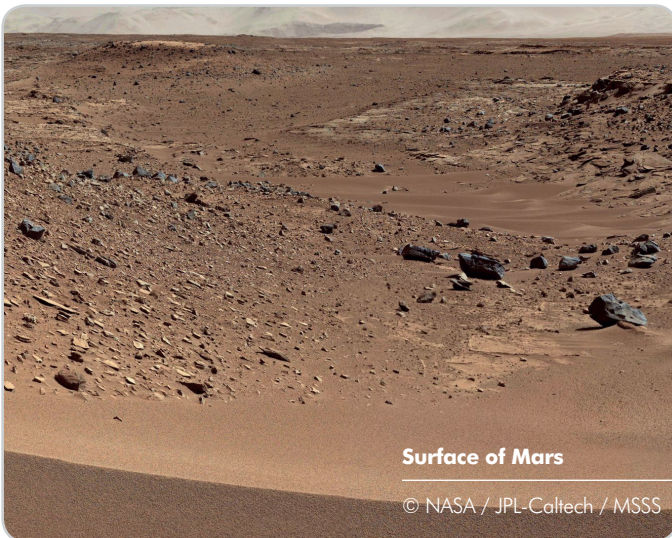


## For 7 to 11 year olds

## Context

ESA's ExoMars mission will send a rover and a lander to Mars. The rover will leave the lander to travel across the Martian surface; the lander will remain stationary. The lander has sensors and instruments to test the climate and atmospheric conditions including temperature, humidity, pressure, UV radiation and dust levels.

In this activity, the children will compare the weather on Mars and Earth, use a thermometer accurately and interpret tables showing actual temperatures taken on Mars and across the UK and prepare a weather report.



Surface of Mars

© NASA / JPL-Caltech / MSSS

## National curriculum links

## Science:

- Research and compare weather on Mars and Earth
- Know that scientists use units to measure weather

## Maths:

- Take accurate measurements
- Use read and interpret information in tables

## Resources

- Newspaper weather report
- Thermometers or data loggers
- Activity sheets 2, 2a
- Disposable cups or containers
- Ice cubes
- Warm and cold water

## Lesson starter

Watch a weather report or read together a weather report from the local newspaper.

- What kinds of weather are there?
- How is the weather described?
- How do think scientists find out about the weather on Mars?

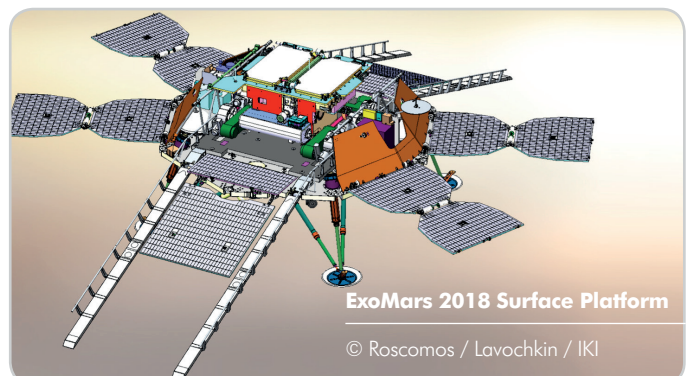
Landers on Mars and orbiters above provide lots of information. Watch this video made from images taken by NASA's Mars Colour Imager (MARCI) on their Reconnaissance orbiter of Mars:

[www.msss.com/msss\\_images/latest\\_weather.html](http://www.msss.com/msss_images/latest_weather.html)

In addition, NASA's Curiosity Rover has instruments (REMS) that measure atmospheric pressure, humidity, UV at the Martian surface, wind speed, air temperature and ground temperature around the rover. Check the latest daily measurements on Mars, using this link:

[mars.nasa.gov/msl/mission/instruments/enviro sensors/rem s/](http://mars.nasa.gov/msl/mission/instruments/enviro sensors/rem s/)

Scientists know from this data that Mars is very cold and dry, and experiences huge dust storms that can cover the surface and the atmosphere with a rusty coloured haze.



ExoMars 2018 Surface Platform

© Roscosmos / Lavochkin / IKI

### Main activity

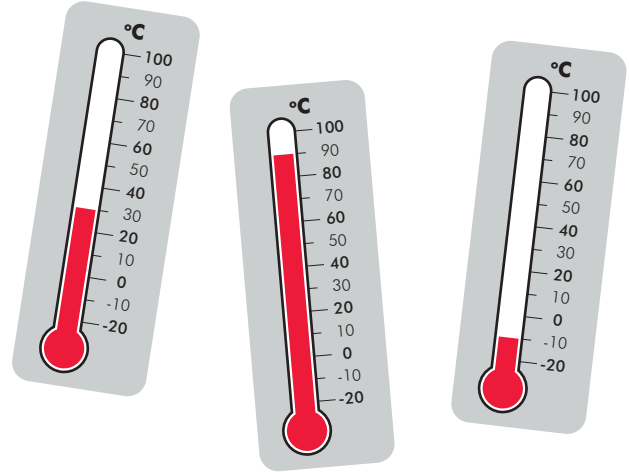
Introduce the thermometer as a measure of temperature. Familiarise the children with the scale where 0°C is the freezing point of water and 100°C is the boiling point. Use the templates on Activity sheet 2 to practise finding and marking a range of temperatures, both above and below freezing point.

Provide cups of ice, ice plus water, cold water, and warm water for each group. The children read the temperature of each. Remind the children about using thermometers accurately (see teacher support notes).

Using the charts on Activity sheet 2a, explain that these show temperature measurements for Gale crater on Mars, the landing site of NASA's Curiosity Rover in 2012. The next table shows the extreme temperatures recorded across the UK. The final table shows the average temperatures experienced in England over a thirty year period.

- Which months on Mars and the UK showed the highest and lowest ever temperatures?
- What is the difference between the highest temperatures ever recorded in the UK and on Mars?

The groups look up the weather at [www.metoffice.gov.uk](http://www.metoffice.gov.uk) for the local area and check the REMS site for Mars conditions for the same day: [mars.nasa.gov/msl/mission/instruments/envirosensors/remes](http://mars.nasa.gov/msl/mission/instruments/envirosensors/remes). They prepare a weather report for the local area and ... Mars!



### Further activities

Set up a mini weather station outside the classroom!

- Build a wind direction and wind speed tester
- Set up a simple rain gauge
- Record temperature, wind conditions, and precipitation data at the same time each day. Look for patterns over a month
- Compare their readings with those on Mars for a similar period

### STEM Vocabulary

Weather	Pressure	Wind speed
Temperature	Humidity	Meteorologist

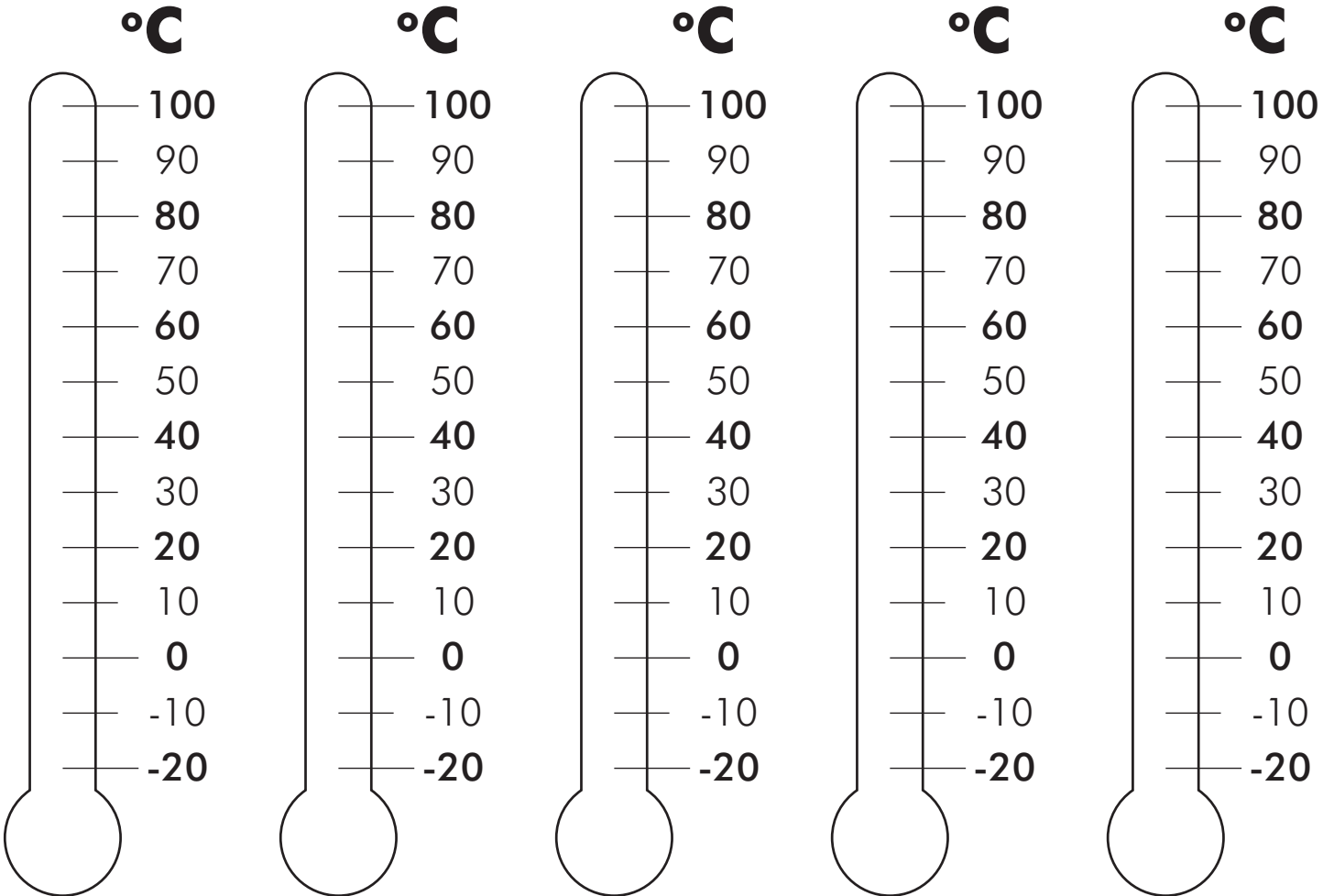
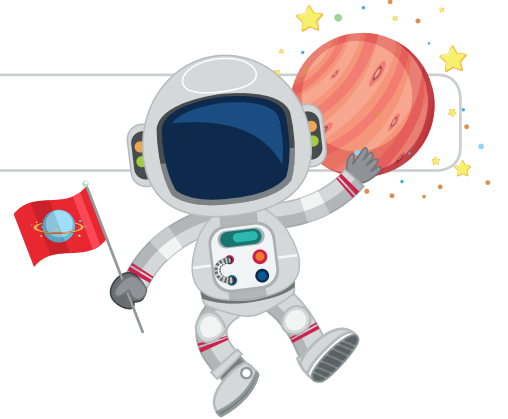
### Plenary

- What are the differences in climate between Mars and planet Earth?
- How do we know all this information?

Meteorologists study weather measurements and report conditions here on Earth and in space. The children may like to read out their weather report for the class.

Remind them that Europe's ExoMars mission will send a lander and a rover to Mars in 2021. The lander will stay in one place, and using its instruments will measure weather on Mars.

Mark the temperatures on the thermometers



**Tables A** and **B** show the **highest** and **lowest** temperatures recorded and the average highest and lowest temperatures, for each month of the year on Mars and in the United Kingdom.

**Table C** shows the average temperatures recorded in England.

### A. Climate for Gale Crater, Mars 2012-2015

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Record high °C</b>	6	6	1	0	7	14	20	19	7	7	8	8
<b>Average high °C</b>	-7	-18	-23	-20	-4	0	2	1	1	4	-1	-3
<b>Average low °C</b>	-82	-86	-88	-87	-85	-78	-76	-69	-68	-73	-73	-77
<b>Record low °C</b>	-95	-127	-114	-97	-98	-125	-84	-80	-78	-79	-83	-110

### B. Extreme climate data for United Kingdom

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Record high °C</b>	18.3	19.7	25.6	29.4	32.8	35.6	36.7	38.6	35.6	29.9	22.4	18.3
<b>Average high °C</b>	6.4	6.6	8.9	11.4	14.7	17.3	19.4	19.1	16.5	12.8	9.1	6.7
<b>Average low °C</b>	0.9	0.7	2.1	3.2	6.0	8.8	10.9	10.8	8.8	6.2	3.3	1.1
<b>Record low °C</b>	-27.2	-27.2	-22.8	-15.0	-9.4	-5.6	-2.5	-4.5	-6.7	-11.7	-23.3	-27.2

### C. Average climate data for England between 1981-2010

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Average high °C</b>	6.4	6.6	9.1	11.8	15.6	18.6	20.4	20.1	17.5	14.0	9.4	7.3
<b>Average low °C</b>	1.2	0.9	2.0	3.9	6.8	9.7	11.7	11.5	9.6	7.2	3.6	2.0