STEP Questions by Topic - Pure (28 pages; 7/6/25)

No STEP 1 for 2020 onwards.

* ⇒ recommended; ** ⇒ highly recommended

Algebra

Paper 1

2005, P1, Q3

2005, P1, Q7

2007, P1, Q4 (cubic)

2009, P1, Q3

2010, P1, Q1 (simultaneous eq'ns)

2013, P1, Q1

2014, P1, Q3

2019, P1, Q6

Paper 3

2008, P3, Q1

2009, P3, Q5 (simultaneous eq'ns)

2020, P3, Q5 (algebraic fractions)

Binomial Expansions

Paper 1

2010, P1, Q5*

2013, P1, Q6 (Fibonacci sequence)

Paper 2

2007, P2, Q1*

2016, P2, Q5

Paper 3

2017, P3, Q1

Calculus

Paper 1

2008, P1, Q2

2011, P1, Q5

2014, P1, Q4* (hands of clock)

2009, P1, Q5 (cone)

2016, P1, Q4 (curvature)

Paper 2

2005, P2, Q1

Paper 3

2007, P3, Q5

2009, P3, Q7

2015, P3, Q7 (operator D)

2017, P3, Q6

2019, P3, Q2

Complex Numbers

These often boil down to geometry problems. The topic is easy to identify on the paper.

Paper 2

Specimen, P2, Q3

2020, P2, Q7 (loci)

Paper 3

1987, P3, Q3

2005, P3, Q8

2006, P3, Q5

2007, P3, Q6

2008, P3, Q7

2009, P3, Q6*

2010, P3, Q3

2011, P3, Q3

2011, P3, Q8*

2012, P3, Q6*

2013, P3, Q4

2013, P3, Q6*

2013, P3, Q8*

2014, P3, Q5

2015, P3, Q6

2016, P3, Q7

2017, P3, Q2

2018, P3, Q6

2018, P3, Q7

2019, P3, Q6

2020, P3, Q3

Counting

Paper 1

Specimen P1, Q5* (number of zeros at the end of 365!)

2005, P1, Q1*

2007, P1, Q1

2009, P1, Q1

Curves (not involving sketches)

Paper 1

2006, P1, Q6

2009, P1, Q2

2011, P1, Q1

2018, P1, Q1

Paper 2

2008, P2, Q4

2009, P2, Q1

2009, P2, Q2

2010, P2, Q1 (osculating circle)

2010, P2, Q8

Paper 3

2003, P3, Q4* (parametric form)

2005, P3, Q5

2024, P3, Q8*

Curve Sketching

Paper 1

2007, P1, Q8

2008, P1, Q6*

2010, P1, Q2*

2012, P1, Q2

2013, P1, Q5

2014, P1, Q2* (ln)

2015, P1, Q1

2016, P1, Q3

2019, P1, Q2

Paper 2

2003, P2, Q6 * (modulus function)

2005, P2, Q3

2006, P2, Q2

2006, P2, Q5

2007, P2, Q2*

2008, P2, Q3 (cubic)

2009, P2, Q2

2011, P2, Q1** (square roots)

2011, P2, Q8

2012, P2, Q5

2013, P2, Q1* (p^q & q^p)

2013, P2, Q4

2013, P2, Q5

2014, P2, Q7 (modulus function)

2015, P2, Q4

2016, P2, Q1

2017, P2, Q3

2020, P2, Q2 (differential eq'n)

Paper 3

2005, P3, Q1

2005, P3, Q2

2006, P3, Q1

2007, P3, Q4 (radius of curvature)

2009, P3, Q3

2012, P3, Q3

2018, P3, Q1

2019, P3, Q7 ('Devil's curve')

2020, P3, Q2* (hyperbolic functions)

(2020, P3, Q6) (polar curves)

Differential Equations

These questions usually follow a similar pattern, with each part providing inspiration for the next. The topic is easy to identify on the paper.

Paper 1

2005, P1, Q8

2008, P1, Q8

2010, P1, Q6

2011, P1, Q7

2012, P1, Q8

2013, P1, Q7

Paper 2

2005, P2, Q8

2007, P2, Q6*

2008, P2, Q7*

2014, P2, Q5

2016, P2, Q6

2018, P2, Q8

2019, P2, Q6

2020, P2, Q2 (sketching curves)

Paper 3

Specimen, P3, Q7*

2005, P3, Q2

2006, P3, Q7

2007, P3, Q8

2008, P3, Q6

2009, P3, Q2

2010, P3, Q7

2010, P3, Q8

2011, P3, Q1

2012, P3, Q1

2012, P3, Q7

2013, P3, Q7

2015, P3, Q8

2018, P3, Q3

2019, P3, Q1

2020, P3, Q7

2024, P3, Q6** (systems of equations)

Differentiation

Paper 1

Specimen, P1, Q2*

Digits

Paper 1

2005, P1, Q1*

Functions

This topic is difficult to prepare for, as questions are of an (especially) one-off nature.

Paper 1

2008, P1, Q4 (convex functions)

2008, P1, Q6* (inverse functions)

2013, P1, Q2 (greatest integer less than or equal to x)

2013, P1, Q8 (composite functions)

2017, P1, Q6

Paper 2

2003, P2, Q6* (modulus function)

2007, P2, Q5 (composite functions)

2007, P2, Q7 (concave functions)

2008, P2, Q6 (periodic function)

2011, P2, Q3

2013, P2, Q8

2014, P2, Q7 (modulus function)

2013, P2, Q7

2018, P2, Q2 (concave function)

2018, P2, Q3 (rotational symmetry)

Paper 3

2006, P3, Q4

2009, P3, Q3 (even function)

2009, P3, Q4 (Laplace transform)

2009, P3, Q7

2011, P3, Q4

2016, P3, Q8

2017, P3, Q4 (geometric mean)

Geometry

This topic is difficult to prepare for, as questions are of an (especially) one-off nature.

Paper 1

(Specimen, P1, Q8) (Coordinate Geometry)

(1988, P1, Q3) (Coordinate Geometry)

(1989, P1, Q6) (Coordinate Geometry)

(1990, P1, Q9) (Coordinate Geometry)

(1999, P1, Q2) (Coordinate Geometry)

(2004, P1, Q6) (Coordinate Geometry)

(2005, P1, Q2) (Coordinate Geometry)

(2005, P1, Q6) (Coordinate Geometry)

2006, P1, Q2* (goat)

2006, P1, Q4 (polygon)

2006, P1, Q8 (tetrahedron)

2007, P1, Q5 (octahedron)

2008, P1, Q7

2009, P1, Q4

2009, P1, Q8 (incircle of triangle)

2010, P1, Q3

2011, P1, Q1

2011, P1, Q4

2012, P1, Q1

2012, P1, Q4

2014, P1, Q8

2015, P1, Q3

2015, P1, Q4

2016, P1, Q5

2017, P1, Q3

2017, P1, Q5

2017, P1, Q7

2018, P1, Q1

2018, P1, Q3

2019, P1, Q1

Paper 2

(1994, P2, Q7) (Coordinate Geometry)

2005, P2, Q5

2006, P2, Q7 (ellipse)

2010, P2, Q6 (tetrahedron)

2012, P2, Q6 (cyclic quadrilateral)

2014, P2, Q1

2014, P2, Q3

2015, P2, Q2

2015, P2, Q7

2017, P2, Q5

2020, P2, Q4 (triangles)

2023, P2, Q8* (isosceles tetrahedron)

Paper 3

(1988, P3, Q8) (Coordinate Geometry)

(1989, P3, Q2) (Coordinate Geometry)

(1990, P3, Q2) (Coordinate Geometry)

(1991, P3, Q4) (Coordinate Geometry)

(1993, P3, Q8) (Coordinate Geometry)

(2001, P3, Q6) (Coordinate Geometry)

(2003, P3, Q7) (Coordinate Geometry)

(2005, P3, Q5) (Coordinate Geometry)

2008, P3, Q3 (ellipse)

2009, P3, Q1 (circle)

2010, P3, Q5

2010, P3, Q6 (sphere)

2012, P3, Q5 (rational points)

2013, P3, Q8*

2014, P3, Q3

2016, P3, Q2

2017, P3, Q7 (ellipse)

2018, P3, Q4 (hyperbola)

Hyperbolic functions

Paper 2

Specimen, P2, Q4*

Paper 3

2005, P3, Q6 (see Erratum, included with paper)

2008, P3, Q4

2014, P3, Q6

2016, P3, Q4

2016, P3, Q6

2020, P3, Q2*

Induction

The topic is easy to identify on the paper, in that 'induction' will be mentioned.

Paper 1

2017, P1, Q8

Paper 2

2013, P2, Q6

2015, P2, Q3

2015, P2, Q5

2017, P2, Q6

Paper 3

2005, P3, Q4

2007, P3, Q3

2008, P3, Q5

2011, P3, Q7

2018, P3, Q2

Inequalities

Paper 1

Specimen, P1, Q9

2008, P1, Q3

2012, P1, Q3

2014, P1, Q5

2017, P1, Q2

Paper 2

2006, P2, Q6

2008, P2, Q5*

2012, P2, Q4

2014, P2, Q2

2016, P2, Q4

2017, P2, Q4 (Schwarz inequality)

2020, P2, Q4* (triangles)

Paper 3

1987, P3, Q3* (1st part)

2011, P3, Q4

2018, P3, Q5 (Arithmetic & Geometric means)

Integers

Paper 1

2006, P1, Q1

2007, P1, Q6

2009, P1, Q1

2010, P1, Q8

2011, P1, Q8

2014, P1, Q1

2015, P1, Q8

2016, P1, Q7

Paper 2

2005, P2, Q2

2006, P2, Q3

2011, P2, Q2

2013, P2, Q7

2014, P2, Q8

2018, P2, Q6 (prime numbers)

2020, P2, Q5 (divisibility)

Paper 3

2013, P3, Q5 (prime numbers)

2016, P3, Q5 (prime numbers)

Integration

Integration questions have the advantage of being instantly recognisable.

Paper 1

Specimen, P1, Q4*

1987, P1, Q5* (substitution)

1987, P1, Q8* (substitution)

2005, P1, Q5*

2006, P1, Q5

2006, P1, Q7

2007, P1, Q3*

2008, P1, Q2

2008, P1, Q6*

2009, P1, Q6

2009, P1, Q7

2010, P1, Q4

2011, P1, Q2*

2012, P1, Q5*

2013, P1, Q4

2014, P1, Q2

2015, P1, Q5

2016, P1, Q2

2017, P1, Q1

2018, P1, Q4

2018, P1, Q8

2019, P1, Q3*

2019, P1, Q8

Paper 2

Specimen, P2, Q7 (floor function; unusually short solution)

1987, P2, Q6** (trigonometry)

2005, P2, Q3

2006, P2, Q4*

2007, P2, Q3*

2007, P2, Q6

2008, P2, Q5*

2009, P2, Q5

2009, P2, Q7

2010, P2, Q2

2010, P2, Q4**

2011, P2, Q6*

2012, P2, Q3*

2013, P2, Q2

2014, P2, Q4*

2015, P2, Q6

2016, P2, Q7*

2017, P2, Q1

2017, P2, Q4

2018, P2, Q5

2019, P2, Q2*

2020, P2, Q1*

2023, P2, Q1**

Paper 3

2005, P3, Q7

(2006, P3, Q2*)

2007, P3, Q7*

2009, P3, Q8

2010, P3, Q2

2010, P3, Q8

2011, P3, Q6

2013, P3, Q1

2014, P3, Q2*

2014, P3, Q4

2015, P3, Q1

2016, P3, Q1

2016, P3, Q3

2018, P3, Q8

2019, P3, Q5* (see Erratum, provided with the paper)

2020, P3, Q1 (induction)

2021, P3, Q3*

2022, P3, Q5*

Irrational numbers

Paper 1

2008, P1, Q1

2019, P1, Q7

Paper 3

2015, P3, Q5

Logarithms

Paper 1

1987, P1, Q4**

2018, P1, Q2** (change of base)

Paper 2

2013, P2, Q1* (p^q & q^p)

Matrices

Paper 2

2019, P2, Q8

2020, P2, Q6 (trace)

2021, P2, Q7*

Paper 3

2019, P3, Q3* (time-consuming)

2020, P3, Q4

2024, P3, Q5 (trace)

Logic [Hasn't appeared in STEP in recent years.]

Paper 2

Specimen, P2, Q10 [True/False statements]

Numbers

Paper 2

2020, P2, Q5** (divisibility)

Polar Curves

Paper 3

1989, P3, Q6** (conics & lines)

(2006, P3, Q6) (parabola)

2011, P3, Q5

(2015, P3, Q3) (Conchoid of Nicomedes)

(2017, P3, Q5)

(2020, P3, Q6)

Polynomials

Paper 1

2006, P1, Q3* (quadratics & cubics)

2007, P1, Q4

2008, P1, Q5 (Chebyshev's theorem)

2012, P1, Q2

2015, P1, Q7

2016, P1, Q1

2018, P1, Q5

2018, P1, Q7* (solving cubic eq'ns)

2019, P1, Q4

Paper 2

2007, P2, Q2*

2008, P2, Q3* (cubic)

2009, P2, Q4

2010, P2, Q7 (cubic)

2012, P2, Q2

2013, P2, Q3 (cubic)

2016, P2, Q2

2016, P2, Q3 (truncated exponential function)

2018, P2, Q1 (quartic)

2019, P2, Q1*

2019, P2, Q3* (integer roots)

2020, P2, Q8 (quartic & quintic)

Paper 3

2005, P3, Q3

2006, P3, Q8

2010, P3, Q4

2011, P3, Q2

2011, P3, Q3

2015, P3, Q4

2017, P3, Q3 (quartic)

2018, P3, Q1 (quadratic)

2019, P3, Q4 (reflexive polynomials)

Proof

Paper 1

2005, P1, Q3

2006, P1, Q3* (quadratic)

Paper 2

2007, P2, Q4*

Recurrence relations

Paper 1

2006, P2, Q1

2012, P1, Q7

2014, P1, Q6

Paper 2

2008, P2, Q1 (sequence of points)

2012, P2, Q8

Paper 3

2005, P3, Q4

2008, P3, Q5

2008, P3, Q8

2012, P3, Q8

2018, P3, Q2

2020, P3, Q8

Sequences & Series

This topic is difficult to prepare for, as questions are of an (especially) one-off nature.

Paper 1

2011, P1, Q6

2016, P1, Q8 (generating functions)

2017, P1, Q4

2017, P1, Q8

Paper 2

2005, P2, Q6*

2008, P2, Q2

2009, P2, Q6 (Fibonacci)

2010, P2, Q3

2011, P2, Q7

2012, P2, Q1

2013, P2, Q6

2015, P2, Q1

2016, P2, Q8

2017, P2, Q2

2017, P2, Q6

2018, P2, Q5

2019, P2, Q4

2019, P2, Q5

2020, P2, Q3 (unimodal sequences)

Paper 3

1989, P3, Q9**

2007, P3, Q2

2008, P3, Q2

2008, P3, Q8

2010, P3, Q1

2012, P3, Q2

2012, P3, Q4

2013, P3, Q2* (Maclaurin Series)

2014, P3, Q1

2014, P3, Q8

2015, P3, Q2

2016, P3, Q4 (hyperbolic functions)

Trigonometry

Paper 1

2005, P1, Q4

2005, P1, Q7

2007, P1, Q2

2007, P1, Q3 (Integration)

2010, P1, Q3

2011, P1, Q3

2012, P1, Q6

2018, P1, Q6

Paper 2

2005, P2, Q4

2007, P2, Q4

2008, P2, Q6

2009, P2, Q3

2011, P2, Q4

2014, P2, Q6

2015, P2, Q2

2017, P2, Q3

2018, P2, Q4

Paper 3

2005, P3, Q1

2006, P3, Q3

2007, P3, Q1

2017, P3, Q8

Vectors

These can be time-consuming; especially when the information given has to be converted to a number of simultaneous equations.

Paper 1

2007, P1, Q7

2010, P1, Q7

2013, P1, Q3

2014, P1, Q7

2015, P1, Q6

2016, P1, Q6

2019, P1, Q5

Paper 2

Specimen, P2, Q9*

2005, P2, Q7

2006, P2, Q8

2007, P2, Q8

2008, P2, Q8

2009, P2, Q8

2010, P2, Q5

2011, P2, Q5

2012, P2, Q7

2015, P2, Q8

2017, P2, Q8

2018, P2, Q7

2019, P2, Q7* (long)

2023, P2, Q8* (isosceles tetrahedron)

Paper 3

2013, P3, Q3

2014, P3, Q7* (cyclic quadrilateral)

2019, P3, Q8 (pyramid)

2022, P3, Q7* (vector triple product)