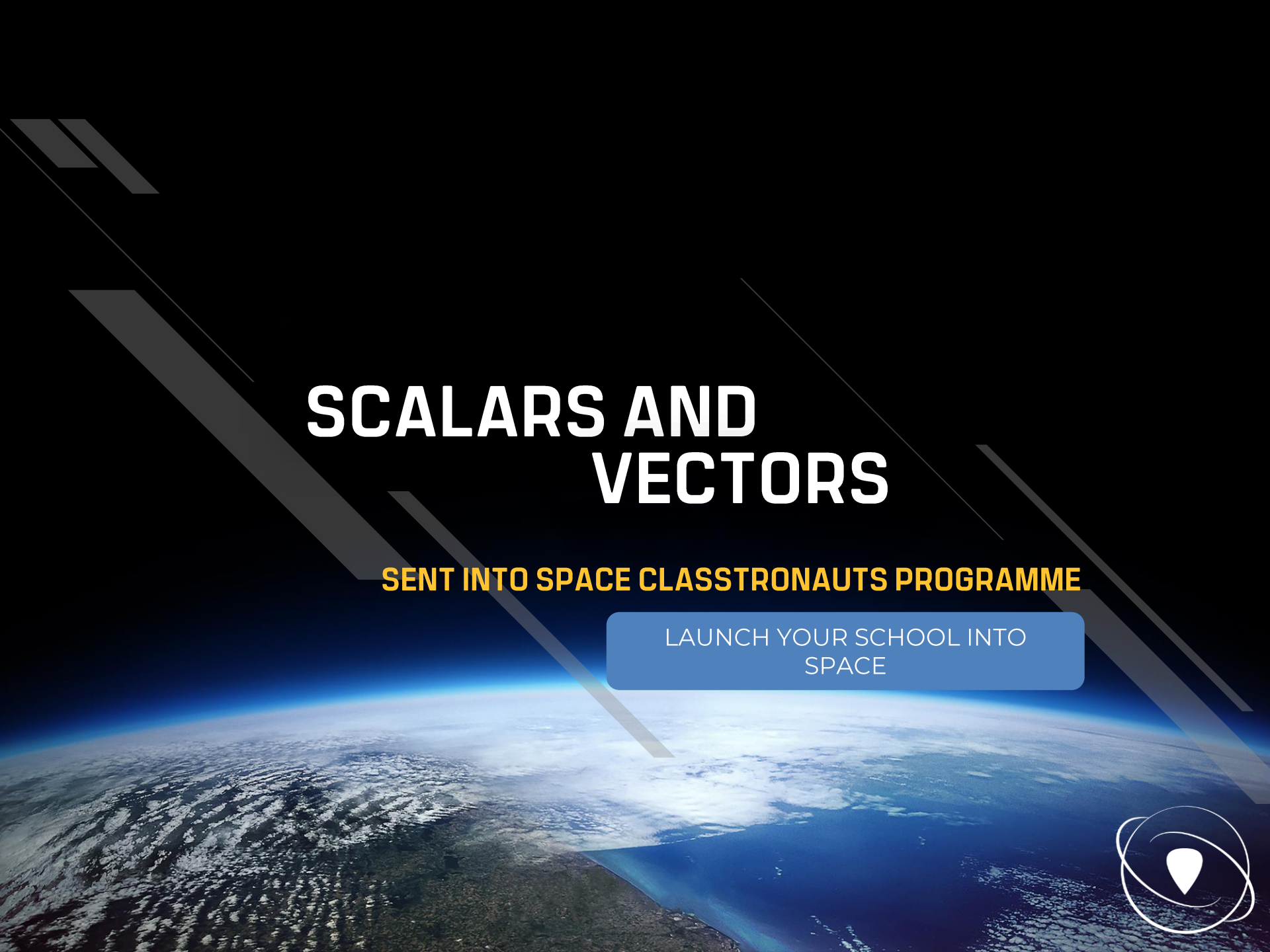
SCALARS AND VECTORS

SENT INTO SPACE CLASSTRONAUTS PROGRAMME

LAUNCH YOUR SCHOOL INTO SPACE



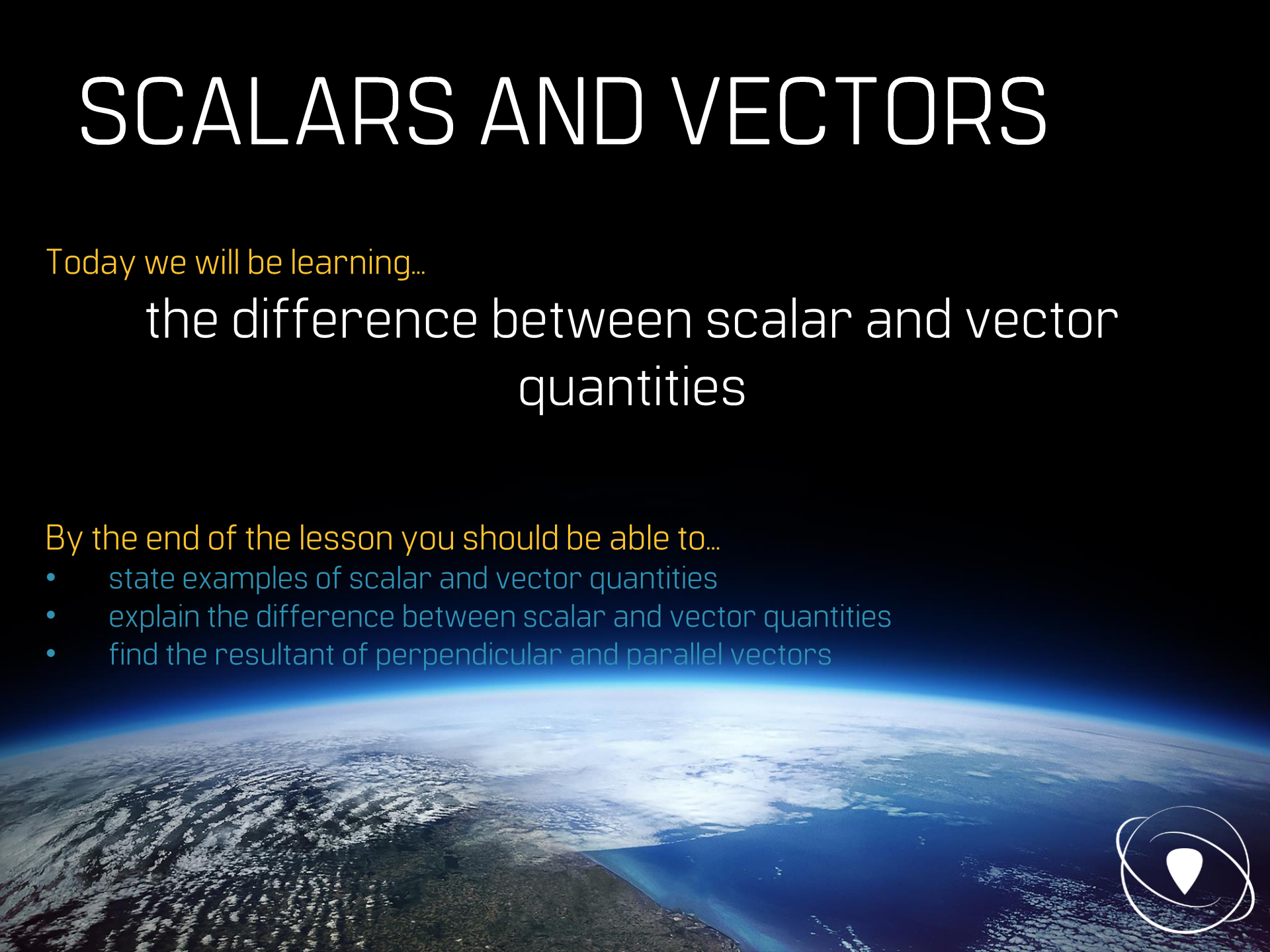
SCALARS AND VECTORS

Today we will be learning...

the difference between scalar and vector quantities

By the end of the lesson you should be able to...

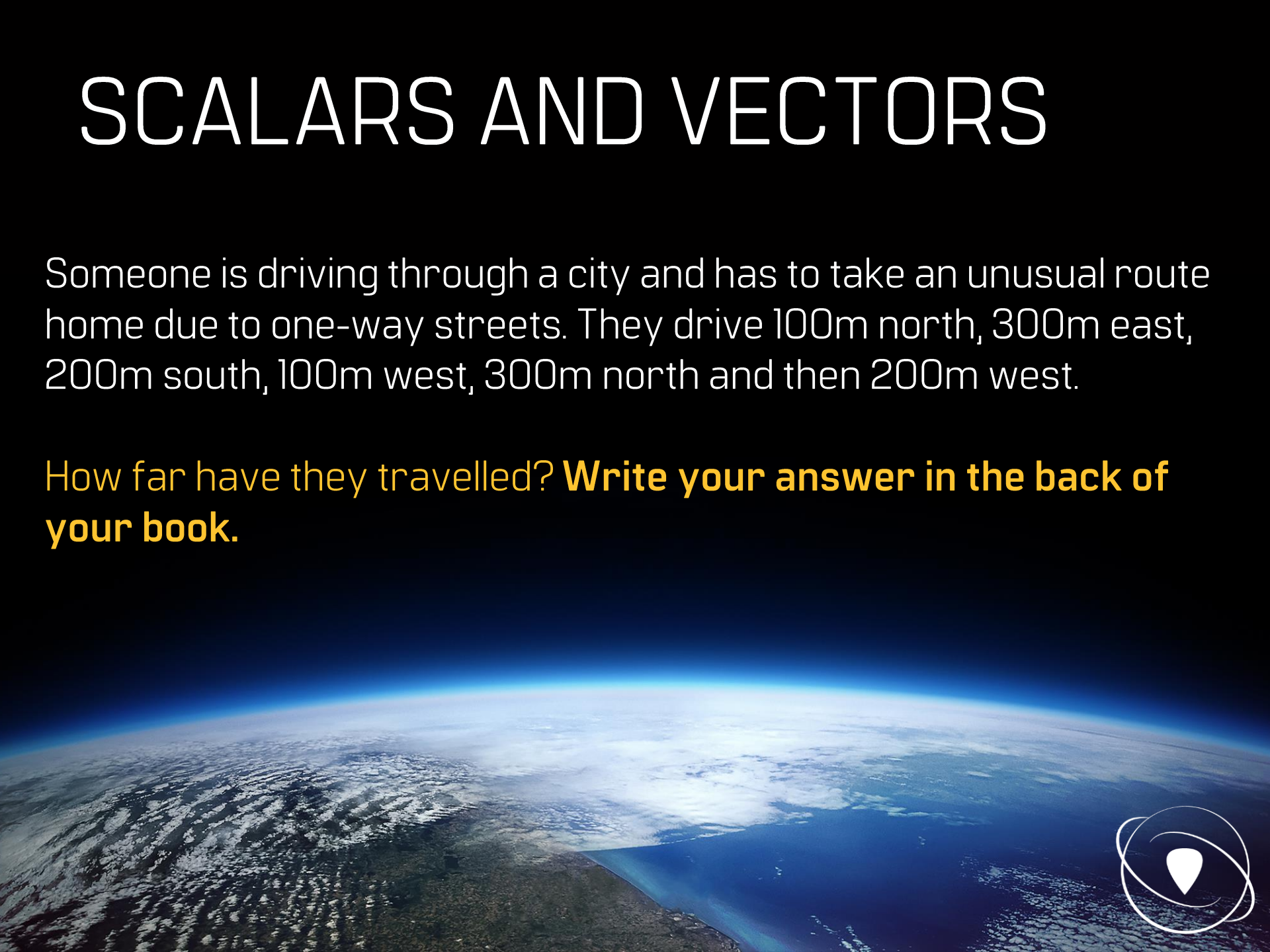
- state examples of scalar and vector quantities
- explain the difference between scalar and vector quantities
- find the resultant of perpendicular and parallel vectors



SCALARS AND VECTORS

Someone is driving through a city and has to take an unusual route home due to one-way streets. They drive 100m north, 300m east, 200m south, 100m west, 300m north and then 200m west.

How far have they travelled? **Write your answer in the back of your book.**

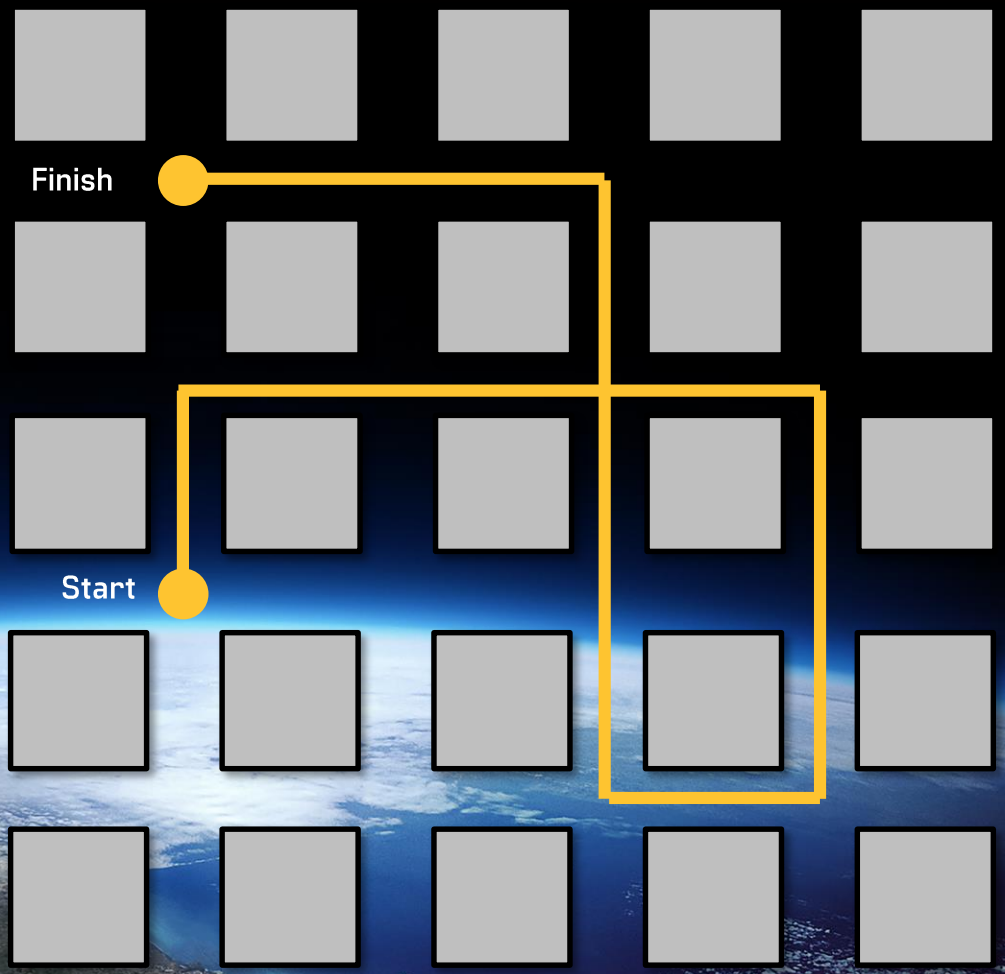


SCALARS AND VECTORS

Distance travelled = ?

Displacement = ?

What is the difference between these two quantities?

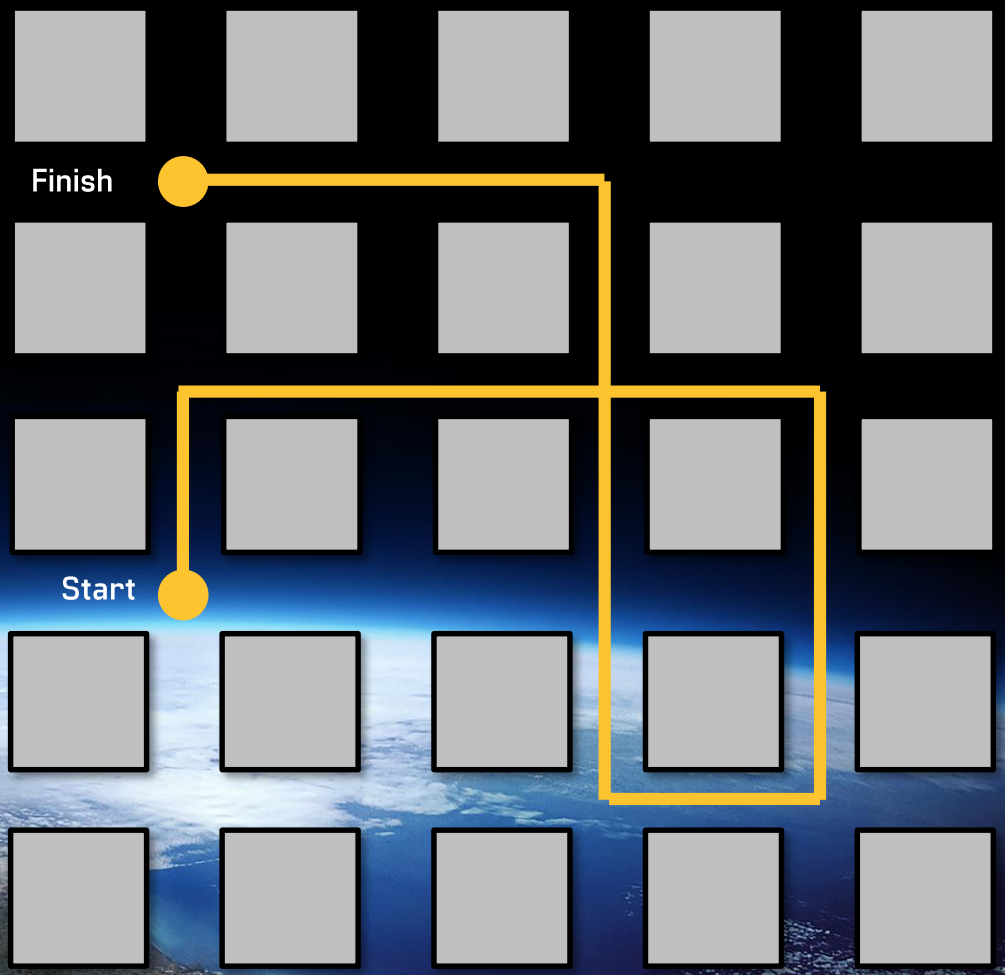


SCALARS AND VECTORS

Distance travelled = 100 + 300 + 200 + 100 + 300 + 200 = 1200m

Displacement = 200m North

What is the difference between these two quantities?

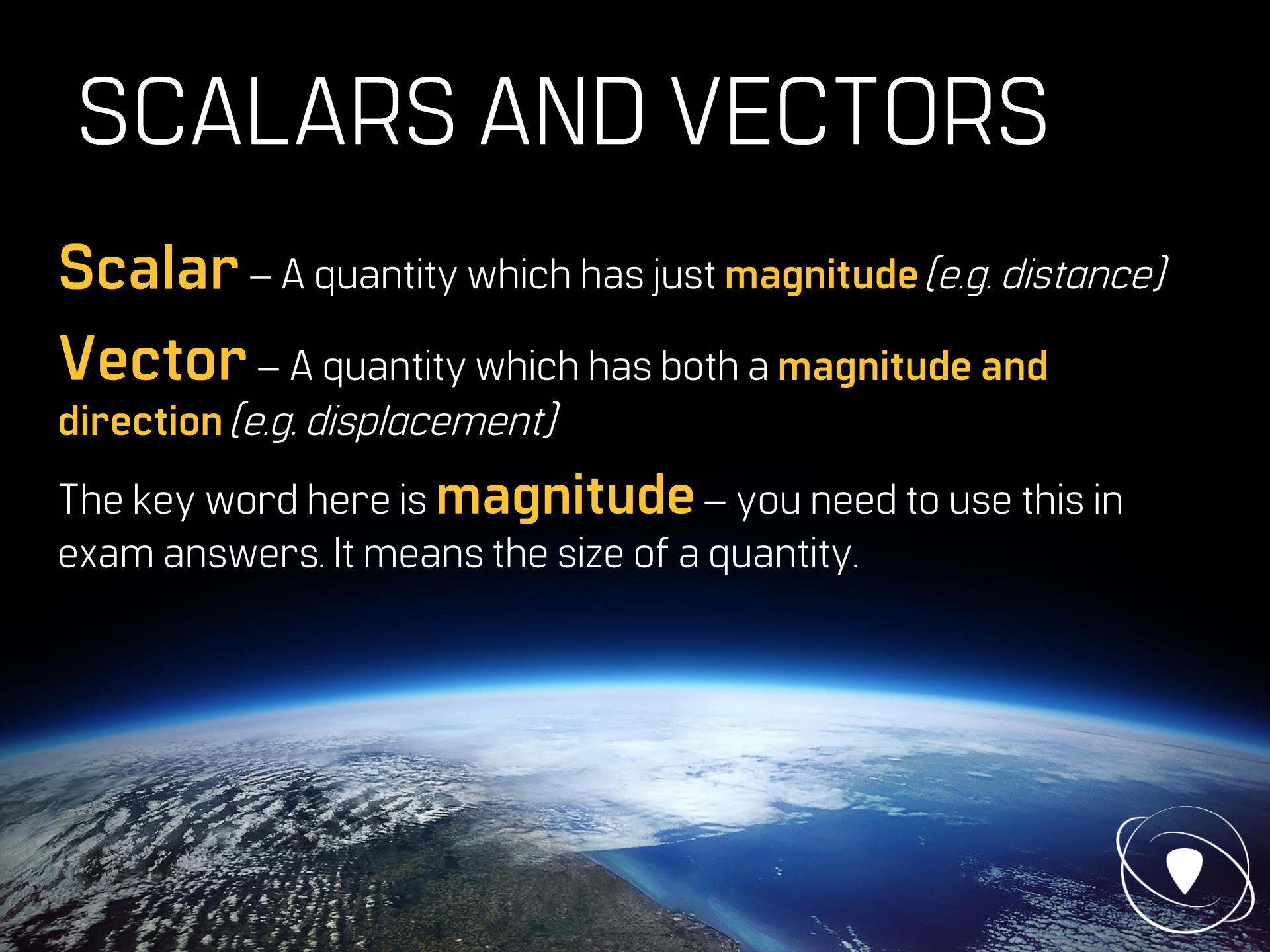


SCALARS AND VECTORS

Scalar – A quantity which has just **magnitude** *(e.g. distance)*

Vector – A quantity which has both a **magnitude and direction** *(e.g. displacement)*

The key word here is **magnitude** – you need to use this in exam answers. It means the size of a quantity.



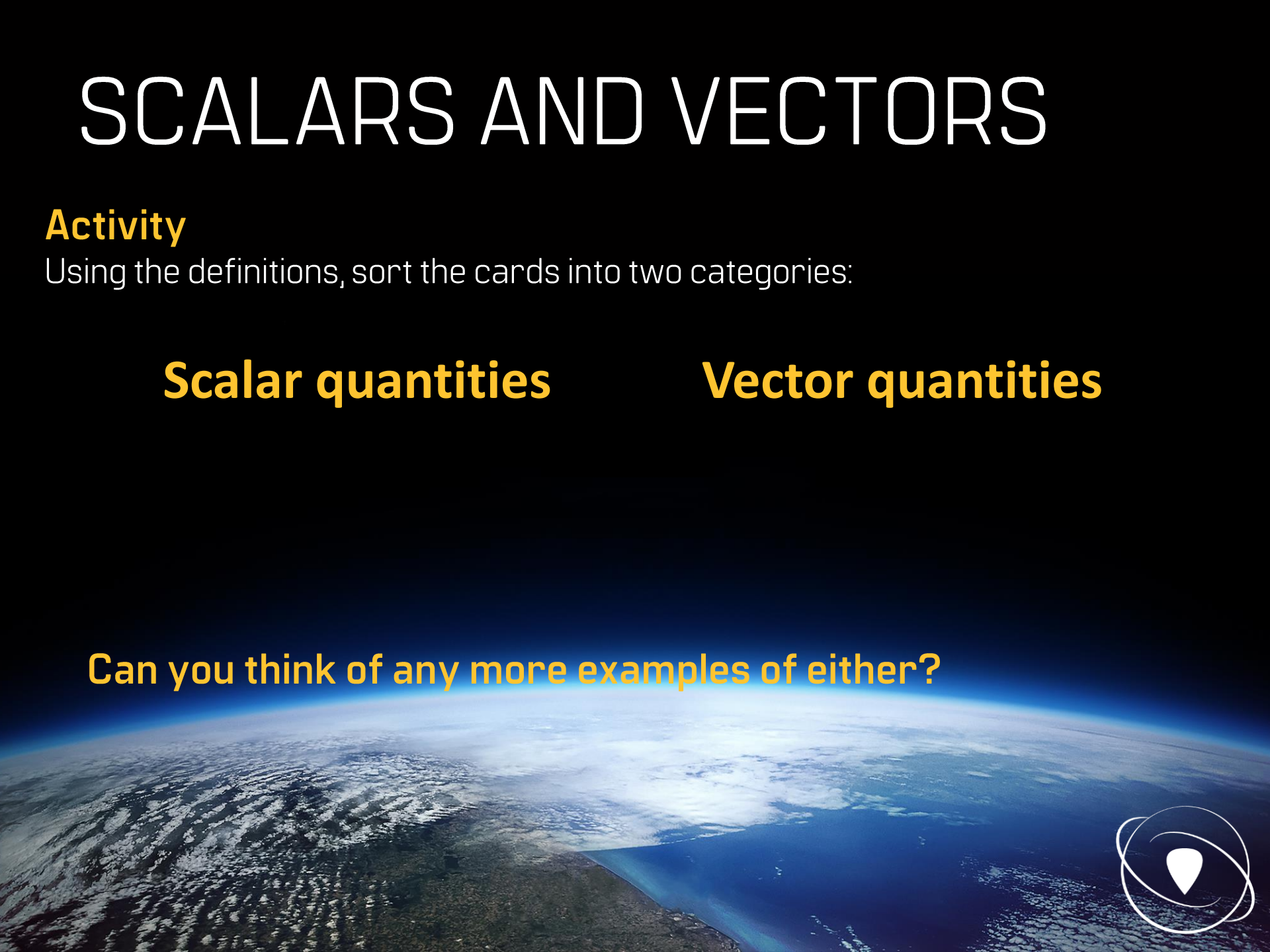
SCALARS AND VECTORS

Activity

Using the definitions, sort the cards into two categories:

Scalar quantities **Vector quantities**

Can you think of any more examples of either?



SCALARS AND VECTORS

Activity

Using the definitions, sort the cards into two categories:

Scalar quantities	Vector quantities
distance	displacement
speed	velocity
mass	acceleration
energy	force

Can you think of any more examples of either?

VECTORS

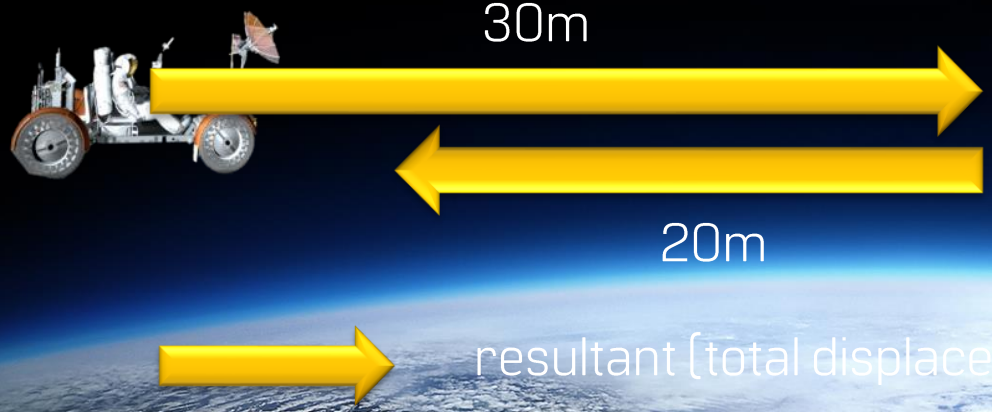
Finding resultant vectors - parallel

A lunar rover is driven 30m east, the astronauts stop to take some measurements and then it is driven a further 20m east. **What is its total displacement?**

VECTORS

Finding resultant vectors - parallel

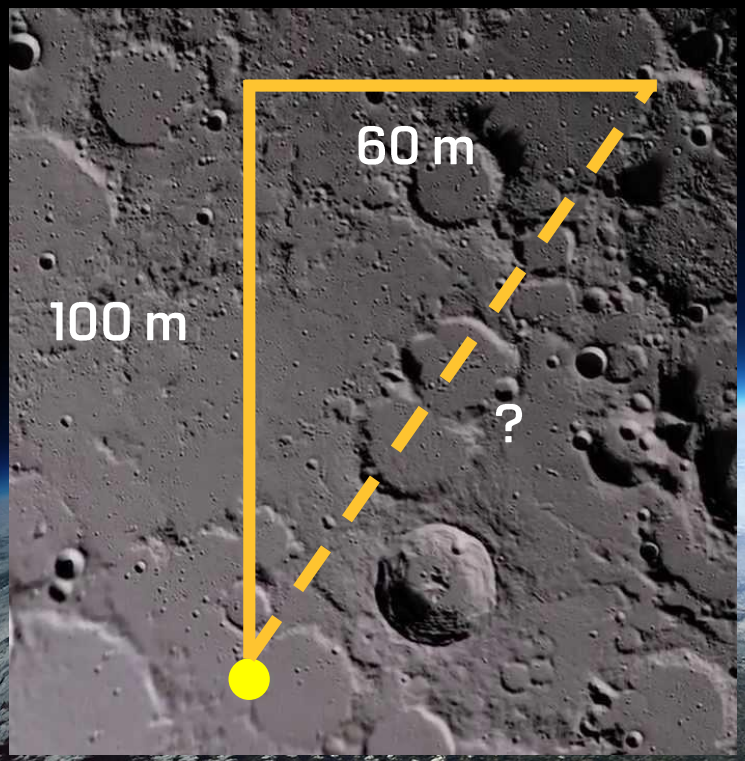
A lunar rover is driven 30m east, the astronauts stop to take some measurements and then it is driven 20m west, back towards its start point.
What is its total displacement?



VECTORS

Finding resultant vectors - perpendicular

A lunar rover drives 100m north, turns right and drives 60m east. **What is its total displacement?**



$c^2 = a^2 + b^2$

$c^2 = 100^2 + 60^2$

$c^2 = 10000 + 3600$

$c = 13600$

$c = 117$

displacement = **117 m**

VECTORS

Finding resultant vectors

Parallel

Same direction - add them together
Opposite directions - subtract one direction from the other

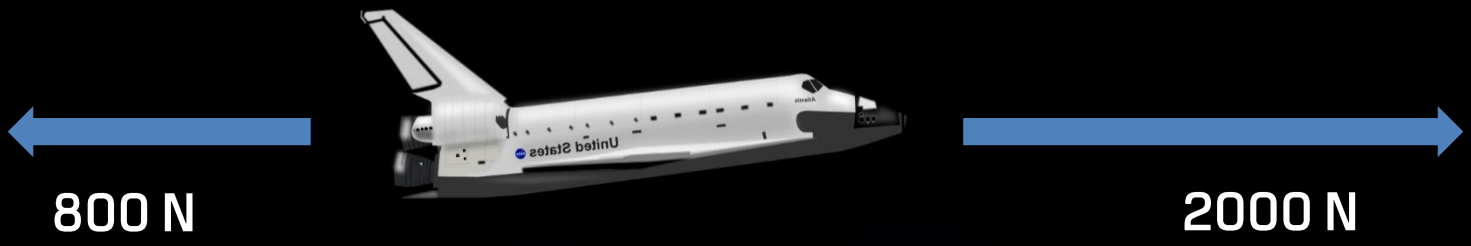
Perpendicular

Use Pythagoras

$c^2 = a^2 + b^2$

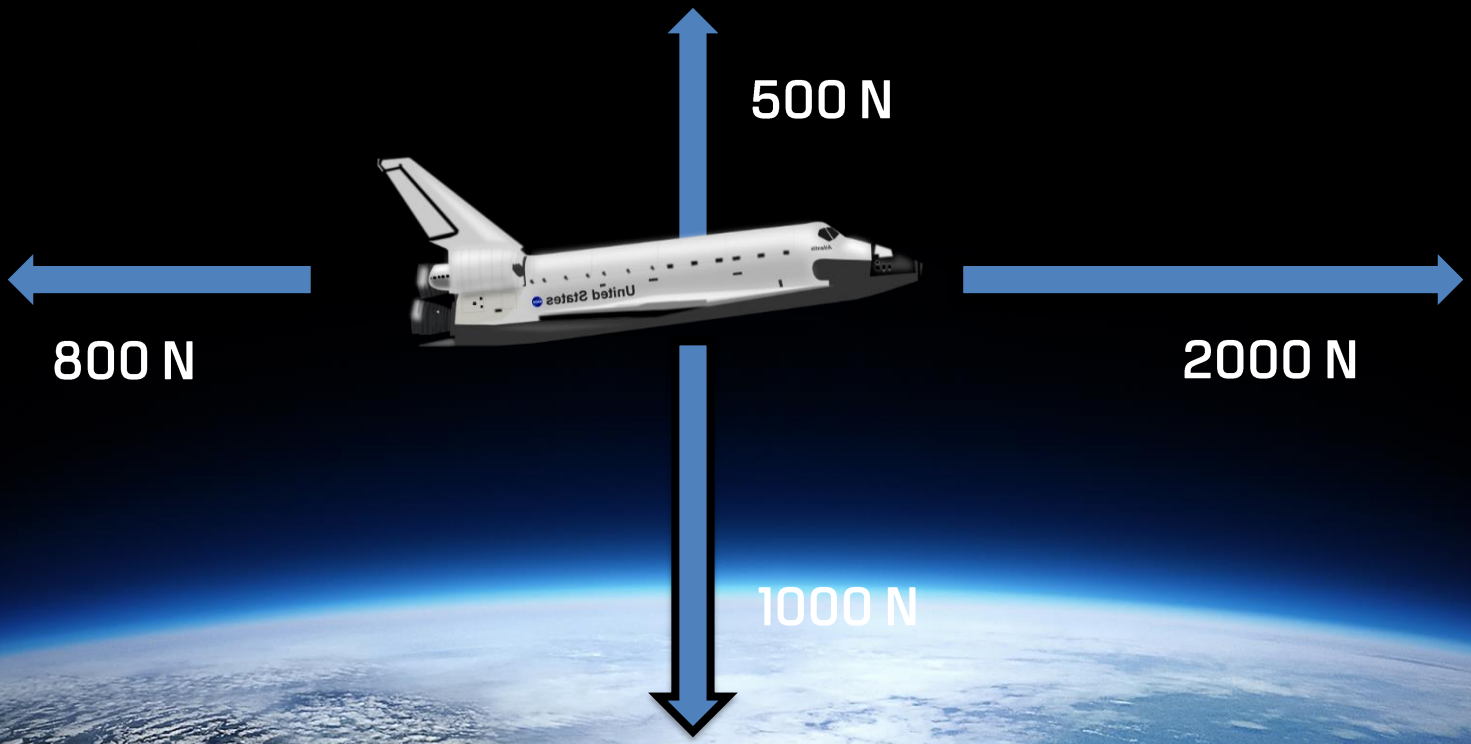
VECTORS

What is the resultant force?



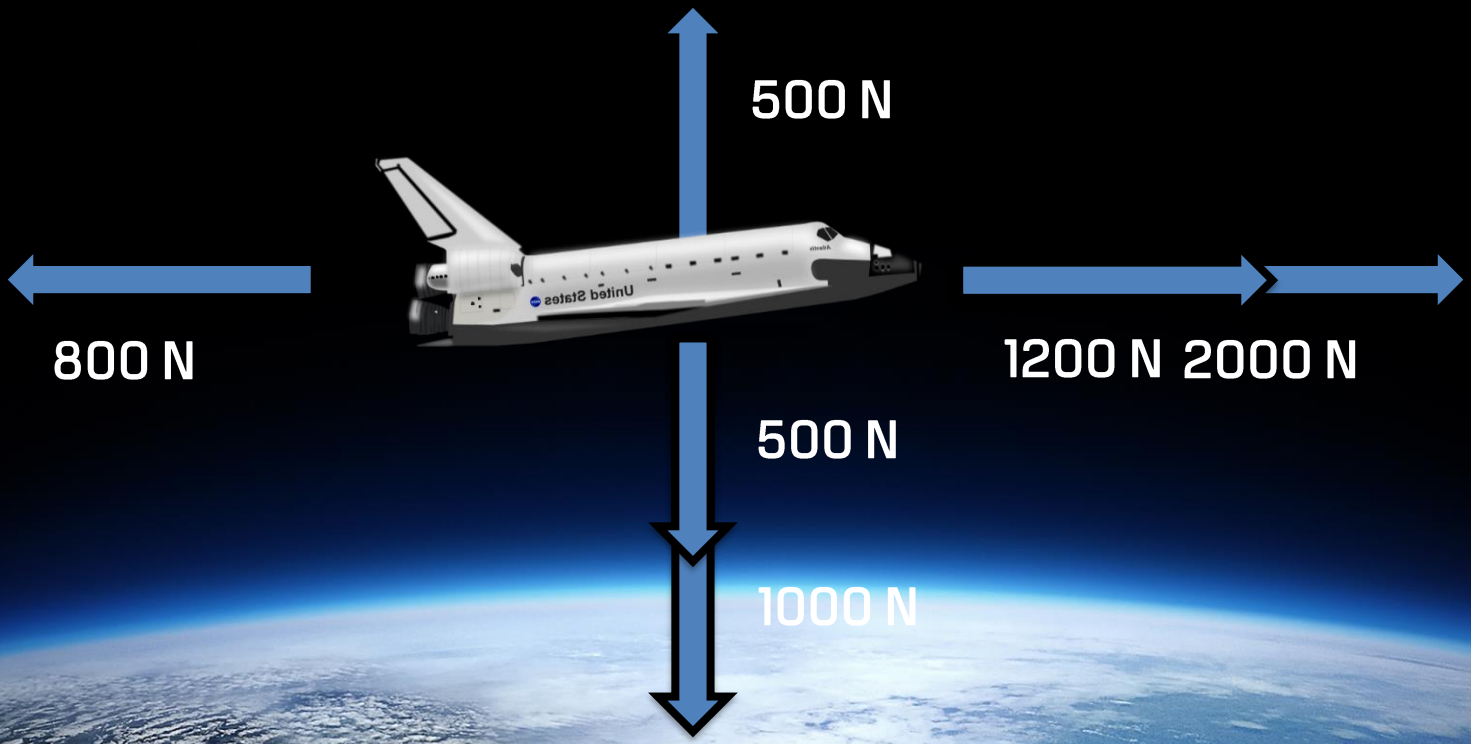
VECTORS

What is the resultant force?



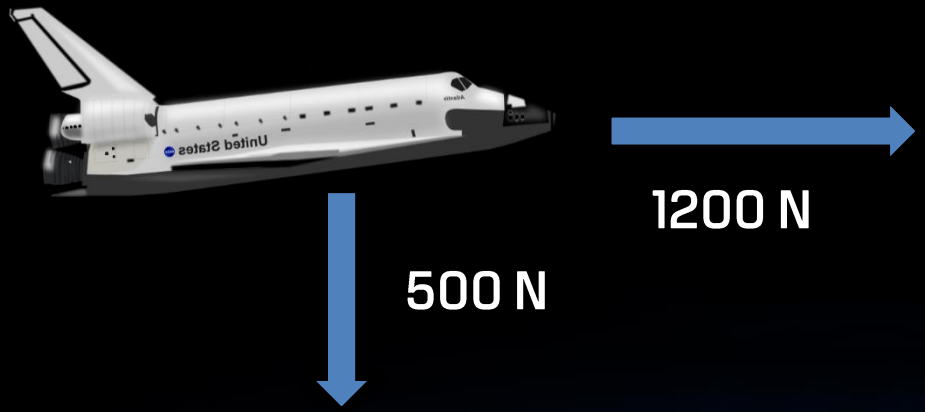
VECTORS

What is the resultant force?

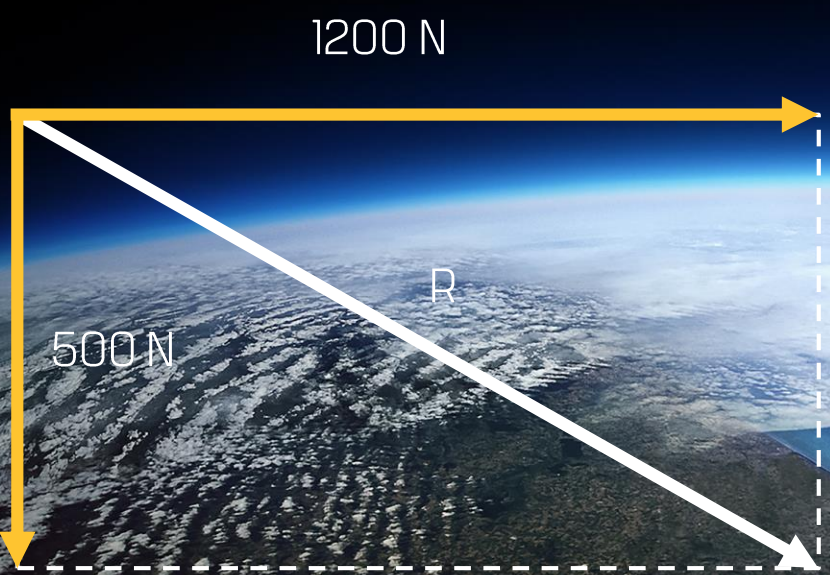


VECTORS

What is the resultant force?



The resultant of two perpendicular forces can be found using Pythagoras.

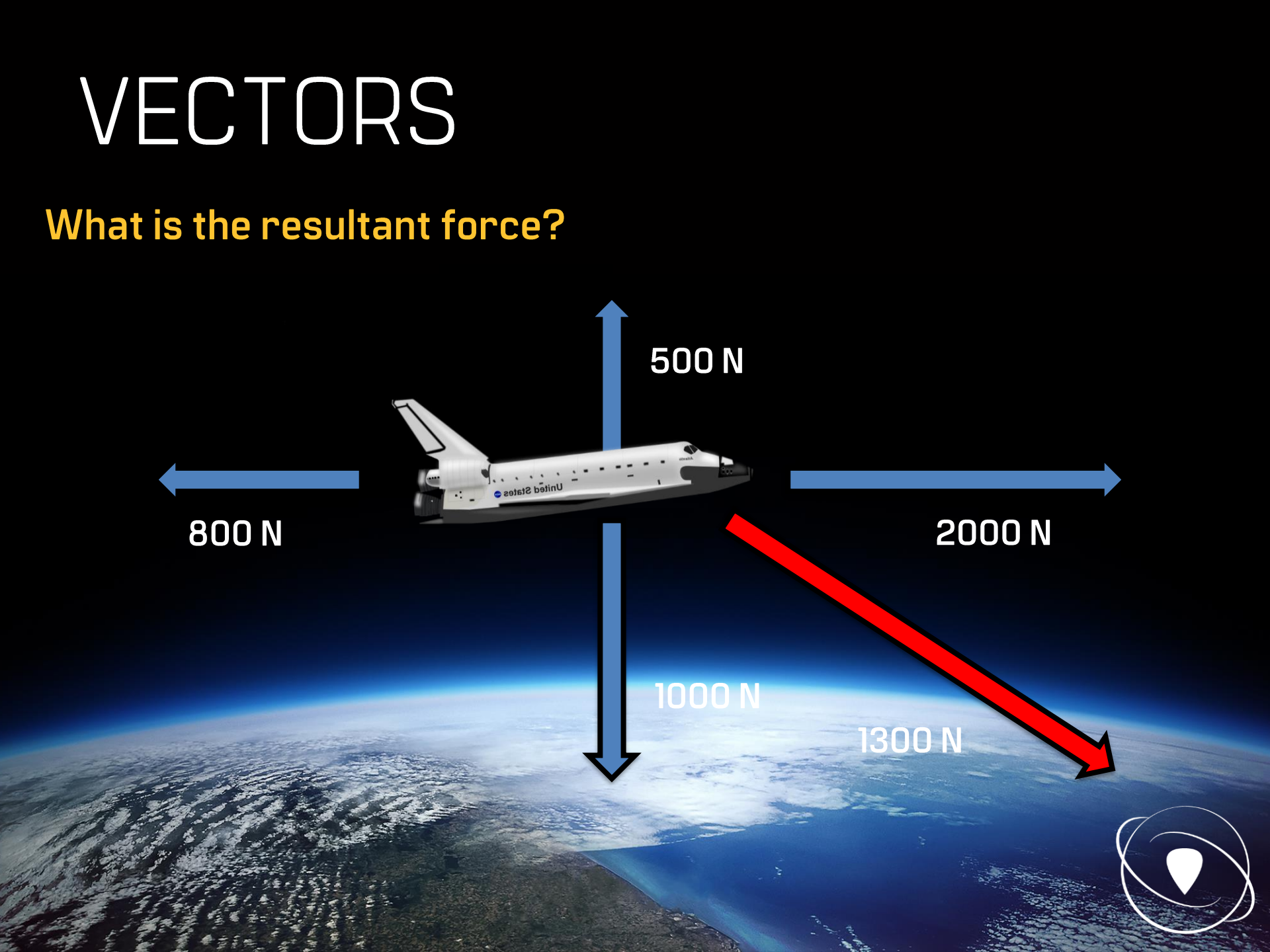


$$R = \sqrt{1200^2 + 500^2}$$

$$R = 1300 \quad \text{N}$$

VECTORS

What is the resultant force?



OUR CLASSTRONAUTS PROGRAMME

This presentation is produced by Sent Into Space and supports the Classtronauts school space launch programme. The ultimate STEM project, launching a balloon into space is a great idea if you're wondering how to engage your pupils with the science curriculum. We'll visit your school and fly a craft into space right from your playground. Our presenter gives a mission briefing explaining the science behind high altitude flight, answering questions from the pupils before launching an item of your choosing into space. It's the perfect activity for Space Week.

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Get in touch to discuss your Classtronauts project further:

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