

# Year 7 – Maths Knowledge Organiser

## Spring 2023.2024

### Operations and equations with directed number

#### What do I need to be able to do?

- By the end of this unit you should be able to:
- Perform calculations that cross zero
  - Add/ Subtract directed numbers
  - Multiply/ Divide directed numbers
  - Evaluate algebraic expressions
  - Solve two-step equations
  - Use order of operations with directed number

#### Keywords

- Subtract: taking away one number from another.  
 Negative: a value less than zero.  
 Commutative: changing the order of the operations does not change the result  
 Product: multiply terms  
 Inverse: the opposite function  
 Square root: a square root of a number is a number when multiplied by itself gives the value (symbol  $\sqrt{\quad}$ )  
 Square: a term multiplied by itself.  
 Expression: a maths sentence with a minimum of two numbers and at least one math operation (no equals sign)

#### Perform calculations that cross zero

Number lines are useful to help you visualise the calculation crossing 0

$4 - 6 = -2$

Use the number line to guide subtraction of 6

Start at 4

Find the difference between 6 and -4

From 6 to 0  
6  
From 0 to -4  
4  
10 beads between them

$-5 + 5 = 0$     Rearrangements of the same equation     $5 - 5 = 0$

#### Odd directed numbers

$2 + -4 = -2$

Representations:  $\bullet = -1$ ,  $\circ = 1$

Zero pair  $(-1 + 1 = 0)$

Two  $-1$ 's left  $= -2$

$8 + -3 = 5$

Partitioning

$8 + -3 = 5$      $5 + 3 + -3 = 5$

Partition the value to create a zero pair calculation

Generalisation:  $+ - = -$

#### Subtract directed numbers

Representation for calculation

$2 - -1 = 3$

"Subtract" - means take away or remove

Take away one

Start with the representation of 2

$2 - -3 = 5$

Generalisation:  $- - = +$

#### Multiply/ Divide directed numbers

Two representations of the same calculation

$2 \times -3 = -6$

Negative, Negative calculation

$-2 \times -3$

This is the negative of  $2 \times -3$

The act of making counters into their negative is turning them over

$-2 \times -3 = 6$

Divisions are the inverse operations

#### Evaluate algebraic expressions

$a = 5$      $b = -4$

$a^2 = 5^2$      $b^2 = (-4)^2$

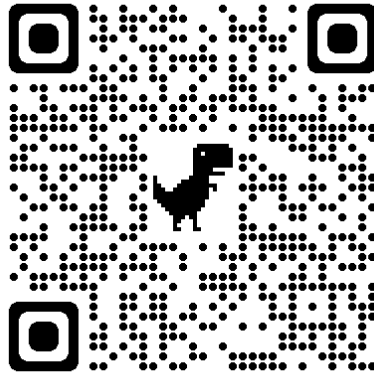
$a^2 = 25$      $b^2 = 16$

With negative numbers the brackets are important so that it performs  $-4 \times -4$

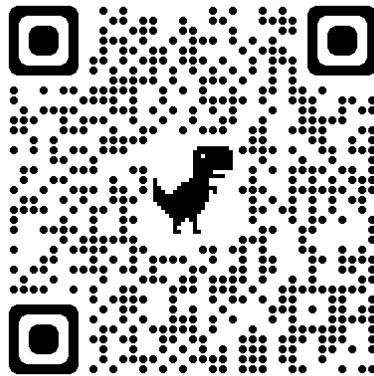
Brackets around negative substitutions helps remove calculation errors

$2a - b = 2 \times 5 - (-4) = 10 + 4 = 14$

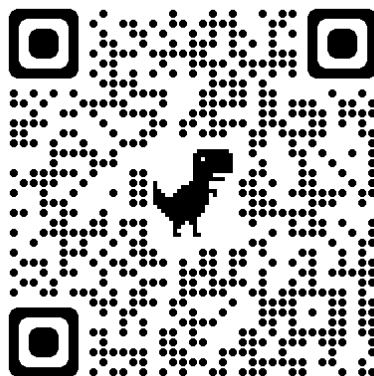
$3b - 2a = 3(-4) - 2(5) = -12 - 10 = -22$



What are positive and negative numbers?



How to add positive and negative numbers.



How to multiply positive and negative numbers.