light minutes
Mass:	332 946 Earths
Type of star:	Yellow dwarf
Luminosity (L):	1

The Planets:

Name	Distance (AU)	Mass	Orbit	Type
Mercury	0.4	0.05 Earths	88 days	Rocky
Venus	0.7	0.8 Earths	225 days	Rocky
Earth	1	1 Earth	365 days	Rocky
Mars	1.5	0.1 Earths	687 days	Rocky
Jupiter	5.2	317 Earths	11.9 years	Gas Giant
Saturn	9.5	92 Earths	29.5 years	Gas Giant
Uranus	19.2	14 Earths	84 years	Gas Giant
Neptune	30	17 Earths	164.8 years	Gas Giant

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Task sheet

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1 Draw circles for the orbits of your planets (remember to look at the scale on your model).

2 Using a different colour, draw circles for the orbits of the Earth (1AU), Jupiter (5AU) and Neptune (30AU), if they fit on your model, and label them.

3 Calculate where the habitable zone is and mark it on your model in a different colour.

4 Using plastacine, make your parent star. Think about its colour and size. Put it on your model.

5 Make your planets out of plastacine. Decide what they should look like by looking at their mass and type. Think about what the planets in our solar system look like.

6 Are any of your planets in or close to the habitable zone? Could there be any life in your system? If so, what might it be like – think about temperature, gravity, moons...

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