



DT Mini Challenge

# Space Invaders (Blockly)

## 1. Space Invaders



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# 1

## SPACE INVADERS

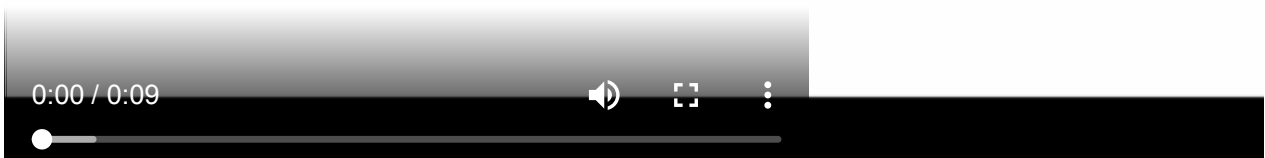
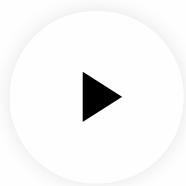
### 1.1. The journey begins

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#### 1.1.1. Apollo 11

Classified and top-secret documents reveal that in the year 1969, Earth faced an Alien Invasion.

The Apollo 11 crew, led by Neil Armstrong, was sent to the moon to construct an early warning station as part of Earth's defence system.



[The Moon \(https://groklearning-cdn.com/modules/ePTCfF3Gf6ggbbJsVPL57f/moonlanding480p.mov\).](https://groklearning-cdn.com/modules/ePTCfF3Gf6ggbbJsVPL57f/moonlanding480p.mov)

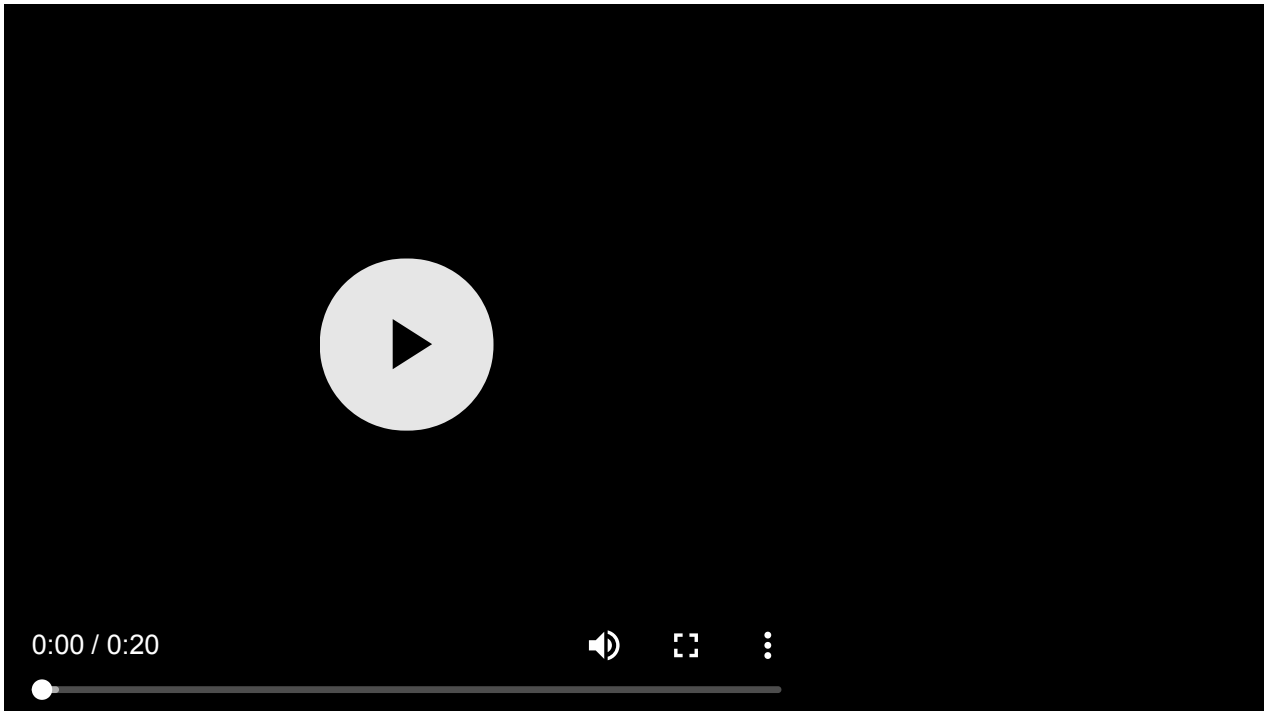
This is the story of the alien invaders.

#### 1.1.2. Planet Zarg

Planet Zarg is suffering from a terrible drought. Most of the water has evaporated into space.

You are the Commander of the alien fleet from planet Zarg.

In this time of crisis, the people of Zarg need your help.



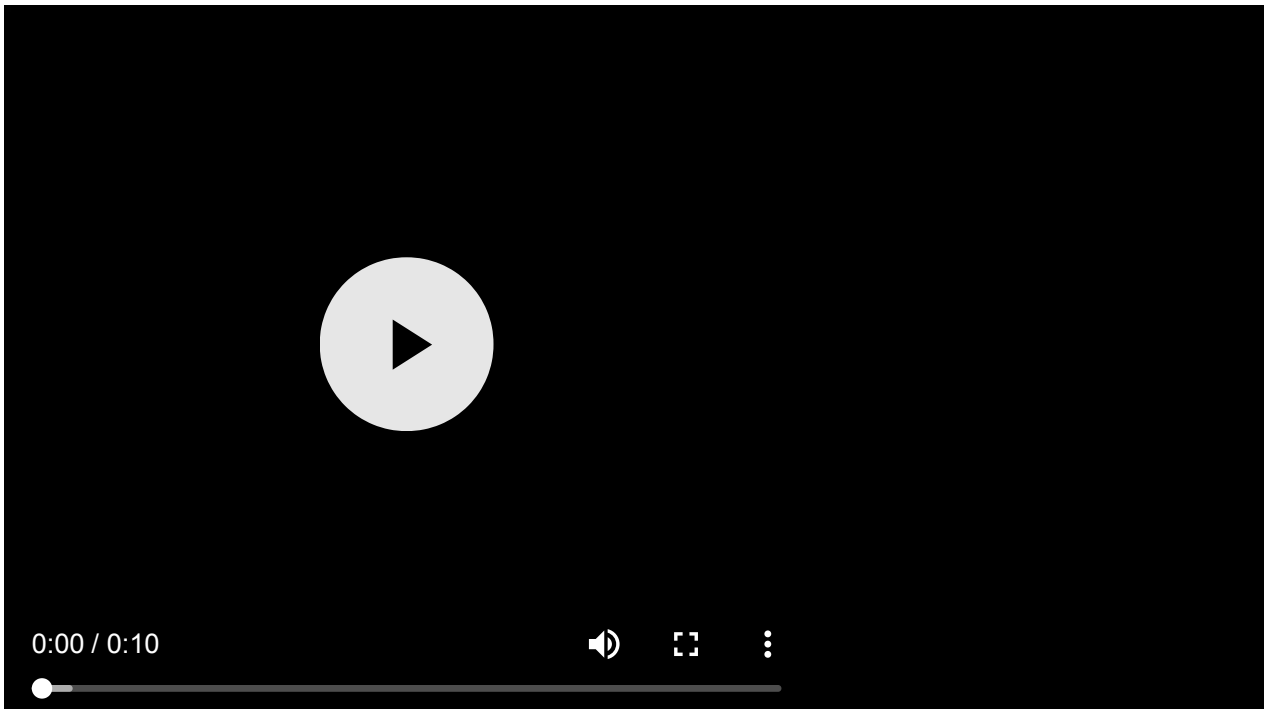
[Planet Zarg \(https://groklearning-cdn.com/modules/Y6xAC38rZ6JenitbkLfrmd/planet\\_zarg480p.mov\)](https://groklearning-cdn.com/modules/Y6xAC38rZ6JenitbkLfrmd/planet_zarg480p.mov).

### 1.1.3. Mission briefing

The only other source of water known in the universe is on planet Earth.

Your mission is to build a fleet of spaceships to get hold of Earth's abundant water supplies.

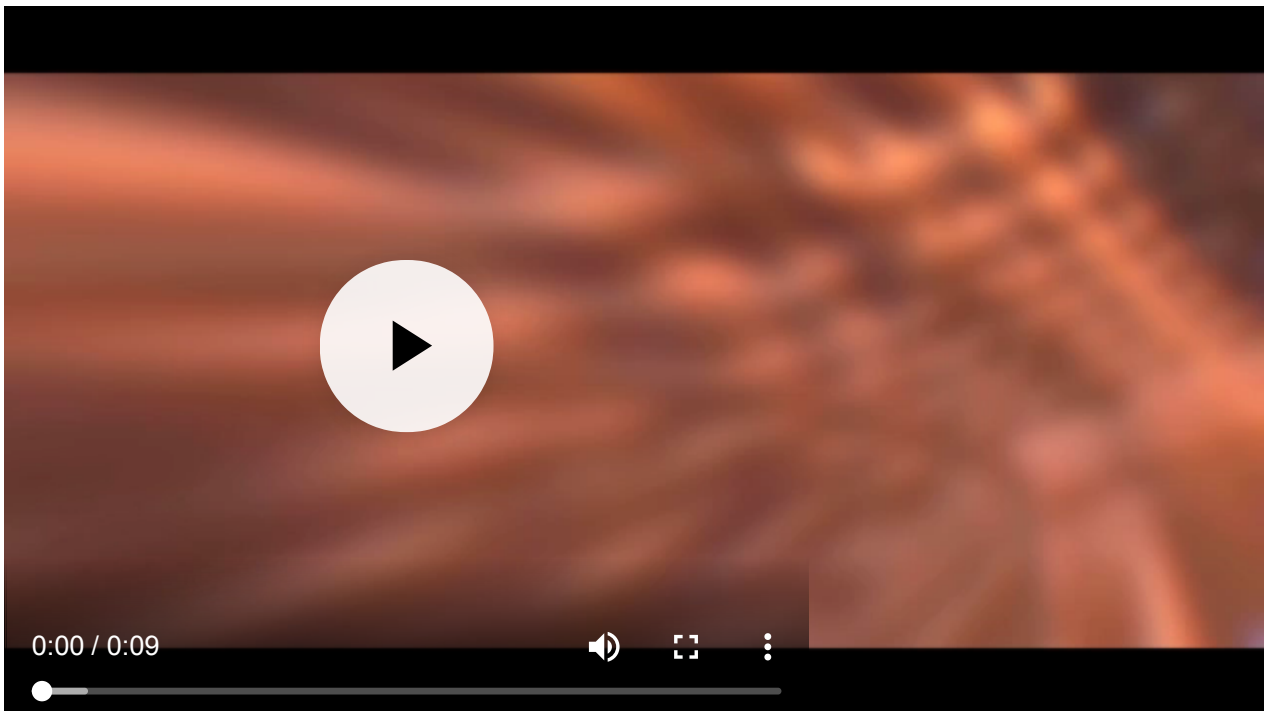
Be advised, the United Nations of Earth has a powerful defence system.



[Earth \(https://groklearning-cdn.com/modules/Z2fp8ziBcAYrLuedYEomdN/securewater480p.mov\)](https://groklearning-cdn.com/modules/Z2fp8ziBcAYrLuedYEomdN/securewater480p.mov).

### 1.1.4. Space station

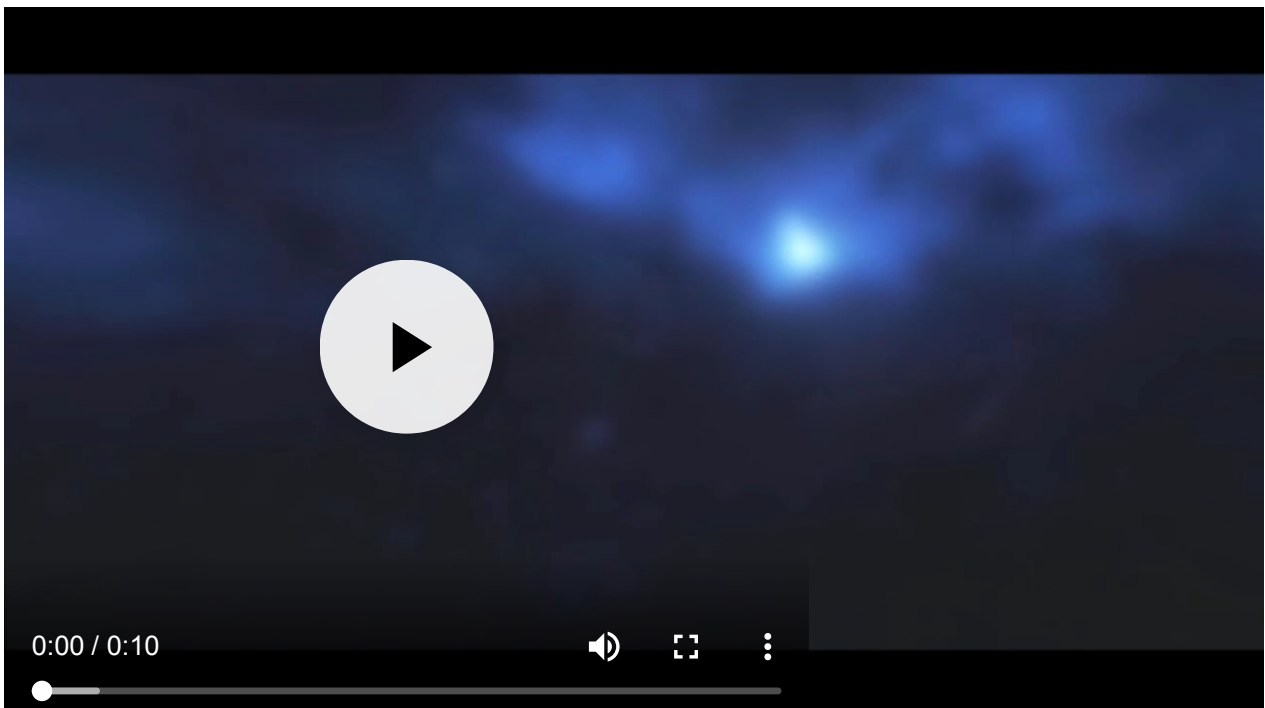
Commander, for the past five years, Zarg's best engineers have constructed a space station in orbit. There, we are building the trans-warp spaceship that will take you to Earth safely.



[Zargan Space Station \(https://groklearning-cdn.com/modules/2XsrgWUDp73rvLGofzC3MG/zargan-space-station.mov\)](https://groklearning-cdn.com/modules/2XsrgWUDp73rvLGofzC3MG/zargan-space-station.mov).

### 1.1.5. Godspeed and good luck

Commander, Mission Control has informed us that our spaceship is ready for launch. Engaging impulse drive to leave orbit.

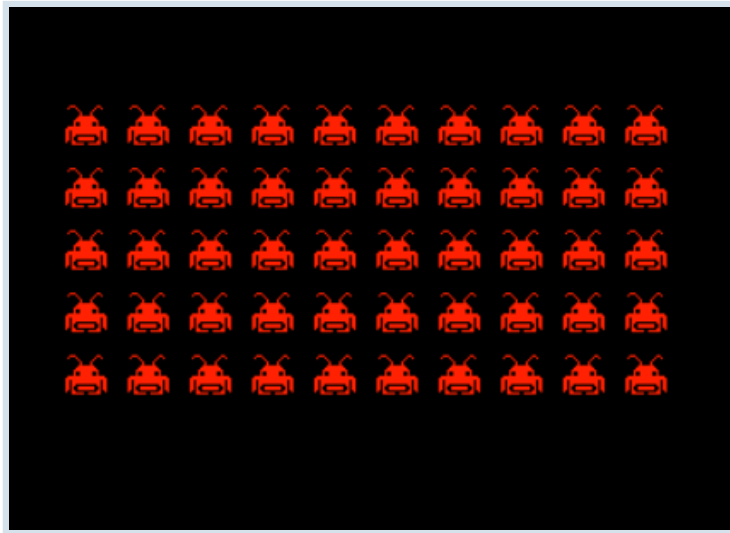


[We are 'go' for Launch \(https://groklearning-cdn.com/modules/BaNrDDHE8wz8jiAe9EfrCn/spaceship\\_leaving\\_zarg.mov\)](https://groklearning-cdn.com/modules/BaNrDDHE8wz8jiAe9EfrCn/spaceship_leaving_zarg.mov).

### 1.1.6. The end goal

Commander, we are building the fleet on our long journey to Earth. Our science department is still working on some of the details, so you will be given access to top-secret command protocols as they become available.

Your end goal is to build a fleet and get some of Earth's water resources.



([https://groklearning-](https://groklearning-cdn.com/modules/kPDtAbVNRtj9kuCSoTdwa8/endgoal.png)

[cdn.com/modules/kPDtAbVNRtj9kuCSoTdwa8/endgoal.png](https://groklearning-cdn.com/modules/kPDtAbVNRtj9kuCSoTdwa8/endgoal.png))


The Zargan Fleet

We are receiving a transmission from the Zargan Science Department ... first set of command protocols available ... upload link activated ... uploading ... upload complete ... you are cleared to begin building your fleet. Good luck, Commander.

### 1.1.7. Handy hints

Commander, on the **next page**, you will start coding. Here are a few useful hints up front.

#### 💡 How do I write and check my code?

1. Write your program in the editor (large panel on the right);
2. Observe the output in the Preview window. Check that the program works correctly and compare its output with the screenshot!
3. Mark your program by clicking  and we will automatically check if your program is correct, and if not, give you some hints to fix it up.

## 1.1.8. Problem: Making our first spaceship



Commander, your first task is to **make one spaceship appear in space**.

You have received access to top-secret command protocols.

Use the computer command interface on the right.

### Follow the steps

#### [Step 1: Prepare the simulator](#)

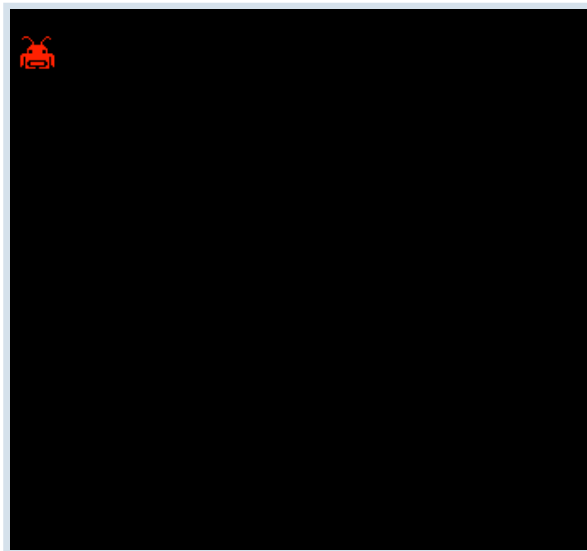


All our code goes into this block.

#### [Step 2: Create an empty spaceship](#)

#### [Step 3: Choose an image for the spaceship](#)

Put the code together and this is the result:



[\\_ \(https://groklearning-](https://groklearning-)

[cdn.com/problems/zBAo5pwkE5TBtmcCe8XiYX/si-step0.png\)](https://cdn.com/problems/zBAo5pwkE5TBtmcCe8XiYX/si-step0.png)

Click to open full-size.

Congratulations, Commander. We have taken the first step towards the invasion of planet Earth.

### You'll need

[program.blockly](#)



## Testing

- ☐ Testing your first spaceship. Good job, Commander. Your code has passed our test.



### 1.1.9. Problem: Changing the appearance of a spaceship



Commander, the science department has developed a new spaceship design that will make it impossible for Earth's defences to lock on. They want you to test it.

#### Change Spaceship Design

To change the spaceship design, change the block with the spaceship image . Look at the editor on the right where you see the code from the previous mission.

new spaceship with image

Change the spaceship image until you see this spaceship:



[\\_ \(https://groklearning-](https://groklearning-)

[cdn.com/problems/Uq8eUrHKDx73VTCW8puDR2/spaceship3-screenshot.png\)](https://cdn.com/problems/Uq8eUrHKDx73VTCW8puDR2/spaceship3-screenshot.png)

Spaceship2 Design

Congratulations, Commander. This is a cool-looking spaceship.

#### You'll need

[program.blockly](https://program.blockly)

in space  
do  
set spaceship to new spaceship with image

#### Testing

☐ Testing the design of the first spaceship. Good job, Commander. Your code has passed our test.

## 1.1.10. Problem: More spaceship designs



Commander, the science department has developed more cool-looking spaceship designs. You now have access to additional top-secret spaceship skins.

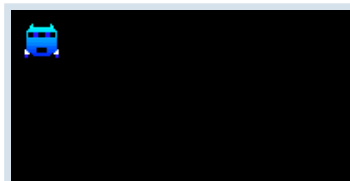
Choose one of these new looks:



([https://groklearning-](https://groklearning-cdn.com/problems/6RLTS6u7saaKRRovWfpsSD/spaceship4-screenshot.png)

[cdn.com/problems/6RLTS6u7saaKRRovWfpsSD/spaceship4-screenshot.png](https://groklearning-cdn.com/problems/6RLTS6u7saaKRRovWfpsSD/spaceship4-screenshot.png))

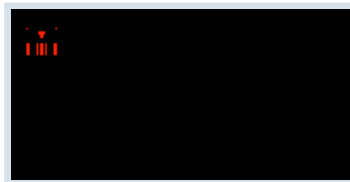
spaceship3 - Inferno



([https://groklearning-](https://groklearning-cdn.com/problems/zqBhB5puN9GgF2irPVBaZ7/spaceship5-screenshot.png)

[cdn.com/problems/zqBhB5puN9GgF2irPVBaZ7/spaceship5-screenshot.png](https://groklearning-cdn.com/problems/zqBhB5puN9GgF2irPVBaZ7/spaceship5-screenshot.png))

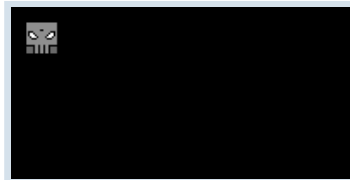
spaceship4 - Blizzard



([https://groklearning-](https://groklearning-cdn.com/problems/F3yq6LGLaa2y5odjDrFbLX/spaceship6-screenshot.png)

[cdn.com/problems/F3yq6LGLaa2y5odjDrFbLX/spaceship6-screenshot.png](https://groklearning-cdn.com/problems/F3yq6LGLaa2y5odjDrFbLX/spaceship6-screenshot.png))

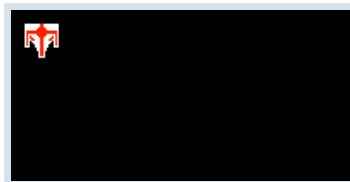
spaceship5 - Stealth



([https://groklearning-](https://groklearning-cdn.com/problems/p3RDwkg4UdCKkiw2veW6MH/spaceship7-screenshot.png)

[cdn.com/problems/p3RDwkg4UdCKkiw2veW6MH/spaceship7-screenshot.png](https://groklearning-cdn.com/problems/p3RDwkg4UdCKkiw2veW6MH/spaceship7-screenshot.png))

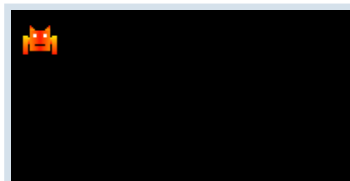
spaceship6 - Skull



([https://groklearning-](https://groklearning-cdn.com/problems/npp3dW7VDna5uxdkVZbkU2/spaceship8-screenshot.png)

[cdn.com/problems/npp3dW7VDna5uxdkVZbkU2/spaceship8-screenshot.png](https://groklearning-cdn.com/problems/npp3dW7VDna5uxdkVZbkU2/spaceship8-screenshot.png))

spaceship7 - Xavier



([https://groklearning-](https://groklearning-cdn.com/problems/z5nVXyfYxCZk9rA27hmHDJ/spaceship9-screenshot.png)

[cdn.com/problems/z5nVXyfYxCZk9rA27hmHDJ/spaceship9-screenshot.png](https://groklearning-cdn.com/problems/z5nVXyfYxCZk9rA27hmHDJ/spaceship9-screenshot.png))

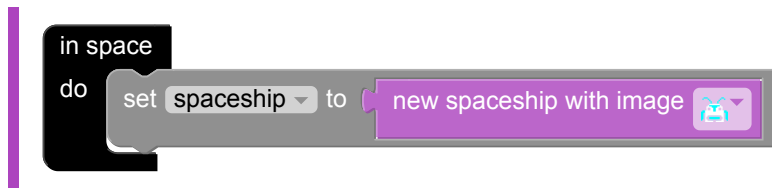
spaceship8 - Wildfire

Congratulations, Commander. The Earthlings will be impressed.

In any of the following questions, you can use your favourite design, or change designs as you like. We will show you the solutions with spaceship1.

## You'll need

 [program.blockly](https://program.blockly.com)

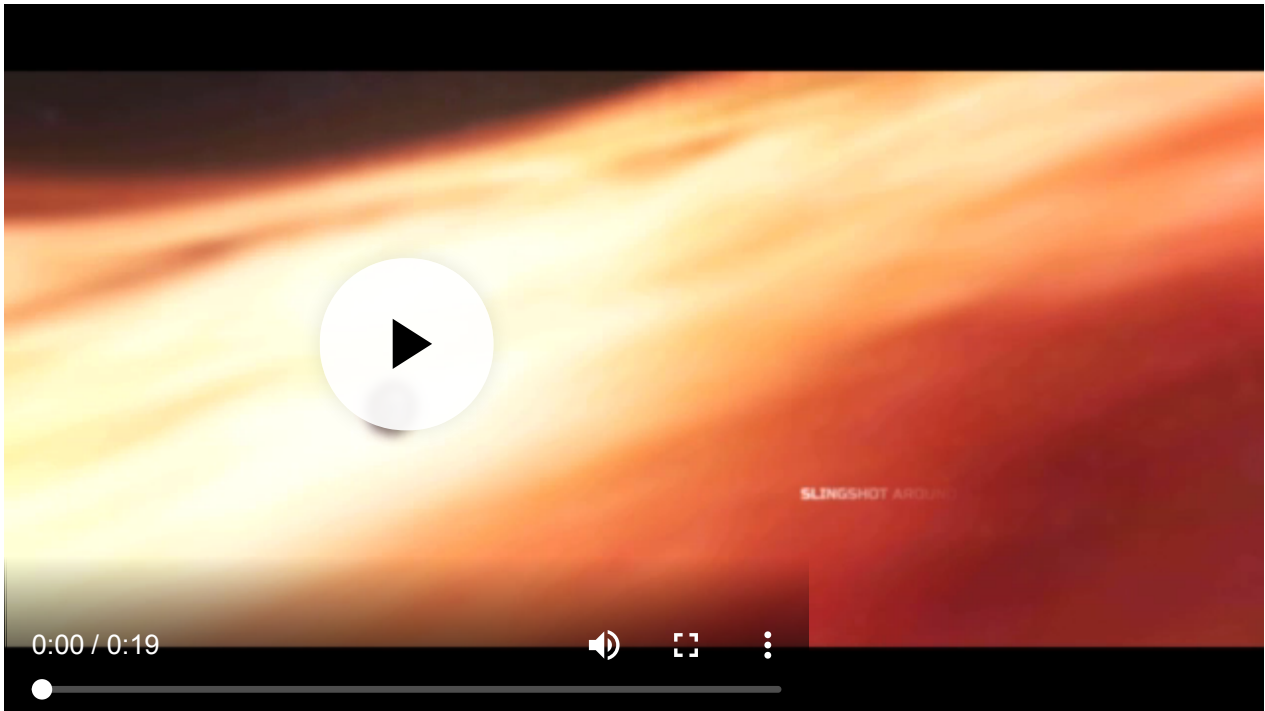


## Testing

- ☐ Testing your first spaceship. Good job. Your code has passed our tests.

### 1.1.11. Slingshot around a black hole

Commander, the helm advises that we are about to slingshot around a black hole to pick up speed on our journey. As a safety precaution, we will put the ship on yellow alert. Put on your spacesuit and enjoy the view from the observation deck.



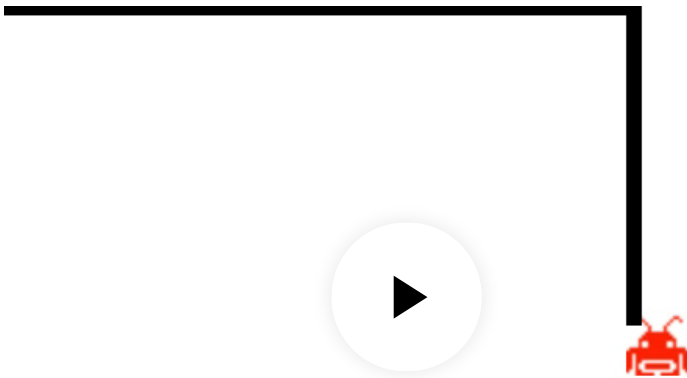
[Black Hole \(https://groklearning-cdn.com/modules/JEovCdw49Sd9BQPrhUXBzb/black\\_hole.mov\)](https://groklearning-cdn.com/modules/JEovCdw49Sd9BQPrhUXBzb/black_hole.mov).

### 1.1.12. Positioning spaceships

Commander, let's work out how to position spaceships. Our maths geniuses have found an elegant way to do this.

They say that we can set the distance from the top and the distance from the left for each spaceship.

In the video and image below, you see a single spaceship, which is positioned 200 pixels from the left and 100 pixels from the top.

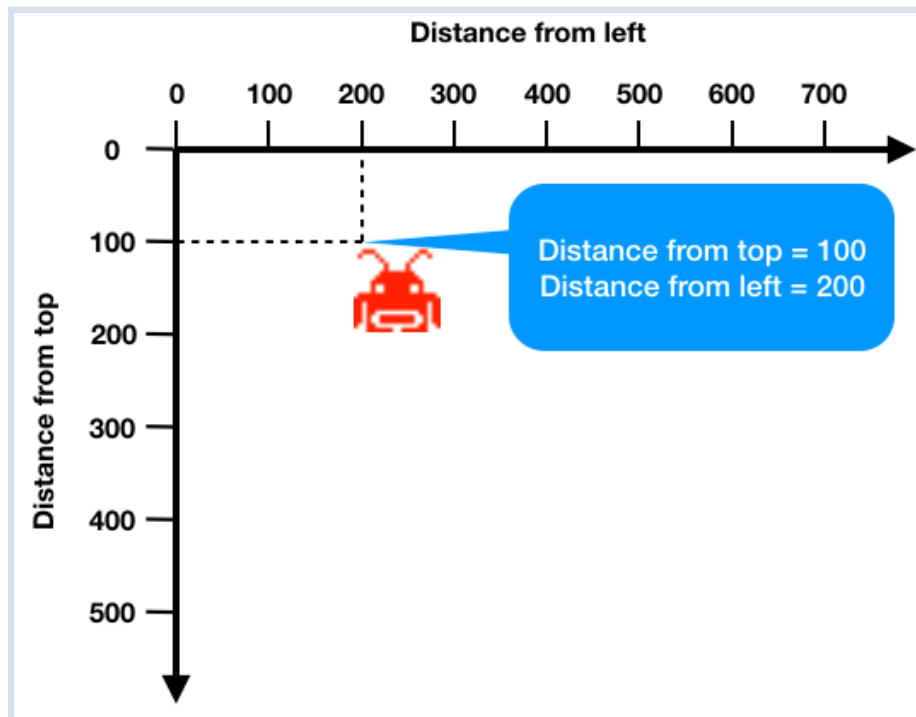


0:00 / 0:08



distance from top: 100px  
distance from left: 200px

Position of a Spaceship (<https://groklearning-cdn.com/modules/rTFcfuSyGe6zeEeBHFD69X/cartesiancoordinates.mov>).



(<https://groklearning->

[cdn.com/modules/DhWwLw58xjNweyYWm7jHfb/cartesiancoordinatesystem.png](https://groklearning-cdn.com/modules/DhWwLw58xjNweyYWm7jHfb/cartesiancoordinatesystem.png)).

Position of a Spaceship

A pixel is a unit of space. Remember that this is top-secret information.

### 1.1.13. Problem: Positioning a spaceship



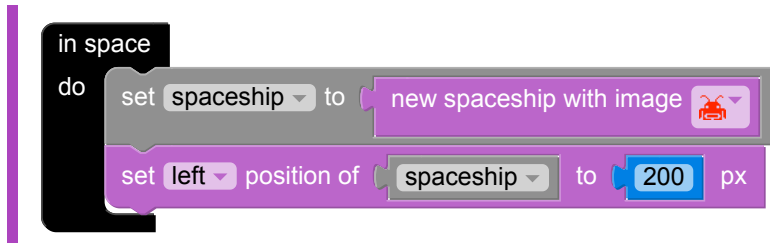
Commander, you have access to top-secret protocols to position your spaceships. We start with one spaceship.

#### Follow the steps

##### Step 1: Left position

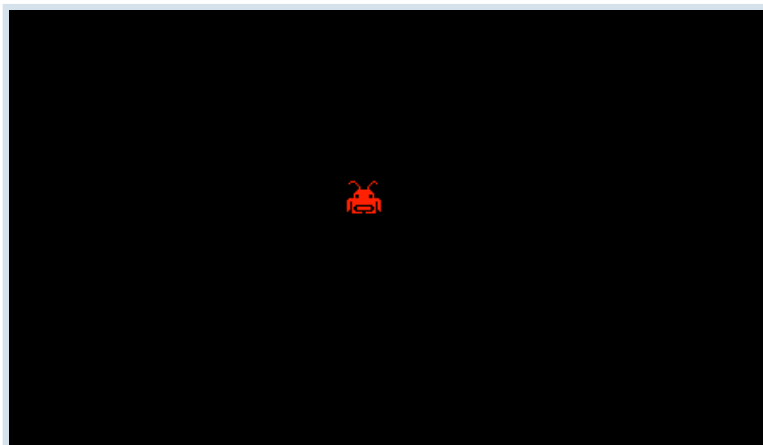
To set the spaceship's position from the left, add a 'left position' block from the purple Space Invaders container. Then you need to:

- add a **spaceship** variable from the grey variables container
- add a position value from the **blue** numbers container
- change the position value from 0 to 200



##### Step 2: Top position

The result should look something like this:



[\\_ \(https://groklearning-cdn.com/problems/KEzcb9yznnJ3vDKPFtrSK/si-step1.png\)](https://groklearning-cdn.com/problems/KEzcb9yznnJ3vDKPFtrSK/si-step1.png)

A spaceship

Congratulations, Commander. You can position your spaceships freely.

We will practice this in the following mission.

#### You'll need

 program.blockly

## Testing

- ☐ Testing the position of the first spaceship. Good job. Your code has passed our tests.

### 1.1.14. Problem: Positioning a spaceship: manoeuvre



Commander, use your learning from the previous mission to position your spaceship:

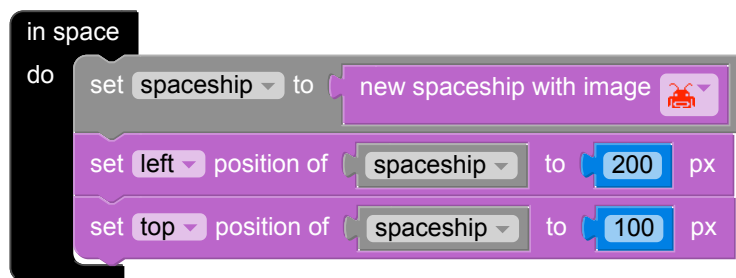
- 277 pixels from the left
- 123 pixels from the top

### Psst ...

Conduct this manoeuvre quietly so that Earth is not alerted to our presence. Our 3D Spaceship printer sometimes makes the space-time continuum vibrate. Earth now has super-sensitive detectors that can pick up gravitational waves.

### You'll need

[program.blockly](#)



### Testing

- ☐ Testing the position of the first spaceship. Good job. Your code has passed our tests.



### 1.1.15. Problem: Positioning a spaceship quiz



What are the correct commands to position a spaceship at 10 pixels from the left and 50 pixels from the top ?

```

in space
do
  set spaceship to new spaceship with image [spaceship icon]
  set left position of spaceship to 50 px
  set top position of spaceship to 10 px
  
```

```

in space
do
  set spaceship to new spaceship with image [spaceship icon]
  set left position of spaceship to 50 px
  
```

```

in space
do
  set spaceship to new spaceship with image [spaceship icon]
  set left position of spaceship to 10 px
  set top position of spaceship to 50 px
  
```

```

in space
do
  set spaceship to new spaceship with image [spaceship icon]
  set left position of spaceship to 277 px
  set top position of spaceship to 123 px
  
```

## Testing

☐ That's right!

### 1.1.16. Captain

Commander, the Zargan High Command is following your efforts with great interest.

The High Command is **very** pleased with your progress of building the fleet and has promoted you to the rank of:

## Captain

The Science Department, the Mathematics Department and all your Space Invaders congratulate you.

Long live the Zargan Empire.



Captain's Badge

### 1.1.17. Spacewalk

Captain, enjoy your promotion with a spacewalk above Jupiter.

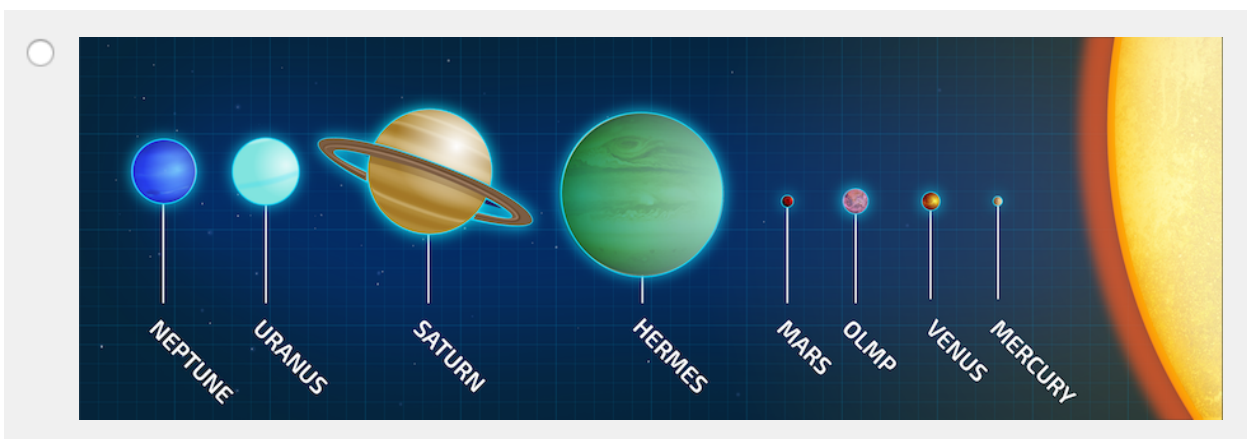
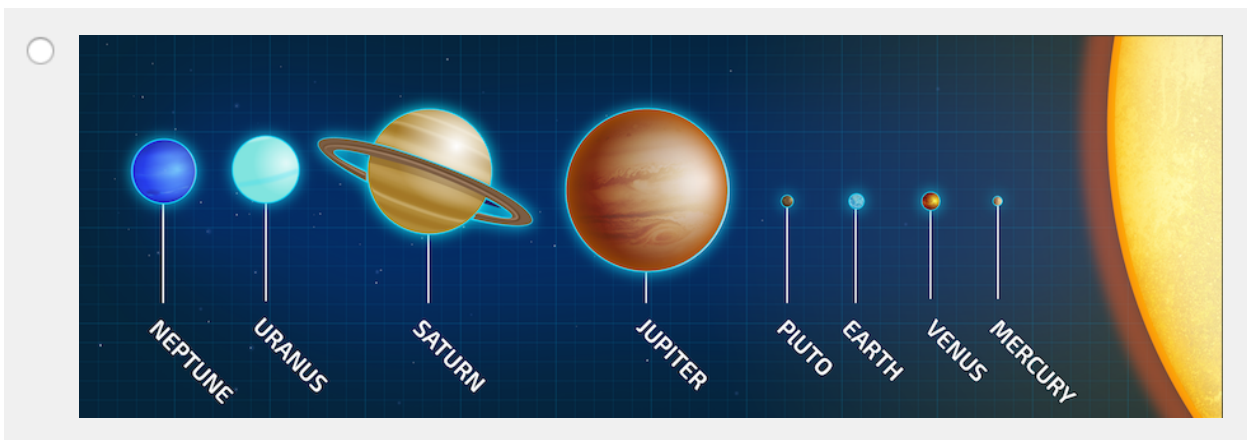
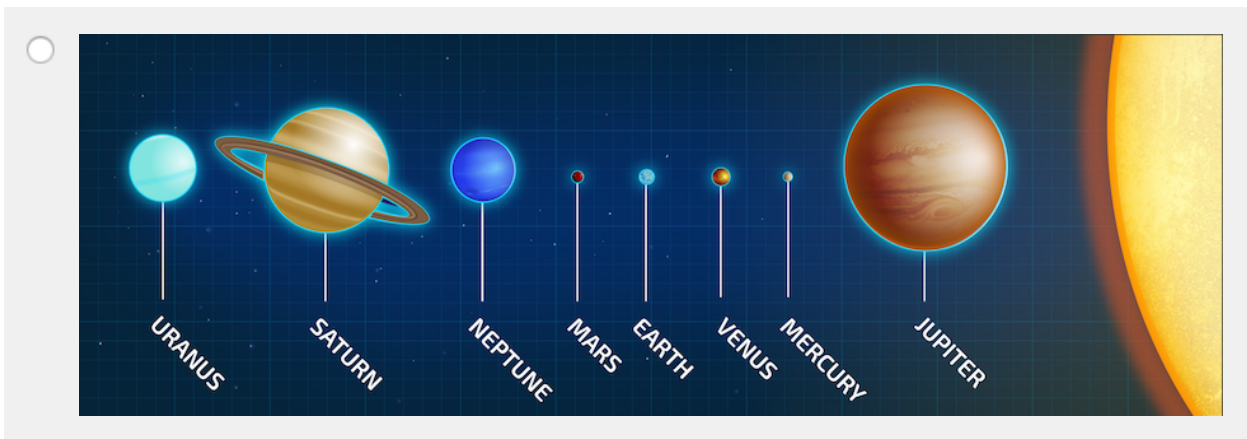
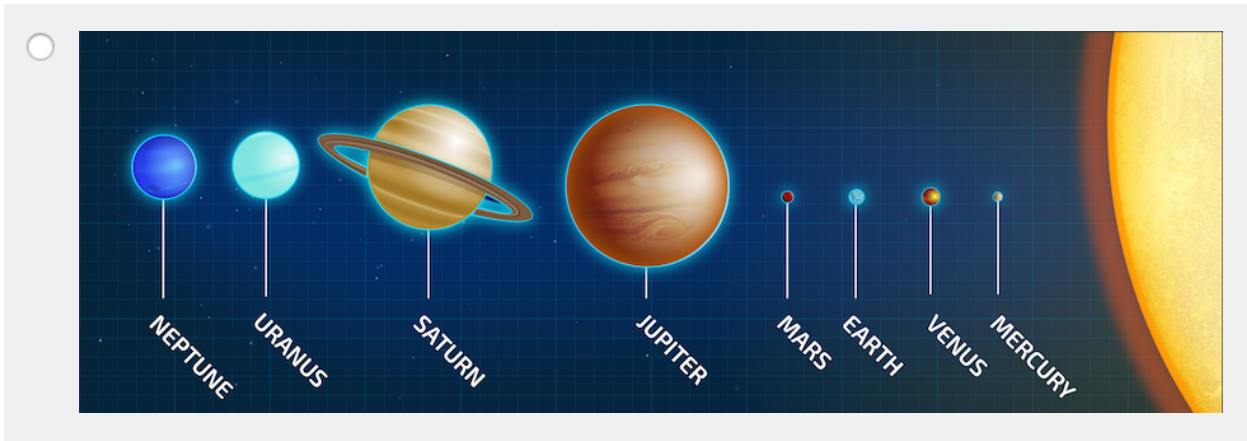


Spacewalk (<https://groklearning-cdn.com/modules/xLep8WbJANv4jSoboySnqC/spacewalk480p.mov>).

### 1.1.18. Problem: Solar system quiz



What is the correct order of planets in the solar system as we travel towards the sun?



## Testing

☐ Yes, this is the right order of planets.

<https://aca.edu.au/challenges.html>

### 1.1.19. Problem: Making two spaceships



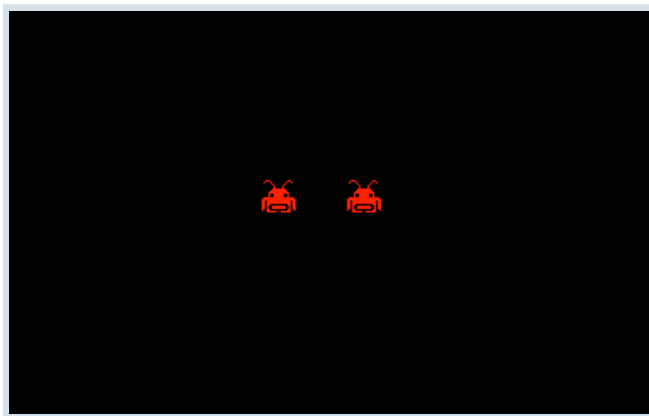
Captain, you are now going to build two spaceships.

- Your first spaceship shall be located at
  - 150 pixels from the left
  - 100 pixels from the top
- Your second spaceship shall be located at
  - 200 pixels from the left
  - 100 pixels from the top

#### Building two Spaceships

- You will need a spaceship2 object. You can find it in the 'Variables' tray.

The result should look something like this:



[cdn.com/modules/373gJwL7YMZPEszktefWsc/si-step2.png](https://cdn.com/modules/373gJwL7YMZPEszktefWsc/si-step2.png)

Two Spaceships

[\\_\(https://groklearning-](https://groklearning-)

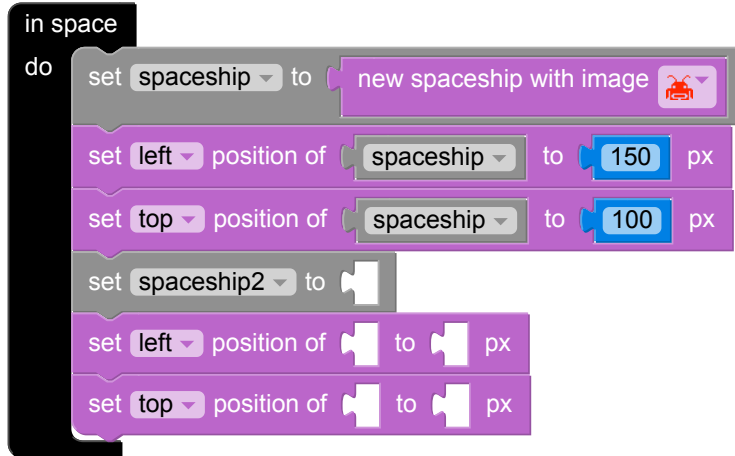
#### Hint

A common mistake is to use the 'spaceship' variable in the lower two purple blocks, rather than 'spaceship2'. So you might accidentally overwrite the positions of 'spaceship'. Make sure you use 'spaceship2'.

Congratulations, Captain. You have successfully made two spaceships.

**You'll need**

 [program.blockly](https://program.blockly)



## Testing

☐ Testing the position of two spaceships. Good job. Your code has passed our tests.



## 1.1.20. Problem: Making five spaceships



Captain, you are now going to build a row of five spaceships.

Your first spaceship shall be located at

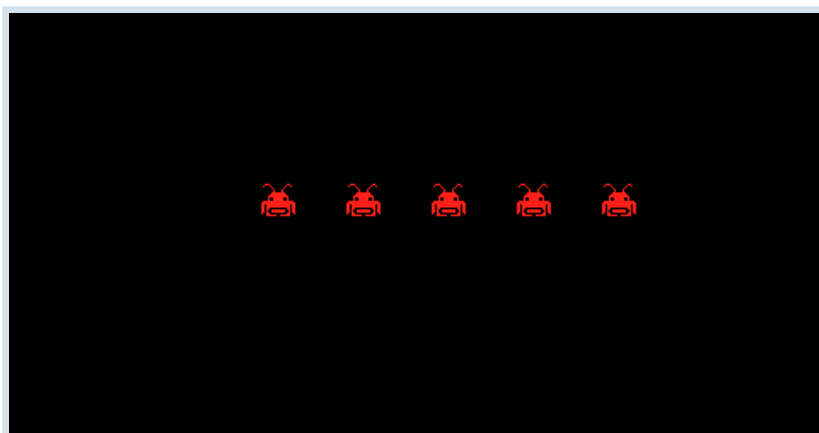
- 150 pixels from the left
- 100 pixels from the top

Each other spaceship shall be located 50 pixels to the right of its neighbour

### 💡 Building five Spaceships

- You will need to make **new spaceship variables** for this question: spaceship3, spaceship4, and spaceship5. You can make them in the 'Variables' tray using [Create variable...](#)

The result should look something like this:



([https://groklearning-](https://groklearning-cdn.com/problems/sEATwm6N6Bebd75qMESFTS/fivespaceships.png)

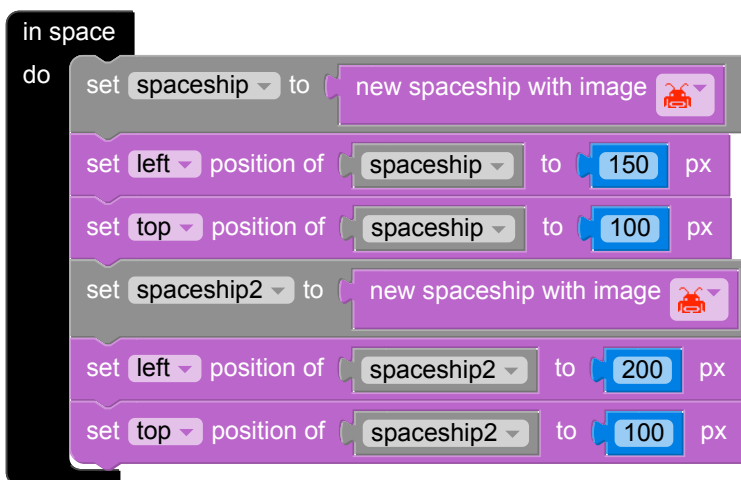
[cdn.com/problems/sEATwm6N6Bebd75qMESFTS/fivespaceships.png](https://groklearning-cdn.com/problems/sEATwm6N6Bebd75qMESFTS/fivespaceships.png))

Five Spaceships

Congratulations, Captain. You have successfully made five spaceships.

### You'll need

[program.blockly](#)



### Testing

- ☐ Testing the position of five spaceships. Good job. Your code has passed our tests.

### 1.1.21. The cover is blown

Captain, we have been spotted by Earth's warning station in the moon's orbit.



[Early warning station \(https://groklearning-cdn.com/modules/tetyCDUjvWtCjib3Ywf4VK/spysatellite480p.mov\).](https://groklearning-cdn.com/modules/tetyCDUjvWtCjib3Ywf4VK/spysatellite480p.mov)

Earth knows we're coming. We have to move fast. You are authorised to use the experimental wormhole drive that will catapult us straight to Earth. Beware, the drive hasn't been tested yet. But we have no other choice.



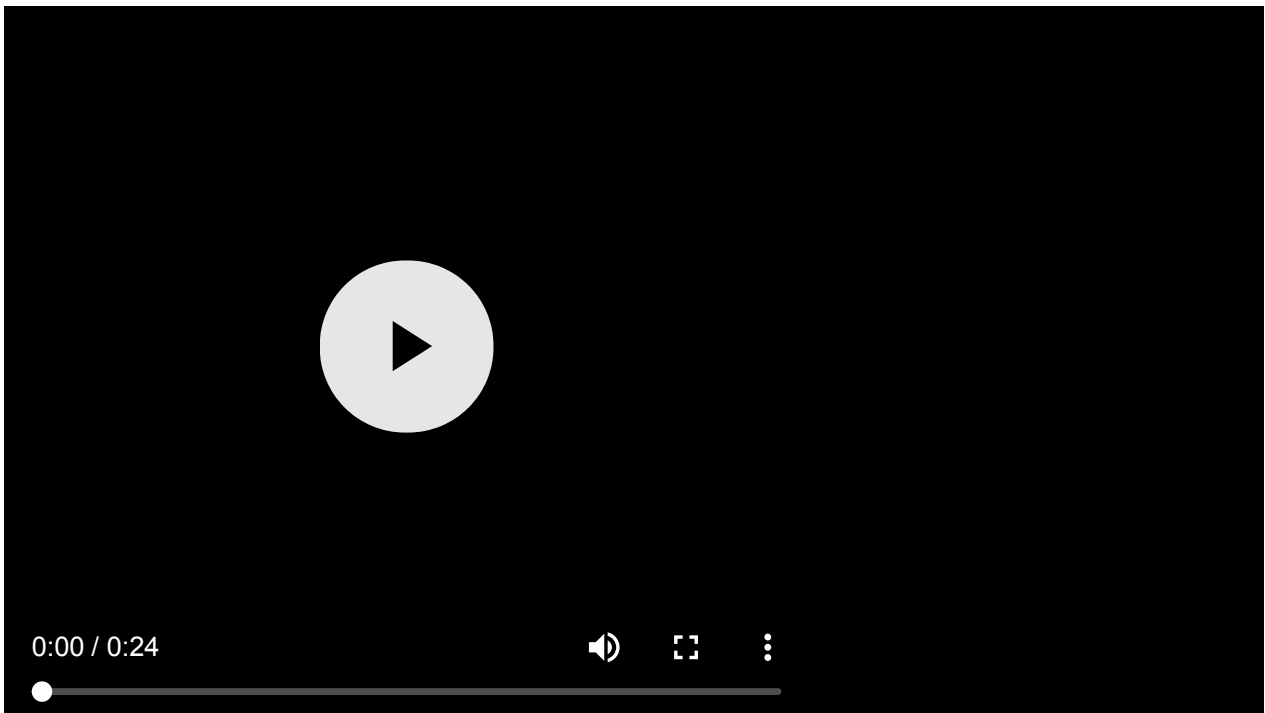
[Wormhole Drive \(https://groklearning-cdn.com/modules/z9MmVGz32vqyqcX3koQLa/wormhole.mov\).](https://groklearning-cdn.com/modules/z9MmVGz32vqyqcX3koQLa/wormhole.mov)

### 1.1.22. Earth

Captain, we have finally reached the blue planet, Earth.

Look at all that water.

We are presently in orbit above Mexico. Ahead of us is the Gulf of California. We continue west to our landing coordinates in the Pacific Ocean, at the east coast of the continent of Australia.



Earth (<https://groklearning-cdn.com/modules/SnkK98tT7QPLgef4gNAxQU/earth480p.mov>).

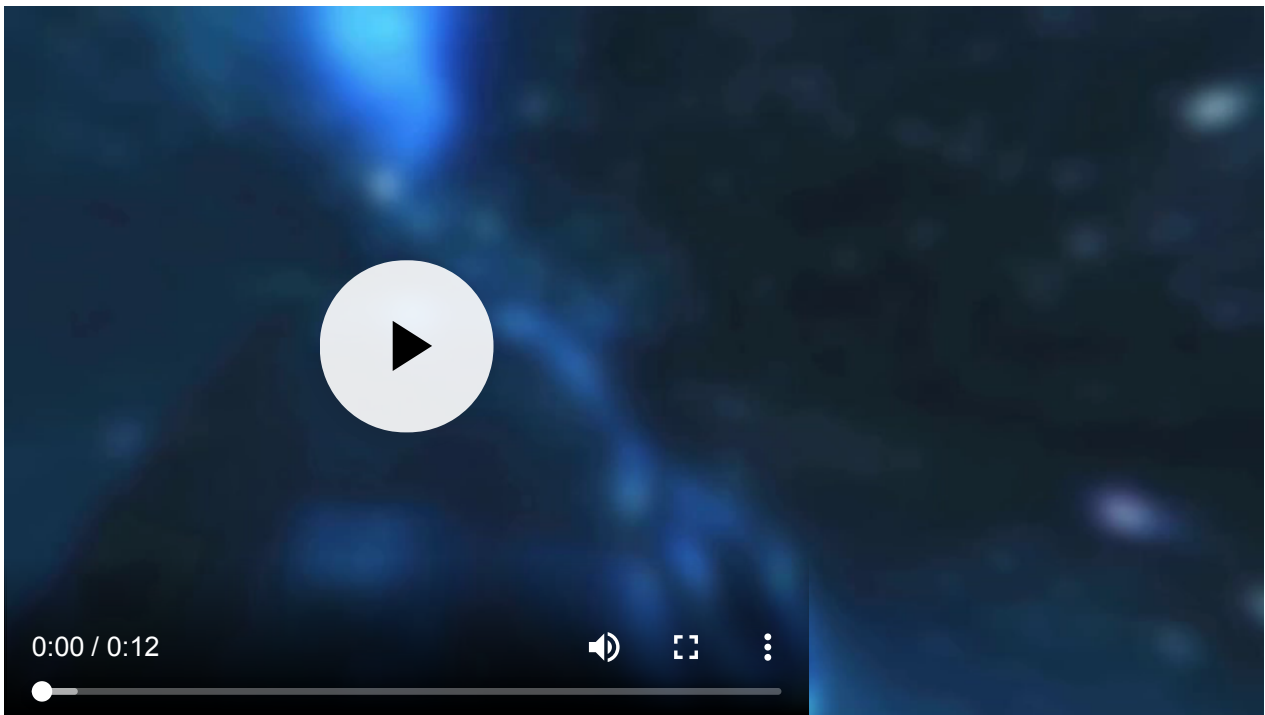
### 1.1.23. Mission briefing

Captain, the fleet reports ready for the invasion of Earth.

Your mission is to successfully land as many spaceships as possible on Earth's Pacific Ocean off the coast of the continent of Australia.

Once landed, the spaceships will deploy a teleportation device with which we can beam Earth's water into the mothership waiting in Orbit.

Be warned, the earthlings expect us and have activated the Global Defence System (GDS).



[Red Alert ... Global Defence System Activated \(https://groklearning-cdn.com/modules/Aw8MiiXbZAKDbJPZyr26F5/gdsactivated480p.mov\)](https://groklearning-cdn.com/modules/Aw8MiiXbZAKDbJPZyr26F5/gdsactivated480p.mov).

## 1.1.24. Problem: Battle for Earth



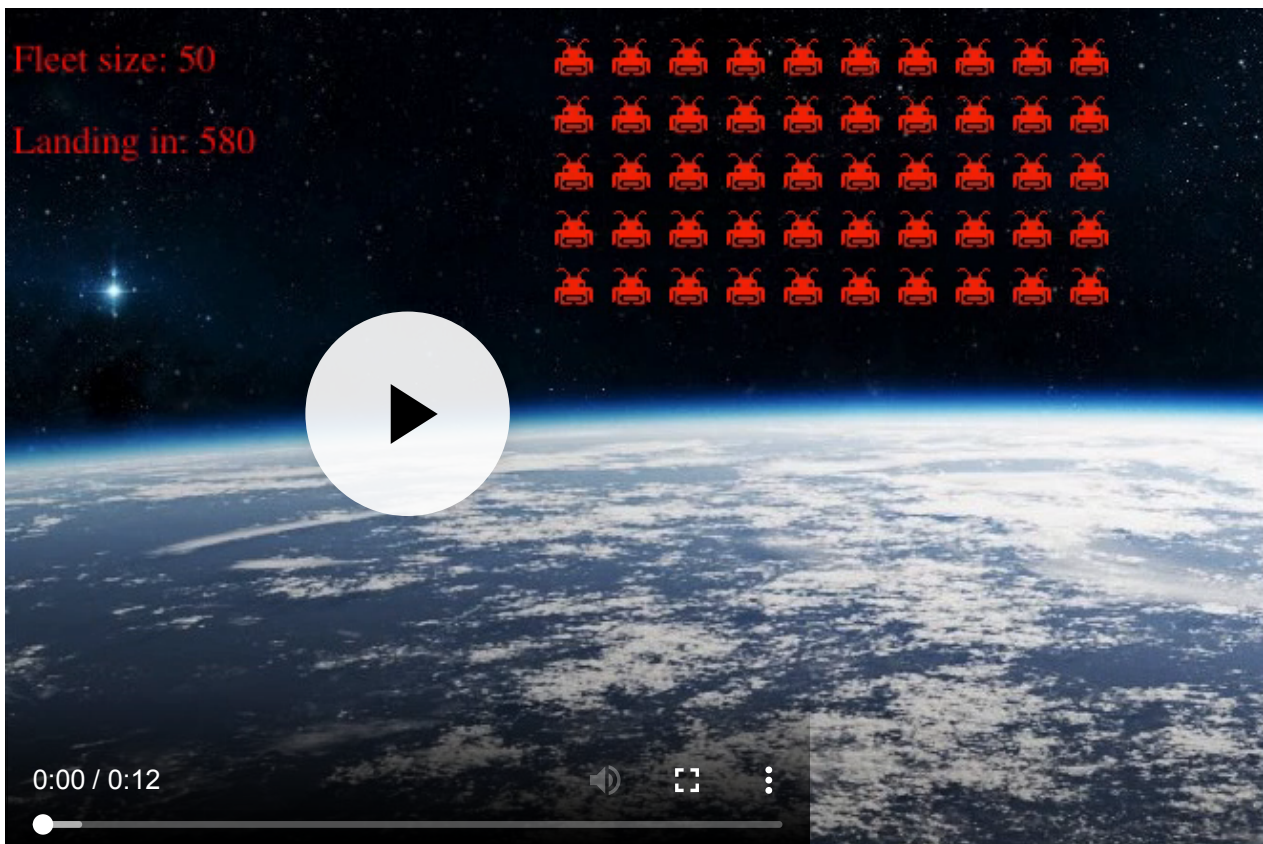
Captain, you are about to engage Earth's global defence system.

Two counters at the top of the page will inform you of your remaining fleet size and distance to the landing spot. You have to land at least one spaceship to win.

Our spaceships are invisible to Earth's radar. All Earth can do is to shoot rockets blindly into space. Beware though - they are lethal.

Make as many spaceships as you like and start the battle. Your ships will automatically start moving.

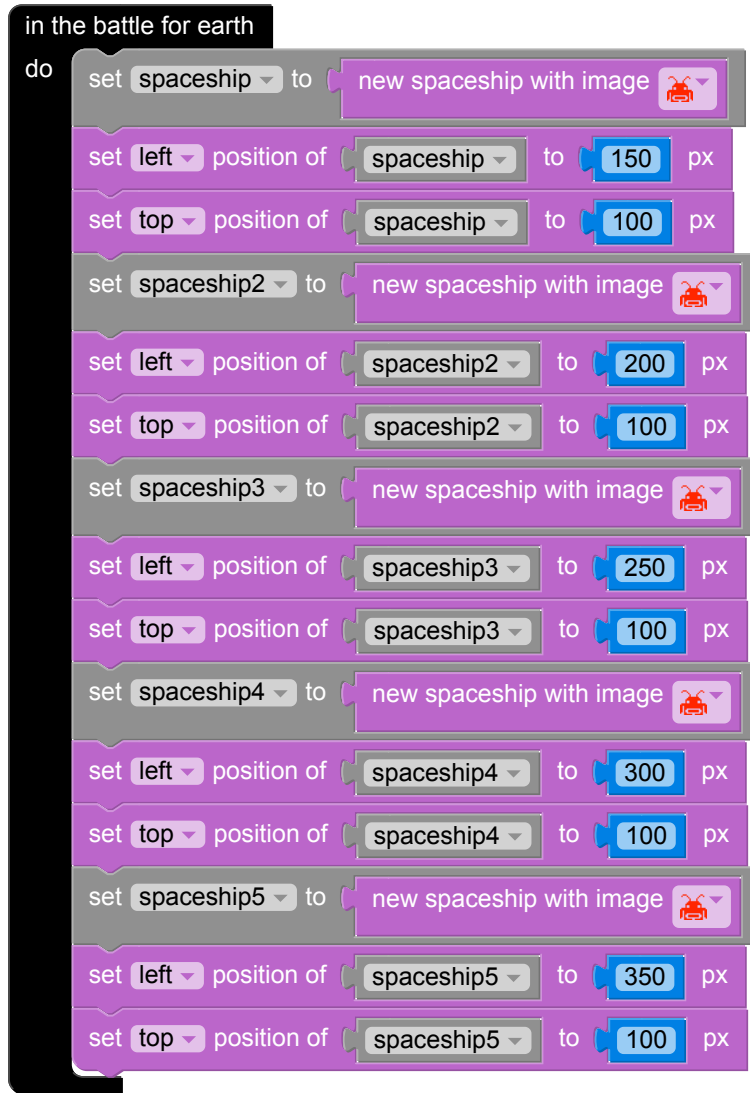
The result could look something like this:



[Battle for Earth \(https://groklearning-cdn.com/modules/7788e3Ah3YVzstVhrfPrEL/battleForEarth.mov\)](https://groklearning-cdn.com/modules/7788e3Ah3YVzstVhrfPrEL/battleForEarth.mov).

**You'll need**

 [program.blockly](https://program.blockly)



## Testing

☐ Congratulations, Captain!

### 1.1.25. Admiral of the Fleet

Congratulations on the successful invasion of Earth. Thanks to your efforts and valour planet Zarg has been saved. The water that you have secured from Earth has been used to restore the Zargan climate.

Luckily, Planet Zarg is 20 times smaller than Earth, so we didn't have to take all that much water from Earth. As a result, Earth's precious ecosystem is not very much affected.

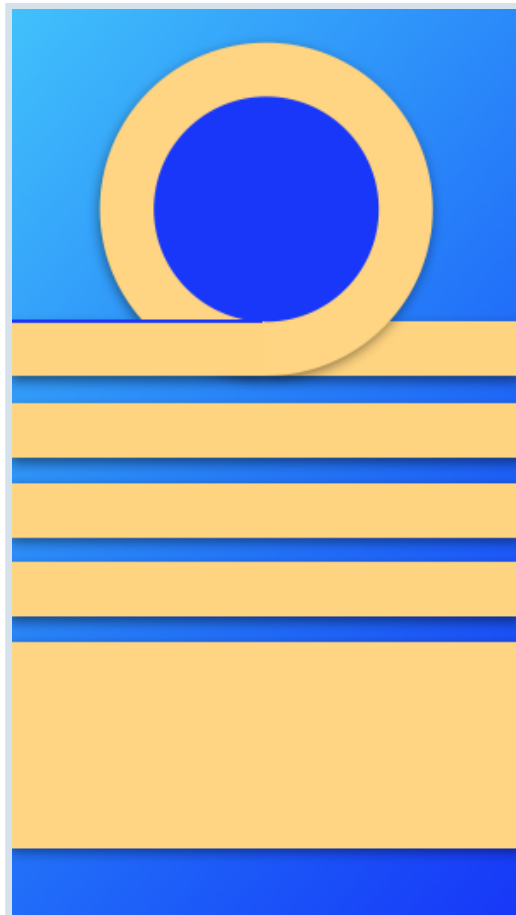
The Zargan High Command is very proud of your achievement and hereby promotes you to the highest rank in the Zargan Spacefleet:

## Admiral of the Fleet

The government and all people of planet Zarg congratulate.

You have been awarded a brand new command to zarg-form Earth's neighbour, Mars, to make it hospitable for future generations of Zargans .

Long live the Zargan Empire.



### Admiral's Badge

### 1.1.26. Let's celebrate

Planet Zarg is celebrating your victory with huge fireworks. Enjoy!



[Live broadcast from planet Zarg \(https://groklearning-cdn.com/modules/9NZ5v38XB8NCaLKGtnTCbN/Fireworks480p.mov\)](https://groklearning-cdn.com/modules/9NZ5v38XB8NCaLKGtnTCbN/Fireworks480p.mov).