CHEAT SHEET # 009

January 2025

ACACIA TUTORING

Australian Curriculum Cheat Sheet Year 7 Mathematics

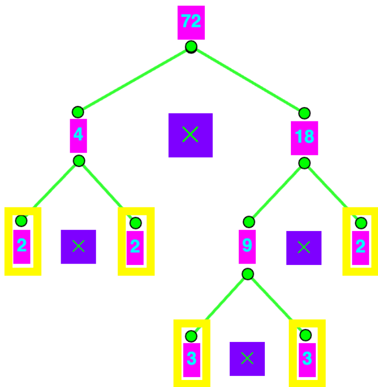
Free and Always will be!

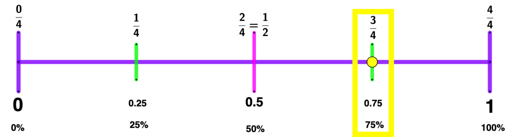
Aim: A cheat sheet for Year 7 Mathematics under the Australian Curriculum, covering key topics, examples, and formulas:

Year 7 Units Overview:

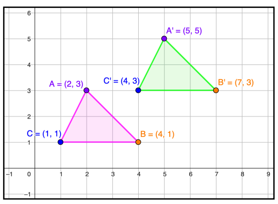
$$a(b+c) = ab + ac$$

Term 1 **Unit 1** - Integers, Powers, and Prime Powers. **Unit 2** - Fractions, Decimals, and Percentages.
Term 2 **Unit 3** - Formulas, and Finance. **Unit 4** - Rates, Ratios, and Algebraic Expressions.
Term 3 **Unit 5** - Equations, Inequalities, Perimeter, Area, and Volume. **Unit 6** - Angles, Shapes, and Transformations.
Term 4 **Unit 7** - Data Representation and Interpretation. **Unit 8** - Probability.

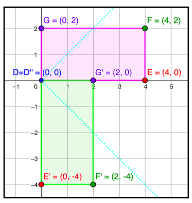


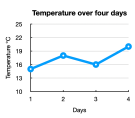


Translation (slide)



Rotation (turn)





$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

Remember,

$0.1 = \frac{1}{10}$

$0.01 = \frac{1}{100}$

$0.001 = \frac{1}{1{,}000}$

$0.0001 = \frac{1}{10{,}000}$

Converslely :

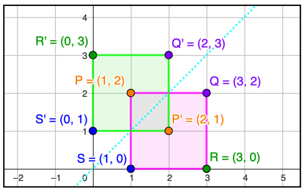
$\frac{1}{10} = 0.1$

$\frac{1}{100} = 0.01$

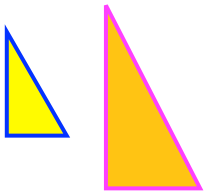
$\frac{1}{1{,}000} = 0.001$

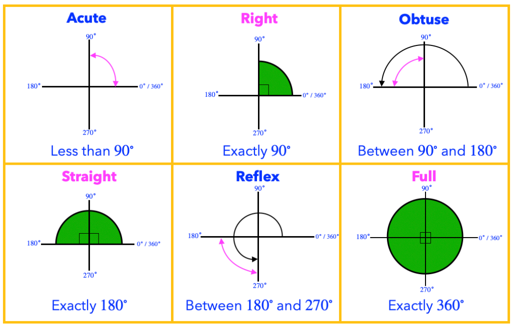
$\frac{1}{10{,}000} = 0.0001$

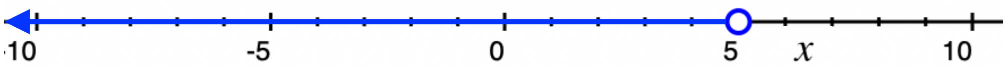
Reflection (flip)



Dilation (resize)







Term 1

Unit 1

1. Number and Algebra

Integers, Powers, and Prime Numbers:

Operations: Addition, Subtraction, Multiplication, Division.

Example: Solve $-3+5$.

Solution:
$-3+5=2$.

Example: Multiply: -2×4.

Rules for $\times$ and $\div$, If signs are: $\begin{cases}\text{opposite} \rightarrow \text{change to } - \\ \text{same} \rightarrow \text{change to } +\end{cases}$

Solution:
$-2\times4=-8$ (A negative times a positive is negative).:

Rules for multiplying (and dividing) positive and negative numbers =

If signs are:

Opposite

$(+\times-=-)$

$(-\times+=-)$

Same

$(+\times+=+)$

$(-\times-=+)$

Comparison:

Example: Arrange the following integers in ascending order: $-4,\ 3,\ -1,\ 0,\ 6$.

Solution:
Ascending order: $-4,-1,0,3,6$.

Word Problems

Example: The temperature was $2^{\circ}C$ at midday but dropped by 7 degrees by midnight. What was the temperature at midnight?

Solution:
Temperature at midnight: $2-7=-5^{\circ}C$.

Rounding and Estimation

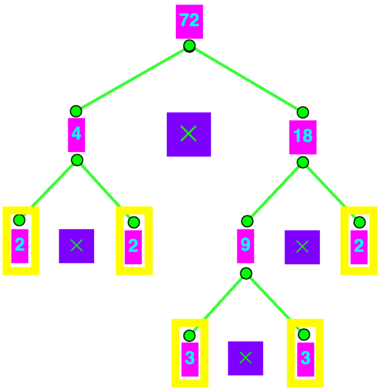
Example: In a school canteen, a student estimates the total cost of their lunch to budget their pocket money. A sandwich costs $\$4.85$, a juice costs $\$2.95$, and a fruit cup costs $\$1.75$.

Solution:
Round each item's cost to the nearest dollar and estimate the total cost.

Products of Prime Numbers

Example: A student is organising a coding club and needs to understand number factorisation for a project. Express the number 72 as a product of powers of prime numbers using index notation. Show your working using a factor tree or division method.

Solution:
Use a factor tree to find prime factors.



Square Numbers and Square roots

Example: A student is designing a square garden bed for a school project and needs to calculate its area and side length. A square garden bed has an area of $16\,m^2$. What is the side length of the garden bed?

Solution:
Side Length for $16\,m^2$

Side length $= \sqrt{16}$
$= 4\,m$ (since $4 \times 4 = 16$).

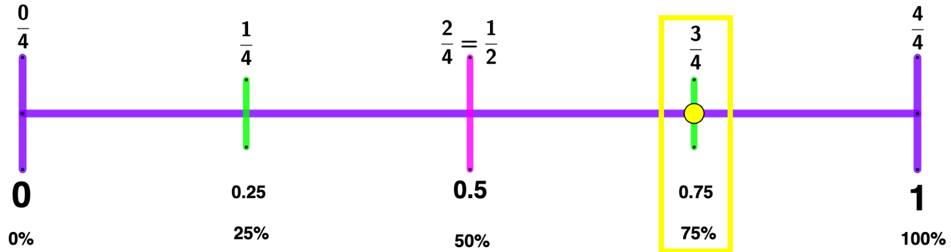
Unit 2

Fractions, Decimals, and Percentages:

Conversion Between Forms.

Example: Convert 0.75 to a percentage.

Solution:
$0.75 \times 100 = 75\,\%$.



Remember,
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Conversley :
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Example: Arrange in ascending order: $0.8,\ \frac{3}{4},\ 75\,\%,\ 0.78.$

Solution:
$\frac{3}{4}\ or\ 75\,\%,\ 0.78,\ 0.8.$

Operations with Fractions and Decimals.

Example: Subtract: $\frac{5}{6} - \frac{1}{3}$.

Solution:
Find a common denominator (6) :
$\rightarrow \frac{1}{2}$

Example: Divide: $0.8 \div 0.4$.

When dividing by a fraction, change the divide to times, and flip the fraction on the right (the one being divided by).

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

Solution:

$$\begin{aligned} &0.8 \div 0.4 \\ &= 2 . \end{aligned}$$

OR

$$\begin{aligned} 0.8 \div 0.4 &= \frac{8}{10} \div \frac{4}{10} \\ &= \frac{8}{4} \\ &= 2 . \end{aligned}$$

Example: What is $20\,\%$ of 60 ?

Solution:

$$\begin{aligned} &20\,\%\ of\ 60 \\ &= 0.2 \times 60 \\ &= 12 . \end{aligned}$$

Real World Scenarios

Example: A cake recipe requires $\frac{3}{4}$ of a cup of sugar. If you want to make half the recipe, how much sugar do you need?

Solution:
$\frac{3}{8}$ of a cup of sugar.

Decimal to Fraction Conversion

Example: Convert 0.625 to a fraction.

Solution:

$$= \frac{625 \div 125}{1000 \div 125}$$

$$= \frac{5}{8} .$$

Term 2
Unit 3
Finance, Formulas, Inequalities, and Algebraic Modelling

Example: A student is saving for a new bicycle as part of a budgeting project. A bicycle costs $\$240$. A store offers a $15\ \%$ discount during a sale. a) Calculate the discount amount and the sale price of the bicycle. b) The student has saved $\$180$. How much more do they need to save to buy the bicycle at the sale price?

Solution:
a) Discount Amount and Sale Price
Sale price $= \$204$

b) Additional Savings Needed
The student needs to save an additional $\$24$.

Example: A student is organising a school fundraiser and needs to calculate costs using a formula. The cost of producing custom wristbands for a fundraiser is given by the formula $C = 50 + 2n$, where C is the total cost in dollars and n is the number of wristbands. Calculate the cost of producing 75 wristbands.

Solution:
Cost for 75 Wristbands $= \$200$

Example: A student is comparing two options for earning pocket money to save for a game console. A student can earn pocket money by mowing lawns. Option A pays $\$10$ per lawn. Option B pays a $\$20$ base fee plus $\$5$ per lawn. Write algebraic expressions for the total earnings from each option, where n is the number of lawns mowed.

Solution:
Algebraic Expressions

Option A :

$\$10$ per lawn, so earnings $= 10n$.

Option B :

$\$20$ base fee $+ \$5$ per lawn, so earnings $= 20 + 5n$.

Example: A student is planning a school event and needs to manage ticket sales. A school event charges $\$8$ per ticket, but groups of 10 or more get a $10\ \%$ discount per ticket. Write a formula for the total cost T of n tickets, considering the discount for groups of 10 or more, use a piecewise formula to display the final two equations.

Solution:
Formula for Total Cost :

$$T = \begin{cases} 8n & \text{if } n < 10 \\ 7.2n & \text{if } n \geq 10 \end{cases}$$

Unit 4

Ratio and Rates:

Simplifying Ratios, Unit Ratios, Solving Problems Involving Rates.

Example: If a recipe calls for flour and sugar in the ratio $3 : 2$, how much sugar for 9 cups of flour?

Solution:

$\frac{2}{3} \times 9 = 6$ cups of sugar.

Example: Is $2 : 3$ the same ratio as $4 : 6$?

Solution:

$$\frac{4 \div 2}{6 \div 2} = \frac{2}{3} \ so \ \frac{4}{6} = \frac{2}{3}$$

Example: If a car travels $150\,km$ in $3\,hours$, what is its speed in km/h ?

Solution:

Speed $=$ Distance $\div$ Time

$= 50\,km/h$.

Example: A $2 - litre$ bottle of juice costs $\$3$. What is the cost per $litre$?

Solution:

Cost per $litre$ $=$ Total cost $\div$ Total litres

$= \$1.5$ per $litre$.

Example: A tap fills a tank at a rate of $8\ litres$ per $minute$. How long will it take to fill a $120 - litre$ tank?

Solution:

Time $=$ Volume $\div$ Rate

$= 15\ minutes$.

Algebraic Expressions:

Simplifying and Substituting into Expressions.

Example: Simplify $2a + 3a - a$.

Solution:

$2a + 3a - a = 4a$.

Example: Expand $2(x + 3)$.

Solution:

$2x + 6$.

$$a(b + c) = ab + ac$$

Example: Evaluate $y^2 - 4$ when $y = 3$.

Solution:
Substitue $y = 3$ into the expression:
$= 5.$

Word Problems, Equivalent Expressions.

Example: Write an expression for "five more than twice a number".

Solution:
Let the number be x, the expression is $2x + 5$.

Example: A shop sells cookies at $\$2$ per cookie. If you buy c cookies, write an expression for the total cost.

Solution:
The expression would be $2c$.

Example: Are $3x + 2x - 1$ and $5x - 1$ equivalent?

Solution:
Yes, because $3x + 2x - 1$ simplifies to $5x - 1$.

Term 3

Unit 5

Equations and Inequalities:

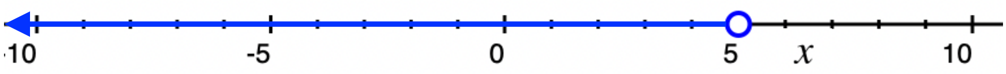
Solving Simple Linear Equations and Inequalities, Word Problems.

Example: Solve $2x + 3 = 15$.

Solution:
$2x = 15 - 3 \rightarrow 2x = 12 \rightarrow x = 6.$

Example: What does $x < 5$ mean on a number line?

Solution:
All numbers less than 5 (open circle on 5, arrow pointing left).



Example: Solve the inequality $x - 3 > 2$.

Solution:
Add 3 to both sides:
$x > 5$.

Example: Sarah has $\$20$. She wants to buy pencils that cost $\$2$ each. How many pencils can she buy?

Solution:
$x \leq 10$.
∴ Sarah can buy at most 10 pencils.

Example: If $x + 4 = 9$, what is the value of x ? Is this value also a solution to $x > 5$?

Solution:
$x = 5$
Since 5 is *not* greater than 5,
∴ x = 5 is *not* a solution to $x > 5$.

2. Measurement and Space

Perimeter, Area, and Volume:

Formulas for Basic Shapes.

Example: Find the perimeter of a rectangle with length $5\,cm$ and width $3\,cm$.

Solution:
Perimeter $= 2 \times$ (length + width)
$= 16\ cm$.

Example: Calculate the area of a rectangle with length 10 cm and width 5 cm.

Solution:
$Area = length \times width = 10 \times 5 = 50\ cm^2$.

Example: Calculate the area of a triangle with base 6 cm and height 4 cm.

Solution:
Area of a triangle $= \frac{1}{2} \times$ base $\times$ height
$= 12\,cm^2$.

Composite Shapes.

Example: Find the perimeter of a shape made from a rectangle (length $8\,cm$, width $3\,cm$) with a semi-circle on one end (diameter equal to the width of the rectangle).

Solution:
Perimeter = Two sides of rectangle + arc of semi-circle:
$\approx 11 + \frac{3\pi}{2}$
$= 15.71\,cm$.

Word Problems.

Example: A fish tank has dimensions $60\,cm$ by $30\,cm$ by $40\,cm$. How many $litres$ of water can it hold?

Solution:

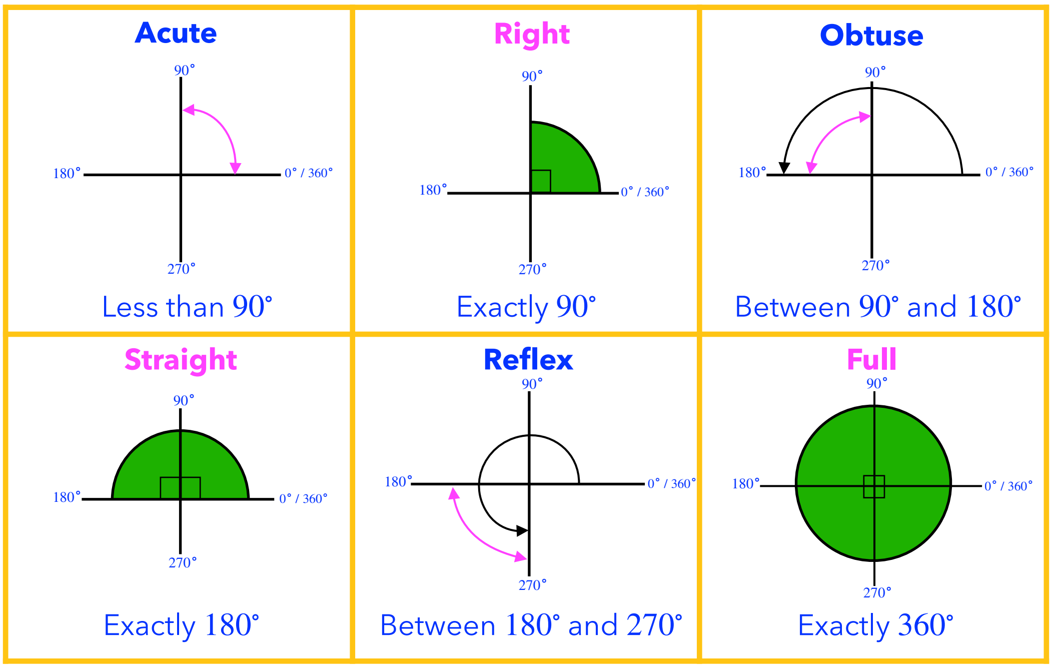
Since, $1\,litre = 1{,}000\ cm^3$ (Remember, $1\,L = 10\,cm \times 10\,cm \times 10\,cm = 1000\,cm^3$)

$72\,litres$.

Unit 6

Angles and Shapes:

Types of Angles, Properties of Triangles and Quadrilaterals.



Example: Identify the type of angle that measures $120°$.

Solution:

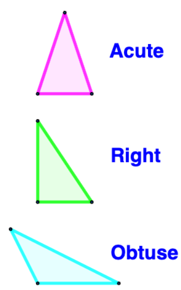
$120°$ is an obtuse angle.

Example: Identify the type of triangle with angles $60°$, $60°$, and $60°$.

Solution:

It's an equilateral triangle.

Example: Name and describe the three main types of triangles based on their angles.



Solution:

Acute Triangle: All angles are less than $90°$.

Right Triangle: One angle is exactly $90°$.

Obtuse Triangle: One angle is greater than $90°$.

Example: List four common types of quadrilaterals and one distinctive property for each.

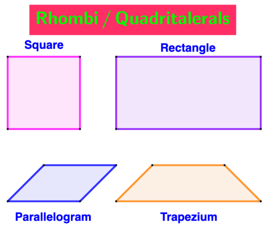
Solution:

Square: All sides are equal, all angles are 90°.

Rectangle: Opposite sides are equal, all angles 90°.

Parallelogram: Opposite sides are equal and parallel.

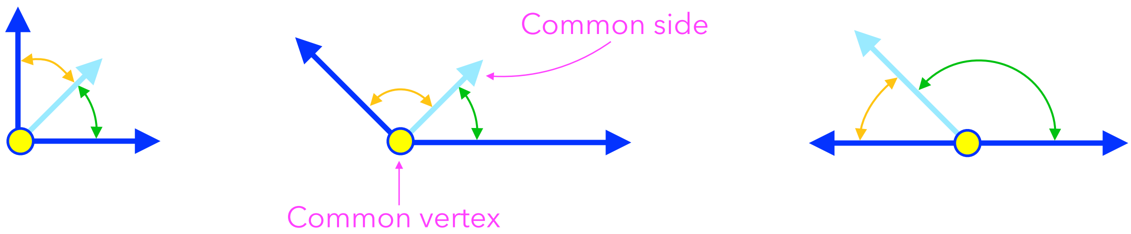
Trapezium: At least one pair of parallel sides.



Example: Explain the difference between adjacent, vertically opposite, and supplementary angles.

Solution:

Adjacent Angles: Share a common vertex and a common side but no interior points.



Transformations:

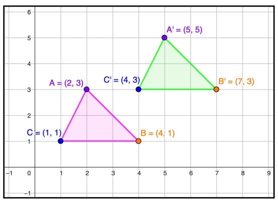
Translation, Rotation, Reflection, and Dilation.

Example: Define what transformations in geometry are. List four types of basic transformations.

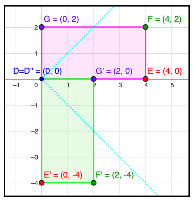
Solution:

Transformations in geometry involve changing the position, size, or orientation of a shape. The four basic types are:

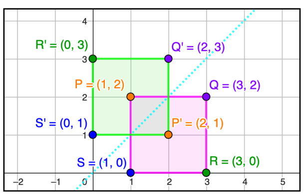
Translation (slide)



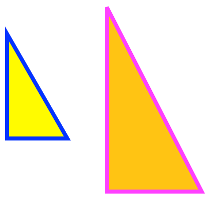
Rotation (turn)



Reflection (flip)



Dilation (resize)



Example: Describe the transformation of point $(2,3)$ after a translation of $(-2,1)$.

Solution:

New point: $(2-2, 3+1) = (0,4)$.

Term 4
Unit 7

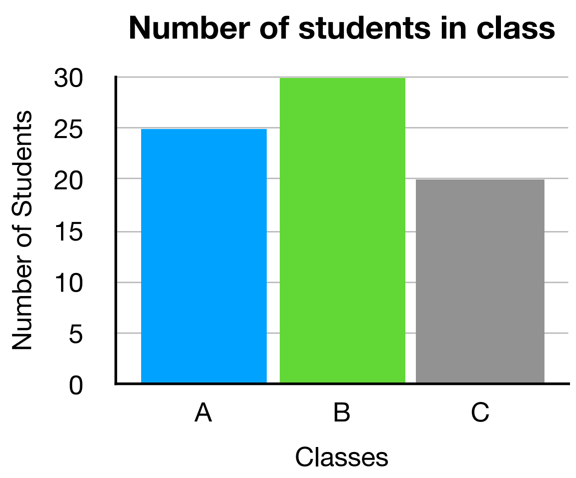
3. Statistics and Probability

Data Representation:

Reading, Drawing, and Interpreting Graphs (bar, pie, line graphs).

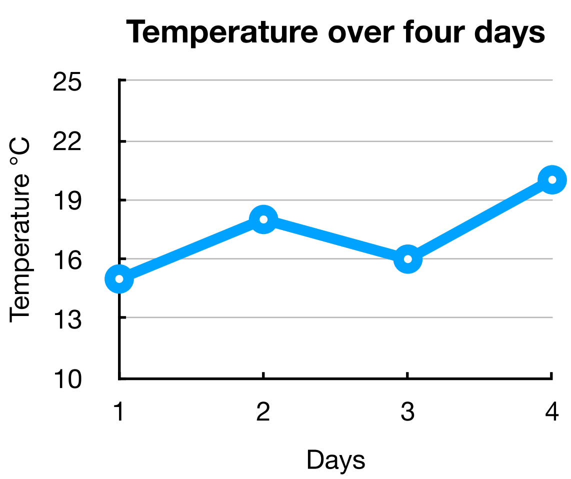
Example: Construct a bar graph for the following data: Number of students in classes A, B, and C are 25, 30, and 20 respectively.

Solution:
The x-axis would list the classes (A, B, C), and the y-axis would show the number of students. Draw bars for A at 25, B at 30, and C at 20 .



Example: Plot a line graph for the temperature over four days if the temperatures were $15^\circ C$, $18^\circ C$, $16^\circ C$, and $20^\circ C$.

Solution:
x-axis would be days, y-axis would be temperature in degrees Celsius. Plot points at and $(4, 20)$, then connect with lines.



Example: If a pie chart shows $25\,\%$ of the total for one category, what fraction is this?

Solution:

$$\frac{25}{100} = \frac{1}{4}.$$

Example: If you wanted to show how the population of one city changes over the years, which graph type would be best?

Solution:
A line graph would best show changes in population over years, highlighting trends or growth.

Example: Create a simple survey in your class about favourite subjects and represent the data using at least two different types of graphs.

Solution:
(This would involve conducting a survey, then creating): A pie chart showing the percentage of students choosing each subject. A bar graph comparing the number of students who like each subject.

Mean, Median, Mode, and Range:

Basic Statistics from Datasets.

Example: Find the median of the set {3, 7, 2, 9, 1}.

Solution:
Ordered set is {1, 2, 3, 7, 9}; median is 3.

Example: Find the mean of the numbers: $4,\ 7,\ 9,\ 10,\ 5$.

Solution:

$$\text{Sum } \left(\sum\right) = 35.$$

$$\text{Mean } (\mu) = \frac{\text{Sum of all numbers}}{\#\text{ of numbers}}$$

$$\text{Mean } = \frac{35}{5} = 7$$

Example: What is the mode in the data set: $1,\ 2,\ 2,\ 3,\ 3,\ 4$?

Solution:
Both 2 and 3 appear twice, so the dataset is bimodal, with modes 2 and 3.

Unit 8

Probability:

Simple Probability of Events.

Example: Define probability. Explain why the probability of an event must be between 0 and 1.

Solution:
Probability is the measure of the likelihood that an event will occur, expressed as a number between 0 and 1. A probability of 0 means the event is impossible, while 1 means the event is certain. Any value between these represents the degree of likelihood, with fractions or decimals showing the chance of the event happening.

Example: What's the probability of rolling a 4 on a fair six-sided die?

Solution:
$P(4) = \frac{1}{6}$.

Example: If the probability of it raining tomorrow is 0.3 , what is the probability that it will not rain?

Solution:
The probability of the complementary event (not raining) is:
$1 - 0.3 = 0.7$.

Example: If you roll a die, what is the probability of getting an even number?

Solution:
There are 3 even numbers $(2,\ 4,\ 6)$ out of 6 possible outcomes, so the probability is

$\frac{3}{6} = \frac{1}{2}$.

Example: Explain the difference between experimental and theoretical probability.

Solution:
Theoretical Probability is calculated based on what should happen under ideal conditions (e.g., the probability of flipping a coin).
Experimental Probability is determined by actually performing an experiment and observing outcomes (e.g., flipping a coin 100 times and recording how often heads come up).

Example: A bag contains 3 red, 2 blue, and 5 green marbles. If one marble is drawn at random, what is the probability of drawing a blue marble?

Solution:
$P(Blue) = \frac{1}{5}$.

General Tips

Estimation: Learn to estimate for quick checks or when exact calculation isn't needed.
Mental Math: Practice mental arithmetic for efficiency.
Problem-Solving: Develop strategies like drawing diagrams, using tables, or logical reasoning.
Units: Always check and use the correct units in measurements.

Additional Tips

Practice with Real-Life Scenarios: Use everyday situations to practice math skills (e.g., budgeting, cooking, sports statistics).
Use of Calculators: Understand when and how to use a calculator effectively.
Common Mistakes: Watch for errors in operations with negative numbers, misinterpretation of data, and forgetting units.

This cheat sheet should act as a quick reference, but remember, the key to mastering Year 7 Maths is regular practice, understanding concepts, and applying them in different contexts. For more comprehensive learning, use textbooks aligned with the Australian Curriculum or online educational resources tailored for Year 7 students.