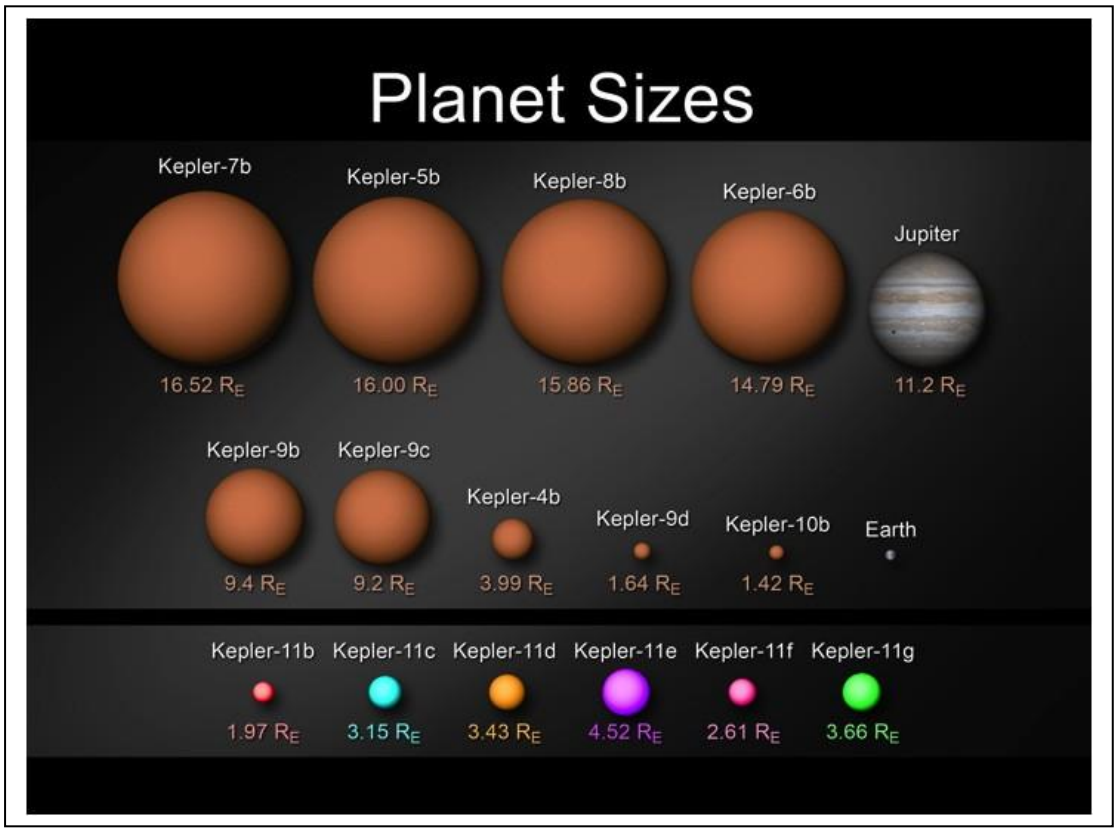

This diagram shows disks representing the planets discovered in orbit around 8 different stars all drawn to the same scale. Earth and Jupiter are also shown so that you can see how big they are in comparison. Solve the problems below using fraction arithmetic to find out how big these new planets are compared to Earth and Jupiter.

Problem 1 – Kepler-5b is 8 times the diameter of Kepler-11b .Kepler-11b is twice the diameter of Earth. How big is the planet Kepler-5b compared to Earth?

Problem 2 – The planet Kepler-9c is 9./11 the diameter of Jupiter, and Kepler-11e is 1/2 the diameter of Kepler-9c. How big is the planet Kepler-11e compared to Jupiter?

Problem 3 – The planet Kepler-10b is 1/10 the diameter of Kepler-6b, and Kepler-9b is 9/15 the diameter of Kepler-6b. If Kepler-11g is 4/9 the diameter of Kepler-9b, how big is Kepler-11g compared to Kepler-10b?

Problem 1 – Kepler-5b is 8 times the diameter of Kepler-11b .Kepler-11b is twice the diameter of Earth. How big is the planet Kepler-5b compared to Earth?

Answer: It helps to set up these kinds of problems as though they were unit conversion problems, and then cancel the planet names to get the desired ratio:

$$\frac{1 \times \text{Kepler5b}}{8 \times \text{Kepler11b}} \times \frac{1 \times \text{Kepler11b}}{2 \times \text{Earth}} = \frac{1\ \text{Kepler5b}}{8 \times \text{Earth}}$$ so Kepler 59 is **8x Earth in diameter**

Note how the 'units' for Kepler-11b have canceled out.

Problem 2 – The planet Kepler-9c is 9./11 the diameter of Jupiter, and Kepler-11e is 1/2 the diameter of Kepler-9c. How big is the planet Kepler-11e compared to Jupiter?

$$\frac{11 \times \text{Kepler9c}}{9 \times \text{Jupiter}} \times \frac{2 \times \text{Kepler11e}}{1 \times \text{Kepler9c}} = \frac{22\text{x Kepler9c}}{9 \times \text{Jupiter}}$$ so Kepler 11e = **9/22 Jupiter**

From the figure we see Kepler11e = 4.52 Re and Jupiter = 11.2 Re so Kepler11e = 4.5/11 = 9/22 Jupiter.

Problem 3 – The planet Kepler-10b is 1/10 the diameter of Kepler-6b, and Kepler-9b is 9/15 the diameter of Kepler-6b .If Kepler-11g is 4/9 the diameter of Kepler-9b, how big is Kepler-11g compared to Kepler-10b?

$$\frac{10\text{xKepler10b}}{1\text{xKepler6b}} \times \frac{9\ \text{Kepler6b}}{15\ \text{Kepler9b}} \times \frac{4\ \text{Kepler9b}}{9\ \text{Kepler11g}} = \frac{40\ \text{Kepler10b}}{15\ \text{Kepler11g}}$$

So 15 x the diameter of Kepler 11g is equal to 40x the diameter of Kepler 10b
And so, Kepler 11g is 40/15 times the diameter of Kepler 10b

From the figure we see that Kepler 11g is 3.66 Re and Kepler 10b is 1.4 Re which is in about the same ratio as our fractions. 3.66/1.4 = 2.6 and 40/15 = 2.7.