# Spotlight 6: a learning check

Is not confident in making reasonable estimates for multiplication or division calculations

***Opportunity for: explaining and discussing***

## Which side?

**Time** 10–25 minutes

### *Resources*

- At least one other child, four is ideal
- Counters
- Bag with number cards 1–9 (Resource sheet 1)
- Another bag with two cards: 'more than' and 'less than'
- *Spinners* (Resource sheet 44)
- *Blank spinners* (Resource sheet 13)
- Paper clip and pencil
- Selection of number lines
- Calculator

### *Check: does the child use key vocabulary?*

estimate
guess
rough answer
almost
nearly
about right
close but too big
close but too small
round up/down

## Teaching activity

'This game, **Which side?**, will help you to get better at estimating, and we are going to use a number line to put our estimates on and compare them with the actual answer.'

> You might want to put on display the recordings from previous Spotlights of things that needed to be remembered.

Players can work cooperatively in teams or in pairs, or they can compete on their own against another player.

The spinner is worked by trapping the paper clip in the middle of the spinner with the point of a pencil. With the other hand, flick the paper clip around. If the paper clip lands on a line, that player chooses which number they want.

Spinners work best if they are copied onto card.

Before you start, decide which spinner you are going to use. If you cut out your spinner, be sure to cut in along the boxes in order to leave enough space for the spinner to be held still while it is being used.

*Blank spinners* (Resource sheet 13) can be used for any numbers you choose.

### *How to play*

1. A player takes two digit cards out of the bag and makes a two-digit number, for example 24. This number is then recorded and is used for both teams. The digit cards are put back in the bag.
2. Another player, on any team, flicks the paper clip to choose the operation and number, for example × 19.

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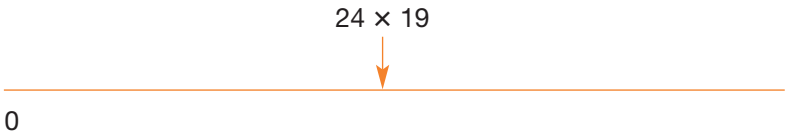
3. Each team then records the calculation on paper, in this case 24 × 19, and someone draws a number line and marks the calculation.

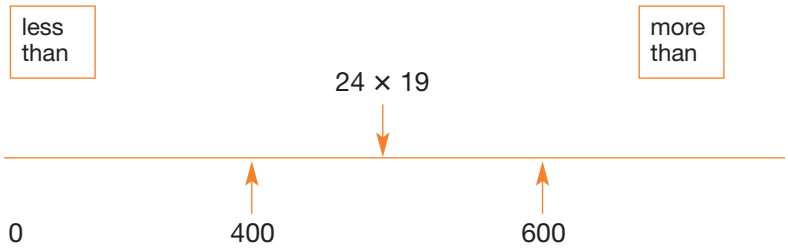



4. Each team then takes one card out of the other bag and shows it to the group.
5. The team with the 'more than' card must make an estimate of the calculation 24 × 19 that will give an answer which is more than the actual answer. The team with the 'less than' card must make an estimate which is less than the actual answer.
6. Each team then works quietly together to work out their estimate.
7. When everyone is ready, the teams take turns to tell everyone about their estimate.

   'We had to make an estimate that would be more than 24 × 19, so we chose 30 × 20 which is 600.'

   'We had to make a rough answer less than the actual answer, so we estimated 20 × 20 which is 400.'

   The teams can challenge any estimate which they think isn't sensible, for example 40 × 30 would not be a sensible estimate for this calculation.
8. Both teams can put their estimates where they think they go on the number line.




9. Then everyone has to work out the actual answer. (Calculators will speed this up and help to take the stress out of the game.)
10. Each team should keep a record of their score. For each round they get:
    ten points for a sensible estimate;
    ten points for calculating their estimate correctly;
    ten points for estimating 'more than' or 'less than' correctly;
    a ten point bonus for calculating the actual answer without a calculator.
11. Then a new two-digit number is made and another number selected on the spinner.

? **How did you work out that your estimate would be more than the actual answer?**

? **Whose estimate was the closest to the actual answer?**
**How do you know?**

? **What if that team had used (a number) instead of (a number)? Would their answer have been closer to the actual answer or further away?**

? **If we draw that number line again, could we position our estimates a bit more accurately?**
*(Some estimates will be much closer to the actual answers, depending on the numbers chosen.)*

? **Which team got the closest to the actual answer?**

? **What shall I record for you to remember for next time?**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### *Variations*

- Play as **Who is the closest?** Players compete to find an estimate as close as they can to the actual answer. (So you don't need to play with the 'more than' and 'less than' cards.)

  The winning team scores ten points, or if they are both the same distance on the number line from the actual answer, they score ten points each. (You will need to help the players to decide who is the closest when they have two different answers. Encourage the players to round numbers to fives as well as numbers with a zero at the end, so fifty-four might be 'rounded' to fifty-five to give a closer estimate.)

  (*Note:* Watch out for children rounding all the numbers! On Spinner 2 hopefully no one will round × 4 to × 0!)

- Play **Who is the closest?**, as above, but also play with the 'more than' and 'less than' cards. This can be very tricky, and children will realise that if they have the 'more than' card, but the numbers are, for example 21 × 51, they will be a long way from the actual answer if they round up to 30 × 60.

  **?** **Can you think of a way to estimate 21 × 51 that might be closer?** *(For example 25 × 50)*

  **?** **What if you round one number up and the other number down? Does that give you a closer estimate?** *(It can do.)*

  **?** **Tell me about an example when this happens.**

- Make three-digit numbers at the start.
- Use the blank spinner to make up your own numbers to multiply and divide. (The game can be played by estimating with addition and subtraction but clarify with the players that they must be careful in the way they go from their estimate to the actual number. What we do for addition and subtraction needs rethinking to find a method that might work for multiplication and division!)

### *Learning outcomes*

By the end of this set of activities children should be able to:

- tackle related learning tasks with increased motivation and confidence;
- use and understand connected mathematical vocabulary;
- make a reasonable estimate of a multiplication or division calculation including calculations with fractions;
- compare two multiplications or divisions and know which one will give the larger answer;
- understand that an estimate is a rough answer;
- make generalisations about the effects on numbers of multiplying and dividing by both numbers more than one and numbers less than one;
- understand that it helps accuracy to make an estimate for all calculations that cannot be calculated mentally immediately;
- understand that in real problem-solving we have to make sensible decisions;
- position estimates and actual answers on a number line.

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