GROUND LEVEL · MATHS / DATA LITERACY · AGES 10-13 (Y5-Y8) · 30-40 MINUTES

What Does Normal Look Like?

Reading warming stripes - averages, baselines, and what one dataset can and can't tell us

Your teacher has projected (or printed) a warming stripes image for a place near you. Each stripe represents one year's average temperature - and together they tell a story about how our climate has been changing.

In this activity you'll learn to read that image properly - and think carefully about what it does and doesn't tell us.

1 First look | 5 min

On your own - no right or wrong answers yet

Look at the stripes image. Before anyone explains anything, write down three things you notice.

1.

2.

3.

2 What is normal? | 8 min

With a partner

Before we read the stripes properly, we need to understand two key ideas: **average** and **baseline**.

Worked example

Here are the midday temperatures (°C) in Newcastle for one week in October:

Mon 12 · Tue 14 · Wed 11 · Thu 13 · Fri 15 · Sat 10 · Sun 13

The average (mean) for this week is 12.6°C. That becomes our baseline - our definition of 'normal' for this week.

Now imagine the same week next year averages 14.1°C. That's 1.5°C above baseline. A small number - but what if it kept rising every year for 50 years?

Your turn

Calculate the average for the worked example above. Does it match 12.6°C?

In the warming stripes, the baseline is the average temperature for 1971-2000. Why do you think scientists chose a 30-year period rather than just one year?

3 Reading the stripes | 10 min

With a partner - use the image projected at the front

These questions use Newcastle upon Tyne as an example - your teacher's version may show a different place. Answer using whichever image is on screen.

Question	Your answer
What does each individual stripe represent?	
What do the blue stripes mean? What do the red stripes mean?	
Roughly when does the image start to shift noticeably from blue to red?	
Where on the image is the change most dramatic - left, middle, or right? What does that tell you about when change accelerated?	
Are there any blue stripes near the right-hand side? What might explain a cooler year within an overall warming trend?	

4 The local story | 8 min

Small groups

If average temperatures in your area have been rising, what might that actually mean in practice? Think about your local area specifically.

Seasons Have you noticed anything different about when seasons seem to start or end? What might change further?	**Weather** What kinds of extreme weather events might become more or less common as temperatures rise?	**Nature** How might local wildlife, plants, or farming be affected by a warming trend over decades?
Water What might rising temperatures mean for rainfall, rivers, flooding, or drought in your area?	**People** How might warmer summers and milder winters affect daily life, health, or energy use locally?	**Coast** If your area is near the sea: what might rising temperatures mean for sea levels and coastal communities?

5 What's missing? | 5 min

Whole class

What does this data show us confidently?	What questions can't this data answer on its own?

GROUND LEVEL · FACILITATOR SCRIPT

Guidance for teachers

30-40 mins · Y5-Y8 (ages 10-13) · Individual → Pairs → Groups → Whole class

Before you start - getting your stripes image

Visit showyourstripes.info and search for your nearest town or city to download a free warming stripes image. Newcastle upon Tyne is used as the worked example on the pupil sheet (data from 1850-2025), but any UK location works equally well - choosing somewhere local to your school makes Stage 4 much more meaningful.

Display options: Project the image full-screen for the whole lesson, or print one copy per pair. The image is free to download and use in educational settings. You don't need the labelled version for this activity - the plain stripes version works better for Stage 1 (first impressions without explanation).

Curriculum links: KS2/3 maths (mean averages, data interpretation); KS2/3 science (climate, data and evidence); KS3 geography (climate change, data literacy); English (reading non-fiction, evaluating sources).

1 First look · 5 min · Individual

Project the plain stripes image (without labels) before explaining anything. Give pupils two full minutes of quiet looking before they write.
"Don't tell me what this is yet - just look at it and write down anything you notice. Colour, pattern, anything at all."
Common first observations: 'it goes from blue to red', 'there are more red ones on the right', 'some years look different from others'. All valid - the goal is to surface prior intuition before any explanation lands.

- 💡 **If needed:** *If pupils seem unsure what to write: prompt with 'describe what you see, left to right - what changes?'*
- 💡 **If needed:** *For younger pupils (Y5-6): accept single words or phrases rather than full sentences.*

2 What is normal? · 8 min · Pairs

Work through the worked example together as a class before pupils attempt the calculation themselves - the numbers are straightforward but the concept of baseline needs a moment of explicit teaching.
"Add up all seven temperatures and divide by seven. That gives us one number that represents the whole week - the average, or mean. That number is our baseline - our definition of normal for that week."
Answer: 12 + 14 + 11 + 13 + 15 + 10 + 13 = 88, divided by 7 = 12.57°C (rounds to 12.6°C). The warming stripes baseline uses the same principle but across 30 years (1971-2000) to smooth out individual unusual years.
"The key insight to draw out: a single unusual year doesn't tell you much. It's the consistent shift above baseline over many years that's significant - that's what the stripes are showing."

- 💡 **If needed:** *For pupils who find the calculation tricky: provide a calculator, or simplify to just explaining the concept without the calculation.*
- 💡 **If needed:** *For stronger mathematicians: ask why a 30-year average is more reliable than a 5-year one, and what problems might arise with very short or very long baseline periods.*

3 Reading the stripes · 10 min · Pairs

Pupils work through the five questions using the projected image. Circulate and listen for misconceptions - the most common is thinking the stripes show daily or monthly temperatures rather than annual averages.
"Remember - each stripe is one whole year's average temperature, compared to the 1971-2000 baseline. A year that was warmer than average is red. A year that was cooler than average is blue."

Question	What to listen for
What does each stripe represent?	*One year's average temperature for that location.*

What do blue / red mean?	*Blue = cooler than the 1971-2000 baseline; red = warmer than baseline. Depth of colour indicates how far above or below.*
When does it shift from blue to red?	*For Newcastle: a noticeable shift from roughly the 1980s onwards, becoming strongly red from the 2000s.*
Where is change most dramatic?	*Right-hand side (recent decades) - acceleration of warming is visible in the density and depth of red stripes.*
Blue stripes near the right?	*Yes - individual cool years still occur within an overall warming trend. Natural variation still exists; it's the long-term pattern that matters.*

- 💡 **If needed:** *If using a non-Newcastle location: the shift dates and colour intensity will vary - use the image itself to answer rather than these notes, which are specific to Newcastle.*

4 The local story · 8 min · Small groups

This stage is deliberately open and will vary significantly depending on where your school is. Use the six prompt cards on the pupil sheet as starting points, but encourage pupils to draw on their own local knowledge.
"Think about your actual local area - not somewhere you've read about. What do you already know about flooding, farming, wildlife, or seasons near here?"

Context	Suggested local focus
Coastal school	*Focus on sea levels, coastal erosion, storm surges, and impact on seaside communities and tourism.*
Urban school	*Focus on urban heat islands, summer heat health risks, drainage and flooding, and green space.*
Rural / farming area	*Focus on growing seasons, crop changes, livestock health in heat, and changing rainfall patterns.*
Upland / moorland area	*Focus on peat bog changes, snowfall reduction, hill farming challenges, and water catchment.*
River / flood plain	*Focus on flood frequency and severity, river levels, and infrastructure resilience.*

5 What's missing? · 5 min · Whole class

The critical close. Take responses from both boxes and use them to build a shared class picture of what this data does and doesn't tell us.
"This image is very powerful - but it only shows one thing: average annual temperature over time. What questions would you still have if you were trying to make a decision based on it?"

What it does show	What it doesn't show
A clear long-term trend in annual average temperature	*Why the temperature is rising - the cause is not visible in this data alone*
The rate and acceleration of change over time	*Rainfall, flooding, drought, wind, or any other climate variable*
How this location compares across different periods	*What the temperature means for specific species, people, or places*
That recent decades are significantly warmer than the baseline	*What actions have been taken, or what might reduce the trend*

Worth leaving pupils with this: if a scientist showed you only this image, what would you be confident saying - and what would you want to check first? That question is exactly what makes data useful rather than just persuasive.

- 💡 **If needed:** *For stronger groups: ask whether a single location's stripes could be used as evidence for global climate change, and why or why not.*

Where next? More free activities and resources at **notyetzero.com** · Questions? Contact rebecca@notyetzero.com