National 5 Timeline

Blue: TJ Book 1, Black: TJ Book 2, Green: Not covered in TJ Books

Expressions and Formulae

1. Surds and Indices
2. Scientific Notation with a calculator

Working with surds	♦ Simplification ♦ Rationalising denominators
Simplifying expressions using the laws of indices	♦ Multiplication and division using positive and negative indices including fractions ♦ $(ab)^m = a^m b^m$ ♦ $(a^m)^n = a^{mn}$ ♦ $a^{m/n} = \sqrt[n]{a^m}$ ♦ Calculations using scientific notation

3. Expanding Brackets and Factorisation

Working with algebraic expressions involving expansion of brackets	♦ $a(bx+c)+d(ex+f)$ ♦ $ax(bx+c)$ ♦ $(ax+b)(cx+d)$ ♦ $(ax+b)(cx^2+dx+e)$ where $a,b,c,d,e,f \in \mathbb{Z}$
Factorising an algebraic expression	♦ Common factor ♦ Difference of squares $p^2x^2 - a^2$ ♦ Trinomials with unitary and non-unitary x^2 coefficient ♦ Combinations of the above

4. Algebraic Fractions

Reducing an algebraic fraction to its simplest form	♦ $\frac{a}{b}$ where a,b are of the form $(mx+p)^n$ or $(mx+p)(nx+q)$ and $b \neq 0$
Applying the four operations to algebraic fractions	♦ $\frac{a}{b} * \frac{c}{d}$ where a,b,c,d can be simple constants, variables or expressions; $*$ can be add, subtract, multiply or divide; and $b \neq 0, d \neq 0$

5. Gradient of a Straight Line & y = mx + c (Introduced earlier at Level 4)

Determining the gradient of a straight line, given two points	◆ $m = \frac{y_2 - y_1}{x_2 - x_1}$

6. Arcs and Sectors

Circle geometry	◆ Calculating the length of an arc ◆ Calculating the area of a sector

7. Volume of 3D shapes

Calculating the volume of a standard solid	◆ Sphere, cone, pyramid

8. Significant Figures

Rounding	◆ To a given number of significant figures

9. Completing the Square

Completing the square in a quadratic expression with unitary x^2 coefficient	◆ Writing quadratics of the form $x^2 + bx + c$ in the form $(x+p)^2 + q$ where $b, c \in \mathbb{Z}$ and $p, q \in \mathbb{Q}$

Relationships

10. Equations and Inequalities (Introduced earlier at Level 4)

Working with linear equations and inequations	♦ Where numerical coefficients are rational numbers, $\mathbb{Q}$ ♦ Where numerical solutions are rational numbers, $\mathbb{Q}$

11. Simultaneous Equations

Working with simultaneous equations	♦ Construct from text ♦ Graphical solution ♦ Algebraic solution

12. Changing the subject (Introduced earlier in Level 4)

Changing the subject of a formula	♦ Linear formula ♦ Formula involving a simple square or square root

13. Straight Line 2: y-b=m(x-a) & rearranging equation to find m & c

Determining the equation of a straight line	♦ Use the formula $y-b=m(x-a)$ or equivalent to find the equation of a straight line, given two points or one point and the gradient of the line ♦ Use functional notation, $f(x)$ ♦ Identify gradient and y-intercept from various forms of the equation of a straight line

14. Quadratics – Functions & Notation, Graphs & Equations

Recognise and determine the equation of a quadratic function from its graph	♦ Equations of the form $y=kx^2$ and $y=k(x+p)^2+q$ where $k,p,q\in\mathbb{Z}$
Sketching a quadratic function	♦ Equations of the form $y=(ax-m)(bx-n)$ where $a,b,m,n\in\mathbb{Z}$ ♦ Equations of the form $y=k(x+p)^2+q$ where $k,p,q\in\mathbb{Z}$
Identifying features of a quadratic function	Identify: ♦ the nature and coordinates of the turning point ♦ the equation of the axis of symmetry of a quadratic of the form $y=k(x+p)^2+q$ where $k,p,q\in\mathbb{Z}$
Solving a quadratic equation	♦ Solving from factorised form ♦ Solving having factorised first ♦ Graphical treatment

Solving a quadratic equation using the quadratic formula	♦ Solving using the quadratic formula
Using the discriminant to determine the number of roots	♦ Know and use the discriminant ♦ Determine the number and describe the nature of roots using the language 'two real and distinct roots', 'one repeated real root', 'two equal real roots' and 'no real roots'

15. Angles Properties of 2D shapes (Introduced earlier at Level 4)
16. Circle Theorem (Introduced earlier at Level 4)

Applying the properties of shapes to determine an angle involving at least two steps	♦ Quadrilaterals/triangles/polygons/circles ♦ Relationship in a circle between the centre, chord and perpendicular bisector

17. Pythagoras(Level 3), Converse of Pythagoras & Applications(3D)

Applying Pythagoras' theorem	♦ Using Pythagoras' theorem in complex situations including converse and three dimensions

18. Similarity, Linear, Area and Volume

Using similarity	♦ Interrelationship of scale — length, area and volume

19. Trig Graphs
20. Trig Equations
21. Trig Identities

Working with the graphs of trigonometric functions	♦ Basic graphs ♦ Amplitude ♦ Vertical translation ♦ Multiple angle ♦ Phase angle
Working with trigonometric relationships in degrees	♦ Sine, cosine and tangent of angles from $0°$ to $360°$ ♦ Period ♦ Related angles ♦ Solve basic equations ♦ Use the identities $\cos^2 x° + \sin^2 x° = 1$ and $\tan x° = \frac{\sin x°}{\cos x°}$

22. Averages & Consistency: Quartiles, SIQR, Mean & Standard Deviation

Comparing data sets using statistics	Compare data sets using calculated/determined: ◆ semi-interquartile range ◆ standard deviation

23. Trigonometry: Area of Triangle, Sine & Cosine Rule, Bearings

Calculating the area of a triangle using trigonometry	◆ Area $= \frac{1}{2}ab\sin C$
Using the sine and cosine rules to find a side or angle in a triangle	◆ Sine rule for side and angle ◆ Cosine rule for side and angle
Using bearings with trigonometry	◆ To find a distance or direction

24. Percentages: Increase/Decrease & Reverse Percentages

Working with reverse percentages	◆ Use reverse percentages to calculate an original quantity
Working with appreciation/depreciation	◆ Appreciation including compound interest ◆ Depreciation

25. Operations with Fractions (Level 3/4)

Working with fractions	◆ Operations and combinations of operations on fractions including mixed numbers (addition, subtraction, multiplication, division)

26. Equation of a line of Best-Fit

Forming a linear model from a given set of data	◆ Determine the equation of a best-fitting straight line on a scattergraph and use it to estimate y given x

27. Vectors

Working with two-dimensional vectors	◆ Adding or subtracting two-dimensional vectors using directed line segments
Working with three-dimensional coordinates	◆ Determining coordinates of a point from a diagram representing a three-dimensional object
Using vector components	◆ Adding or subtracting two- or three-dimensional vectors using components
Calculating the magnitude of a vector	◆ Magnitude of a two- or three-dimensional vector