

A Level Mathematics

Equations and Inequalities

Edexcel Pure Mathematics - Unit 03 - Autumn First Half

This booklet accompanies your course textbook.

It contains the key skills, worked examples, consolidation questions,
practice questions and exam-style questions for this chapter.

Name: _____

Class: _____

Chapter Overview

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Key Vocabulary and notes

KWL

Know	Want to learn	Learnt

Key Words

Expressions Equations Terms Solving Linear Quadratic
 Simultaneous Inequality Algebraically Graphically Region
 Discriminant

Key Notes

Equations link two _____ together by an equals sign.

_____ equations have a set of solutions which satisfy both equations.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

The following formula is known as the _____ equation. The $b^2 - 4ac$ part is known as the _____.

You can solve simultaneous equations both algebraically and _____.

$x < 4$ means x is _____ 4 and $x > 4$ means x is _____ 4.
 These are called _____.

When graphically solving inequalities we find the _____ that satisfies all the inequalities.

Word Bank

Quadratic More than Less than Equals Region Discriminant
 Simultaneous Graphically Inequalities

How do we solve non-linear simultaneous equations algebraically and graphically?

Learning Objective

TBAT solve linear simultaneous equations

KEY POINT

Simultaneous equations are two or more equations which can be solved together to find a set of solutions that satisfy both equations.

I DO

Solve the following simultaneous equations by using elimination.

$$3x + y = 10 \quad (1)$$

$$2x + y = 7 \quad (2)$$

Solve the following simultaneous equations by using substitution.

$$x - 2y = 1 \quad (1)$$

$$4x - 3y = 14 \quad (2)$$

YOU DO

Solve the following simultaneous equations by using elimination.

$$5x + y = 2 \quad (1)$$

$$2x - y = 5 \quad (2)$$

Solve the following simultaneous equations by using substitution.

$$x - 2y = 3 \quad (1)$$

$$2x - 7y = 3 \quad (2)$$

Textbook practice

For further practice, complete the relevant questions from:

Edexcel Alevel Maths - Year 1 Pure

Exercises 3A - All Questions

Learning Objective

TBAT solve quadratic simultaneous equations

I DO

Solve the following simultaneous equations.

$$y = x^2 \quad (1)$$

$$y = -4x - 3 \quad (2)$$

$$y + x = -8 \quad (1)$$

$$xy = 12 \quad (2)$$

$$y - x^2 = 5 \quad (1)$$

$$y + 6x = -3 \quad (2)$$

YOU DO

Solve the following simultaneous equations.

$$y = x^2 \quad (1)$$

$$y = -7x - 12 \quad (2)$$

$$y + x = -9 \quad (1)$$

$$xy = 18 \quad (2)$$

$$y - x^2 = 7 \quad (1)$$

$$y + 7x = -3 \quad (2)$$

Textbook practice

For further practice, complete the relevant questions from:

Edexcel Alevel Maths - Year 1 Pure

Exercises 3B - All Questions

Learning Objective

TBAT solve simultaneous equations graphically

KEY POINT

If you can write a simultaneous equation as a quadratic equation in the form $ax^2 + bx + c = 0$, then you can use the discriminant to see if there are any solutions.

The discriminant is $b^2 - 4ac$, (the part in the square root sign).

Because you can not square root a negative number in the real numbers, then if $b^2 - 4ac < 0$, there are no real solutions to the simultaneous equation.

If $b^2 - 4ac = 0$ there is only one solution.

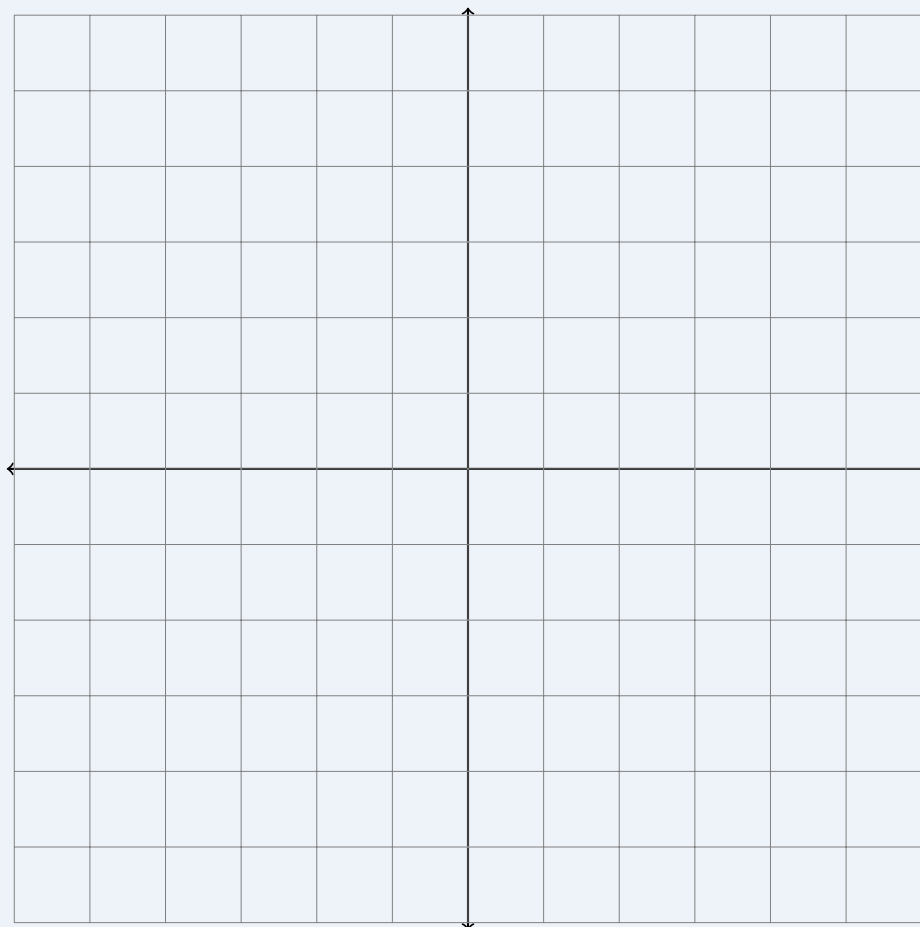
There are two sets of solutions if $b^2 - 4ac > 0$.

I DO

Solve the following simultaneous equation graphically.

$$y = 2x + 1 \quad (1)$$

$$y = 3x - 1 \quad (2)$$

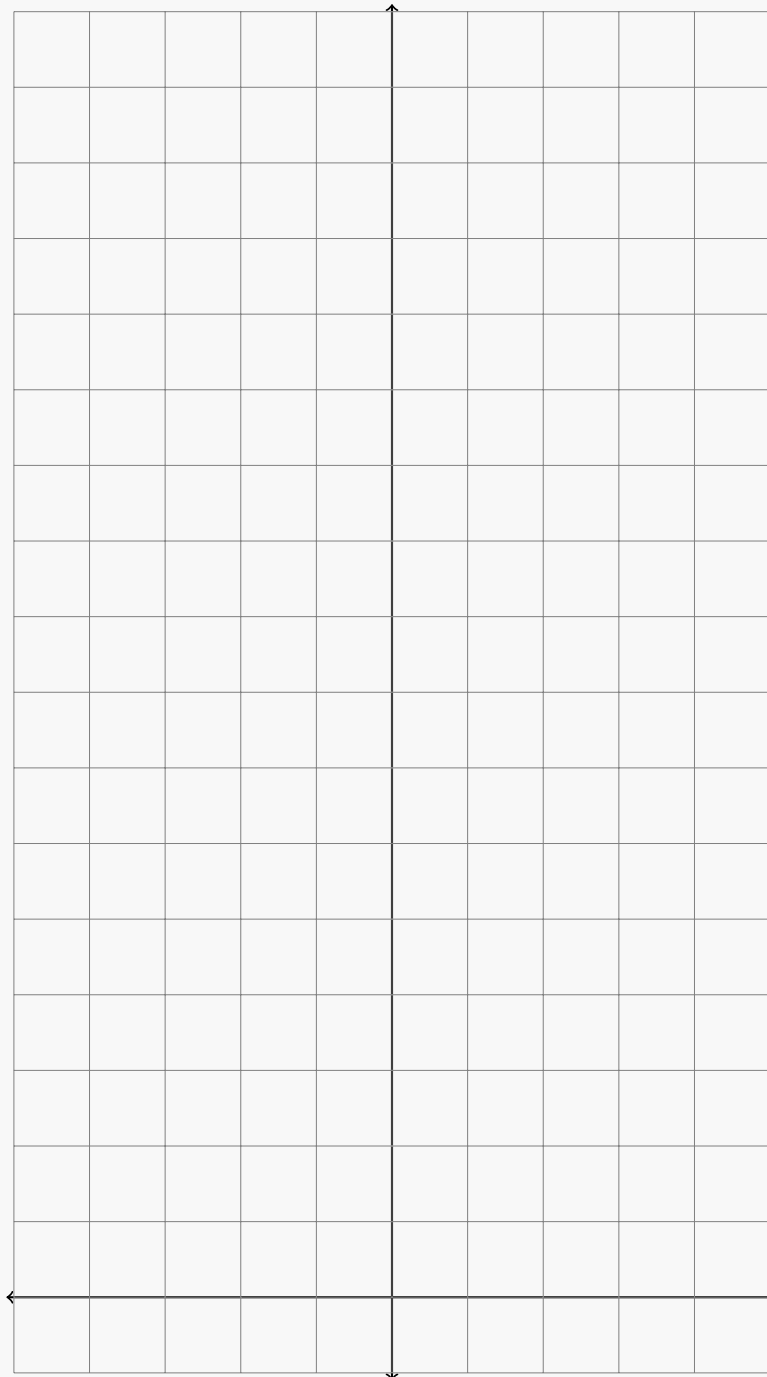


YOU DO

Solve the following simultaneous equation graphically.

$$y = x^2 \quad (1)$$

$$y = 4 \quad (2)$$



Textbook practice

For further practice, complete the relevant questions from:

Edexcel Alevel Maths - Year 1 Pure

Exercises 3C - All Questions

How do we solve linear and quadratic inequalities and present our answers using graphs or set notation?

Learning Objective

TBAT solve linear inequalities

KEY POINT

The solution of an inequality is the set of all numbers that satisfies the inequality.

KEY POINT

- $> \implies$ Greater than
- $< \implies$ Less than
- $\geq \implies$ Greater than or equal to
- $\leq \implies$ Less than or equal to

I DO

Solve the inequalities

$$3x < 12$$

$$3x + 4 > 22$$

$$5x + 3 \leq 3x + 13$$

$$-x \geq -6$$

$$\frac{3x}{2} < \frac{2}{3}$$

YOU DO

$$4x < 12$$

$$6x + 4 > 22$$

$$6x + 3 \leq 2x + 15$$

$$-x \geq -3$$

$$\frac{5x}{3} < \frac{2}{7}$$

Learning Objective

TBAT use set notation

KEY POINT

In alevel we use set notation.

KEY POINT

$x < 3$ becomes $\{x : x < 3\}$

KEY POINT

$3 < x < 7$ becomes $\{x : 3 < x < 7\}$

KEY POINT

$x < 3$ or $x > 7$ becomes $\{x : x < 3\} \cup \{x : x > 7\}$

I DO

Write in set notation

$$x < 3$$

$$y \leq 7$$

$$3 < x < 7$$

$$x > 3 \text{ and } x > 7$$

$$x < 3 \text{ or } x > 7$$

YOU DO

Write in set notation

$$x < 6$$

$$y \leq 10$$

$$6 < x < 10$$

$$x > 6 \text{ and } x > 10$$

$$x < 6 \text{ or } x > 10$$

Textbook practice

For further practice, complete the relevant questions from:

Edexcel Alevel Maths - Year 1 Pure

Exercises 3D - All