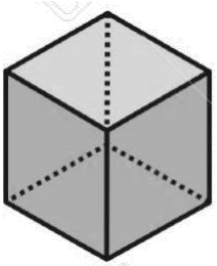
Year 11 Maths
Knowledge Organiser

GCSE Foundation Tier

10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 1

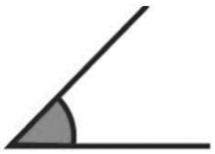
1. A **cube** has squares for all of its faces



2. **sum** means 'total' (add up)
   e.g. the sum of 7 and 3 is 10

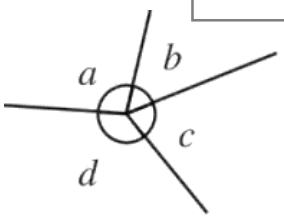
3. **even numbers** are the 2 times table:
   2, 4, 6, 8, 10, 12, 14, 16, …
   They end in 2, 4, 6, 8 or 0

4. An **acute angle** is less than 90°



5. The **area** of a shape is the amount of space inside it

6. **Angles at a point** add up to 360°



7. To **multiply**, we **add** the powers

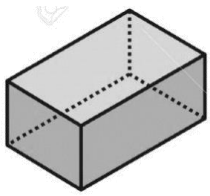
$$p^9 \times p^3 = p^{12}$$

$$5^{11} \times 5^9 = 5^{20}$$

8. 1 m = 100 cm
   1 cm = 10 mm

9. **A mixed number** has a whole number part and a fraction part
   e.g. $5\frac{2}{3}$

10. A **cuboid** has rectangles for all of its faces (some can be squares)



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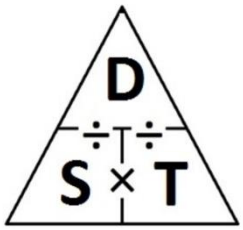
Know

10 things to learn

Maths Knowledge Organiser
GCSE Foundation Part 2

1. **speed**
   distance
   time



2. 1 km = 1000 m
   1 kg = 1000 g

3. **odd numbers** are those which are <u>not</u> in the 2 times table:
   1, 3, 5, 7, 9, 11, 13, 15, …
   They end in 1, 3, 5, 7 or 9

4. An **obtuse angle** is more than 90° but less than 180°

5. An **improper fraction** is 'top-heavy' e.g. $\frac{17}{5}$

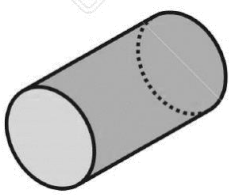
6. **difference** means subtract
   e.g. the difference between 10 and 6 is 4.

7. A **function** 'does something' to **input** numbers to turn them into **output** numbers.
   e.g. "add 5" is a function

8. A **sphere** is a ball-shape

9. **expand** or **multiply out** mean 'get rid of the brackets'

10. A **cylinder** is a tube-shape, with circles at both ends



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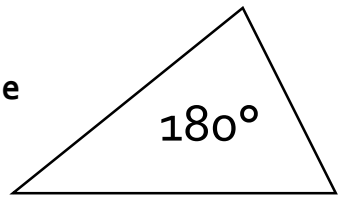
Know

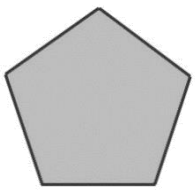
10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 3

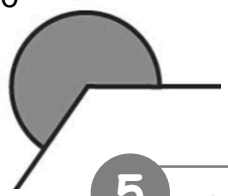
1. The **angles** in any **triangle** add up to 180°



2. A **factor** goes into another number
e.g. the factors of 10 are: 1 & 10, 2 & 5

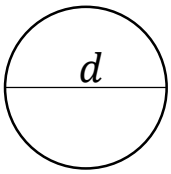
3. 
A **pentagon** has 5 sides

4. A **reflex angle** is more than 180° but less than 360°



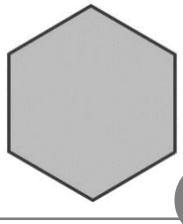
5. **product** means 'multiply'
e.g. the product of 3 and 4 is 12

6. **Circumference** of a circle:
$C = \pi \times d$

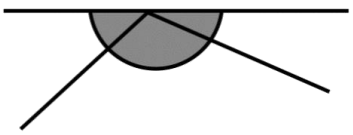


7. To **divide,** we **subtract** powers
e.g. $p^9 \div p^3 = p^6$
$5^{11} \div 5^9 = 5^2$

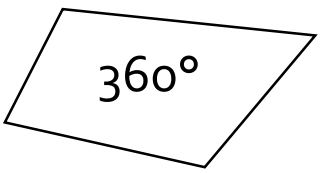
8. A **hexagon** has 6 sides



9. **Angles on a line** add up to 180°



10. The **angles** in any **quadrilateral** add up to 360°



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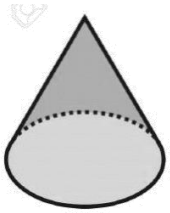
Know

10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 4

1. A **cone** has a curved surface with a point at one end and circle at the other end



2. **integer** means 'whole number'

3. A **prime number** has <u>exactly two factors</u> (1 and itself)

   Learn the **primes** less than 20:

   2, 3, 5, 7, 11, 13, 17, 19, …

4. To work out the **mean** average,
   - **add** up all the data
   - **divide** by the number of items

5. The **perimeter** of a shape is the total distance around the outside of it

6. $>$ means 'greater than'

   On a number line:

7. 1 litre = 1000 ml

8. $\geq$ means 'greater than or equal to'

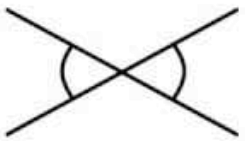
   On a number line:

9. A **recurring** decimal has a repeating pattern
   Dot notation is used to show the pattern:

   e.g. $0.4\dot{5} = 0.455555\ldots$

   $0.\dot{4}\dot{5} = 0.454545\ldots$

10. **vertically opposite angles** are equal



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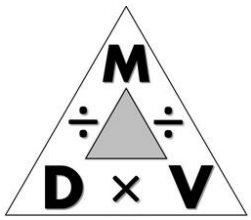
Know

10 things to learn

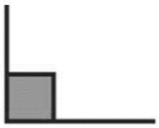
Maths Knowledge Organiser GCSE Foundation Part 5

1. **density**
   mass
   volume



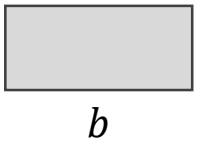
2. **percent** means 'out of 100'

3. A **right angle** has exactly 90°



4. **Area of rectangle**

$b \times h$

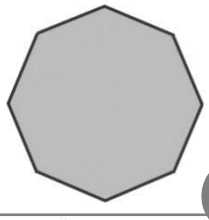


5. **index** means 'power' (plural: **indices**)
   e.g. $2^4 = 2 \times 2 \times 2 \times 2 = 16$

6. The **multiples** of a number are its times table.
   e.g. multiples of 10 are: 10, 20, 30, 40, ...

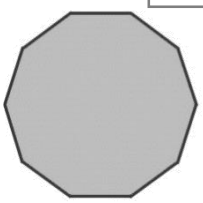
7. In an **arithmetic sequence** (or **linear sequence**) we add or subtract the same each time
   e.g. 5, 8, 11, 14, ... (add 3)

8. An **octagon** has 8 sides



9. A negative power is a **reciprocal**
   e.g. $5^{-1} = \frac{1}{5}$

10. A **decagon** has 10 sides



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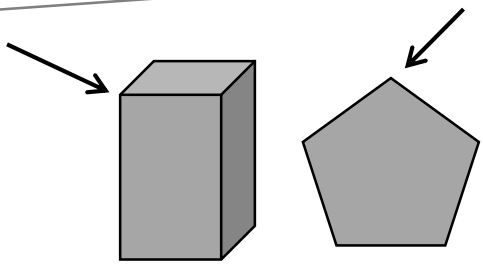
Know

10 things to learn

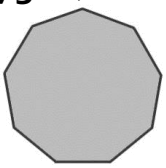
Maths Knowledge Organiser GCSE Foundation Part 6

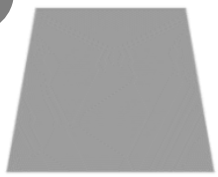
1. In a 2D or 3D shape, a **vertex** is a corner.
(plural: **vertices**)



2. The **surface area** of a 3D solid is the areas of all of its faces added together

3. A **regular** shape (**polygon**) has:
- all equal sides
- all equal angles

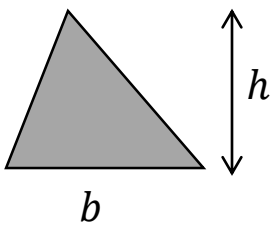


4. 
A **trapezium** has one pair of parallel sides

5. $\frac{1}{4} = 0.25 = 25\%$

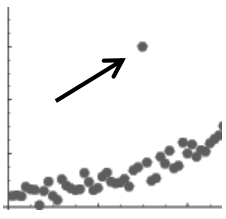
6. A **common factor** is a factor of both numbers
e.g. 2 is a common factor of 14 and 16

7. **Area of triangle**
$\frac{b \times h}{2}$



8. 
A **rhombus** has 4 equal sides

9. An **outlier** is a piece of data that doesn't fit the pattern of the rest of the data



10. 
A **parallelogram** has two pairs of parallel sides

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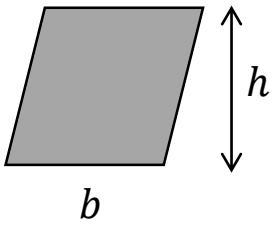
Know

10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 7

1 **Area of parallelogram**

$b \times h$



2 **estimate** means 'work out a rough answer' (by rounding each number to 1 s.f.)

3 **discrete data** can only have certain values

e.g. number of people
shoe size

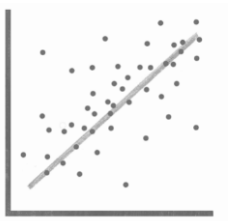
4 **continuous data** can be measured very accurately

e.g. height, weight, time

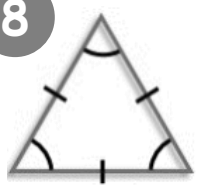
5 $\frac{3}{4} = 0.75 = 75\%$

6 A **common multiple** is a multiple of both numbers

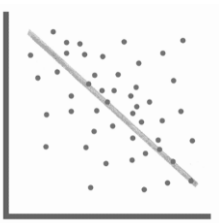
e.g. 20 is a common multiple of 2 and 5

7 

positive correlation

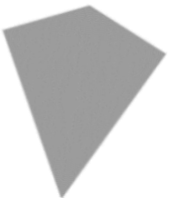
8 

An **equilateral triangle,** has 3 equal sides and 3 equal angles (of 60°)

9 

negative correlation

10 A **kite** has 2 pairs of equal sides.
The equal sides are **adjacent** (next to each other)



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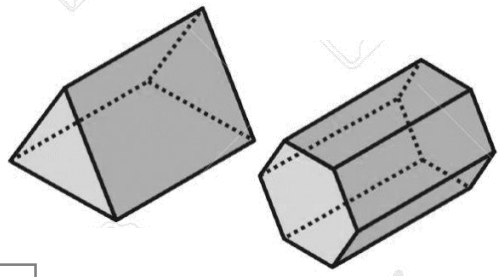
Know

10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 8

1. A **prism** has the same shape running all the way through the middle



2. **factorise** means 'put into brackets'

3. To find the **median** average
   - put the numbers in **order**
   - select the **middle** number (or in between the two, if there are 2 middle numbers)

4. A **square number** is made by multiplying a number by itself

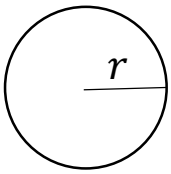
   Learn the **squares** up to 10 x 10:

   1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ...

5. $\frac{1}{10} = 0.1 = 10\%$

6. **Area** of a circle:

   $\boldsymbol{A = \pi \times r^2}$



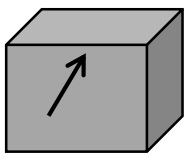
7. **trend** means 'overall pattern'

   e.g. The profits went up

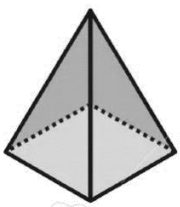
8. 

   An **isosceles triangle** has 2 equal sides and 2 equal angles (the **base angles**)

9. In a 3D shape, an **edge** is a line connecting two faces.



10. A **square-based pyramid** has one square face and the other faces triangular



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Know

10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 9

1. 

A **scalene triangle** has no equal sides and no equal angles

2. The **volume** of a 3D solid is the amount of space it takes up

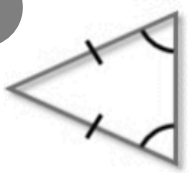
3. The **lowest common multiple** is the smallest multiple of both numbers

e.g. 20 is the **LCM** of 10 and 4

4. In **simple random sampling** every person (or object) has the same probability of being in the sample.

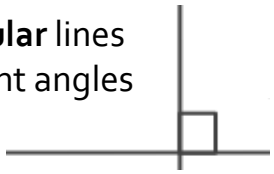
e.g. names from a hat

5. $\frac{1}{5} = 0.2 = 20\%$

6. 

The **base angles** of an isosceles triangle are equal

7. **Perpendicular** lines meet at right angles



8. The **mode** is the data value which is the <u>most common</u>.
There can be 2 modes (**bimodal** data) or no mode.

9. **evaluate** means 'work out the **value**' giving your answer as a number

10. A **cube number** is made by multiplying three of the number together (cubing it)

e.g. 2 x 2 x 2 = <u>8</u>

Learn the first five cube numbers: 1, 8, 27, 64, 125, …

Know

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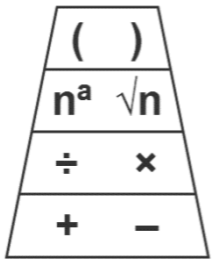
10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 10

1. The order of operations tell us the right order to do a calculation

   Learn the diagram on the right to help you remember the order

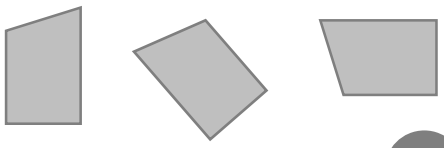


2. A **plan** is a view from above

3. The **highest common factor** is the largest factor of both numbers

   e.g. 2 is the **HCF** of 10 and 8

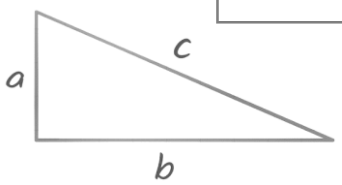
4. **congruent** shapes are <u>identical</u>
   (One can be rotated or reflected)



5. **depreciate** means 'go down in value'
   (like a second-hand car)

6. **Pythagoras' theorem:**

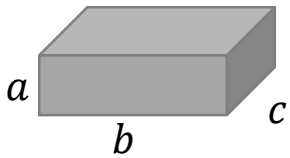
$$a^2 + b^2 = c^2$$



7. In probability, OR means ADD

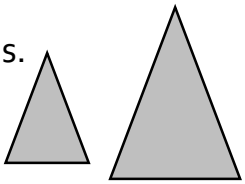
8. **Volume of cuboid:**

$$a \times b \times c$$



9. In probability, AND means MULTIPLY

10. **Similar** shapes have the same angles.
    One is an enlargement of the other.



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Know

10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 11

1

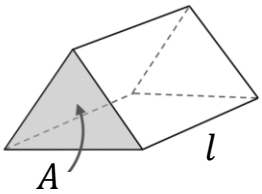
$$\frac{4}{6} \overset{\times 2}{=} \frac{8}{12}$$

We make **equivalent** (identical) fractions by multiplying (or dividing) the numerator and denominator by the same number

2

Volume of prism:

$$area\ of\ end \times length$$



3

A **vector** describes movement

e.g. $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$ 5 right & 2 up

$\begin{pmatrix} -5 \\ -2 \end{pmatrix}$ 5 left & 2 down

4

Equation of a line:

$$y = mx + c$$

with m = gradient

c = y-axis intercept

5

A% of B: A ÷ 100 x B

e.g. 12% of £300: 12 ÷ 100 x 300

6

sin, cos & tan

SOH-CAH-TOA

7

It's easy to multiply fractions:

e.g. $\frac{2}{5} \times \frac{3}{7} = \frac{6}{35}$ $\leftarrow 2 \times 3$ $\leftarrow 5 \times 7$

8

$<$ means 'less than'

On a number line:

9

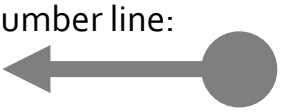
The **square root** of a number is what you square to make it

e.g. $\sqrt{16} = 4$ because $4 \times 4 = 16$

10

$\leq$ means 'less than or equal to'

On a number line:



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Know

10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 12

1 We make **equivalent** (identical) ratios by multiplying (or dividing) both parts by the same number

$$1:5 \quad (\times 2) \quad 2:10 \quad (\times 2)$$

2 **in terms of π** means 'leave π in your answer' e.g. 6π

3 **Gradient of a line**:

$$m = \frac{change\ in\ y}{change\ in\ x}$$

4 In a **Fibonacci-type sequence,** two terms are added to get the next one

e.g. 1, 1, 2, 3, 5, 8, 13, …

(1 + 1 = 2, 1 + 2 = 3, etc.)

5 **A out of B as a %** A ÷ B x 100

e.g. 5 out of 17: 5÷ 17 x 100

6 A number in **standard form**:

$$1.3 \times 10^{9}$$

between 1 & 10 — power of 10

7 **Parallel lines** go in the same direction.
They have the same **gradient**
e.g. $y = 5x + 2$, $y = 5x - 7$

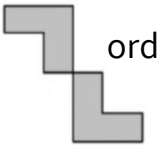
8 $+ \ - $ **makes** $-$
$- \ - $ **makes** $+$

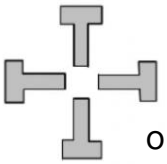
e.g. $5 + -3 = 5 - 3 = 2$
$5 - -3 = 5 + 3 = 8$

9 The **cube root** of a number is what you cube to make it

e.g. $\sqrt[3]{8} = 2$ because $2 \times 2 \times 2 = 8$

10 The **order of rotational symmetry** is the number of ways the shape will look identical as it is rotated through a full turn.

e.g.  order 2

 order 4

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10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 13

1 × **and** ÷ with negatives:

One − ⇒ answer is −

Both − ⇒ answer is +

e.g. $5 \times -3 = -15$

$-5 \times -3 = 15$

$-20 \div 2 = -10$

$-20 \div -2 = 10$

2 **equidistant** means 'equal distances' (from two points)

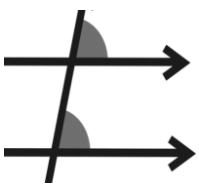
3 $\sin 30 = \cos 60 = \frac{1}{2}$

4 A **quadratic** (x^2) graph makes a U-shape called a **parabola**

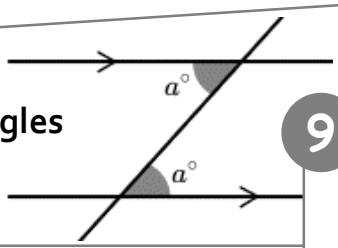
5 **bisect** means 'cut in half'

6 $\sin 60 = \cos 30 = \frac{\sqrt{3}}{2}$

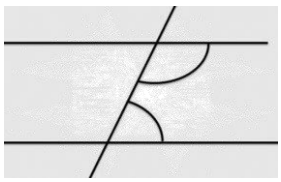
7 **corresponding angles** are equal



8 **alternate angles** are equal



9 **co-interior angles** add up to 180°



10 $\sin 45 = \cos 45 = \frac{\sqrt{2}}{2}$

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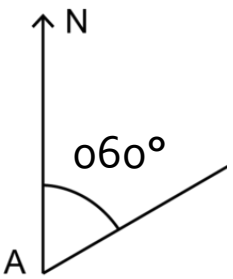
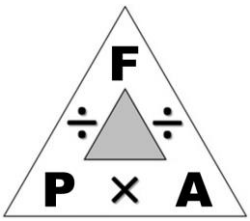
Maths Knowledge Organiser
GCSE Foundation Part 14

1 **bearings** are measured clockwise from north and written with 3 digits



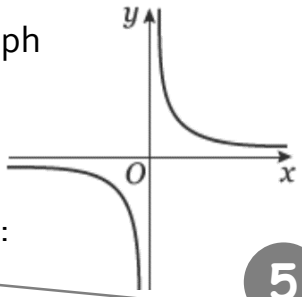
2 **inverse** means 'opposite'
e.g. + and − are inverse operations

3



pressure
force
area

4 A **reciprocal** graph such as $y = \frac{1}{x}$ looks like this:



5 With **simple interest,** the interest is the same amount every time

6 $\tan 30 = \frac{\sqrt{3}}{3}$

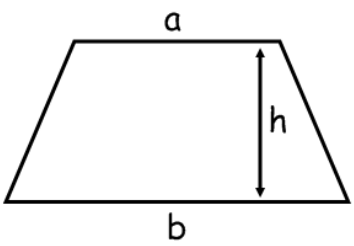
7 In a **geometric sequence** we multiply or divide by the same amount each time
e.g. 3, 6, 12, 24, … (x 2)

8 $\tan 60 = \sqrt{3}$

9 With **compound interest,** you pay (or earn) interest on the interest

10 **Area of a trapezium**

$$\frac{1}{2}(a+b)\,h$$



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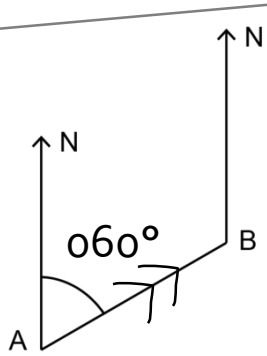
10 things to learn

Maths Knowledge Organiser GCSE Foundation Part 15

1

The bearing of **B <u>from A</u>** is the direction to travel to get to B <u>from A</u>.

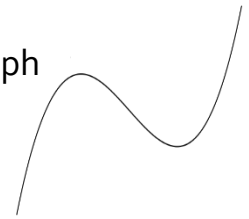


2

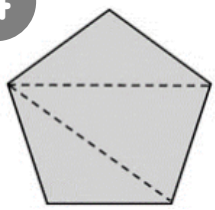
Direct proportion: $y = kx$

3

A **cubic** (x^3) graph generally has a shape like this:



4



For an n-sided polygon, **sum of interior angles**

$(n-2) \times 180$

5

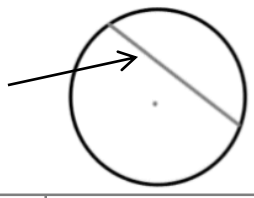
tangent

6

Inverse proportion: $y = \frac{k}{x}$

7

chord



8

The conditions for triangles to be congruent are:

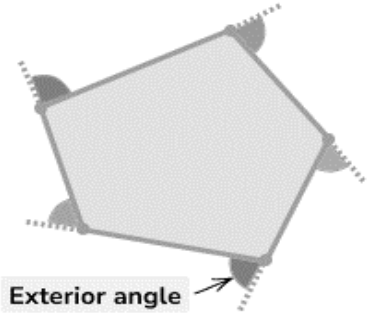
SSS, SAS, ASA, RHS

9

$\tan 45 = 1$

10

The **exterior angles** of any polygon add up to 360°



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Know