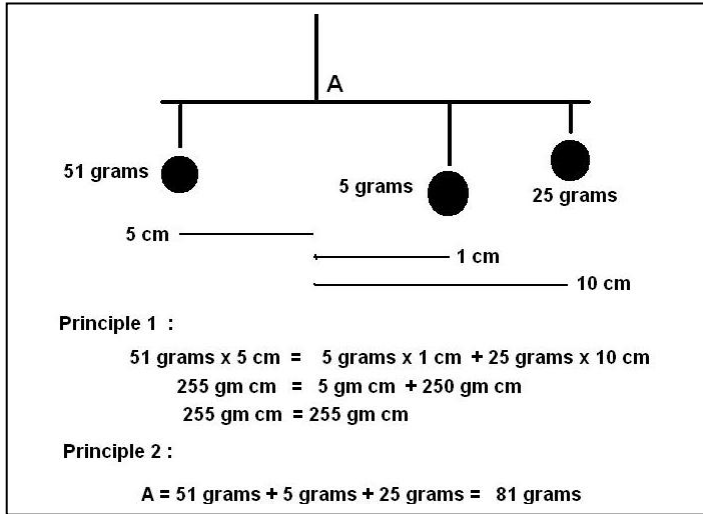# Space Mobile Puzzle

Mobiles are fun to build, but are an example of several important physical principles. The example to the left displays the two basic ones:

1 - The product of the mass x distance from the suspension point of each body must equal zero at the balance point.

2 - The mass at the balance point equals the sum of the masses on the suspended bar.

Principle 1 :

51 grams x 5 cm =   5 grams x 1 cm + 25 grams x 10 cm

255 gm cm   =   5 gm cm + 250 gm cm

255 gm cm = 255 gm cm

Principle 2 :

A = 51 grams + 5 grams + 25 grams = 81 grams

Using the above two principles, fill-in the missing numbers in the mobile below. The masses of each ball are shown by the numbers inside each circle. The lengths of each cross-bar are indicated by the corresponding numbers. Can you design more elaborate mobiles using these two principles?
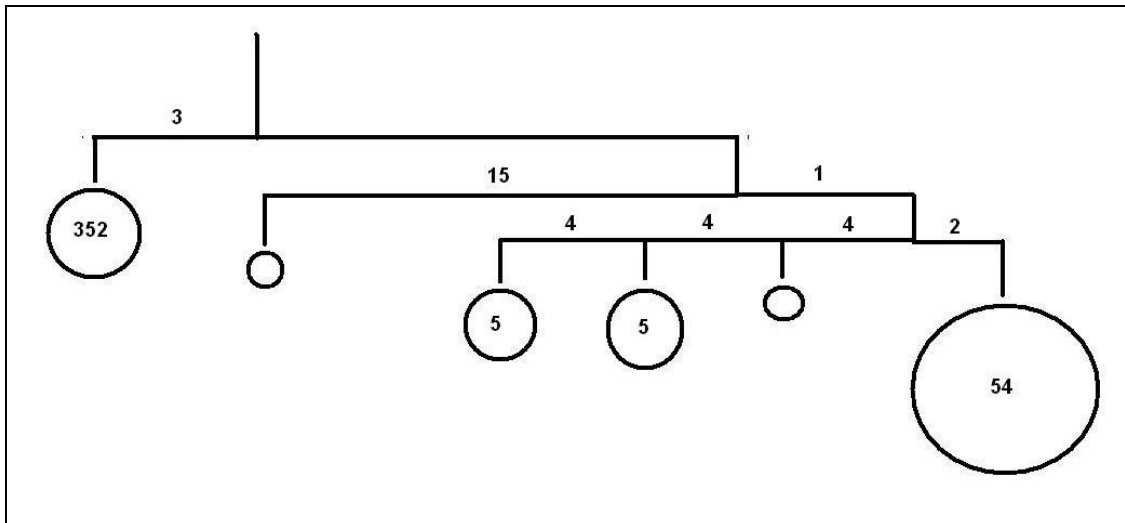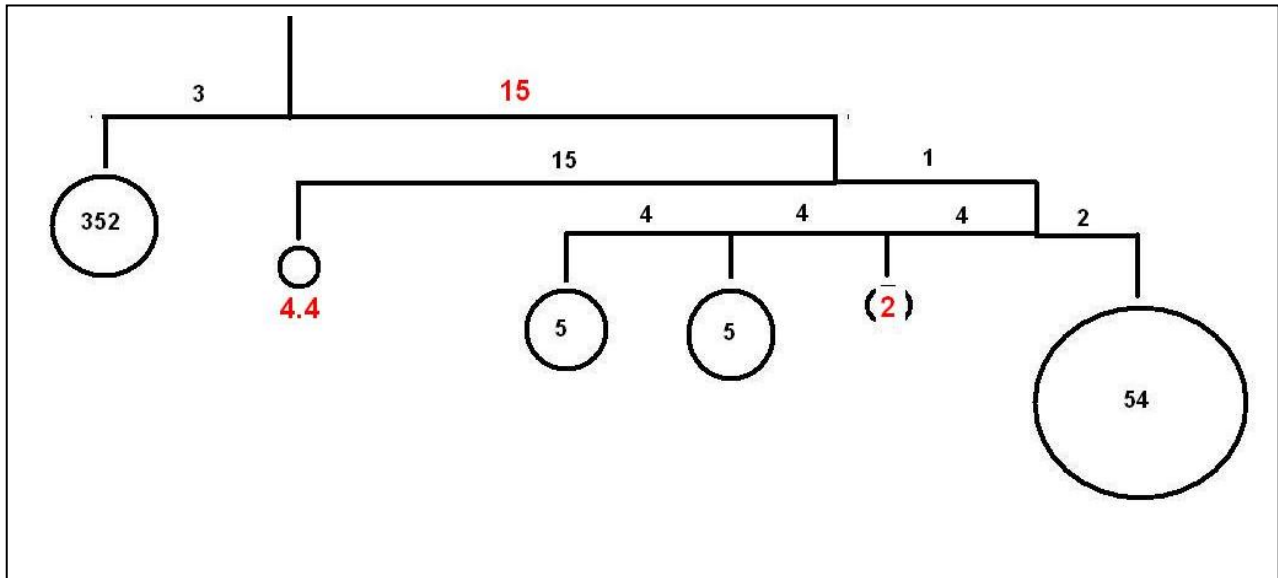
Lower Crossbar:
Principle 2:

$54 \times 2 = M \times 4 + 5 \times (4 + 4) + 5 \times (4 + 4 + 4)$

$108 = 4m + 100$

$8 = 4 M$

$2 = M$ answer:

Middle Crossbar:
Principle 1:   Total mass = $54 + 2 + 5 + 5 = 66$
Principle 2: $66 \times 1 = 15 \times M$

$66/15 = M$

$4.4 = M$ answer

Top Crossbar
Principle 1:   Total mass = $66 + 4.4 = 70.4$

Principle 2: $352 \times 3 = L \times 70.4$

$1056/70.4 = L$

$15 = L$ answer