

LP 9 1 Galaxy Pancakes
Syllabus links

4.6.10 gravitational force	a) identify that all objects exert a force of gravity on all other objects in the universe.
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4.9.2 components of the universe	a) describe some major features of the universe, including galaxies, stars, nebulae and solar systems b) use appropriate scales to describe differences in sizes of, and distances between, structures making up the universe.
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5.9.1 the big bang theory	a) discuss current scientific thinking about the origin of the universe b) identify that some types of electromagnetic radiation are used to provide information about the universe c) describe some of the difficulties in obtaining information about the universe.
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5.9.3 components of the universe	a) relate some major features of the universe to theories about the formation of the universe b) describe some changes that are likely to take place during the life of a star.
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Big bang theory	<ul style="list-style-type: none"> compare the big bang theory with other theories of the development of the universe consider interactions between various features of the universe and hypotheses on past and future developments in the universe investigate the ways in which different societies have described changes in the universe observed over recorded time describe evidence used to support estimates of time in the universe.
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Components of the universe	<ul style="list-style-type: none"> relate colours of stars to their age, distance from Earth and size explain why quasars have provided evidence of a changing universe discuss the impact of Voyager probes and the Hubble Space Telescope on knowledge and understanding of the universe.
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4/5.2 the nature and practice of science
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f) give examples that demonstrate the benefits and limitations of using models

Prior learning and Rationale

In the previous lessons students learnt the Big Bang nucleo-synthesis 6 – 20 minutes after the start of time.

In this lesson Review 1) what galaxies look like using World Wide Telescope. This shows what Galaxies look like in the night sky. It reviews the impact of Hubble and Microsoft ant the internet.

This lesson departs from the powers of 10 approach and choose a key scale 1mm = 1000 ly.

The class is questioned what is a galaxy, our Galaxies name, Review ly as a unit of measure, Universe is 78 Billion ly wide. [Reference](#)

The Galaxysong <http://dingo.care2.com/cards/flash/5409/galaxy.swf>

Put up this table with key items missing.

Feature	Actual	1mm = 1000 ly
No of stars in a Galaxy	400, billion (Current figure)	-
No of Galaxies in Universe	200 billion	
Width	100,000 Ly	100mm
Bulge thickness	16 ly	16mm
Thickness	3,000 ly	3mm

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Our distance to core	30,000 ly	30mm
Distance to Andromeda	2,000,000 ly	2m
Distance to edge of Universe	39,000 ly	39 km

The pancake represents a galaxy, icecream the core, and a chocolate drop a central blackhole or several for a Quasar.

You will need

Qty	Item
1	Barbeque + Gas
3	Flippers
1	Butter or oil
1 roll	Paper towel
4	bottles of add water and shake pancake mix
1l	vanilla icecream
30	Paper plates+ Forks
2	Spoons for icecream serving
1pkt	Chocolate melts

Students assign preparation and cooking roles, Teachers control icecream and blackholes.

The condiments are only added when the correct model analogy is identified.

Students are asked to keep 2m from each galaxy, clumps of students are called galactic clusters.

Students are advised that the galaxies distort the light coming from behind them and the edge of the universe is 39 km away, where the CMB appears to come from.

The fact that light at this scale takes 2million years to travel 2 m.

Timing: The cooking of pancakes will take 40 mins

Note the milky way rotates with it spirals frozen in position once every 225 million years. Our sun moves faster, [skipping from arm to arm \(other reference\)](#) each 135 million years.