

Empire of the Rolling Spheres

A serious game by James Vestey

Empire of the Rolling Spheres

Number of players (2-6), play time (45-90 minutes), age (16+)

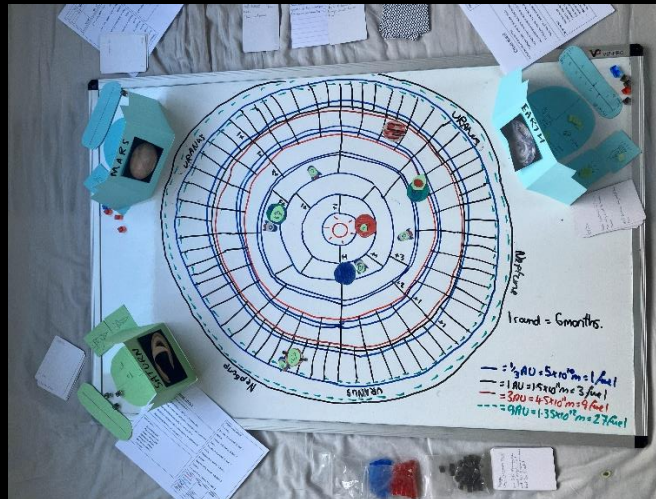
Introduction

The solar system is a vast and mysterious place; largely empty and lifeless this game reimagines the solar system we live in as one full of life and opportunity. Players will need to balance their resources and make bold moves to gain control of the board and collect the required victory points needed to win. With life accurate scales and information this game allows you to consider the complexities of interplanetary travel as you see if you have what it takes to win!

Empire of the Rolling Spheres was designed to introduce students to the science of Astrophysics, teaching them

- the true scale of the solar system and the planets within
- the properties and defining characteristics of the terrestrial and gas giant planets.

This recourse should be used to gain an initial appreciation and understanding of the topic to later build on with more complex ideas and



Game overview:

The aim of the game is to be the first player to gain 7 victory points which will be collected through playing the game. The game progresses in rounds which are broken up into phases:

1) Science phase	Here players will spend their science to increase their production of resources and to reduce the number of planet cards available for them to draw. They will then draw planet cards for each planet they have workers on.	5) Interaction phase	The sent out spaceships, which have arrived at a planet, now interact with the planet either peacefully orbiting, cooperating or invading.
2) Planet movement	The planets all move around the board by the specified number of tiles.	6) Worker allocation	workers are placed on the worker placement board so that they can collect resources at the end of the round
3) Development cards	Players may spend their resources to buy development cards.	7) Collection	players collect their resources and prepare for the next round
4) Spaceship phase	players may buy in, fill up and send out spaceships		

This repeats until a player has won.

Victory points are awarded for:

- Having workers currently on a planet (x2)
- Having workers currently on a dwarf planet/ moon (x1)
- Having workers currently on the sun mine (x1)
- Visiting point nemo (x2 for first player, x1 otherwise)
- Maximising the resource ladder (x1)

Game components

Game board

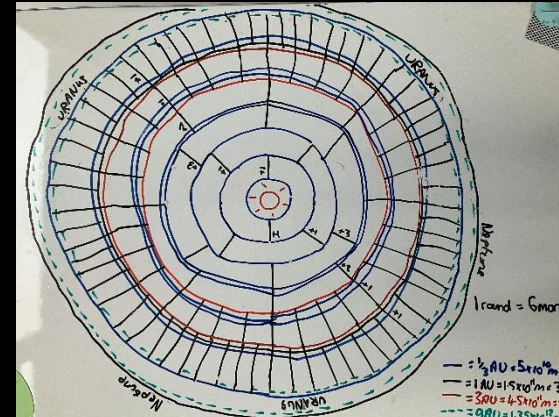
The game board shows the solar system broken down into sections:

Orbits:

Each planet lies in and is restricted to its own orbit. The order of the planets in the solar system is **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune** (Uranus and Neptune are not included in this game)

Tiles:

These are the different game tiles, planets will move around their orbits tiles by tiles.

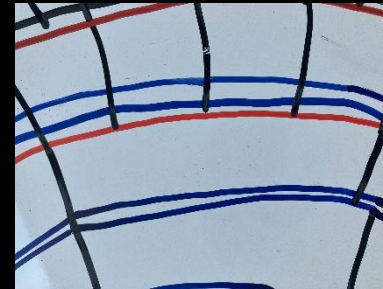


Quantity:



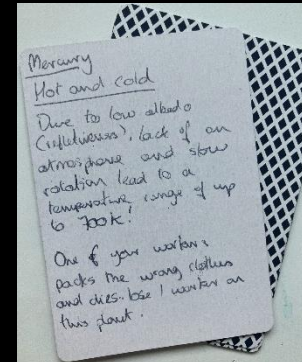
Boarders:

These are the lines between the sectors. They represent the relative distance to travel from one game tile to the next with **blue** representing one third the distance from the earth to the sun ($1/3$ AU), **black** is three times the distance of blue (1 AU) and **red** represents three times the distance of black



Planet card decks:

there are 6 decks of cards each specific to a planet which show a characteristic property of the planet and a negative consequence for the player.



X6

Resource tokens:

There are three resources in this game which the players will need to produce, manage and spend. **Metal** is the main currency for ship building and **development card** buying, **fuel** helps the player to traverse the solar system, and **science** increases the efficiency of the players actions.



3x40

Planet tokens:

These are markers to be placed onto the board to show the position of the planets throughout the game.



X6

Cheet sheets:

These are sheets showing an overview of a game round as well as other useful information

Cheat sheet

Victory points are awarded for:

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- Having workers currently on a dwarf planet/ moon (x1)
- Having workers currently on the sun mine (x1)
- Visiting point nemo (x2 for first player, x1 otherwise)
- Maximising the resource ladder (x1)

1st to 7 wins

Round order:

- Science phase – invest, planet cards
- Planet movement
- Development card
- Spaceship phase – filling and sending spaceships
- Interaction phase – conflicts in turn order
- Worker allocation – remember phase 1
- collection

Planet production:

Mercury
People: 3-6, metal: 3, fuel: 1

Venus
People: 3-9, metal: 2, fuel: 1

Earth
People: 4-9, metal: 1, fuel: 1

Mars
People: 3-8, metal: 1, fuel:1

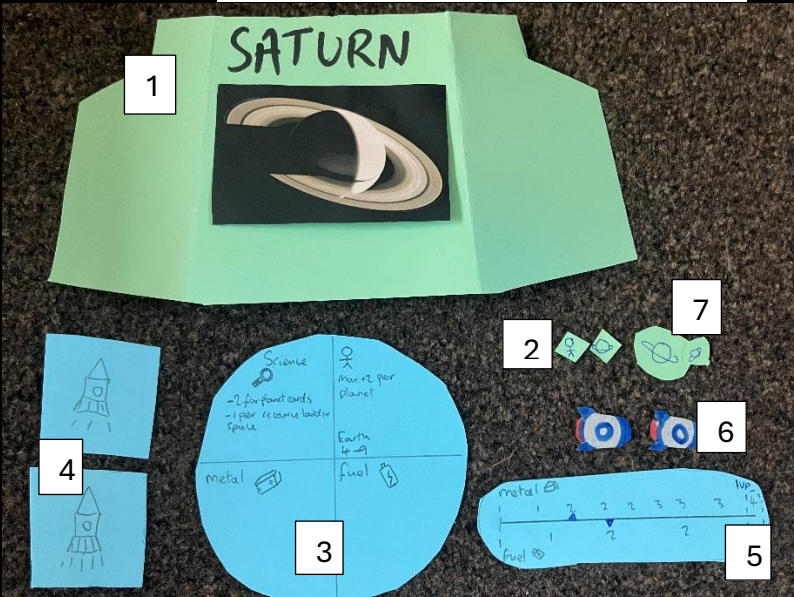
Jupiter
People: 6-13, metal: 1/3, fuel: 3

Saturn
People: 5-12, metal: 1/3, fuel: 3

Player 1 (native) >	Coop	attack
Player two (ship) <		
Orbit	Orbit	+1
Coop	Cooperate	+1
attack	+1	+1

X6

Player sets:



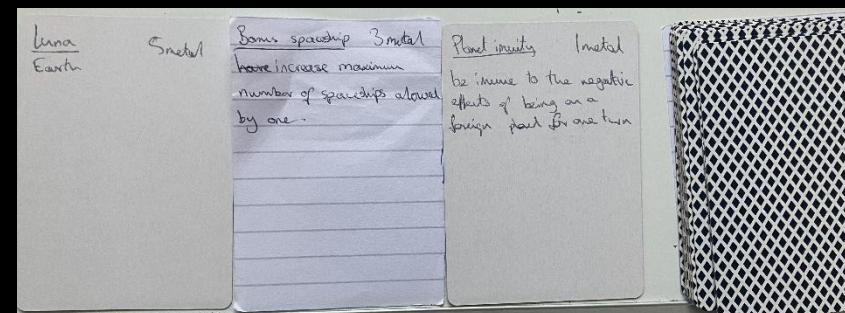
X6

1) Player shield:

This has the players' starting home planet on the front and some useful gameplay tips and planet facts on the back. This is to help players hide their resources and actions.

X6

2) Workers:	These are how players gain resources and interact with other players. They are not Specialised to a player but rather to a planet planet.	6x30
3) Worker Placement Board	During the correct phase of the game workers are placed onto one of the four sections of this board: science, worker, metal or fuel, to create new resources. This is where workers are assigned to create new resources. The character section shows the starting and maximum capacity of the planet.	X6
4) Spaceship Assignment Marker	These are used to keep track of workers assigned to ships	x14
5) Resource Ladder	This is used to keep track of the production of each resource per worker for your home planet. The initial value is the starting production .	X6
6) Spaceships Also referred to as ships	This is how a player moves their workers through space	X14
7) Race trackers (big and small)	The larger race tracker is used to show the home planet of your race while the smaller trackers are used to show where your race has workers (eg on a ship or on a different planet)	X6 and x42
Numbered card deck	These cards are used to discretely share information with another player	
Development card deck	These are cards available to the player to help them throughout the game. There are various benefits and rewards given to the player by owning different cards	



Setup

Each player chooses a home planet and collects the matching player set. Players shuffle the planet cards and arrange their pieces as shown.

Workers must be accessible to all players. Each player then places their planet piece on the closest section to themselves within the planets' orbit. Then, shuffle the development cards and place them face down next to the board. Turn over the top three cards. Finally, chose a starting player for the round. Players start with the starting numbers of workers as well as the starting production for each resource (rounded down) (the first number on the resource ladders and the smaller number on the worker section of the worker assignment board)



1). Science phase:

In this phase players take turns around the circle to spend their science resource. This can be done in a couple of ways:

- You may use science to increase your production of one of metal or fuel by one space per science, as shown on the resource ladder, this may not always result in an increase in production but will overall be useful. Completion of both of these two ladders gains the player a victory point.
- You may pay two science to permanently remove one planet card from circulation for your home planet permanently.

Planet cards

These are unique cards given to each player which contain information on the properties of the planet they're on. Each card has a negative drawback which will either remove resources from the player or prevent them from completing an action that turn on the planet that they have drawn the card from.

Each player will draw one card for (1) their **home planet** and (2) any **other planet** they have workers on in this phase. Each card affects the workers on that planet only. If an alliance is formed, the allied player draws from the same deck as the native player, otherwise draw a card from the full deck from this planet.

If a player has invested science into removing a planet card from circulation on their home planet, then when drawing cards they set this card aside.

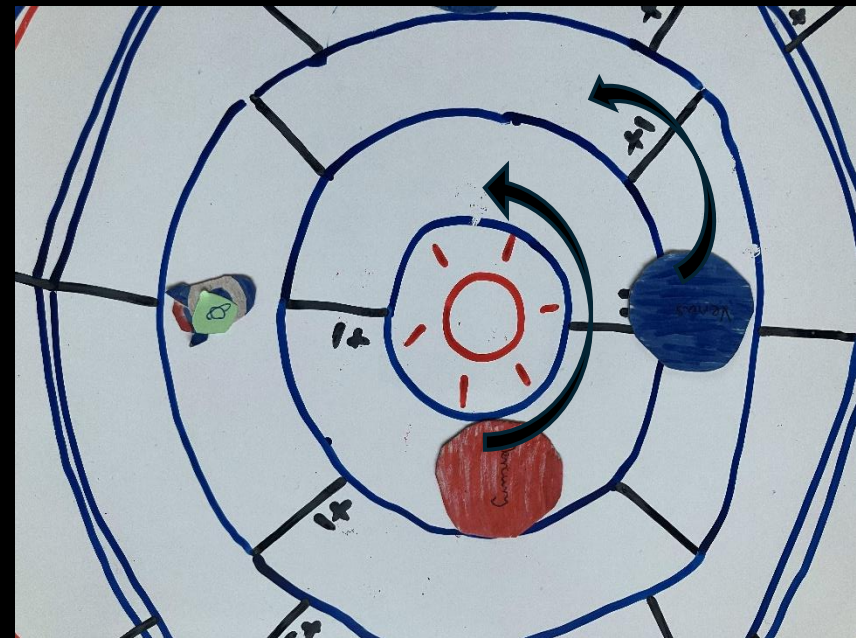
A player may remove all cards from their deck.

Skip this phase on the first round

2). Planet movement:

In this phase planets are moved by the amount specified on the game board in an anticlockwise direction (this is arbitrary). This movement of the planets represents a 6 month period.

Mercury and Venus both rotate more than one whole rotation but for simplicity they only need to be moved one section. Dwarf planets and moons follow their host planet.



Rockets

Rockets do not rotate with the planets unless they have been specified to be in orbit around the planet.

Any rocket within the path of a planet can choose whether to join the planet and move around the board with the planet. Since Mercury and Venus complete more than one whole rotation, a rocket anywhere within the orbit of these planets may choose to join the planet during this stage regardless of whether the planet token moved across a tile the rocket was in or not.

Skip this phase on the first round.

3). Development card phase:

Development cards are useful to get the upper hand on players, gain information, gain access to resources or to gain new settlement opportunities which can grant victory points.

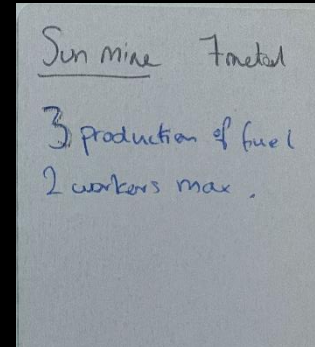
Players (in turn order) will use their resources to buy development cards from the three face up cards. Once a card is bought, the top card from the deck immediately replaces it. There is no limit to the number of cards a player may buy in a round or hold in their hand, however, once a player has stated they are finished buying cards they are unable to buy any new cards that round.

Cards may be used at any (appropriate) point in the game.

Most cards explain their workings themselves but two types of card require further rules:

Sun mine

This unique card allows the player in possession to build the sun mine! This is a settlement on the sun tile with space for two workers which produce fuel at a rate of 3 per worker. The player currently occupying the sun mine gets a victory point for as long as they hold the position. The sun mine may be taken over by a different player once it has been built.



Dwarf planets and major moons

These are cards which give the owner access to settle the specified body shown on the card. The card specifies the location that it may be found.

The player in possession of the card must travel to the location to play the card. Once played this behaves as a small planet.

The maximum number of workers allowed on the dwarf planet/moon is the **starting number** of workers on the planet which it is closest to and workers on the planet produce resources at the **starting rate** of the planet which the body is closest to.

Dwarf planets/ moons are unable to be researched by science.

They also cannot be invaded while the player occupying it still has a home planet



Once a player leaves their home planet they're able to turn a dwarf planet/moon into a planet to become their home planet (this is because the definition of a planet isn't rigorous). The dwarf planet or moon inherits the properties of the planet which it is closest to.

Players have to draw planet cards from the deck of the planet it is closest to and are able to use science to upgrade their production and remove planet cards as before.

The science the player has invested already into resource production transfers over, however, science invested into removing planet cards does not transfer. Signify the ownership of the dwarf planet/ moon with a small race tracker and upgrade this to a large race tracker if it is used as a players' home location.



4). Spaceship phase

Players have the option of sending out their spaceships into the solar system. Each player (unless otherwise stated) can have a maximum of two spaceships on the board at any one time. Spaceships are bought onto the board at a price of **two metal per spaceship**.

Once a player has bought a spaceship, they place it next to one of the planets where they have workers and use a small race tracker to show ownership. Workers may now be placed onto the ship from the planet it is in orbit around (a minimum of one worker is required per ship at all times) which are represented by placing them on the spaceship assignment tiles. There is not a maximum limit to the number of workers allowed on a ship at any point.

Workers can freely move between an orbiting ship and the planet below, during this phase, if you have workers on the planet already and it doesn't exceed the maximum planet occupancy at any time.

Once all workers have been allocated to their spaceships a player may move the ship. This costs fuel (one fuel per blue line crossed, three per black and 9 per red). Players may move their ship part, or the full way to their destination in a single turn. Once the start player for the round has allocated all workers and moved all ships to the desired location the second player does the same.

Workers are unable to move between planets or ships without being transported, however, resources can be moved freely.

(for example, for mercury to get an army large enough to be sure to invade a fully populated Jupiter they would need to keep a spaceship in orbit around mercury and keep transferring workers over a series of rounds onto the ship to avoid exceeding the planet cap of mercury)

5). Interaction

If there are ships which have arrived at a planet controlled by another player, the ship (Alice) must interact with the player on the planet (Bob). This goes in player order, starting with the start player of the round who completes all of their interactions in any order they choose before moving on to the next player in the playing order.

There are three possible outcomes of an interaction:

Orbit

This means that the ship follows the planet on its course, no battle is fought and Alice (the ship owner) orbiting the planet gains access to the information of the number of workers on the planet and also the number of workers on any ship sent from the planet.



Cooperate

This means that the Alice can place workers onto the planet without causing a conflict. Alice is able to use these workers to gain resources on the following rounds but is restricted to the starting production rate of the new planet. Each round Alice draws a card from the same deck as Bob. Both players gain an additional two science as a one-time bonus and both players contribute to the planet maximum worker count. Alice may move some or all of their workers in the ship onto the surface of the planet. If the ship is fully evacuated, it returns to Alice (the two metal cost isn't refunded). Alice's workers on the new planet are represented by workers from this new planet and so are swapped out. This is to help keep track of the location of each player's workers.

There are a maximum of two players on any one planet.

Invasion

This means that one or both players has instigated a conflict. Alice and Bob then secretly assign a number of workers to battle as well as any bonuses they wish to apply to the battle. All workers assigned to fight will perish regardless of the outcome of the battle.

The player who commits the largest number of workers wins (the planet based player (Bob) wins in the event of a draw)

Outcome 1

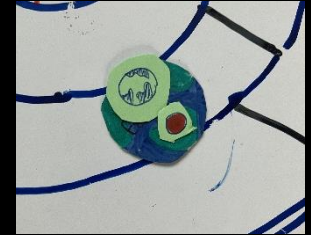
If Alice loses, then their whole ship is destroyed along with any workers in the ship and in the battle.

If Bob wins then they lose the workers assigned to the battle but nothing else.

Outcome 2

If Alice wins then they're able to place workers onto the planet and use them to produce resources on the following round. Each round they draw a card from the complete planet deck of this planet and they produce resources at the starting rate of the planet and are unable to upgrade this. This player conducts any further interactions with this planet while it still has workers here. They are bound by the planet limit for number of workers.

If Bob loses then all workers assigned to the battle are lost but any remaining workers go 'underground'. Underground workers produce resources at half the rate of normal but **do not** contribute to the planet maximum worker capacity from the other player but form their own



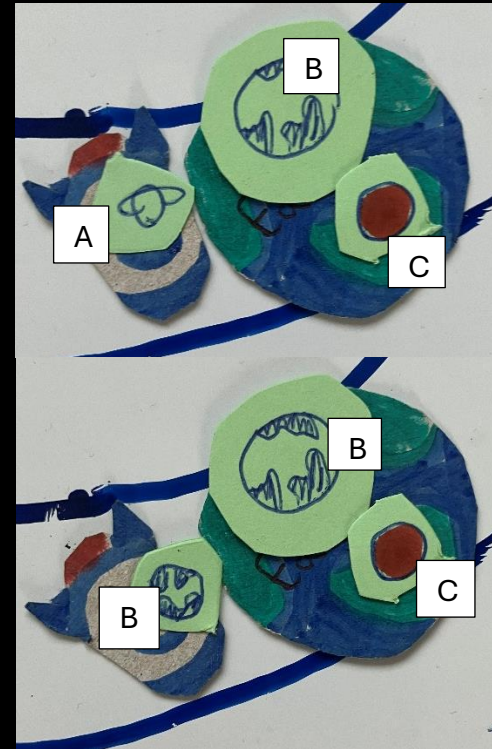
This is equivalent to Alice having two home worlds, except that they may not use science to upgrade resource production

For example mercury
could hold 8 workers
from the invader and
8 underground
workers.

underground planet capacity. Bob now has access to all hidden information from Alice which they can use or sell to their advantage.

If two players have cooperated on a planet (Bob and Charlie) then Charlie, who is non-native to the planet, may contribute workers to the fight. This is done after Bob has locked in the number of workers they are contributing. If Alice successfully invades the planet then Charlie loses all remaining workers on the planet and is removed.

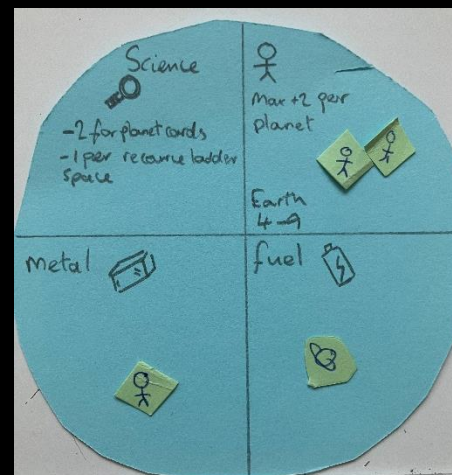
A player on the planet cannot interact with another player on the planet. To remove the other player they must place workers in a ship orbiting this planet in the spaceship phase and continue as normal.



Having workers on a planet grants the player 2 victory points per planet. At the end of this phase if a player has reached the total number of victory points required then they win the game. In the event of a tie the first player to have done so (In the round order) wins.

6). Worker allocations

Workers on a planet are now put to work. Each worker may be assigned to produce one of the resources on the worker placement board. Workers produce resources at the rate specified by the planet the worker is on. A player may produce a maximum of two workers on each planet that they have workers on (up to the planet worker maximum). The native player gets the first decision of how many workers to produce on their planet in the event of a cooperation. It is the native player's responsibility to ensure that the total number of workers doesn't exceed the maximum.



This player gains 2 workers on earth, gains 1 metal and 3 fuel from the Saturn worker

7). Collection

Resources are collected

Point nemo: this is a fictional location (based on a place on earth) which is opposite Saturn in its orbit. This is included to encourage exploration and movement of players.

Adaptations:

For a two player game play to 10 victory points and it is recommended to start as Earth and Mars. For fewer than 6 players it's recommended to not choose Saturn as a home planet for any player. To shorten the game resource production is automatically maximised for each planet.

Notes for teachers:

This game can be adapted to suit different learning outcomes and for different levels if needed.

- To use this game as a revision tool or to achieve more levels of learning (Bloom's taxonomy) students can write their own planet and development cards.
- To teach or ensure knowledge of angular momentum ships must obey conservation of angular momentum and vectors of ships must be worked out before moving them.