

Time, Speed & Distance

Formulas, conversions and quick reference - Primary to lower secondary

A practical reference covering time calculations, speed-distance-time formulas, unit conversions, average speed, journeys, timetables and real-life travel problems.

1. Time Basics

Seconds	1 minute = 60 seconds.
Minutes	1 hour = 60 minutes.
Hours	1 day = 24 hours.
Days	1 week = 7 days.
Year	1 common year = 365 days; a leap year usually has 366 days.
12-hour clock	Uses a.m. and p.m. to distinguish times before and after midday.

2. 24-Hour Time

Midnight	00:00 is midnight at the start of a day.
Midday	12:00 is noon.
Afternoon	For 1 p.m. to 11 p.m., add 12 to the hour for 24-hour time.
Example	3:30 p.m. = 15:30.
Conversion back	For times after 12:59, subtract 12 from the hour to express p.m. time.

3. Elapsed Time

Formula	Elapsed time = finishing time - starting time.
Method	Break a journey or event into convenient time intervals when needed.
Midnight	For a period crossing midnight, calculate to midnight and then from midnight onward.
Check	Finishing time = starting time + elapsed time.

Speed, Distance & Time

The three essential formulas

4. Core Formulas

Speed	Speed = distance / time.
Distance	Distance = speed x time.
Time	Time = distance / speed.
Memory triangle	Place distance at the top, with speed and time below: cover the quantity you need.

5. Units

Speed	Common units include km/h, m/s and mph.
Distance	Common units include km, m and miles.
Time	Common units include hours, minutes and seconds.
Important	Distance and time units must match the speed unit before using a formula.

6. Simple Rearrangement

From speed	If speed and time are known, multiply to find distance.
From distance	If distance and speed are known, divide to find time.
From journey	If distance and time are known, divide to find speed.
Check	Use the other two formulas to verify the relationship.

7. Real-Life Meaning

Higher speed	For the same time, a higher speed gives a greater distance.
Longer time	At the same speed, a longer time gives a greater distance.
Same distance	For the same distance, a higher speed means less travel time.

Speed Unit Conversions

Converting between kilometres per hour and metres per second

8. km/h to m/s

Conversion	Multiply by $5/18$.
Formula	Speed in m/s = speed in km/h $\times 5/18$.
Example	$72 \text{ km/h} \times 5/18 = 20 \text{ m/s}$.
Reason	1 km = 1000 m and 1 hour = 3600 seconds.

9. m/s to km/h

Conversion	Multiply by $18/5$.
Formula	Speed in km/h = speed in m/s $\times 18/5$.
Example	$10 \text{ m/s} \times 18/5 = 36 \text{ km/h}$.

10. Miles & Kilometres

Approximation	1 mile is approximately 1.61 kilometres.
Reverse	1 kilometre is approximately 0.62 miles.
mph to km/h	Multiply mph approximately by 1.61.
km/h to mph	Multiply km/h approximately by 0.62.

11. Time Conversion for Formulas

Minutes to hours	Divide minutes by 60.
Hours to minutes	Multiply hours by 60.
Seconds to minutes	Divide seconds by 60.
Seconds to hours	Divide seconds by 3600.

Average Speed & Multi-Part Journeys

Working with changing speeds and journey sections

12. Average Speed

Formula	Average speed = total distance / total time.
Important	Do not simply average two speeds unless the situation specifically makes that valid.
Total distance	Add the distances travelled in all parts of the journey.
Total time	Add the time taken for all parts, including any stops if the question includes them.

13. Multi-Part Journeys

Step 1	Calculate distance or time for each stage if necessary.
Step 2	Add all journey distances.
Step 3	Add all journey times.
Step 4	Use total distance / total time for overall average speed.

14. Stops & Waiting Time

Moving average	If asked for average speed while moving, exclude stop time.
Whole journey	If asked for average speed for the entire trip, include stop time.
Read carefully	The wording determines which time should be used.

15. Equal Distances

Key idea	When equal distances are travelled at different speeds, the overall average is not usually the simple mean of the speeds.
Method	Find the time for each section, add the times, then divide total distance by total time.

Timetables, Travel & Time Zones

Using time mathematics in real-life journeys

16. Timetable Problems

Departure	The time a journey or event begins.
Arrival	The time a journey or event ends.
Journey time	Arrival time - departure time, allowing for date changes.
Connections	Add waiting time between arrival of one service and departure of the next.

17. Time Zones

UTC	Coordinated Universal Time is a common reference for world time zones.
Local time	Local time = UTC time + or - the stated time-zone offset.
Difference	Compare the two offsets to find the time difference.
Date change	A time-zone calculation may move into the previous or next calendar day.

18. International Travel

Flight duration	Use departure and arrival times only after accounting for time-zone differences.
Local arrival	Convert the departure time to the destination time zone or work through UTC.
Check date	Long journeys may cross midnight or the International Date Line.

19. Everyday Applications

Travel	Road trips, flights, trains and public transport.
Sport	Race times, pace and speed.
School	Timetables, lesson durations and schedules.
Planning	Estimating arrival times and comparing routes.

Relative Speed & Problem Solving

Useful extensions for more challenging journey questions

20. Moving in Opposite Directions

Relative speed	When two objects move apart in opposite directions, relative speed = speed 1 + speed 2.
Distance apart	Distance apart = relative speed x time.
Use	Useful when two travellers leave the same point in opposite directions.

21. Moving in the Same Direction

Relative speed	When one object catches another moving in the same direction, relative speed = faster speed - slower speed.
Catch-up time	Time = initial gap / relative speed.
Check	Use compatible speed and distance units.

22. Meeting Problems

Towards each other	Combined speed = speed 1 + speed 2.
Meeting time	Time to meet = initial distance apart / combined speed.
Distance by each	Distance travelled = individual speed x meeting time.

23. Problem-Solving Routine

Step 1	Identify what is known: speed, distance and/or time.
Step 2	Convert all units so they are compatible.
Step 3	Choose the correct formula.
Step 4	Calculate and include the correct unit.
Step 5	Check whether the answer is realistic.

Quick Reference & Common Mistakes

Essential formulas and self-checking reminders

24. Essential Formula Box

Speed	Speed = distance / time.
Distance	Distance = speed x time.
Time	Time = distance / speed.
Average speed	Average speed = total distance / total time.
km/h to m/s	Multiply by 5/18.
m/s to km/h	Multiply by 18/5.

25. Common Mistakes to Watch

Mixed units	Do not use kilometres with seconds or metres with hours unless converted appropriately.
Average speed	Do not automatically take the arithmetic mean of different speeds.
Minutes	30 minutes = 0.5 hour, not 0.30 hour.
Stops	Check whether waiting or stop time should be included.
Time zones	Account for both the time difference and any date change.
Final unit	Always state km/h, m/s, hours, minutes or the appropriate unit.

26. Calculation Checks

Estimate	Predict a sensible approximate answer first.
Formula check	Confirm that the formula matches the unknown quantity.
Units	Check all units before calculating.
Reverse check	Use distance = speed x time to check a speed or time answer.
Reasonableness	Ask whether the journey time or speed makes sense in the real situation.

Maths Connects Us All

Time, speed and distance help us plan journeys, compare movement and understand travel, sport and transport in everyday life around the world.