

How can this new Oxford course help more of my students achieve real success at A Level?

Clearer explanations, aims and layout help inspire students to realise how they can succeed at A Level.

2 Coordinate geometry

This chapter will show you how to

- find the equation of a straight line from geometrical information
- find the general equation of a straight line
- determine if two lines are parallel or perpendicular

Before you start:

You should know

Focus on 'common misconceptions' throughout to help tackle key ideas and actively prevent pitfalls

More stretch-and-challenge, to differentiate between your most able students

2.2 General equation of a straight line

You can express a linear equation in the general form $ax + by + c = 0$ where a , b and c are constants.

Write the straight line equation $y = 3 - x$ in the form $ax + by + c = 0$

$y = 3 - x$
 Rearrange: $y - 3 + x = 0$
 Hence: $x + y - 3 = 0$

You can also rearrange equations containing fractions.

Write the following equation in the form $ax + by + c = 0$

$\frac{1}{1+x} = \frac{3}{1-2y}$

Eliminate the fractions: $(1-2y)(1+x) = 3(1+y)$
 $1 - 2y + x - 2xy = 3 + 3y$
 Collect all the terms on the left-hand side: $1 - 2y + x - 3 - 3y = 0$
 Rearrange and simplify: $-3x - 2y - 2 = 0$
 Multiply through by (-1) : $3x + 2y + 2 = 0$

Exercise 2.2

1 Rearrange these straight line equations into the form $ax + by + c = 0$ where a , b and c are integers.

a $y = x - 3$ b $4 - x = 0$
 c $y = \frac{1}{2}(x - 3)$ d $\frac{x}{2} = 3$
 e $y = 7$ f $\frac{x}{2} + \frac{y}{3} = 1$
 g $\frac{x}{2} = \frac{3}{y}$ h $\frac{1+x}{2} - \frac{1-y}{3} = 0$
 i $\frac{1}{x+1} = \frac{3}{y-1}$ j $2(x-2) = 3(5-y)$

2 a Find the point where the line $2y + 3x - 1 = 0$ cuts the x - and y -axes.
 b Find the equation of the line whose gradient is $-\frac{1}{2}$ and whose y -intercept is $\frac{3}{2}$.
 Give your answer in its general form.
 c The point $(2, 3)$ lies on the line $ax + by = 4$, which has a gradient of 2. Find the values of the constants a and b and hence, in its general form, the equation of the straight line.
 d The lines $2y = 3x - 2$ and $3y + 2x = 1$ intersect each other at the point P .
 i Find the coordinates of P .
 ii Sketch the two lines. What do you notice?

INVESTIGATIONS

3 Two straight lines have the equations $ax + by + c = 0$ and $dx + ey + f = 0$.

a Given that the lines don't intersect, write down some facts about the letters.
 b Given that the lines have an identical y -intercept, write down another fact.
 c Given that the first line has identical x - and y -intercepts, write down another fact.

4 The shows the Leaning Pyramid in Paris.

Assuming the pyramid is 80 m across and 60 m high, find an equation for the left hand slope. Similarly, find the equation for the right hand slope.

Steady progression of exercises to engage students at all levels

Investigations to explore concepts further

Unique 'links' feature inspires students by linking the Mathematics they are studying to its real life applications

Unique bridging material makes the change from GCSE to A Level easier for your students

All-new exam questions covering the latest curriculum

3 Exit

Summary

- A quadratic function of the form $f(x) = ax^2 + bx + c$ has the shape
 - when $a > 0$ (minimum point)
 - when $a < 0$ (maximum point)
- Quadratic equations of the form $ax^2 + bx + c = 0$ can be solved by
 - factorising
 - completing the square or
 - applying the quadratic formula
- The formula for solving the quadratic equation $ax^2 + bx + c = 0$ is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- The discriminant, $b^2 - 4ac$, may be used to determine how many roots a quadratic has
 - $b^2 - 4ac > 0$ (two real roots)
 - $b^2 - 4ac = 0$ (one real root)
 - $b^2 - 4ac < 0$ (no real roots)

LINKS

Quadratic equations play a vital role in modelling the motion of objects ranging from the astronomical down to the subatomic scale.

Depending on how you look at them, you get four different conic sections – circles, ellipses, hyperbolas and parabolas. These are all described by quadratic equations, and they all have practical applications. You will be most familiar with circles, but ellipses and hyperbolas describe the motion of planets around the sun, while parabolas are used in the design of radio telescopes and satellite dishes. (In a more down-to-earth level, each time you throw a stone or kick a ball you are creating a parabola (with its own quadratic equation) in the air.)

Quadratic equations are important too, because, as they are used in describing wavefunctions, fluid flow and oscillatory motion – you would solve quadratic equations if you were designing an aeroplane or a bridge, for example.

Over an electronic level, quadratic are at the heart of integrated circuitry – your computer, mobile phone or iPad would not exist without quadratic equations!

All pages from Core C1/C2 Students' Book

Free CD-ROM with Core books gives extra practice and powerpoint worked examples