

## Mars:

- Day/Night is 39 minutes longer than Earth's
- Temperature: 70 degrees Fahrenheit (20 degrees Celsius) or as low as about -225 degrees Fahrenheit (-153 degrees Celsius).
- Gravity  $\frac{1}{3}$  gravity
- Resources: iron, titanium, nickel, aluminum, sulfur, chlorine and calcium. Water ice, Silicon dioxide is the most common material on Mars,
- Dangers: low pressure, radiation
- Air: Will need to generate oxygen - this technology exists
- Water: Water ice exists, will need to mine and purify
- Food can be grown

## Moon

- Two week day/night cycle
- $\frac{1}{6}$  gravity
- Temperature: 250 degrees Fahrenheit (120° C), while nighttime temperatures get to a chilly -208 degrees Fahrenheit (-130° C)
- Resources: iron, titanium aluminum, calcium, and uranium,
- Dangers: Vacuum, radiation - - this technology exists
- Air: Will need to generate oxygen
- Water: Water ice exists, will need to mine and purify
- Food: can be grown

## Low Earth Orbit Space Station

- Day/night cycle 90 minutes
- Micro-gravity environment
- Temperature: 250 degrees Fahrenheit (120° C), while nighttime temperatures get to a chilly -208 degrees Fahrenheit (-130° C)
- Resources: none
- Dangers, Vacuum, radiation, micro-meteorites, physiological shifts to the human body
- Air: Can be recycled but there will be some loss over time which will need to be imported
- Water: Can be recycled but there will be some loss over time which will need to be imported
- Food: Can be grown

## Asteroid belt - Ceres

- Day/night cycle - 9.4 hours
- Gravity - 0.029 g
- Temperature: temperatures range from 200 K (-73 °C) at 2.2 AU down to 165 K (-108 °C) at 3.2 AU
- Resources: iron, nickel, iridium, palladium, platinum, gold, and magnesium, water
  - Multiple types of asteroids have been identified but the three main types would include the C-type, S-type, and M-type asteroids:

- C-type asteroids have a high abundance of water which is not currently of use for mining but could be used in an exploration effort beyond the asteroid. Mission costs could be reduced by using the available water from the asteroid. C-type asteroids also have high amounts of organic carbon, phosphorus, and other key ingredients for fertilizer which could be used to grow food.
- S-type asteroids carry little water but are more attractive because they contain numerous metals, including nickel, cobalt, and more valuable metals, such as gold, platinum, and rhodium. A small 10-meter S-type asteroid contains about 650,000 kg (1,433,000 lb) of metal with 50 kg (110 lb) in the form of rare metals like platinum and gold.
- M-type asteroids are rare but contain up to 10 times more metal than S-types.
- Dangers: Vacuum, radiation, collision, physiological shifts to the human body
- Air: Can be recycled but there will be some loss over time which will need to be imported
- Water: Water ice exists, will need to mine and purify
- Food: Can be grown