Reasoning about multiplication

Notes and guidance

In this small step, children develop their knowledge and understanding of the structure of multiplication.

Children begin by recapping what multiplication looks like with objects, and gradually use more abstract representations. These include cubes, base 10, arrays and number sentences. They use the symbols <, > and = to compare groups using multiplication and division structures, both in context and within number sentences. Children are encouraged to realise that, for example, 6 × 3 > 6 × 2 without doing any calculation, but by recognising the relationship between the calculations and that the first must give an answer greater than the second because the same number is being multiplied by 3 and 2

Things to look out for

- When comparing number sentences, children may find it difficult to recognise which digit is referring to the size of the group and which digit is referring to the number of groups.

- Children may try to work out the calculations to make comparisons, rather than using their understanding of the multiplicative structure.

Key questions

- What number sentences are shown by the array?
- What is the same and what is different about 8 × 3 and 8 × 4?
- Which digit represents the size of the group?
- Which digit refers to the number of groups?
- What happens if you increase/decrease the number of groups?
- What happens if you increase/decrease the size of the groups?
- Do you need to complete the calculations to compare them?

Possible sentence stems

- _____ lots of _____ is greater than _____ lots of _____
- _____ lots of _____ is less than _____ lots of _____
- I know that _____ is greater because …

National Curriculum links

- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

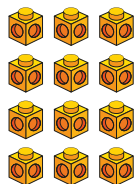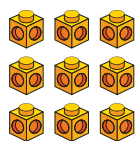# Reasoning about multiplication

Key learning

- Complete the number sentences to match the pictures.

  $6 \times 3 = $ _____

  $6 \times 5 = $ _____
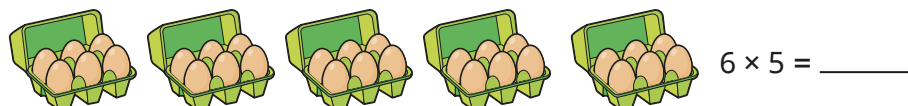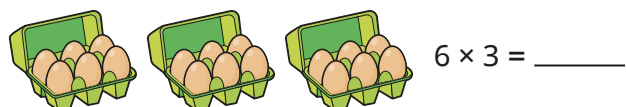
  Write > or < to complete the statement.

  $6 \times 3 \bigcirc 6 \times 5$

- Complete the number sentences and write <, > or = to compare the arrays.

  _____ × _____ = _____   _____ × _____ = _____

- Write <, > or = to complete the statement.

  $2 \times 30 \bigcirc 4 \times 30$

- Write <, > or = to compare the multiplications.
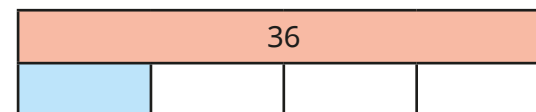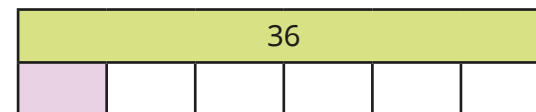
  $8 \times 3 \bigcirc 7 \times 4$ $8 \times 2 \bigcirc 6 \times 4$

  $80 \times 3 \bigcirc 70 \times 4$ $8 \times 20 \bigcirc 6 \times 40$

- How do the bar models show that $36 \div 6 < 36 \div 4$?

  Draw bar models to compare the pairs of calculations.
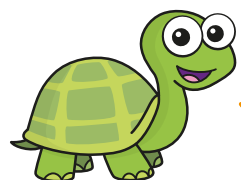
  $12 \div 6 \bigcirc 12 \div 4$ $15 \div 5 \bigcirc 15 \div 3$

  $27 \div 3 \bigcirc 24 \div 3$ $20 \div 5 \bigcirc 20 \div 4$

Reasoning about multiplication

Reasoning and problem solving

8 × 8
is greater
than double
4 × 8

Do you agree with Tiny?

Use counters to show your answer.

No

8 × 8 = double 4 × 8

Is each statement true or false?

6 × 7 < 6 + 6 + 6 + 6 + 6 + 6 + 6

7 × 6 = 7 × 3 + 7 × 3

2 × 3 > 5 × 3

False

True

False

Use all the cards to complete the statements.

| 4 × 5 | 3 × 8 | 3 × 4 |
| 5 × 5 | 4 × 8 | 3 × 5 |

_____ < _____

_____ > _____

_____ < _____

various possible answers, e.g.

3 × 5 < 4 × 5

4 × 8 > 3 × 8

3 × 4 < 5 × 5

Find three different ways to complete each number sentence.

_____ × 3 + _____ × 3 < _____ × 3

_____ × 4 < _____ × 4 < _____ × 4

_____ × 8 > _____ × 8 > _____ × 8

multiple possible answers, e.g.

1 × 3 + **2** × 3 < **5** × 3

2 × 4 < **8** × 4 < **12** × 4

7 × 8 > **2** × 8 > **1** × 8