Line graphs: compare, add and find the difference

Teacher		**Class**	Year 5
Subject	Maths	**Topic**	Line graphs
Date		**Room**	
Lesson length	60 minutes	**Country**	United Kingdom

Pupils learn to solve comparison, sum and difference problems from line graphs. They read values, calculate with a partner and explain their methods.

Curriculum links

- solve comparison, sum and difference problems using information presented in a line graph [1][2]

Learning objectives

- Students will read values from a line graph using title, axes and scale.
- Students will solve comparison and difference problems using presented line graph data.
- Students will find totals by adding two values shown on a line graph.

Success criteria

- I can read exact values from dots on a line graph.
- I can find the difference by subtracting the smaller value from a line graph.
- I can find the total by adding two values together from a line graph.

What students already know

Show any simple line graph for 2 minutes. Ask: What does the title tell us? What is on each axis? Where do you look to read one dot?

Key words

line graph	a picture with dots joined to show change over time [10]
comparison	finding which value is more or less
sum	total when you put two amounts together
difference	gap left when you take one amount away from another
trend	pattern of going up and down over time [13]
scale	numbers and steps going up the side [4]

Materials

- Slides 2, 3, 4, 5, 6, 9, 10, 12
- Video clip 1 (1:15–4:40) on Slide 6
- Worksheet Task C printed copies - bike sales line graph
- whiteboard and whiteboard pens
- squared-paper notebooks, pencils and rulers
- mini-whiteboards and pens

Before the lesson

- Print Worksheet Task C - one per pair - and check rulers are available
- Test Slide 6 Video clip 1 (1:15–4:40) for sound and picture
- Prepare whiteboard axes for plant height in centimetres across weeks, with week 3 as 3 cm and week 8 as 12 cm

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- Set out squared-paper notebooks and mini-whiteboards

Lesson outline

0–8 min **Starter** 8 min · Whole class

To hook pupils and recall how to read a line graph.

YOU DO

1. Display Slide 2 and take a quick vote on what to track for a week.
2. Use the hook to set the lesson mood and introduce the plant graph challenge.
3. Ask what title and axes tell us and remind class line graphs are often used to show how a value changes over time [3].
4. Link the vote to today's goal: solve sum and difference questions from a teacher-drawn graph.

STUDENTS DO

1. Vote for one thing to track and tell a partner why.
2. Answer what the title and axes show on a line graph.
3. Repeat today's goal in own words.

Say: No tablets, no worksheets — just your brain, your partner and my dodgy drawing! Today we become graph detectives. We will read dots carefully, then compare, add and subtract to answer maths questions.

Ask: What does the title of a line graph tell us? (What the graph is about.) · What usually goes on the horizontal axis and the vertical axis? (Time on the horizontal, what is measured on the vertical [9].)

Check understanding: Thumbs up if you can point to title, horizontal axis and vertical axis; reteach with finger pointing if unsure.

Support: Point to each label as you name it and let pupils echo. **Stretch:** Ask which choice would go up and down most over a week and why.

Use: Slide 2

8–20 min **Teaching** 12 min · Whole class

To model the 3-step method for comparison, sum and difference.

YOU DO

1. Show Slide 3 and talk through the 3 steps: read title, axes and scale, find exact dots, then compare, add or subtract.
2. Show Slide 4 water timeline with 18°C at 0 mins to model sliding across to the vertical scale to read temperature in °C [6].
3. Model the Slide 5 bike example step by step on the whiteboard with number sentences.
4. Stress that a line graph is drawn by plotting data points and joining them with straight lines [7].

STUDENTS DO

1. Follow the 3 steps with fingers on the slide.
2. Copy the two number sentences for difference and sum.
3. Say the compare words more, less and altogether with a partner.

Say: First we read carefully. Then we find the exact numbers. Last we do the maths. Readers before calculators. Watch how I line up each dot with the side numbers before I add or subtract.

Worked example: January sold 50 bikes, February sold 30 bikes. How many more, and how many altogether? Difference: 50 - 30 = 20, so January sold 20 more. Sum: 50 + 30 = 80, so 80 altogether.

Ask: January sold 50 bikes, February sold 30 bikes. Which month sold more? (January sold more.) · How do you find how many more and how many altogether? (Subtract for more: 50-30=20. Add for altogether: 50+30=80.)

Check understanding: Mini-whiteboards up with 20 and 80; re-model lining up to scale if many show 2 or 8.

Support: Keep the two number sentences on the board and colour difference blue and sum green. **Stretch:** Ask what February plus a new March of 40 would total.

Use: Slides 3–5

20–30 min **Guided practice** 10 min · Pairs

To practise reading exact values together from a bike graph.

YOU DO

1. Play Video clip 1 and pause to repeat how scale helps read dots.
2. Display Worksheet Task C bike sales graph where frequency is on the vertical scale and time is on the horizontal scale [4].
3. Read two dots together using a ruler to line up across to the vertical axis [5].
4. Ask pairs to call out comparison, then difference, then sum.

STUDENTS DO

1. Watch the video and spot compare words: more, less.
2. Use Worksheet Task C graph to read January and February with a ruler.
3. Tell a partner the comparison, difference and sum.

Say: Watch how to find exact values and listen for compare words. We will stop, point, and read together. Put your ruler across from the dot to the numbers so you do not misread.

Worked example: On the bike graph, January dot lines up to 50 and February dot lines up to 30. Comparison: January is higher. Difference: 50 - 30 = 20. Sum: 50 + 30 = 80.

Ask: How do you read a dot that sits between labelled numbers? (Look at the steps on the scale and count up carefully [5].) · Which number sentence finds the gap between two months? (Bigger minus smaller, e.g. 50 - 30 = 20.)

Check understanding: Pairs hold up Task C answers on mini-whiteboards; revisit scale steps if readings differ.

Support: Mark the two target dots with counters so pupils only read those two values [4]. **Stretch:** Ask pairs to add a third month and find the new three-month total.

Use: Video clip 1 (1:15–4:40), Slide 6, Worksheet Task C

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30–50 min **Main activity** 20 min · Pairs

To solve comparison, sum and difference questions from a teacher-drawn graph.

YOU DO

1. Draw axes on the whiteboard for plant height in centimetres across weeks, plot points including week 3 as 3 cm and week 8 as 12 cm, and join them with straight lines [7].
2. Label every point with its number so pupils practise adding and subtracting rather than reading the scale [18].
3. Set three pair tasks: which week grew most compared with the week before, difference between tallest and shortest, sum of two weeks.
4. Circulate, ask for number sentences and for pupils to point to the peaks used.

STUDENTS DO

1. Copy the values from the teacher graph into notebooks.
2. With a partner find the biggest weekly rise, the tallest-shortest difference and the chosen sum.
3. Write two number sentences, one for the sum and one for the difference, and point to the dots.

Say: Copy my dodgy drawing into your squared-paper notebooks. You have three missions with your partner. Compare weeks, find the gap, and find the total. Always point to the dots you used and write the add or take-away underneath.

Worked example: Week 3 was 3 cm, week 8 was 12 cm. Difference between week 8 and week 3: 12 - 3 = 9 cm. Sum of week 3 and week 8: 12 + 3 = 15 cm. Comparison: week 8 is taller than week 3.

Ask: How did you find which week grew most compared with the week before? (Subtract each week from the one before and look for the biggest rise.) · What is the difference between 12 cm and 3 cm, and what is the total? (Difference 9 cm, total 15 cm.)

Check understanding: Pairs whisper answers on countdown and show number sentences; check dot-pointing if totals are wrong.

Support: Label every point with its number so pupils practise the adding and subtracting rather than reading the scale [18]. **Stretch:** Ask pupils to predict Week 9 if it grows by the same difference as the last two weeks.

Use: Slide 9

50–60 min **Plenary** 10 min · Whole class

To check learning and use key vocabulary to explain methods.

YOU DO

1. Show Slide 10 key words and ask pupils to use comparison, sum, difference and trend in sentences.
2. Run Slide 12 quick quiz on January 50 and February 30 for more and altogether.
3. Give 3 exit questions on mini-whiteboards and review the 3 steps.
4. Set homework and praise clear pointing to graph evidence.

STUDENTS DO

1. Say meanings for sum, difference and trend to a partner.
2. Answer the quick quiz and exit questions on mini-whiteboards.
3. Share one sentence starting We know because the graph shows...

Say: Maths stars explain with words. Tell me: what was the comparison, what was the sum, what was the difference? Start with: We know because the graph shows... Then give your numbers.

Ask: What is the difference between sum and difference? (Sum is total when you add, difference is gap when you subtract.) · What does trend tell us on a line graph? (Pattern of up and down, going up means increasing [13].)

Check understanding: All mini-whiteboards up for 50-30=20 and 50+30=80; reteach subtraction order if reversed.

Support: Provide sentence starters and a ruler image to recall lining up to the axis. **Stretch:** Ask what happens to the total if February goes up by 10 bikes.

Use: Slides 10, 12

Common mistakes

Mistake	How to spot it	How to fix it
Reading the scale as ones when it goes up in twos or fives	Answers are out by doubles when vertical axis goes up in steps of 2 degrees [5]	Slide a ruler or card across from dot to axis and count in steps, not lines [5]
Adding when asked for difference, or subtracting the wrong way round	Total given for gap question, or negative-looking answer like 30-50	Underline compare words more/less and always do bigger minus smaller for difference
Thinking only dots matter and ignoring what the joining line shows	Cannot say if values are rising or falling between weeks	Remind that going up means increasing and going down means decreasing, the line tells the story [13]

Support

- Label every point with its number so pupils practise adding and subtracting rather than reading the scale [18]
- Use counters on target dots, rulers to line up to the axis, and sentence starters

Stretch

- Ask pupils to predict the next week if it grows by the same difference as the last two weeks
- Ask pupils to estimate a value halfway between two weeks and include it in a new total

For the LSE or teaching assistant

Sit with pairs who find scale reading hard; help line up ruler to axis, keep labelled numbers visible, and prompt We know because the graph shows...

Check for understanding

Question	Answer
January sold 50 bikes, February sold 30 bikes. How many more in January?	20 more (50-30=20)
How many bikes altogether in January and February?	80 altogether (50+30=80)
Week 3 plant was 3 cm, week 8 was 12 cm. What is the difference?	9 cm (12-3=9)

Homework

Draw axes for something you could track for a week and write what goes on each axis.

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