2. Chemical equations

- Reactants are on the left, products on the right, joined by an arrow (→).

Symbol	Meaning
(s)	solid
(ℓ)	liquid
(g)	gas
(aq)	aqueous, dissolved in water
heat or Δ over the arrow	reaction needs heating
↑ and ↓	gas released, precipitate formed

- Law of conservation of mass : Mass is neither created nor destroyed in a reaction. So atoms of each element must be equal on both sides.

3. Types of chemical reactions

A. Combination reaction

- Combination reaction : Two or more reactants join to form one single product.

$$CaO(s) + H_2O(\ell) \rightarrow Ca(OH)_2(aq)$$
$$C(s) + O_2(g) \rightarrow CO_2(g)$$
$$2H_2(g) + O_2(g) \rightarrow 2H_2O(\ell)$$

quicklime + water gives slaked lime; coal burning and hydrogen burning are combination too

- Quicklime (CaO) reacts with water with a hissing sound and lots of heat.
- A reaction that gives out heat is exothermic. Burning of natural gas and respiration are exothermic.

- Guild restrictions removed in towns; transport and communication improved; businessmen gained from uniform laws, weights, measures and a common currency.

2. Making of nationalism in Europe

- Mid-18th century Europe had no nation-states: Habsburg and Ottoman empires, many small states and duchies.
- Landed aristocracy was the powerful class; the new middle class (businessmen, professionals) spread nationalism.

Liberal nationalism

- Liberalism : From Latin liber, meaning free: freedom for the individual and equality before law.
- Politically: government by consent, end of autocracy, a constitution, representative government.
- The Napoleonic Code kept limited suffrage and made women minors under fathers and husbands.
- Economically: freedom of markets, end of state restrictions on goods and capital.
- Zollverein (1834): customs union begun by Prussia; removed tariff barriers, cut currencies from over thirty to two.

Conservatism after 1815

- Napoleon was defeated at Waterloo (1815) by Britain, Russia, Prussia and Austria.
- Congress of Vienna (1815), hosted by Austria's chancellor Duke Metternich, aimed to undo Napoleon's changes.
- Bourbon dynasty restored in France; buffer states set up on French borders (Netherlands including Belgium; Genoa added to Piedmont).
- The German Confederation of 39 states set up by Napoleon was left in place.

Chapter - 11 (last-day revision)

Areas Related to Circles

First revise

- Arc length and perimeter of a sector or of a region bounded by arcs
- Shaded-region areas combining circles, semicircles and quadrants with other shapes
- Area of a sector; find the angle or radius from a sector area
- Circumference and area basics: ratios, wheel revolutions, equal perimeters

Be careful

- Using diameter as radius. Halve the diameter first.
- Perimeter of a sector is arc + two radii, not just the arc.

1. Circle basics

$$\text{Circumference} = 2\pi r = \pi d$$
$$\text{Area} = \pi r^2$$
$$\text{Ring (path) area} = \pi(R^2 - r^2)$$
$$= \pi(R + r)(R - r)$$

Use the value of π the question gives ($\frac{22}{7}$ or 3.14). If none is given, use $\frac{22}{7}$ when r is a multiple of 7

- Semicircle: area $\frac{1}{2}\pi r^2$, perimeter $\pi r + 2r$.

- Quadrant: area $\frac{1}{4}\pi r^2$, perimeter $\frac{1}{2}\pi r + 2r$.

Chapter - 8 (last-day revision)

Introduction to Trigonometry

First revise

- Prove a trigonometric identity
- Given one ratio, find the other ratios or evaluate an expression
- Simplify using identities
- Evaluate expressions with standard-angle values

1. Trigonometric ratios

- Works in a right triangle only. Pick an acute angle θ.
- Sides are named from θ: opposite, adjacent, hypotenuse.
- Hypotenuse is always the longest side, opposite the right angle.
- Opposite and adjacent change when you switch to the other acute angle.