The orbital laboratory offers the following options:

Destroy the egg

There is a 35% probability of developing an unknown, aggressive animal species that could threaten the entire human population, reproduce uncontrollably and transmit unknown diseases. There is 100% certainty that the species will not be discovered.

Grow the creature in the lab

Scientists offer a plan to grow the creature in a controlled way. It will be placed in the lab for observation and experimentation (e.g. exposure to radiation and various chemicals) until it becomes too large and dangerous. After that, the creature will be killed and dissected. There is a risk of the security system failure, the creature escaping and spreading its species to the Galaxy (estimated at 1 %). There is a high probability of gaining valuable knowledge (e.g. new biotechnologies, drugs, etc.)

Capture the creature

The option of building a heavily guarded facility where the creature will be held for the rest of its life. It will not come into contact with other creatures, and therefore will not be able to reproduce. The probability of lab security failure is less than 3%.

Release the creature on a planet with a suitable ecosystem

A planet with acceptable living conditions for these creatures will be chosen. Inhabitants of the planet will be evacuated in advance and compensated. The creatures will be observed there and will be allowed to reproduce in a controlled manner. There is a risk of them being spread into the Galaxy, e.g. by smugglers (40 % probability).

Freedom

After hatching out and being explored, the creature will be released on a suitable planet without evacuating the humans first, so that it has an evolutionarily fair chance of survival. This option includes all the risks mentioned before.

ENGINEERS – tutorial

Engineers control the ship's reactor. The reactor's fuel is dark matter (DM), and it also needs a modulator (MO) and control rods (CR). The interaction of these three components at any given time is always unique and can be expressed by using the propositional logic.

At the moment, the reactor is set up as follows:

$$(DM \wedge CR) \Leftrightarrow (MO \vee CR)$$

You need to find out how efficient the reactor is (%), and then adjust the ship's systems accordingly.

The efficiency of the reactor is given by the ratio of positive results (1) to all results.

The reactor displayed the following values:

DM	CR	MO	DM ∧ CR	MO ∨ CR	(DM∧CR) ⇔ (MO ∨CR)
0	0	0	0	0	1
0	0	1	0	1	0
0	1	0	0	1	0
0	1	1	0	1	0
1	0	0	0	0	1
1	0	1	0	1	0
1	1	0	1	1	1
1	1	1	1	1	1

Overall result: The entire proposition is true in 4 out of 8 cases, which means that the reactor is 50 % efficient.

ENGINEERS – situation 1

Engineers control the ship's reactor. The reactor's fuel is dark matter (DM), and it also needs a modulator (MO) and control rods (CR). The interaction of these three components at any given time is always unique and can be expressed by using the propositional logic.

At the moment, the reactor is set up as follows:

$$(CR \Leftrightarrow MO) \wedge (\neg DM \vee MO)$$

You need to find out how efficient the reactor is (%), and then adjust the ship's systems accordingly.

The efficiency of the reactor is given by the ratio of positive results (1) to all results.

The reactor displayed the following values:

DM	CR	MO	¬DM	CR ⇔ MO	¬DM ∨ MO	(CR ⇔ MO) ∧ (¬DM ∨ MO)
0	0	0				
0	0	1				
0	1	0				
0	1	1				
1	0	0				
1	0	1				
1	1	0				
1	1	1				

ENGINEERS – situation 3

Engineers control the ship's reactor. The reactor's fuel is dark matter (DM), and it also needs a modulator (MO) and control rods (CR). The interaction of these three components at any given time is always unique and can be expressed by using the propositional logic.

At the moment, the reactor is set up as follows:

$$\neg(MO \lor DM) \Leftrightarrow (DM \lor CR)$$

You need to find out how efficient the reactor is (%), and then adjust the ship's systems accordingly.

The efficiency of the reactor is given by the ratio of positive results (1) to all results.

The reactor displayed the following values:

DM	CR	MO	$MO \lor DM$	$\neg(MO \lor DM)$	$DM \lor CR$	$\neg(MO \lor DM) \Leftrightarrow (DM \lor CR)$
0	0	0				
0	0	1				
0	1	0				
0	1	1				
1	0	0				
1	0	1				
1	1	0				
1	1	1				

ENGINEERS – situation 4

Engineers control the ship's reactor. The reactor's fuel is dark matter (DM), and it also needs a modulator (MO) and control rods (CR). The interaction of these three components at any given time is always unique and can be expressed by using the propositional logic.

At the moment, the reactor is set up as follows:

$$(MO \Rightarrow CR) \land (DM \lor MO)$$

You need to find out how efficient the reactor is (%), and then adjust the ship's systems accordingly.

The efficiency of the reactor is given by the ratio of positive results (1) to all results.

The reactor displayed the following values:

DM	CR	MO	MO ⇒ CR	DM ∨ MO	(MO ⇒ CR) ∧ (DM ∨ MO)
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

ENGINEERS – situation 5

Engineers control the ship's reactor. The reactor's fuel is dark matter (DM), and it also needs a modulator (MO) and control rods (CR). The interaction of these three components at any given time is always unique and can be expressed by using the propositional logic.

At the moment, the reactor is set up as follows:

$$(MO \Leftrightarrow \neg CR) \vee (DM \Leftrightarrow CR)$$

You need to find out how efficient the reactor is (%), and then adjust the ship's systems accordingly.

The efficiency of the reactor is given by the ratio of positive results (1) to all results.

The reactor displayed the following values:

DM	CR	MO	¬ CR	MO ⇔ ¬ CR	DM ⇔ CR	(MO ⇔ ¬CR) ∨ (DM⇔CR)
0	0	0				
0	0	1				
0	1	0				
0	1	1				
1	0	0				
1	0	1				
1	1	0				
1	1	1				

EXPLORERS – situation 1

There is an unknown object near the ship. It may be a dangerous meteorite or a valuable resource. The shooters are now sending a drone to the object. Your task is to use the detectors to find out what it is. We get two pieces of information from the detectors. The Alpha detector tells us whether the object is a danger or a valuable resource. We get the Alpha value by calculating the probability that the "aimed" and "target" phenomena occur at the same time, that is, the probability of the ratio of aimed and transmitted signals multiplied by the probability of the ratio of "target" to transmitted signals.

Alpha signal scale

< 25 % Danger	25-75 % valuable resource	> 75 % Danger

We will verify the reliability of the signal from the Alpha detector by using the Beta detector. If Beta shows a signal in the range of 20-65, it means that the Alpha detector is wrong (a resource is a danger and vice versa).

Beta signal scale

< 20 % Alpha is correct	20-65 % Alpha is incorrect	> 65 % Alpha is correct

Recorded Alpha signal

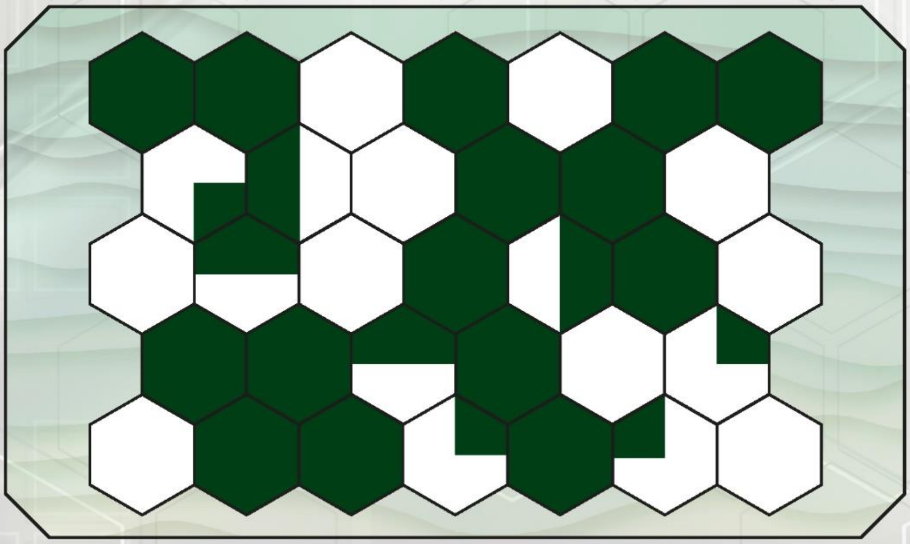
Out of 1200 signals transmitted from the Alpha detector, the following reflections came back:

Aimed	750
Interference	360
Target	445

The probability of "aimed" reflections being also " target" reflections gives us the value of the Alpha signal, which must be checked on the Alpha signal scale.

Recorded Beta signal

The value of the Beta signal is the ratio of the white area of the picture to the whole area of the picture.



EXPLORERS – situation 2

There is an unknown object near the ship. It may be a dangerous meteorite or a valuable resource. The shooters are now sending a drone to the object. Your task is to use the detectors to find out what it is. We get two pieces of information from the detectors. The Alpha detector tells us whether the object is a danger or a valuable resource. We get the Alpha value by calculating the probability that the "aimed" and "target" phenomena occur at the same time, that is, the probability of the ratio of aimed and transmitted signals multiplied by the probability of the ratio of "target" to transmitted signals.

Alpha signal scale

< 25 % Danger	25-75 % valuable resource	> 75 % Danger

We will verify the reliability of the signal from the Alpha detector by using the Beta detector. If Beta shows a signal in the range of 20-65, it means that the Alpha detector is wrong (a resource is a danger and vice versa).

Beta signal scale

< 20 % Alpha is correct	20-65 % Alpha is incorrect	> 65 % Alpha is correct

Recorded Alpha signal

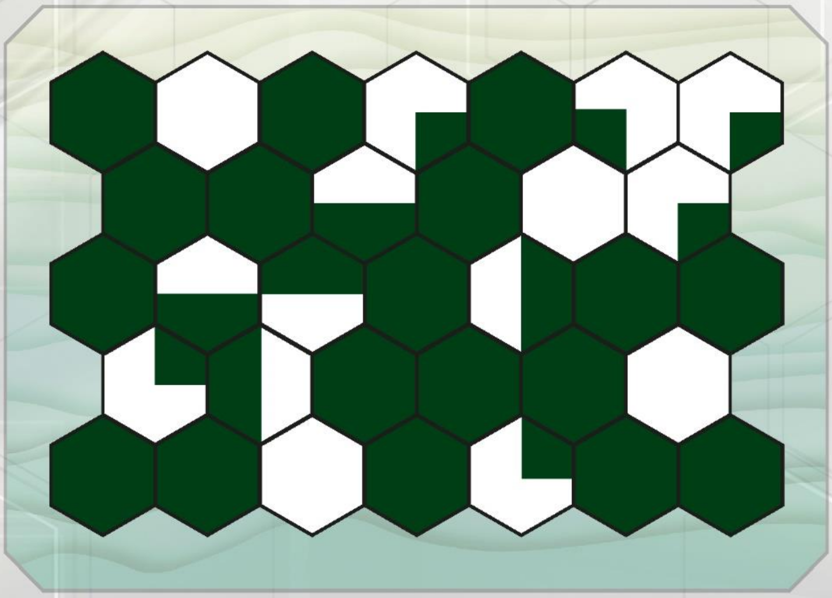
Out of 1200 signals transmitted from the Alpha detector, the following reflections came back:

Aimed	1900
Interference	200
Target	1800

The probability of "aimed" reflections being also " target" reflections gives us the value of the Alpha signal, which must be checked on the Alpha signal scale.

Recorded Beta signal

The value of the Beta signal is the ratio of the white area of the picture to the whole area of the picture.



EXPLORERS – situation 3

There is an unknown object near the ship. It may be a dangerous meteorite or a valuable resource. The shooters are now sending a drone to the object. Your task is to use the detectors to find out what it is. We get two pieces of information from the detectors. The Alpha detector tells us whether the object is a danger or a valuable resource. We get the Alpha value by calculating the probability that the "aimed" and "target" phenomena occur at the same time, that is, the probability of the ratio of aimed and transmitted signals multiplied by the probability of the ratio of "target" to transmitted signals.

Alpha signal scale

< 25 % Danger	25-75 % valuable resource	> 75 % Danger

We will verify the reliability of the signal from the Alpha detector by using the Beta detector. If Beta shows a signal in the range of 20-65, it means that the Alpha detector is wrong (a resource is a danger and vice versa).

Beta signal scale

< 20 % Alpha is correct	20-65 % Alpha is incorrect	> 65 % Alpha is correct

Recorded Alpha signal

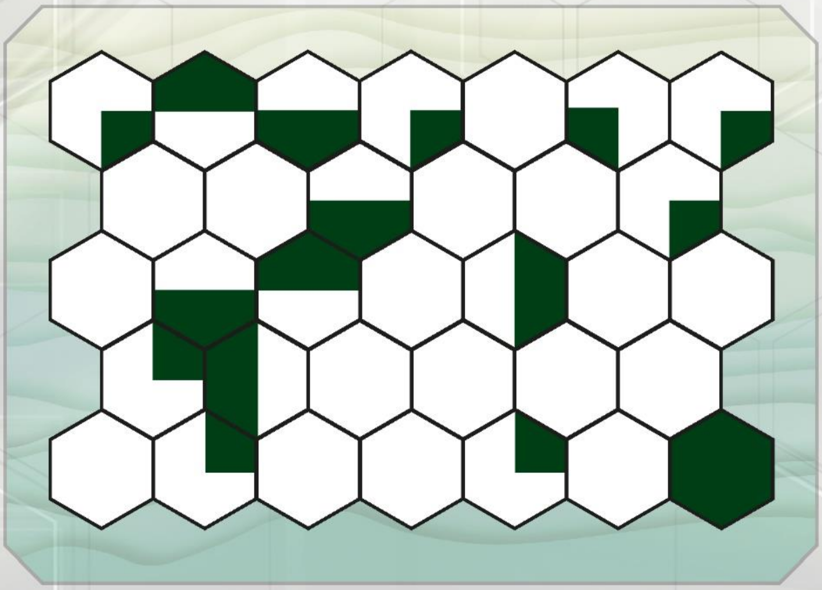
Out of 1200 signals transmitted from the Alpha detector, the following reflections came back:

Aimed	630
Interference	115
Target	420

The probability of "aimed" reflections being also " target" reflections gives us the value of the Alpha signal, which must be checked on the Alpha signal scale.

Recorded Beta signal

The value of the Beta signal is the ratio of the white area of the picture to the whole area of the picture.



EXPLORERS – situation 4

There is an unknown object near the ship. It may be a dangerous meteorite or a valuable resource. The shooters are now sending a drone to the object. Your task is to use the detectors to find out what it is. We get two pieces of information from the detectors. The Alpha detector tells us whether the object is a danger or a valuable resource. We get the Alpha value by calculating the probability that the "aimed" and "target" phenomena occur at the same time, that is, the probability of the ratio of aimed and transmitted signals multiplied by the probability of the ratio of "target" to transmitted signals.

Alpha signal scale

< 25 % Danger	25-75 % valuable resource	> 75 % Danger

We will verify the reliability of the signal from the Alpha detector by using the Beta detector. If Beta shows a signal in the range of 20-65, it means that the Alpha detector is wrong (a resource is a danger and vice versa).

Beta signal scale

< 20 % Alpha is correct	20-65 % Alpha is incorrect	> 65 % Alpha is correct

Recorded Alpha signal

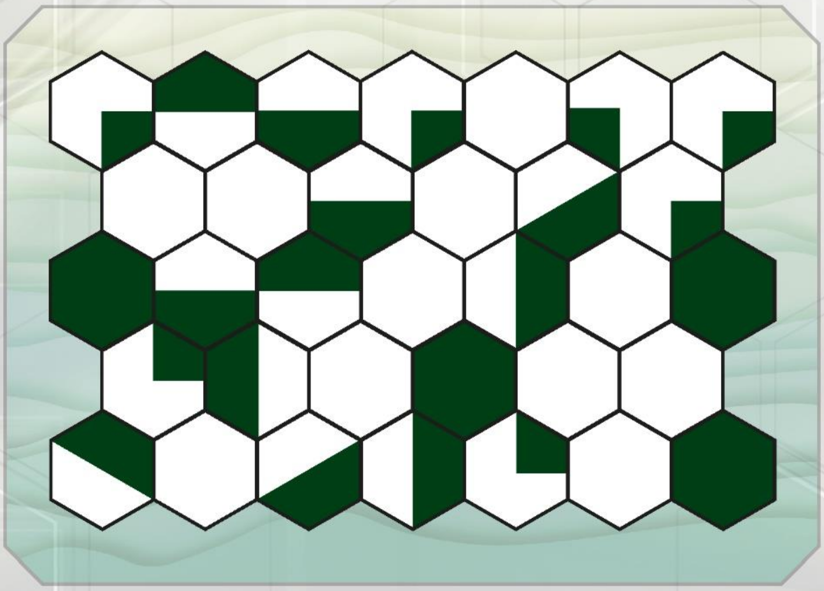
Out of 1200 signals transmitted from the Alpha detector, the following reflections came back:

Aimed	1440
Interference	1050
Target	550

The probability of "aimed" reflections being also " target" reflections gives us the value of the Alpha signal, which must be checked on the Alpha signal scale.

Recorded Beta signal

The value of the Beta signal is the ratio of the white area of the picture to the whole area of the picture.



EXPLORERS – situation 5

There is an unknown object near the ship. It may be a dangerous meteorite or a valuable resource. The shooters are now sending a drone to the object. Your task is to use the detectors to find out what it is. We get two pieces of information from the detectors. The Alpha detector tells us whether the object is a danger or a valuable resource. We get the Alpha value by calculating the probability that the "aimed" and "target" phenomena occur at the same time, that is, the probability of the ratio of aimed and transmitted signals multiplied by the probability of the ratio of "target" to transmitted signals.

Alpha signal scale

< 25 % Danger	25-75 % valuable resource	> 75 % Danger

We will verify the reliability of the signal from the Alpha detector by using the Beta detector. If Beta shows a signal in the range of 20-65, it means that the Alpha detector is wrong (a resource is a danger and vice versa).

Beta signal scale

< 20 % Alpha is correct	20-65 % Alpha is incorrect	> 65 % Alpha is correct

Recorded Alpha signal

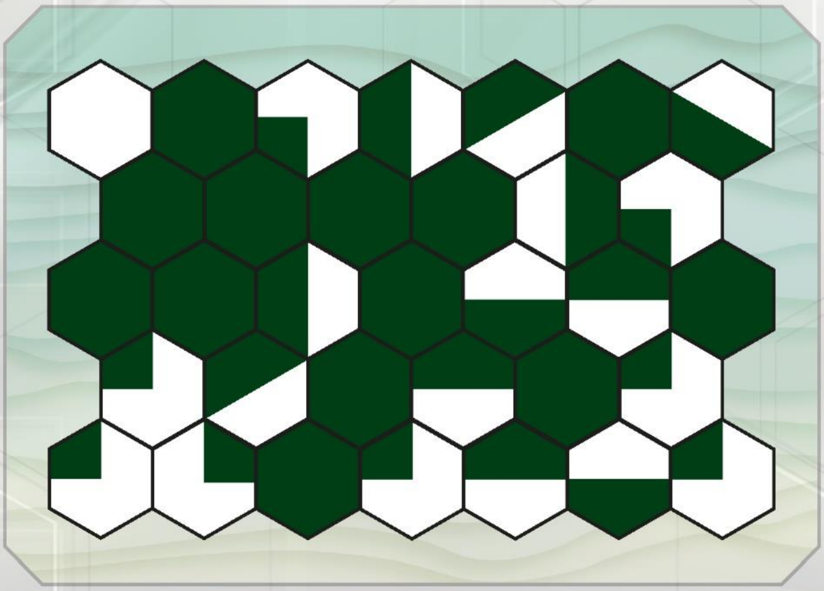
Out of 1200 signals transmitted from the Alpha detector, the following reflections came back:

Aimed	1220
Interference	305
Target	980

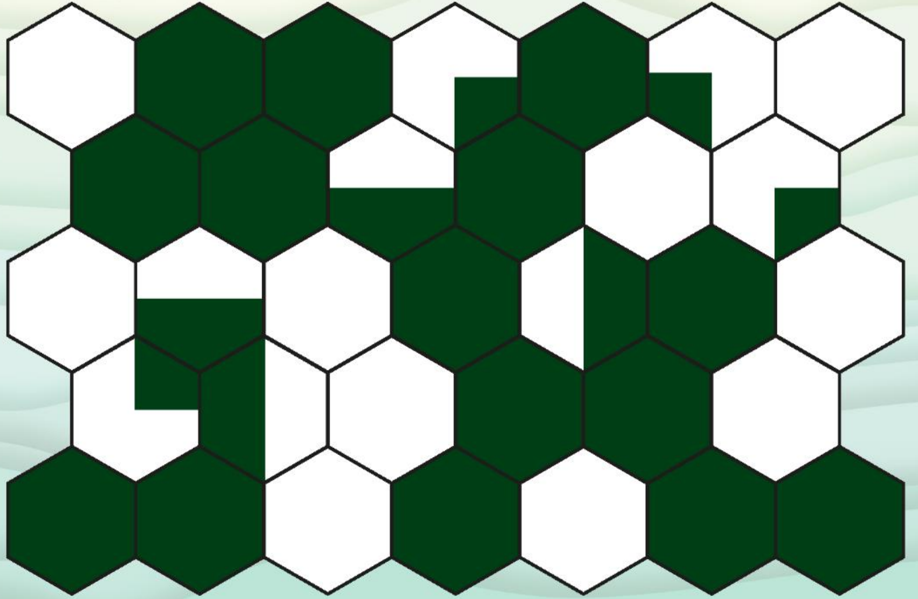
The probability of "aimed" reflections being also " target" reflections gives us the value of the Alpha signal, which must be checked on the Alpha signal scale.

Recorded Beta signal

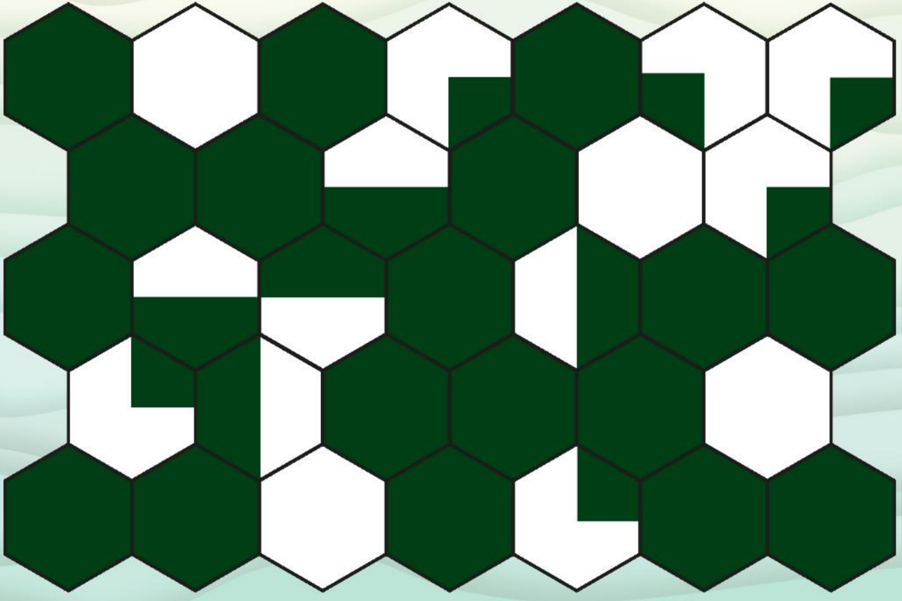
The value of the Beta signal is the ratio of the white area of the picture to the whole area of the picture.



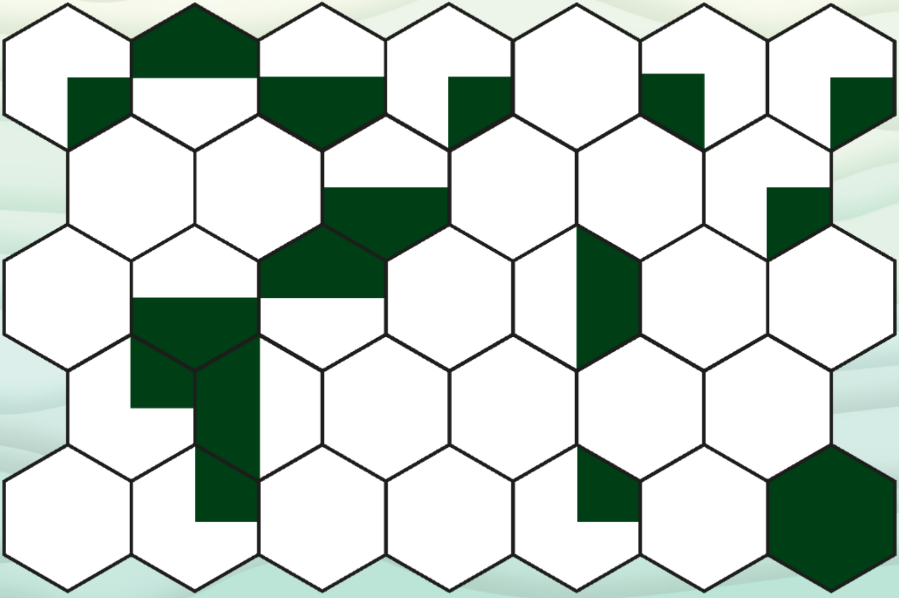
Explorers – situation 1



Explorers – situation 2



Explorers – situation 3



EXPLORERS – tutorial

There is an unknown object near the ship. It may be a dangerous meteorite or a valuable resource. The shooters are now sending a drone to the object. Your task is to use the detectors to find out what it is. We get two pieces of information from the detectors. The Alpha detector tells us whether the object is a danger or a valuable resource. We get the Alpha value by calculating the probability that the "aimed" and "target" phenomena occur at the same time, that is, the probability of the ratio of aimed and transmitted signals multiplied by the probability of the ratio of "target" to transmitted signals.

Alpha signal scale

< 25 % Danger	25-75 % valuable resource	> 75 % Danger

We will verify the reliability of the signal from the Alpha detector by using the Beta detector. If Beta shows a signal in the range of 20-65, it means that the Alpha detector is wrong (a resource is a danger and vice versa).

Beta signal scale

< 20 % Alpha is correct	20-65 % Alpha is incorrect	> 65 % Alpha is correct

Step-by-step solution – signal Alpha

Out of 1000 signals transmitted from the Alpha detector, the following reflections came back:

Aimed	530
Interference	325
Target	420

The probability of "aimed" reflections being also " target" reflections gives us the value of the Alpha signal, which must be checked on the Alpha signal scale.

The probability of “aimed” is 530/1000 = 0,53 → 53 % (the number of “aimed” reflections divided by the total number of reflections)

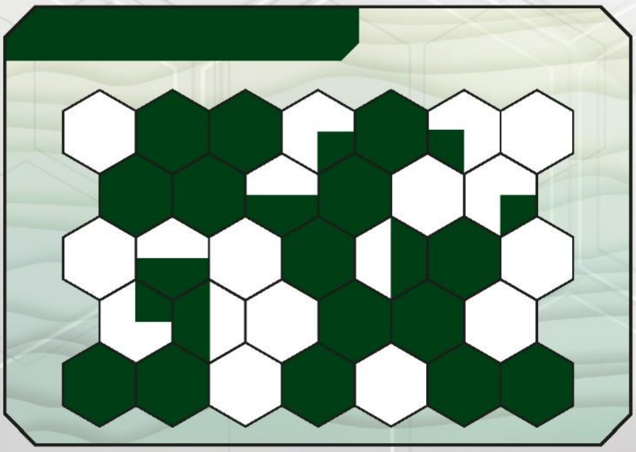
The probability of “target” is 420/1000 = 0,42 → 42 %

The probability of these phenomena occurring at the same time is 0.42 x 0.53, which equals 0,2226 → 22,26 %.

The result: signal Alpha = 22,26 %

Step-by-step solution – signal Beta

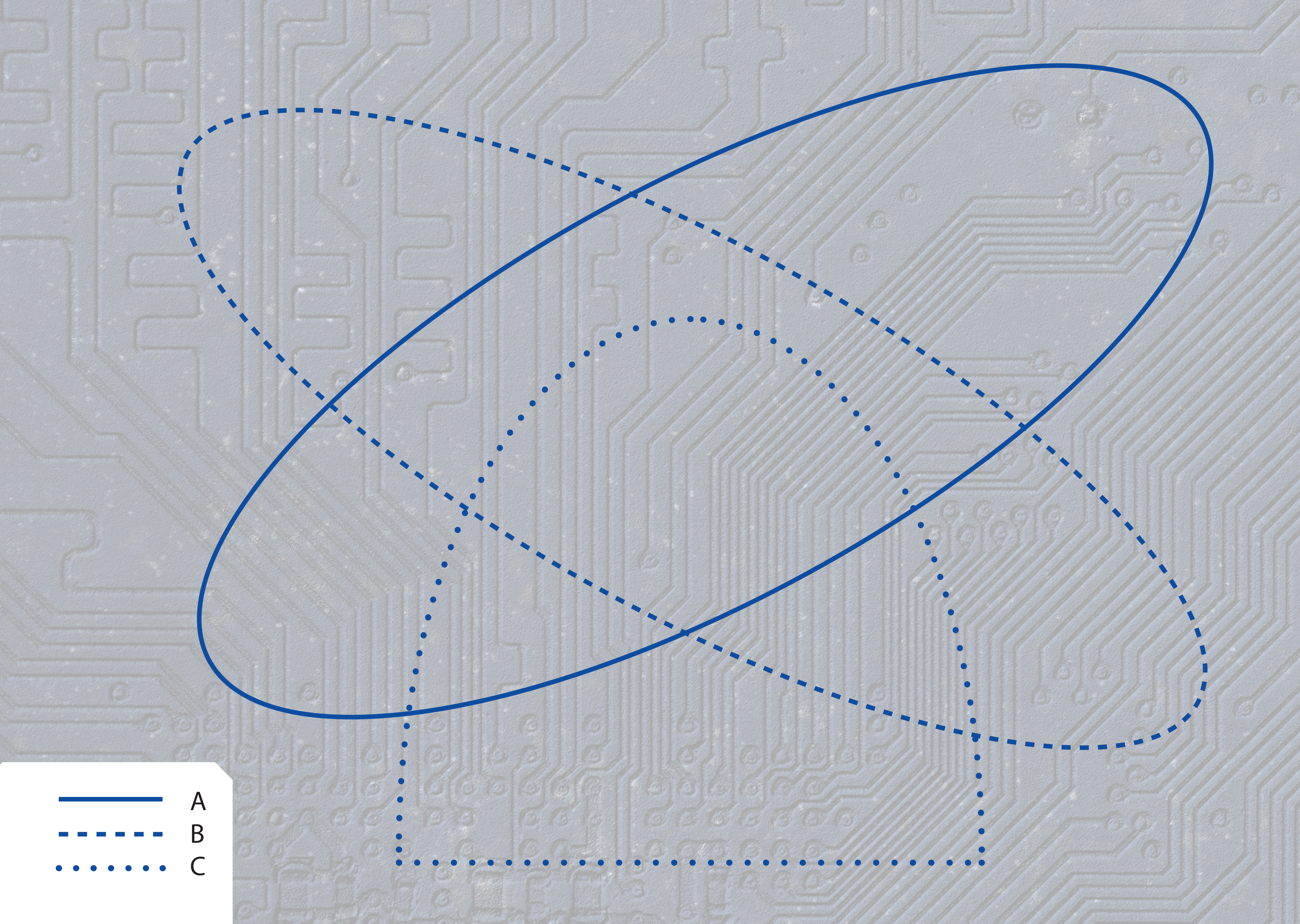
The value of the Beta signal is the ratio of the white area of the picture to the whole area of the picture.
In the picture on the right, the white area is 45 % of the total area.



Alpha is 22,26 % → danger

Beta is 45 % → Detector Alpha gives a wrong (opposite) value

Overall result: the examined object is a valuable resource.


A
B
C

MECHANICS – situation 2

Your task is to find out which sector of the ship is damaged the most. A repair robot will be automatically sent to this area.

The ship is divided into three sectors (A, B, and C). The sectors may overlap.

Each sector is defined by a different type of damage. The damaged areas are numbered and listed below:

4, 5, 6, 10, 12, 15, 20, 22, 24, 25, 30, 38, 42, 51, 60

Damaged areas need to be correctly assigned to individual sectors or overlaps.

Individual damaged areas may belong to more than one sector.

First, you need to identify which sector suffered which type of damage.

Types of damage

Damage type code	*Type of damage*
4	is divisible by 5
22/7	is divisible by 4
15/7	even numbers
35	odd numbers
42	$10 \le x \le 30$

It is possible to identify the type of damage by solving the following problems:

Sector A

Problem: $\frac{x}{3} - 4 = \frac{x}{3} + 4$

Sector B

Problem: $\frac{x}{8} + 14 = \frac{x}{\frac{18}{54} + \frac{26}{78} + \frac{34}{102}}$

Sector C

Problem: $(x+2) \times (x+6) = (x-10)^2$

MECHANICS – situation 3

Your task is to find out which sector of the ship is damaged the most. A repair robot will be automatically sent to this area.
The ship is divided into three sectors (A, B, and C). The sectors may overlap.
Each sector is defined by a different type of damage. The damaged areas are numbered and listed below:

2 3 4 8 9 14 18 19 22 24 25 28 30 32 33

Damaged areas need to be correctly assigned to individual sectors or overlaps.
Individual damaged areas may belong to more than one sector.
First, you need to identify which sector suffered which type of damage.

Types of damage

Damage type code	*Type of damage*
$10x^3 + 28x^2 + 6x - 20$	is divisible by 3
$16x^3 - 24x^2 + 28x - 20$	even numbers
$16x^3 - 20x^2 + 32x - 20$	is divisible by 5
$10x^3 + 21x^2 + 12x - 20$	odd numbers
$10x^3 + 7x^2 + 13x - 20$	$8 < x \leq 28$

It is possible to identify the type of damage by solving the following problems:

Sector A

Problem: $(5x^2 + 4x - 5) \times (2x + 4) =$

Sector B

Problem: $(4x^2 - 2x + 5) \times (4x - 4) =$

Sector C

Problem: $(5x - 4) \times (2x^2 + 3x + 5) =$

MECHANICS – situation 4

Your task is to find out which sector of the ship is damaged the most. A repair robot will be automatically sent to this area.
The ship is divided into three sectors (A, B, and C). The sectors may overlap.
Each sector is defined by a different type of damage. The damaged areas are numbered and listed below:

1, 3, 5, 6, 9, 11, 12, 15, 20, 21, 22, 24, 27, 30, 35

Damaged areas need to be correctly assigned to individual sectors or overlaps.
Individual damaged areas may belong to more than one sector.
First, you need to identify which sector suffered which type of damage.

Types of damage

Damage type code	*Type of damage*
$3x^2 - 8x + 1$	even numbers
$3x^2 - 6x + 1$	odd numbers
$3x^2 - 5x + 1$	Digit sum 5
$3x^2 - 4x + 1$	$5 \leq x < 35$
$3x^2 - 2x + 1$	divisible by 3

It is possible to identify the type of damage by solving the following problems:

Sector A

Problem: $(3x^4 - 4x^3 + 7x^2 - 8x + 2) : (x^2 + 2) =$

Sector B

Problem: $(6x^4 - 12x^3 + 20x^2 - 36x + 6) : (2x^2 + 6) =$

Sector C

Problem: $(3x^4 - 2x^3 + 7x^2 - 4x + 2) : (x^2 + 2) =$

MECHANICS – situation 5

Your task is to find out which sector of the ship is damaged the most. A repair robot will be automatically sent to this area.
The ship is divided into three sectors (A, B, and C). The sectors may overlap.
Each sector is defined by a different type of damage. The damaged areas are numbered and listed below:

3 4 7 8 11 12 13 15 19 20 22 24
28 31 32

Damaged areas need to be correctly assigned to individual sectors or overlaps.
Individual damaged areas may belong to more than one sector.
First, you need to identify which sector suffered which type of damage.

Types of damage

Damage type code	*Type of damage*
202	divisible by 3
210	divisible by 4
218	odd number
220	even number
222	Digit sum 4

It is possible to identify the type of damage by solving the following problems:

Sector A

Problem: The spaceship's crew used twice as many kilograms of raw materials during the first month of the flight as during the second month minus 26 kg. During the third month, they used half as much as the second and first months combined. In the second month, they used 3 times more raw materials than the fourth month. The fourth month they used 18 kg of raw materials. How much raw material did they use in total?

Sector B

Problem: The 3x4x5 cm triangle-shaped device must be completely covered with a special fabric. How many cm² of fabric are needed to cover 15 pieces of the device? Let's add extra 2 cm² to each piece for folds and clippings.

Sector C

Problem: If we divide the number of used batteries by two and add 7, we get the same number as if we subtract three times 34 from the number of batteries. How many used batteries have we got?

MECHANICS – tutorial

Your task is to find out which sector of the ship is damaged the most. A repair robot will be automatically sent to this area.
The ship is divided into three sectors (A, B, and C). The sectors may overlap.
Each sector is defined by a different type of damage. The damaged areas are numbered and listed below:

4 5 8 10 12 15 16 17 21 23 24 30 31 36 42

Damaged areas need to be correctly assigned to individual sectors or overlaps.
Individual damaged areas may belong to more than one sector.
First, you need to identify which sector suffered which type of damage.

Types of damage

Damage type code	*Type of damage*
10	$12 \le x \le 31$ (x = the number/s of damaged area/s)
12	The numbers of damaged areas are divisible by 3
13	The numbers of damaged areas are odd numbers
15	The numbers of damaged areas are divisible by 6
18	The numbers of damaged areas are even numbers

It is possible to identify the type of damage by solving the following problems:

Sector A

Problem: The generator can display value 1 or value 2. In the last hour, it showed 30 values. How many times was the value 1 shown if the average shown number is 1.4?

Step-by-step solution:
Value 1 = x
Value 2 = 30-x

$(x+2\times(30-x))/30 = 1{,}4$

$$x + 60 - 2x = 42$$

$$-x = -18$$

$$x = 18$$

Value 1 was shown 18 times.

The result: 18 → even number → sector A contains even numbers

Sector B

Problem: The base of the generator is rectangular and its shorter side is 6 dm long. How long is the longer side if the area of the base equals (5*25-47) dm^2?

Step-by-step solution:

5 * 25 = 125

125 - 47 = 78

x times 6 = 78

x = 78/6

x = 13

Result: 13 → odd number → sector B contains odd numbers

Sector C

Problem: Square (x^2) the initial quantity of fuel in litres, subtract 80, then take the square root ($\sqrt{x}$) and add 2 litres. This equals 10 litres of fuel. What is the initial quantity of fuel?

Step-by-step solution:

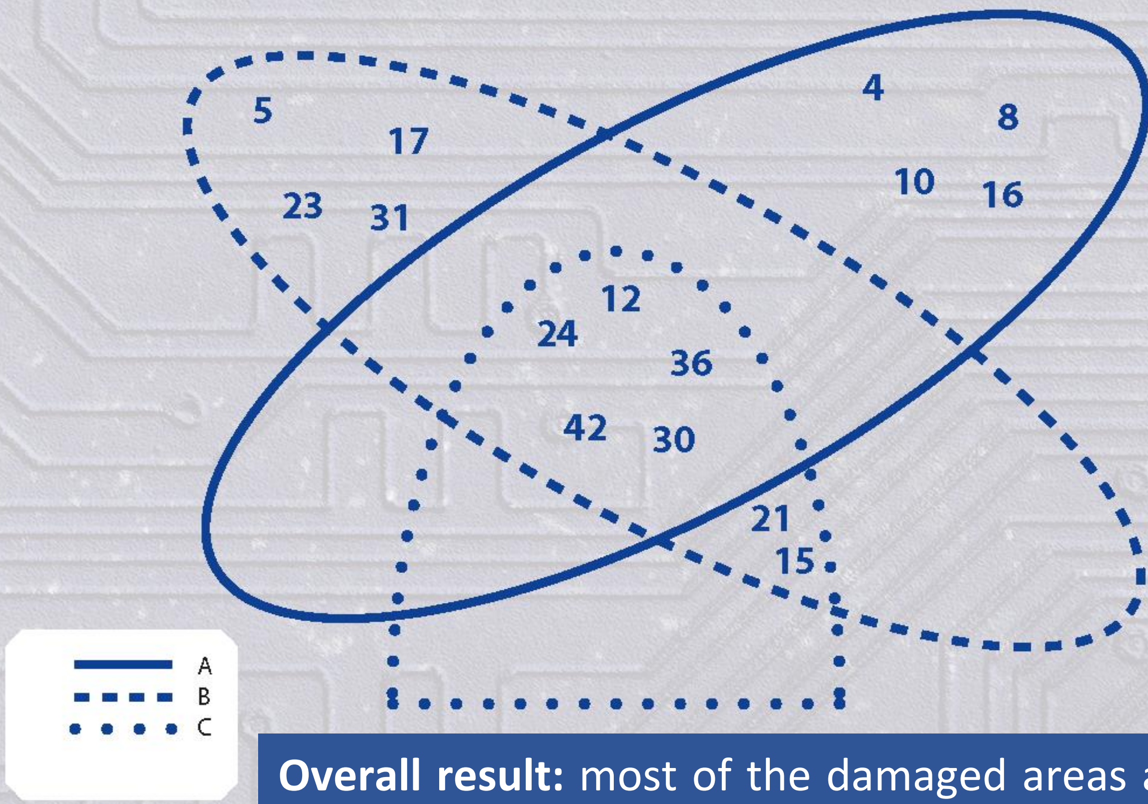
10 - 2 = 8

8 * 8 = 64

64 + 80 = 144

√144 = 12

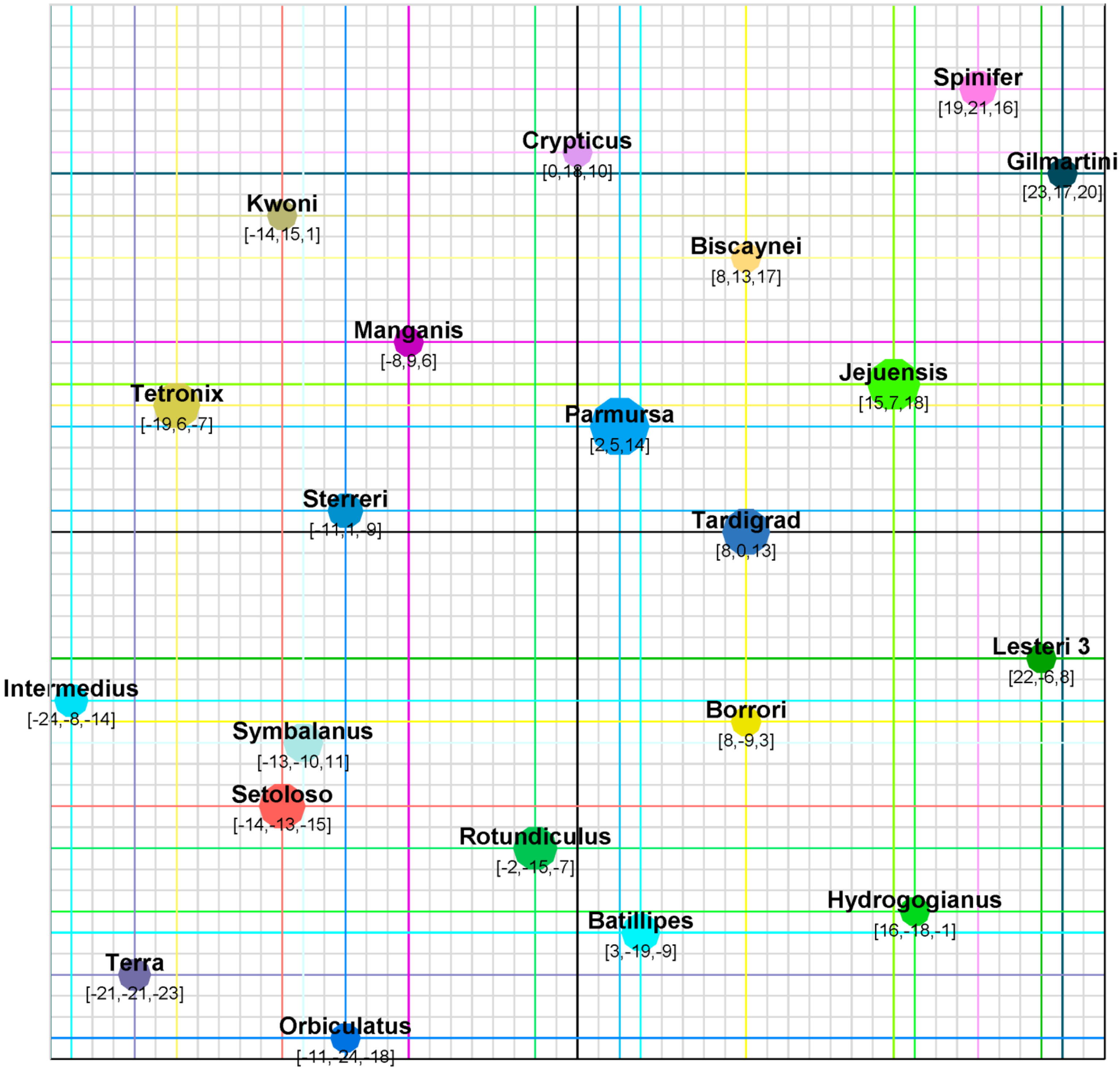
Result: 12 → divisible by 3 → sector C contains numbers divisible by 3



Overall result: most of the damaged areas are in the overlap of sectors A and C

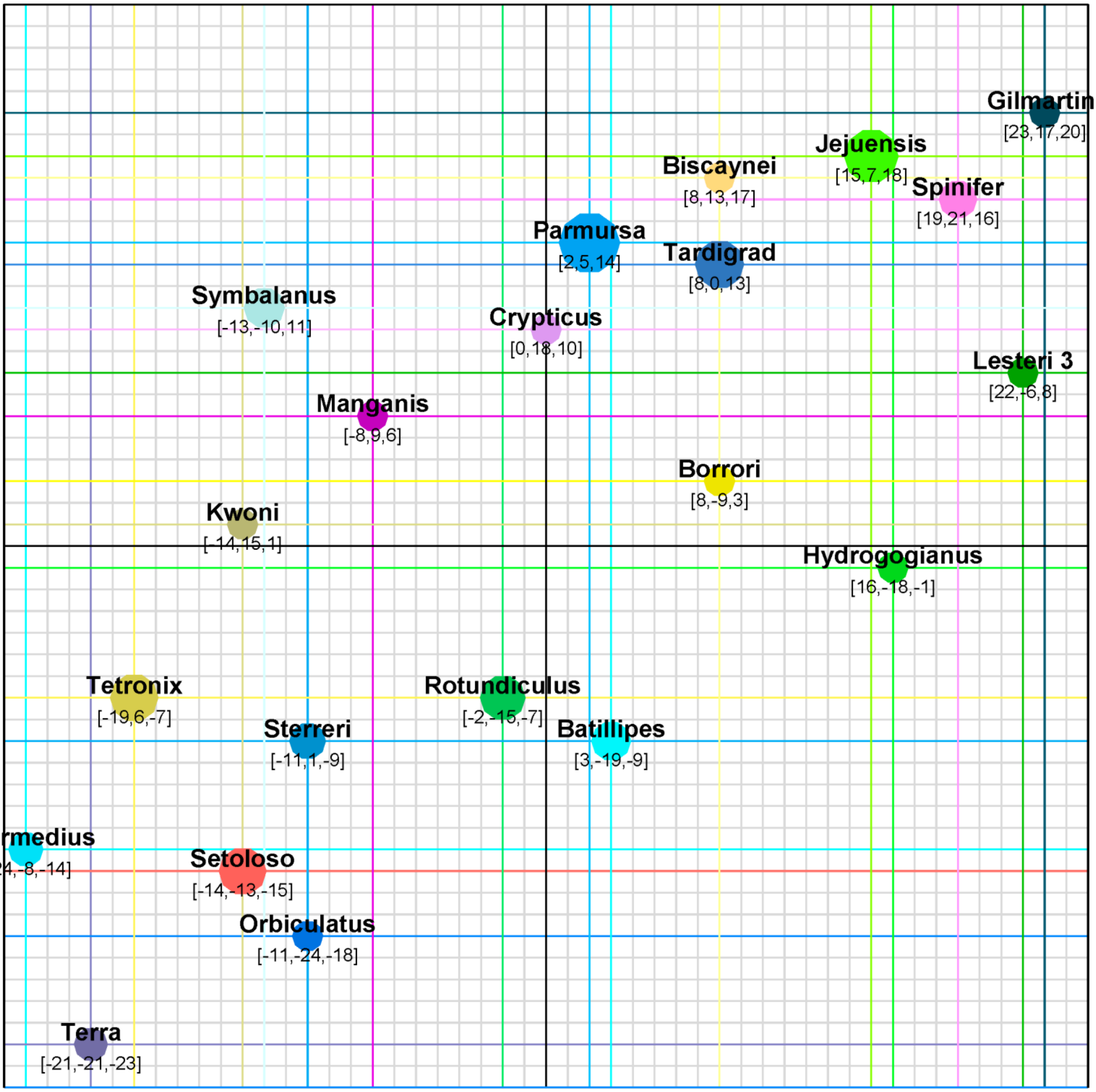
MAP OF THE STAR SYSTEMS

X-AXIS AND Y-AXIS



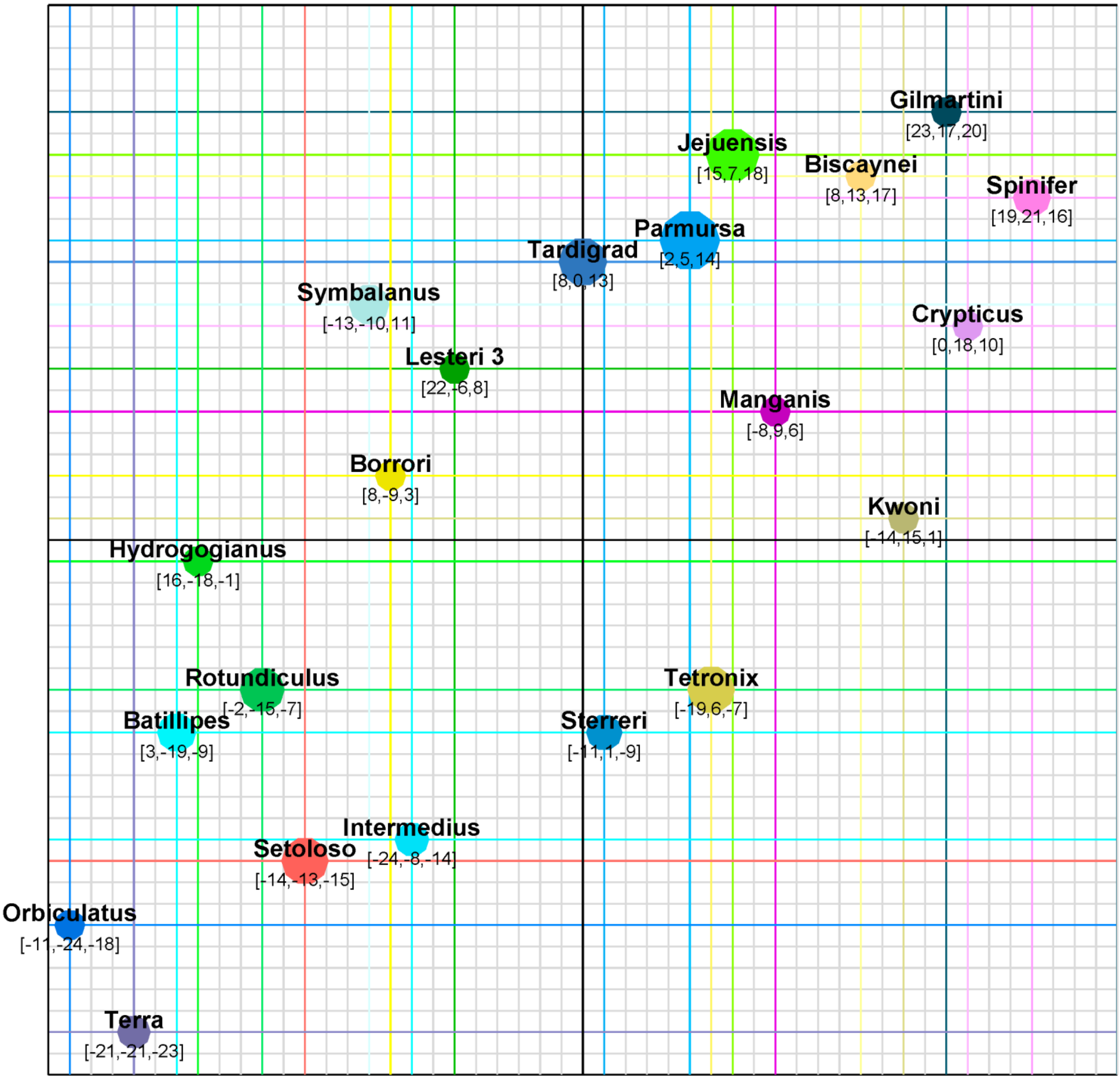
MAP OF THE STAR SYSTEMS

X-AXIS AND Z-AXIS

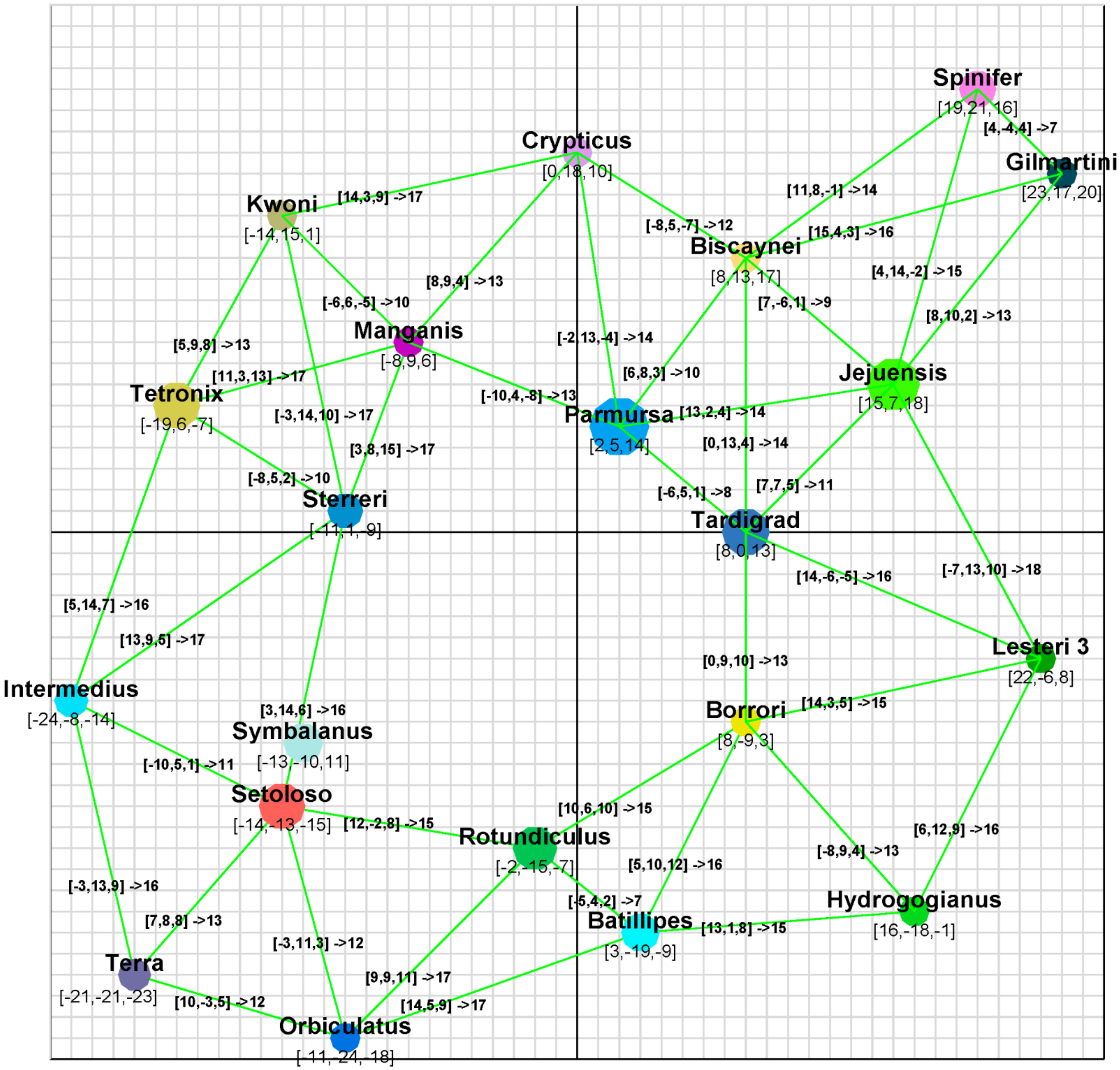


MAP OF THE STAR SYSTEMS

Y-AXIS AND Z-AXIS



DISTANCE BETWEEN THE STAR SYSTEMS (SPACESHIP RANGE)



NAVIGATORS – tutorial

Your spaceship (Starflyer) uses Dark Matter to perform hyperjumps. One Dark Matter container provides the energy for one hyperjump with a maximum length of 18 parsecs. The ship's engine can only use one container at a time.

Your task is to find the next planetary system within the hyperjump range and calculate the flight vector.

How to determine the spaceship range:

Verify that we can reach the planet by hyperjump

Suppose we are in the star system Terra and its position is [-21, -21, -23]

We want to jump to Rotundiculus [-2, -15, -7].

First, we need to calculate the distance to make sure we can jump there (the maximum length of a hyperjump is 18):

Subtract the coordinates of each x, y, and z-axis

[-2, -15, -7] - [-21, -21, -23] = (19, 6, 16) ← the vector of the flight

Calculate the distance as follows:

$19^2 + 6^2 + 16^2 = 361 + 36 + 256 = 653$

Now we should take the square root of this number and see if it is less than the range (18). To avoid this, we can compare the result (653) with the square of the hyperjump distance ($18^2 = 324$).

653 > 324 which means that we are not able to reach this star system.

How to enter the data for hyperjump

Report your current star system, the name of the system you want to fly to, and the previously calculated flight vector to the Android.

COMPARISON OF THE PLANETS

	Sanus	**Vultus**
Population		
Crime rate		
Technological advancement		
Average age		
Life expectancy		
Living conditions		
Natural resources		
Ecosystem		
Form of government		
Number of arrested terrorists		
Number of wars in the last 10 years		

COMPARISON OF THE PLANETS

	Sanus	Vultus
Population	1,2 billion	900 000 000
Crime rate	19 %	11 %
Technological advancement	¼ Earth	17/35 Earth
Average age	29 years	42 years
Life expectancy	85 years	68 years
Living conditions	Almost ideal	medium difficulty
Natural resources	rich non-renewable resources	Plenty of water ice
Ecosystem	damaged by mining	very diverse
Form of government	democracy	oligarchy
Number of arrested terrorists	2501	355
Number of wars in the last 10 years	3	1

SHOOTERS – situation 1

There is an unknown object near the ship. Your task is to navigate a drone – it will either pull the object into the ship or destroy it. The Explorers are responsible for identifying the object (valuable resource / dangerous meteorite).

Your task is to navigate the drone so that it meets the target. There are two targeting lasers on the spaceship, Alpha and Beta, and one observation room, and they all lie on a straight line (side of the ship). The drone will be sent to the intersection of the lasers. The angle of inclination of the Alpha and Beta lasers must be calculated (rounded to two decimal places).

The distance between the two lasers is 360 meters.

The observation room is located between the lasers, 240 meters from the left one.

If the lasers are not activated, they point at the observation room at an angle of 0°.

The unknown object is on a perpendicular line to the ship that passes through the observation room. The distance between the unknown object and the observation room is 3250 meters.

SHOOTERS – situation 2

There is an unknown object near the ship. Your task is to navigate a drone – it will either pull the object into the ship or destroy it. The Explorers are responsible for identifying the object (valuable resource / dangerous meteorite).

Your task is to navigate the drone so that it meets the target. There are two targeting lasers on the spaceship, Alpha and Beta, and one observation room, and they all lie on a straight line (side of the ship). The drone will be sent to the intersection of the lasers. The angle of inclination of the Alpha and Beta lasers must be calculated (rounded to two decimal places).

The distance between the two lasers is 360 meters.

The observation room is located between the lasers, 240 meters from the left one.

If the lasers are not activated, they point at the observation room at an angle of 0°.

The unknown object is on a perpendicular line to the ship that passes through the observation room. The distance between the unknown object and the observation room is 650 meters.

SHOOTERS – situation 3

There is an unknown object near the ship. Your task is to navigate a drone – it will either pull the object into the ship or destroy it. The Explorers are responsible for identifying the object (valuable resource / dangerous meteorite).

Your task is to navigate the drone so that it meets the target. There are two targeting lasers on the spaceship, Alpha and Beta, and one observation room, and they all lie on a straight line (side of the ship). The drone will be sent to the intersection of the lasers. The angle of inclination of the Alpha and Beta lasers must be calculated (rounded to two decimal places).

The distance between the two lasers is 360 meters.

The observation room is located between the lasers, 240 meters from the left one.

If the lasers are not activated, they point at the observation room at an angle of 0°.

The unknown object is on a perpendicular line to the ship that passes through the observation room. The distance between the unknown object and the observation room is 500 meters.

SHOOTERS – situation 4

There is an unknown object near the ship. Your task is to navigate a drone – it will either pull the object into the ship or destroy it. The Explorers are responsible for identifying the object (valuable resource / dangerous meteorite).

Your task is to navigate the drone so that it meets the target. There are two targeting lasers on the spaceship, Alpha and Beta, and one observation room, and they all lie on a straight line (side of the ship). The drone will be sent to the intersection of the lasers. The angle of inclination of the Alpha and Beta lasers must be calculated (rounded to two decimal places).

The distance between the two lasers is 360 meters.

The observation room is located between the lasers, 240 meters from the left one.

If the lasers are not activated, they point at the observation room at an angle of 0°.

The unknown object is on a perpendicular line to the ship that passes through the observation room. The distance between the unknown object and the observation room is 1425 meters.

SHOOTERS – situation 5

There is an unknown object near the ship. Your task is to navigate a drone – it will either pull the object into the ship or destroy it. The Explorers are responsible for identifying the object (valuable resource / dangerous meteorite).

Your task is to navigate the drone so that it meets the target. There are two targeting lasers on the spaceship, Alpha and Beta, and one observation room, and they all lie on a straight line (side of the ship). The drone will be sent to the intersection of the lasers. The angle of inclination of the Alpha and Beta lasers must be calculated (rounded to two decimal places).

The distance between the two lasers is 360 meters.

The observation room is located between the lasers, 240 meters from the left one.

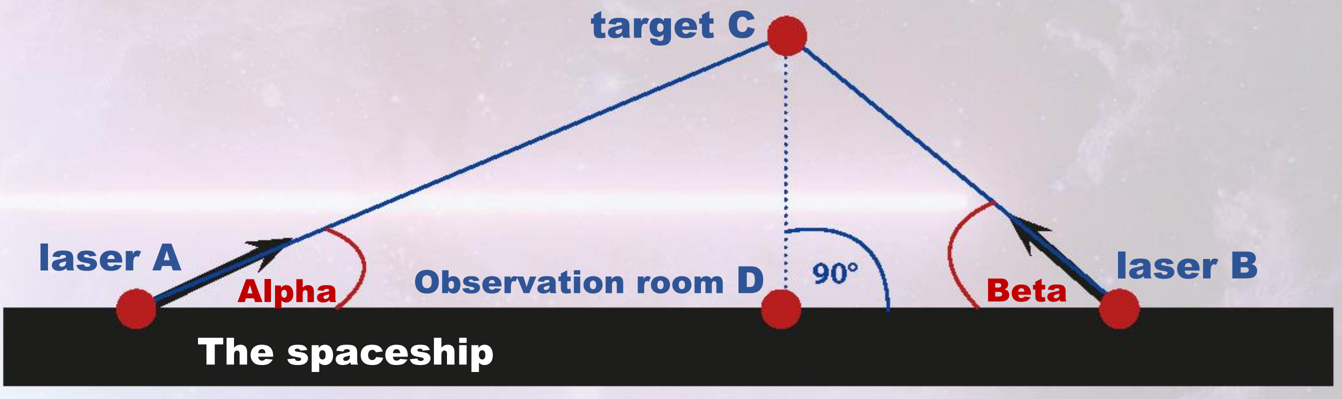
If the lasers are not activated, they point at the observation room at an angle of 0°.

The unknown object is on a perpendicular line to the ship that passes through the observation room. The distance between the unknown object and the observation room is 410 meters.

SHOOTERS – tutorial

Your task is to navigate a drone so that it meets the target. There are two targeting lasers on the spaceship and the drone will be sent to the intersection of the lasers (see the picture below). It is necessary to calculate the angle of inclination of the Alpha and Beta lasers (rounded to two decimal places).

The distance from the unknown object, that is the distance between D and C, is 1260 m.



The ratio of the sides AD and DB is 2:1. Side AB is 360 m long. Therefore, AD = 240 m and DB = 120 m.

The tangent α equals the opposite (DC) to the adjacent (AD)

$$\text{tg } \alpha = \frac{DC}{AD}$$

$$\text{tg } \alpha = \frac{1260}{240}$$

$$\text{tg } \alpha = 5{,}25$$

$$\text{tg } \alpha = 79{,}21°$$

The tangent α equals the opposite (DC) to the adjacent (DB)

$$\text{tg } \beta = \frac{DC}{DB}$$

$$\text{tg } \beta = \frac{1260}{120}$$

$$\text{tg } \beta = 10{,}5$$

$$\text{tg } \beta = 84{,}55°$$

The result: Adjust the lasers at angles α = 79.21° and β = 84.55°

CORRECT ANSWERS – EXPLORERS

Situation 1
Alpha = 23 % = danger
Beta = 55 % = Alpha is the opposite
Correct answer: resource

Situation 2
Alpha = 85 % = danger
Beta = 67 % = Alpha is right
Correct answer: danger

Situation 3
Alpha = 29 % = resource
Beta = 19,7 % = Alpha is right
Correct answer: resource

Situation 4
Alpha = 5,7 % = danger
Beta = 37 % = Alpha is the opposite
Correct answer: resource

Situation 5
Alpha = 39 % = resource
Beta = 62 % = Alpha is the opposite
Correct answer: danger

CORRECT ANSWERS – SHOOTERS

Situation 1
$\alpha=85{,}78°$

$\beta=87{,}89°$

Situation 2
$\alpha=69{,}75°$

$\beta=79{,}55°$

Situation 3
$\alpha=64{,}32°$

$\beta=76{,}51°$

Situation 4
$\alpha=80{,}44°$

$\beta=85{,}19°$

Situation 5
$\alpha=59{,}68°$

$\beta=73{,}70°$