**Unit 1 WJEC   
Revision Sheet**

**Proof**

(a) Proof by **deduction**.  
(b) Proof by **exhaustion**.  
(c) **Disproof** by **counter-example**.

**Rules of Indices**

.

**Surds**

Rationalise the denominator:

E.g.

**The Discriminant**

Two distinct real roots:   
.   
Two real roots:  
.  
One real root (repeated):  
.  
Two complex roots /   
No real roots:  
.

**Completing the Square**

.

.

**Solving Equations and Inequalities**

Simultaneous equations.

Either or .

**The Remainder Theorem**

When the polynomial is divided by the polynomial , where is a number, then the remainder at the end of the calculation is .

**The Factor Theorem**

(a) The polynomial is a **factor** of the polynomial if .  
(b) If then the polynomial is a **factor** of the polynomial .

**Graphs**

Polynomial graphs, e.g.   
   
Reciprocal graphs, e.g.   
Asymptotes.  
Transformations:  
   
Move the graph units **right**.   
   
Move the graph units **up**.  
   
**Stretch** along the –axis.   
   
**Compress** along the –axis.

**Co-ordinate Geometry**

Let A = , B = . **Length** of AB = **Gradient** of AB: **Equation** of AB:   
 **Mid-point** of AB =

Lines and with gradients and :

and are **parallel**: .  
 and are **perpendicular**:   
, ,  
.

If a **tangent** has gradient then the **normal** has gradient .

**Equation of a Circle**

Equation of a circle with centre and radius :   
 or  
, where ; .

Tangent and radius meet at 90°, so the gradient of the tangent is the **negative reciprocal** of the gradient of the radius.

Intersection of two circles and with centres , ; radii , :  
**Two** intersections:  
Length .  
**One** intersection (the circles tough **externally**):  
Length.  
**One** intersection (the circles touch **internally**):  
Length. **No** intersections:  
Length .  
Length

**Circle Theorems**

(a) The angle in a **semicircle** is a right angle.  
(b) The perpendicular from the centre to a chord **bisects** the chord.  
(c) The radius of a circle at a given point on its circumference is **perpendicular** to the tangent to the circle at that point.

**The Binomial Theorem**

Pascal’s Triangle:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | 1 |  |  |  |  |  |
|  |  |  |  |  | 1 |  | 1 |  |  |  |  |
|  |  |  |  | 1 |  | 2 |  | 1 |  |  |  |
|  |  |  | 1 |  | 3 |  | 3 |  | 1 |  |  |
|  |  | 1 |  | 4 |  | 6 |  | 4 |  | 1 |  |
|  | 1 |  | 5 |  | 10 |  | 10 |  | 5 |  | 1 |

etc...

**Trigonometry**

.

Exact values for 30°, 45°, 60°.  
The graphs of sin, cos, tan.

Sine rule:   
or .

a  
  
c b

Cosine rule:  
   
or .

Area of a triangle .

|  |  |
| --- | --- |
| S | A |
| T | C |

.   
.  
.

**Exponentials and Logarithms**

If then .  
Solving equations with logarithms.

The graphs of ,   
and

Exponential models: (growth) or (decay).  
.  
Limitations of models.

Rules:  
.  
.  
.

PROOF

Curve fitting:  
 (polynomial):  
.   
 (exponential):  
.

**Differentiation**

From first principles:

.

Quick differentiation: If then .

Finding the equation of a tangent or normal.

Identify where functions are **increasing** or **decreasing**.

**Stationary Points**

Solve the equation and use the test to find the nature of the stationary points.   
If is **negative,** then it is a **maximum** point; if it is **positive,** then it is a **minimum** point; if it is **zero,** more investigation is needed.

**Integration**

.

.

**Vectors**

Position vector  
.

.

**.**

The point that divides in the ratio is .

E.g. is the point on the line so that the ratio is . The vector that goes from the origin to is   
.

[Vector equation of the line :   
.]

Two vectors and are parallel if for some number .

**The Examination**

Length: 2 hours 30 minutes.  
120 marks.  
25% of the A Level qualification.   
62.5% of the AS Level.

**Checklist**

* I have attempted all the past paper questions.
* I know which formulae appear in the formulae booklet.
* I can check answers using a graphical calculator.

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