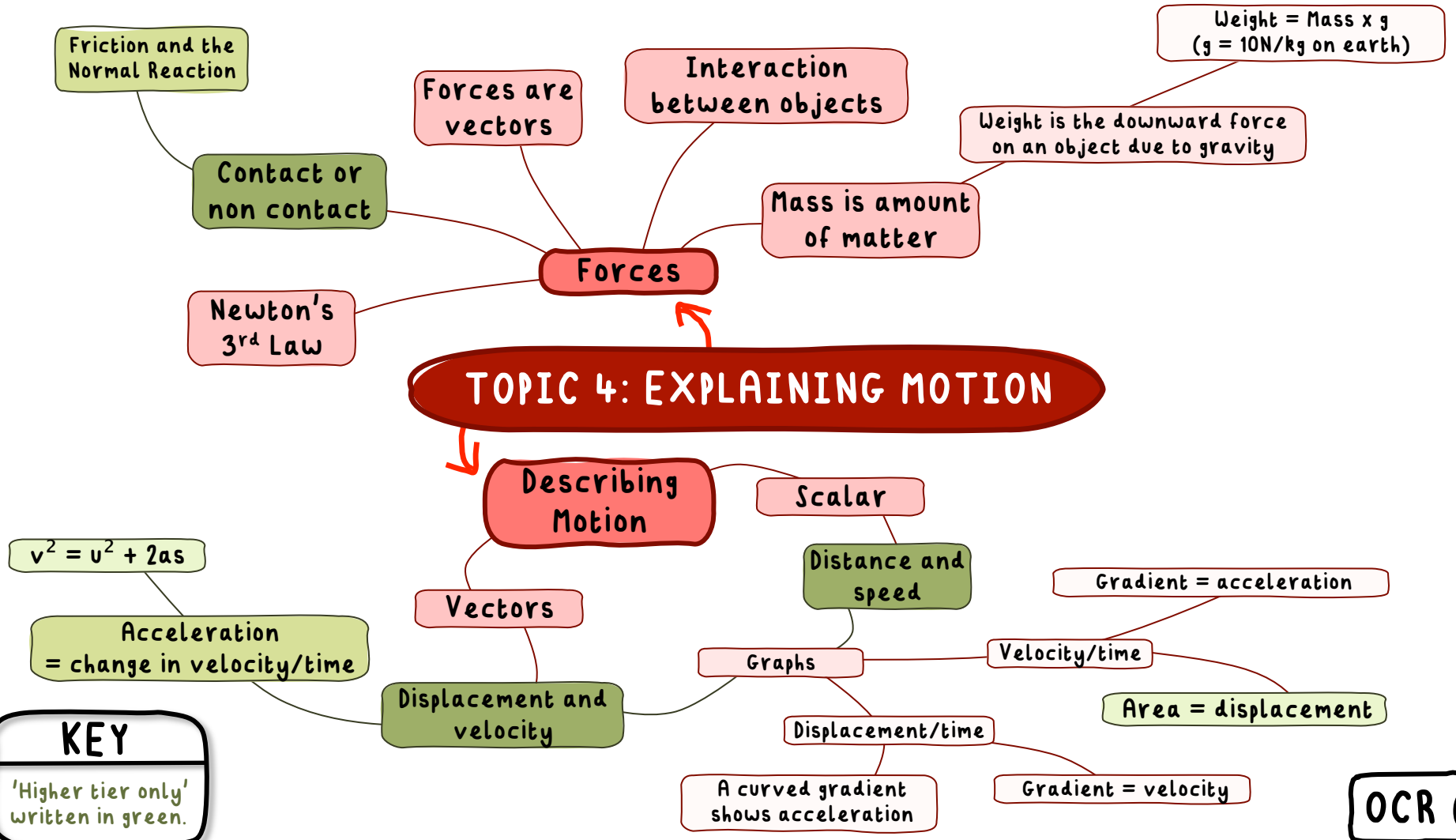
TOPIC 4: EXPLAINING MOTION
Forces
Friction and the Normal Reaction
Contact or non contact
Forces are vectors
Interaction between objects
Weight = Mass x g (g = 10N/kg on earth)
Weight is the downward force on an object due to gravity
Mass is amount of matter
Newton's 3rd Law
Describing Motion
Scalar
Distance and speed
Vectors
Displacement and velocity
Graphs
Velocity/time
Gradient = acceleration
Area = displacement
Displacement/time
Gradient = velocity
A curved gradient shows acceleration
Acceleration = change in velocity/time
$v^2 = u^2 + 2as$
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TOPIC 4: EXPLAINING MOTION: ENERGY

Energy
= mass x g x height

When an object is lifted, its Gravitational Potential Energy increases

Energy
= ½ mass x velocity²

Moving objects store Kinetic Energy

Work done

Energy is dissipated when work is done against resistive forces (friction, air resistance etc)

The energy transferred from one form to another

Power is the rate of energy transfer

Power = work done / time

Work done
= force x distance moved

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TOPIC 4: EXPLAINING MOTION: FORCES AND MOTION

- Constant speed, changing velocity
- Circular Motion
  - Moments
    - The rotational effect of a force–gears and levers
    - Moment = force x distance
      - Distance is the perpendicular distance between the pivot and the line of action of the force
      - Force at right angles to the direction of motion
  - Inertial mass
    - Difficulty in changing motion of an object
      - F=ma
  - Cars
    - Braking distance
      - Affected by speed, road conditions, tyre conditions and weight of car
    - Thinking distance
      - Affected by speed, reactions, concentration, tiredness, drugs and distractions
    - Braking distance + thinking distance = overall stopping distance
    - Safety precautions
      - Seat belts
      - Crumple zones
      - Air bags

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TOPIC 4: EXPLAINING MOTION: FORCES AND MOTION

- **Momentum = mass x velocity**
  - A resultant force means a change in momentum
    - Change in momentum = force x time = (impulse)
      - Newton's 2nd Law
        - A non-zero resultant force – accelerate or decelerate
  - Conservation of momentum – momentum is always conserved in a collision/explosion
- **Resultant Force**
  - Net forces acting on an object
- **Terminal Velocity**
  - Weight causes acceleration downwards (resultant force down)
    - As speed increases, air resistance increases
      - Resultant force decreases
        - Eventually, air resistance = weight so there is no resultant force
          - No more acceleration

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