The Expansion of Space
The Expanding Universe
Black Box

Building and Revising Scientific Models
Activity 3: The Expansion of Space

- An activity used to demonstrate the expansion of a one-dimensional universe using a simple model of washers attached with elastics.
- Students will measure distances between washers in an early and later universe and use guided discovery to confront misconceptions about the expansion of our actual universe.
Activity 3: The Expansion of Space

- Early Universe:

- Later Universe:
Activity 3: The Expansion of Space

Misconceptions

- On your white boards, list three misconceptions that your students might believe when thinking about the expansion of space.
Activity 3: The Expansion of Space

After completing the activity, put yourself in the shoes of the students and answer the inquiry questions listed on the handout.

1. Compare your slope with that of your classmates. What do you notice? What effect does your choice of home galaxy have on the slope?
2. Describe how the positions of the distant galaxies changed compared to the positions of the nearby galaxies. How does your slope reflect this?
3. How would the chain look if the slope value were higher? Lower? How would you describe the universe if the slope were higher? Lower?
4. Comment on the difference in measurement units used. Is one system better than another?
5. If the universe is expanding, why don’t the sizes of the galaxies expand as well?
POE: Where is the Centre?

The universe in the past...
POE: Where is the Centre?

The universe now now...
POE: Where is the Centre?

Everything is moving away from us
POE: Where is the Centre?

Choose another viewpoint...
POE: Where is the Centre?

Or another viewpoint…
POE: Where is the Centre?

Or another...
POE: Where is the Centre?

It doesn’t matter where you are… everything else is moving away from you.

There is NO CENTRE!!
Thank You!!

www.perimeterinstitute.ca

Greg Dick
Perimeter Institute
gdick@pitp.ca
@Greg_Dick

Dave Fish
Sir John A Macdonald SS
dfish@pitp.ca
@DaveFishPI