

STEP Questions by Topic - Mechanics (10 pages; 25/7/24)

2005-2018: Q9-11 (Papers 1, 2 & 3; formulae booklet)

2019: Q9&10 (Papers 1, 2 & 3; no formulae booklet)

2020-2022: Q9&10 (Papers 2 & 3; no formulae booklet)

* \Rightarrow recommended; ** \Rightarrow highly recommended

As can be seen below, some Mechanics topics appear almost every year, and may be worth specialising in. Often the major difficulty in a question concerns algebra rather than Mechanics, as the theory involved is often quite limited.

Centre of mass**Paper 1**

2010, P1, Q9*

Paper 2

2009, P2, Q9

Circular Motion**Paper 2**

2020, P2, Q10*

Paper 3

2007, P3, Q9

2016, P3, Q10

2018, P3, Q11*

Collisions

Paper 1

2005, P1, Q10

2006, P1, Q11

2009, P1, Q11

2010, P1, Q11

2011, P1, Q10*

2013, P1, Q10*

2014, P1, Q10

2016, P1, Q10

2017, P1, Q10

Paper 2

2006, P2, Q10*

2007, P2, Q9

2008, P2, Q10*

2009, P2, Q10*

2010, P2, Q10

2011, P2, Q9*

2012, P2, Q11

2013, P2, Q11

2015, P2, Q11*

2016, P2, Q9*

2018, P2, Q9

Paper 3

2005, P3, Q9

2006, P3, Q11

2018, P3, Q9

2019, P3, Q10

2021, P3, Q9* (triangular path)

2022, P3, Q9*

Constrained motion

Paper 2

2021, P2, 10** (bead on wire in accelerating train)

Paper 3

2021, P3, Q10** (string wrapping round cylinder)

Differential Equations

(See also Hooke's Law & Energy)

Paper 2

2018, P2, Q10

Paper 3

2009, P3, Q10

2010, P3, Q10

2013, P3, Q9*

2017, P3, Q10

Energy

(See also Hooke's Law & Power)

Paper 2

2015, P2, Q9

2017, P2, Q10 (entirely 'show that')

2020, P2, Q10* (circular motion, equilibrium)

Paper 3

2006, P3, Q9

2012, P3, Q11

Forces

Paper 1

2005, P1, Q9

2006, P1, Q9 (pulley)

2007, P1, Q9

2008, P1, Q11

2009, P1, Q10

2010, P1, Q9 (friction)

2011, P1, Q11

2012, P1, Q11 (pulleys - one moving)

2013, P1, Q11* (equilibrium / friction)

2014, P1, Q11* (pulleys - one moving)

2015, P1, Q11

2016, P1, Q9* (friction)

2017, P1, Q11

2018, P1, Q9

2018, P1, Q10* (train)

2018, P1, Q11

2019, P1, Q9

Paper 2

2005, P2, Q9

2005, P2, Q11*

2006, P2, Q9

2007, P2, Q10

2008, P2, Q11

2009, P2, Q11

2010, P2, Q11

2011, P2, Q11

2012, P2, Q10 (friction)

2013, P2, Q9

2014, P2, Q9

2014, P2, Q11* (eq'n of motion)

2015, P2, Q10*

2016, P2, Q9

2016, P2, Q10

2017, P2, Q9

2018, P2, Q11

2019, P2, Q10

2021, P2, Q9* (equilibrium)

2022, P2, Q9* (equilibrium)

2023, P2, Q9** (truck pulling trailer)

Paper 3

2007, P3, Q11

2008, P3, Q9

2009, P3, Q11 (comet)

2010, P3, Q9

2010, P3, Q11 (bullet hitting block)

2011, P3, Q9

2013, P3, Q11

2017, P3, Q10

2020, P3, Q9* (equilibrium / friction)

Hooke's Law

Paper 3

2005, P3, Q10 (see Erratum, included with paper)

2008, P3, Q10

2011, P3, Q10

2012, P3, Q10

2014, P3, Q10*

2015, P3, Q9*

2016, P3, Q9

2017, P3, Q9* (entirely 'show that')

Kinematics

Paper 1

2007, P1, Q10* (Normans & Saxons)

2012, P1, Q10 (well)

2015, P1, Q10* (rain falling on bus)

Paper 2

2015, P2, Q10

2021, P2, Q10** (accelerating frame of reference; constrained motion)

Oscillations

Paper 3

2020, P3, Q10*

Power

Paper 2

2009, P2, Q11

Paper 3

2016, P3, Q11*

Projectiles

Paper 1

2006, P1, Q10*

2007, P1, Q11

2008, P1, Q10

2009, P1, Q9*

2011, P1, Q9*

2012, P1, Q9*

2013, P1, Q9

2014, P1, Q9

2015, P1, Q9

2016, P1, Q11

2017, P1, Q9

2019, P1, Q10 (entirely 'show that' problems)

Paper 2

2005, P2, Q10*

2007, P2, Q11

2008, P2, Q9

2010, P2, Q9

2011, P2, Q10

2012, P2, Q9

2013, P2, Q10

2014, P2, Q10

2016, P2, Q11

2017, P2, Q11

2019, P2, Q9

2020, P2, Q9*

2022, P2, Q10*

Paper 3

2007, P3, Q10

2009, P3, Q9

2014, P3, Q9

2018, P3, Q11*

Rotation

Paper 1

2008, P1, Q9* (rolling)

Paper 3

2005, P3, Q11 (rotating spindle ; equilibrium positions)

2006, P3, Q10 (rotating disc)

2008, P3, Q11 (particle on string, wrapped round vertical wheel)

2011, P3, Q11 (horizontal disc hanging from vertical strings)

2012, P3, Q9 (particles hanging from pulley)

2013, P3, Q10 (rod hit by particle)

2014, P3, Q11 (particle attached to strings, and rotating in horizontal plane)

2015, P3, Q10 (rod moving in vertical plane)

2015, P3, Q11 (horizontally rotating disc, with rod attached)

2018, P3, Q10 (vertically rotating disc)

Vectors

Paper 1

2005, P1, Q11

2010, P1, Q10

Paper 2

2011, P2, Q11

Paper 3

2019, P3, Q9* (moving hemisphere)