Name .... Class .... Date ....
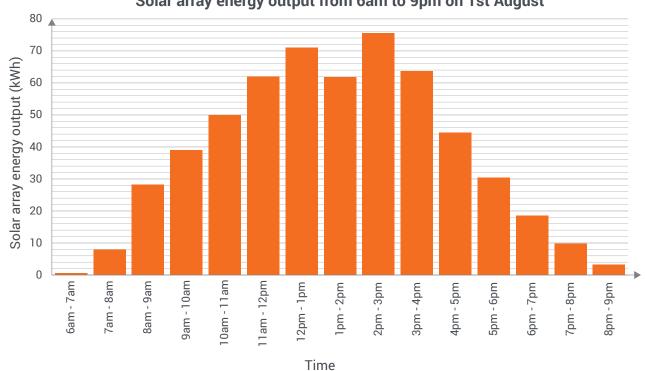
You are a Renewable Energy Consultant working with INEOS TEAM UK to measure the output of their solar array. Complete the tasks to help them make the most of their renewable energy and increase their sustainability.

Mark Rogers: Facilities Manager at INEOS TEAM UK

Mark helps to ensure the INEOS TEAM UK base is as energy efficient as possible.

The INEOS TEAM UK base has a fantastic solar array on the roof. To ensure they are reaching their sustainability goals, Mark and the team need to ensure it's working at its best, and understand the impact that it has.

Task 1: Changes With Time

1 The chart below shows the hourly energy output of the base's solar array, in kWh.

Solar array energy output from 6am to 9pm on 1st August

a How much energy was produced between 11am and 12pm?

....

b How much more energy was produced between 2pm and 3pm than between 1pm and 2pm?

....

c At what times does the base produce more than 70kWh of energy?

....

2

a Read the statement below and cross out the incorrect option to make it read correctly:

As the sun rises in the sky in the morning, the power output increases/decreases until the middle of the day. After that, as the sun gets lower in the sky, the power output increases/decreases.

b What could have caused the dip at 1–2pm? Remember that the energy comes from the sun.

....

....

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....

....

3

The table below shows equipment used in the base's offices.

a How much energy does all of this equipment use each hour? Multiply the quantity and energy values, and then add them up to get a total.
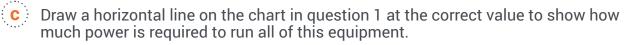
> 80 desktop computers x 110Wh = 8800Wh in total.

Equipment	Quantity	Energy used in 1 hour (Wh)	Quantity x energy (Wh)
Desktop computer	80	110	8,800
TV screen	12	75	
Lights	22	25	
Air conditioner	8	1000	
		Total energy over 1h	

b What is the total energy used in kWh by all the equipment?

Top tip: 1000Wh = 1kWh

Total energy used = ... Wh = ... kWh

c Draw a horizontal line on the chart in question 1 at the correct value to show how much power is required to run all of this equipment.

d At what times do the solar panels produce enough power to run all the equipment?

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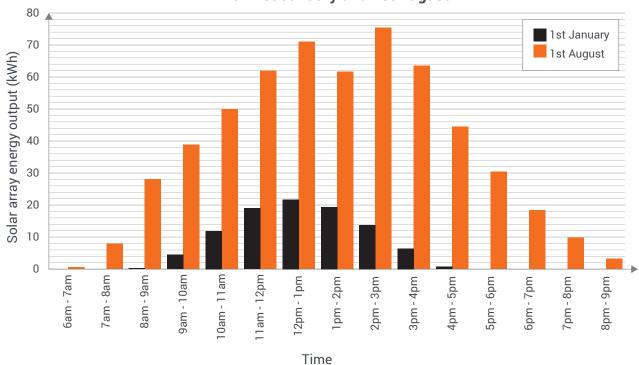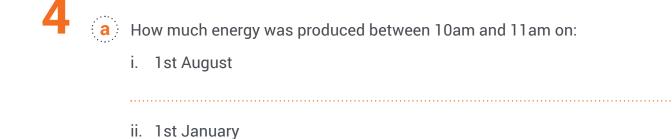
Task 2: changes with season

The chart below compares the solar array's output on a single day in summer (1st August) and winter (1st January).

Solar array energy output comparison from 6am to 9pm on 1st January and 1st August

4

a How much energy was produced between 10am and 11am on:

i. 1st August

....

ii. 1st January

....

b What is the difference in energy output between 1st August and 1st January between 10am and 11am?

....

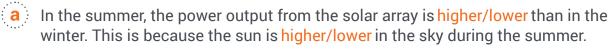**c** How many hours does the base produce solar energy for on 1st January?
Ignore hours where solar output is below 1kWh.

....

d Between 12pm and 1pm, the base produces more than 3 times as much energy on
1st August than on 1st January. True or False?

....

5 Read the statements below and cross out the incorrect option to make it read correctly:

a In the summer, the power output from the solar array is higher/lower than in the
winter. This is because the sun is higher/lower in the sky during the summer.

b In the winter, the solar array produces electricity for more/fewer hours than in the
summer. This is because the sun rises earlier/later and sets earlier/later in the winter
than in the summer.

Task 3 (extension): electricity at home

The INEOS TEAM UK base uses a large solar panel array, but lots of people also choose to have
smaller arrays on their homes. These may consist of just a few panels.

6 Your house has one solar panel installed which can produce 110W of power each hour in
the summer. Complete the table below to find out which of the devices you could run from
only solar power.

Device	Power requirement	Can run for free, with one panel?	Number of panels needed to run
42" TV	75W	Yes/~~No~~	1
Xbox One	110W	Yes/No	
PlayStation 4	137W	Yes/No	
Laptop	70W	Yes/No	
Washing machine	500W	Yes/No	
Kettle	2200W	Yes/No	