

UNIT 8.3

Number

Revision slides: everything you need for the test, one idea per slide.

Multiplying and dividing directed numbers

Same signs give a positive; **different signs** give a negative. This works for $\div$ as well as $\times$.

$$-4 \times 6 = -24; -4 \times (-6) = 24; -24 \div 4 = -6; -24 \div (-4) = 6.$$

Pattern: $3 \times (-2) = -6$, $2 \times (-2) = -4$, $1 \times (-2) = -2$, $0 \times (-2) = 0$, so $-1 \times (-2) = +2$.

An even number of negatives in a product gives a positive.

$$(-3)^2 = 9 \text{ but } -3^2 = -9.$$

Order of operations

Order: **Brackets**, then **exponents** (powers and roots), then **division and multiplication**, then **addition and subtraction**.

When operations tie ($\times$ and $\div$, or $+$ and $-$), work **left to right**.

Include powers and negatives: $2 + 3 \times (-4)^2 = 2 + 3 \times 16 = 50$.

Set out **one operation per line** and keep the equals signs in a column.

$(2 + 3)^2 = 25$ but $2 + 3^2 = 11$.

The distributive property

Distributive property: $a(b + c) = ab + ac$. Multiply the outside by every term inside.

Area model: a rectangle with height 4 and width $(x + 3)$ has area $4x + 12$.

Positive outside: $5(x + 2) = 5x + 10$. Negative outside: $-3(x - 4) = -3x + 12$ (every sign flips).

Check by substituting a number: if $x = 2$, $5(x + 2) = 20$ and $5x + 10 = 20$ ✓.

Use it for mental maths: $6 \times 47 = 6 \times 40 + 6 \times 7 = 282$.

WATCH OUT · MISCONCEPTIONS

Don't fall for these

✗ " $-3 \times -4 = -12$."

✓ Two negatives give a positive: 12.

✗ " $-3^2 = 9$."

✓ Only the 3 is squared: -9 . With brackets $(-3)^2 = 9$.

✗ " $2 + 3 \times 4 = 20$."

✓ Multiply first: $2 + 12 = 14$.

✗ " $-3(x - 4) = -3x - 12$."

✓ $-3 \times (-4) = +12$, so $-3x + 12$.

✗ " $5(x + 2) = 5x + 2$."

✓ Multiply every term: $5x + 10$.

TEST YOURSELF

Test yourself

1. $-4 \times 6 =$

Answer -24 . Different signs give a negative.

2. $-4 \times (-6) =$

Answer 24 . Same signs give a positive.

3. Expand $5(x + 2)$.

Answer $5x + 10$. Multiply both terms by 5.

4. Expand $3(2x - 5)$.

Answer $6x - 15$. $3 \times 2x = 6x$ and $3 \times (-5) = -15$.