## 1. Limits and Continuity

**Weeks 1**

极限与连续性

### They should be able to

1. Interpret the rate of change at an instant in terms of average rates of change over intervals containing that instant.
2. Represent limits analytically using correct notation.
3. Interpret limits expressed in analytic notation.
4. Estimate limits of functions.
5. Estimate limits of functions.
6. Determine the limits of functions using limit theorems.
7. Determine the limits of functions using equivalent expressions for the function or the squeeze theorem.
8. Determine the limits of functions using equivalent expressions for the function or the squeeze theorem.
9. Justify conclusions about continuity at a point using the definition.
10. Justify conclusions about continuity at a point using the definition.
11. Determine intervals over which a function is continuous.
12. Determine values of $x$ or solve for parameters that make discontinuous functions continuous, if possible.
13. Interpret the behavior of functions using limits involving infinity.
14. Interpret the behavior of functions using limits involving infinity.
15. Explain the behavior of a function on an interval using the Intermediate Value Theorem.

| Stage | Use | Your notes |
|---|---|---|
| **Starter**<br>10 min · retrieval practice | Topic quiz 01 (10 questions, answers on sheet 2) | |
| **Teach**<br>the new content | Handout 01<br>Slide deck 01<br>Vocabulary list 01 | |
| **Practice**<br>guided then independent | Exercise sheets 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16<br>Past-paper sheets 1.15, 1.16 | |
| **Check**<br>before they leave | Unit test 1 (with mark scheme) | |
| **Homework**<br>set from the Library | Any unused exercise sheet above<br>Holiday homework pack | |



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## 2. Differentiation: Definition and Fundamental Properties

**Weeks 2–3**

微分：定义与基本性质

### They should be able to

1. Determine average rates of change using difference quotients.
2. Represent the derivative of a function as the limit of a difference quotient.
3. Represent the derivative of a function as the limit of a difference quotient.
4. Determine the equation of a line tangent to a curve at a given point.
5. Estimate derivatives.
6. Explain the relationship between differentiability and continuity.
7. Calculate derivatives of familiar functions.
8. Calculate derivatives of familiar functions.
9. Calculate derivatives of familiar functions.
10. Interpret a limit as a definition of a derivative.
11. Calculate derivatives of products and quotients of differentiable functions.
12. Calculate derivatives of products and quotients of differentiable functions.
13. Calculate derivatives of products and quotients of differentiable functions.

| Stage | Use | Your notes |
|---|---|---|
| **Starter**<br>10 min · retrieval practice | Topic quiz 02 (10 questions, answers on sheet 2) | |
| **Teach**<br>the new content | Handout 02<br>Slide deck 02<br>Vocabulary list 02 | |
| **Practice**<br>guided then independent | Exercise sheets 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10<br>Past-paper sheets 2.1, 2.3, 2.4, 2.6, 2.7, 2.8, 2.9 | |
| **Check**<br>before they leave | Unit test 2 (with mark scheme) | |
| **Homework**<br>set from the Library | Any unused exercise sheet above<br>Holiday homework pack | |

## 3. Differentiation: Composite, Implicit, and Inverse Functions Weeks 4–5

微分：复合、隐式与反函数

### They should be able to

1. Calculate derivatives of compositions of differentiable functions.
2. Calculate derivatives of implicitly defined functions.
3. Calculate derivatives of inverse and inverse trigonometric functions.
4. Calculate derivatives of inverse and inverse trigonometric functions.
5. Determine higher order derivatives of a function.

| Stage | Use | Your notes |
|---|---|---|
| **Starter**<br>10 min · retrieval practice | Topic quiz 03 (10 questions, answers on sheet 2) | |
| **Teach**<br>the new content | Handout 03<br>Slide deck 03<br>Vocabulary list 03 | |
| **Practice**<br>guided then independent | Exercise sheets 3.1, 3.2, 3.3, 3.4, 3.5, 3.6<br>Past-paper sheets 3.1, 3.2, 3.6 | |
| **Check**<br>before they leave | Unit test 3 (with mark scheme) | |
| **Homework**<br>set from the Library | Any unused exercise sheet above<br>Holiday homework pack | |



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## 4. Contextual Applications of Differentiation Weeks 6–8

微分在实际情境中的应用

### They should be able to

1. Interpret the meaning of a derivative in context.
2. Calculate rates of change in applied contexts.
3. Interpret rates of change in applied contexts.
4. Calculate related rates in applied contexts.
5. Interpret related rates in applied contexts.
6. Approximate a value on a curve using the equation of a tangent line.
7. Determine limits of functions that result in indeterminate forms.

| Stage | Use | Your notes |
|---|---|---|
| **Starter**<br>10 min · retrieval practice | Topic quiz 04 (10 questions, answers on sheet 2) | |
| **Teach**<br>the new content | Handout 04<br>Slide deck 04<br>Vocabulary list 04 | |
| **Practice**<br>guided then independent | Exercise sheets 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7<br>Past-paper sheets 4.1, 4.2, 4.4, 4.5, 4.6, 4.7 | |
| **Check**<br>before they leave | Unit test 4 (with mark scheme) | |
| **Homework**<br>set from the Library | Any unused exercise sheet above<br>Holiday homework pack | |

## 5. Analytical Applications of Differentiation

**Weeks 9–11**

微分的分析性应用

### They should be able to

1. Justify conclusions about functions by applying the Mean Value Theorem over an interval.
2. Justify conclusions about functions by applying the Extreme Value Theorem.
3. Justify conclusions about the behavior of a function based on the behavior of its derivatives.
4. Justify conclusions about the behavior of a function based on the behavior of its derivatives.
5. Justify conclusions about the behavior of a function based on the behavior of its derivatives.
6. Justify conclusions about the behavior of a function based on the behavior of its derivatives.
7. Justify conclusions about the behavior of a function based on the behavior of its derivatives.
8. Justify conclusions about the behavior of a function based on the behavior of its derivatives.
9. Justify conclusions about the behavior of a function based on the behavior of its derivatives.
10. Calculate minimum and maximum values in applied contexts or analysis of functions.
11. Interpret minimum and maximum values calculated in applied contexts.
12. Determine critical points of implicit relations.
13. Justify conclusions about the behavior of an implicitly defined function based on evidence from its derivatives.

| Stage | Use | Your notes |
|---|---|---|
| **Starter**<br>10 min · retrieval practice | Topic quiz 05 (10 questions, answers on sheet 2) | |
| **Teach**<br>the new content | Handout 05<br>Slide deck 05<br>Vocabulary list 05 | |
| **Practice**<br>guided then independent | Exercise sheets 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12<br>Past-paper sheets 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.9, 5.10, 5.12 | |
| **Check**<br>before they leave | Unit test 5 (with mark scheme) | |
| **Homework**<br>set from the Library | Any unused exercise sheet above<br>Holiday homework pack | |



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## 6. Integration and Accumulation of Change

**Weeks 12–15**

积分与变化的累积

### They should be able to

1. Interpret the meaning of areas associated with the graph of a rate of change in context.
2. Approximate a definite integral using geometric and numerical methods.
3. Interpret the limiting case of the Riemann sum as a definite integral.
4. Represent the limiting case of the Riemann sum as a definite integral.
5. Represent accumulation functions using definite integrals.
6. Represent accumulation functions using definite integrals.
7. Calculate a definite integral using areas and properties of definite integrals.
8. Evaluate definite integrals analytically using the Fundamental Theorem of Calculus.
9. Determine antiderivatives of functions and indefinite integrals, using knowledge of derivatives.
10. For integrands requiring substitution or rearrangements into equivalent forms:
11. For integrands requiring substitution or rearrangements into equivalent forms:
12. For integrands requiring integration by parts:
13. For integrands requiring integration by linear partial fractions:
14. Evaluate an improper integral or determine that the integral diverges. **BC ONLY**

| Stage | Use | Your notes |
|---|---|---|
| **Starter**<br>10 min · retrieval practice | Topic quiz 06 (10 questions, answers on sheet 2) | |
| **Teach**<br>the new content | Handout 06<br>Slide deck 06<br>Vocabulary list 06 | |
| **Practice**<br>guided then independent | Exercise sheets 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14<br>Past-paper sheets 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.11, 6.12, 6.13 | |
| **Check**<br>before they leave | Unit test 6 (with mark scheme) | |
| **Homework**<br>set from the Library | Any unused exercise sheet above<br>Holiday homework pack | |

## 7. Differential Equations

**Weeks 16–17**

微分方程

### They should be able to

1. Interpret verbal statements of problems as differential equations involving a derivative expression.
2. Verify solutions to differential equations.
3. Estimate solutions to differential equations.
4. Estimate solutions to differential equations.
5. Estimate solutions to differential equations.
6. Determine general solutions to differential equations.
7. Determine particular solutions to differential equations.
8. Interpret the meaning of a differential equation and its variables in context.
9. Determine general and particular solutions for problems involving differential equations in context.
10. Interpret the meaning of the logistic growth model in context. **BC ONLY**

| Stage | Use | Your notes |
|---|---|---|
| **Starter**<br>10 min · retrieval practice | Topic quiz 07 (10 questions, answers on sheet 2) | |
| **Teach**<br>the new content | Handout 07<br>Slide deck 07<br>Vocabulary list 07 | |
| **Practice**<br>guided then independent | Exercise sheets 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9<br>Past-paper sheets 7.2, 7.3, 7.4, 7.5, 7.6, 7.7 | |
| **Check**<br>before they leave | Unit test 7 (with mark scheme) | |
| **Homework**<br>set from the Library | Any unused exercise sheet above<br>Holiday homework pack | |



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## 8. Applications of Integration

**Weeks 18–21**

积分的应用

### They should be able to

1. Determine the average value of a function using definite integrals.
2. Determine values for positions and rates of change using definite integrals in problems involving rectilinear motion.
3. Interpret the meaning of a definite integral in accumulation problems.
4. Determine net change using definite integrals in applied contexts.
5. Calculate areas in the plane using the definite integral.
6. Calculate areas in the plane using the definite integral.
7. Calculate areas in the plane using the definite integral.
8. Calculate volumes of solids with known cross sections using definite integrals.
9. Calculate volumes of solids with known cross sections using definite integrals.
10. Calculate volumes of solids of revolution using definite integrals.
11. Calculate volumes of solids of revolution using definite integrals.
12. Calculate volumes of solids of revolution using definite integrals.
13. Calculate volumes of solids of revolution using definite integrals.
14. Determine the length of a curve in the plane defined by a function, using a definite integral. **BC ONLY**

| Stage | Use | Your notes |
|---|---|---|
| **Starter**<br>10 min · retrieval practice | Topic quiz 08 (10 questions, answers on sheet 2) | |
| **Teach**<br>the new content | Handout 08<br>Slide deck 08<br>Vocabulary list 08 | |
| **Practice**<br>guided then independent | Exercise sheets 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.10, 8.11, 8.12, 8.13<br>Past-paper sheets 8.1, 8.2, 8.3, 8.4, 8.7, 8.9, 8.11, 8.12, 8.13 | |
| **Check**<br>before they leave | Unit test 8 (with mark scheme) | |
| **Homework**<br>set from the Library | Any unused exercise sheet above<br>Holiday homework pack | |

## 9. Parametric Equations, Polar Coordinates, and Vector-Valued Functions

**Weeks 22–25**

参数方程、极坐标与向量值函数

### They should be able to

1. Calculate derivatives of parametric functions. **BC ONLY**
2. Calculate derivatives of parametric functions. **BC ONLY**
3. Determine the length of a curve in the plane defined by parametric functions, using a definite integral. **BC ONLY**
4. Calculate derivatives of vector-valued functions. **BC ONLY**
5. Determine a particular solution given a rate vector and initial conditions. **BC ONLY**
6. Determine values for positions and rates of change in problems involving planar motion. **BC ONLY**
7. Calculate derivatives of functions written in polar coordinates. **BC ONLY**
8. Calculate areas of regions defined by polar curves using definite integrals. **BC ONLY**
9. Calculate areas of regions defined by polar curves using definite integrals. **BC ONLY**

| Stage | Use | Your notes |
|---|---|---|
| **Starter**<br>10 min · retrieval practice | Topic quiz 09 (10 questions, answers on sheet 2) | |
| **Teach**<br>the new content | Handout 09<br>Slide deck 09<br>Vocabulary list 09 | |
| **Practice**<br>guided then independent | Exercise sheets 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9<br>Past-paper sheets 9.1, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9 | |
| **Check**<br>before they leave | Unit test 9 (with mark scheme) | |
| **Homework**<br>set from the Library | Any unused exercise sheet above<br>Holiday homework pack | |



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## 10. Infinite Sequences and Series

**Weeks 26–30**

无穷数列与级数

### They should be able to

1. Determine whether a series converges or diverges. **BC ONLY**
2. Determine whether a series converges or diverges. **BC ONLY**
3. Determine whether a series converges or diverges. **BC ONLY**
4. Determine whether a series converges or diverges. **BC ONLY**
5. Determine whether a series converges or diverges. **BC ONLY**
6. Determine whether a series converges or diverges. **BC ONLY**
7. Determine whether a series converges or diverges. **BC ONLY**
8. Determine whether a series converges or diverges. **BC ONLY**
9. Determine whether a series converges or diverges. **BC ONLY**
10. Approximate the sum of a series. **BC ONLY**
11. Represent a function at a point as a Taylor polynomial. **BC ONLY**
12. Approximate function values using a Taylor polynomial. **BC ONLY**
13. Determine the error bound associated with a Taylor polynomial approximation. **BC ONLY**
14. Determine the radius of convergence and interval of convergence for a power series. **BC ONLY**
15. Represent a function as a Taylor series or a Maclaurin series. **BC ONLY**
16. Interpret Taylor series and Maclaurin series. **BC ONLY**
17. Represent a given function as a power series. **BC ONLY**

| Stage | Use | Your notes |
|---|---|---|
| **Starter**<br>10 min · retrieval practice | Topic quiz 10 (10 questions, answers on sheet 2) | |
| **Teach**<br>the new content | Handout 10<br>Slide deck 10<br>Vocabulary list 10 | |
| **Practice**<br>guided then independent | Exercise sheets 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 10.9, 10.10, 10.11, 10.12, 10.13, 10.14, 10.15<br>Past-paper sheets 10.2, 10.4, 10.6, 10.7, 10.8, 10.9, 10.10, 10.11, 10.12, 10.13, 10.14, 10.15 | |
| **Check**<br>before they leave | Unit test 10 (with mark scheme) | |
| **Homework**<br>set from the Library | Any unused exercise sheet above<br>Holiday homework pack | |