

**Index**

- Accuracy, and trigonometric questions** 15  
**Addition rule for probabilities** 210  
**Adjacent (right-angled triangle)** 13  
**Algebraic equations** 9–10  
**Algebraic expressions, manipulating** 9  
**Amplitude** 160, 161, 165  
**"And" in probability questions** 205  
**Angle of depression** 15  
     of elevation 15  
     of inclination of a line 45  
     sum and difference identities 183–5  
**Arc length** 48, 50, 57–63  
**Area of a triangle** 14  
     given two sides and the angle between them 25–8  
**Asymptotes** 140, 142
- Bearings** 15  
**Binomial expansion** 241
- Chord length** 48, 49  
**Co-domain** 65  
**Collinear points** 35  
**Combinations** 237–40  
     and Pascal's triangle 241  
**Complement** 16  
**Complementary events** 18, 219  
**Completing the square** 114–115, 126, 130  
**Concavity** 96, 142  
**Conditional probability** 197–202, 203, 219  
**Coordinates of midpoint** 81–2  
**Cosine of an angle, unit circle definition** 22–4, 161  
**Cosine function** 161  
     positive or negative? 171  
**Cosine ratio** 13–14  
**Cosine rule** 14, 32–5  
**Counting** 233–43  
**Cubic functions** 133–9  
**Cyclic quadrilateral** 35
- Degrees, converting to radians** 53–4  
**Dependent variable** 11  
**Direct proportion (direct variation)** 8, 77  
**Discriminant** 128  
**Distance between two points** 82, 83  
**Domain** 65, 66, 67, 143
- Elements** 16  
**Empirical probability** 18  
**Equally likely outcomes** 18  
**Equation of a circle** 152–5  
**Equation of a straight line** 74–80, 85–87  
**Exact values (trigonometry)** 42–4, 173–5
- Factorials** 235–6
- Function notation** 11  
**Functions** 11, 65–6, 68–71  
     general 146–51  
     graphs of 68, 69  
     linear 11, 73–91  
     machine analogy 11, 67  
     natural domain 67  
     polynomial 133–9  
     quadratic 12, 93–115  
     reciprocal 9, 12–13, 140–1  
     trigonometric 159–74  
     types of 11–13
- Gradient**  
     line joining two points 81–2, 83  
     parallel lines 90  
     perpendicular lines 90–1  
     straight line graphs 74–6
- Graphs**  
     cubic functions 134  
     functions 68, 69  
     quadratic functions 94–106  
     reciprocal functions 13, 140–1  
     trigonometric functions 159–70
- Hexagonal numbers** 242  
**Horizontal inflection** 142  
**Horizontal lines** 76  
**Hyperbolas** 140  
**Hypotenuse** 13
- Implied domain of a function** 67  
**Independent events** 218, 219, 221–3, 226–7  
**Independent variable** 11  
**Intersection (sets)** 16  
**Inverse proportion** 8–9
- Length of the line joining two points** 82, 83  
**Line symmetry** 143  
**Line of symmetry** 94, 96, 99, 102, 104  
**Linear functions** 11, 73–91  
**Lines parallel to the axes** 76–7
- Many-to-one function** 65, 66  
**Maximum turning point** 96, 102, 104, 142  
**Minimum turning point** 94, 96, 102, 104, 142  
**Multiplication principle** 234–6  
**Multiplication rule for probabilities** 210, 218  
**Mutually exclusive events** 209, 218, 219, 221
- Natural domain of a function** 67  
**"Not" in probability questions** 205  
**Numbers, types of** 7
- Odd functions** 160, 162

- One-to-one function 65, 66
- Opposite (right-angled triangle) 13
- "Or" in probability questions 205
- Order of the polynomial 133
- Parabolic shape** 94, 152
- Parallel lines, gradient 90
- Parity of the integer 161
- Pascal's triangle 10, 242–3
  - and combinations 241
- Pentagonal numbers 242
- Period 160, 161, 164–5
- Permutations 236
- Perpendicular lines, gradient 90–1
- Phase 161
- Points of inflection 142
- Polygonal numbers 242
- Polynomial functions 133–9
  - cubic functions 133–9
  - reciprocal functions 9, 12–13, 140–1, 143–4
- probability 17–18, 193–4, 196–230
  - conditional 197–202, 203, 219
  - empirical 18
  - independent events 218, 219, 221–3, 226–7
  - mutually exclusive 218–219, 221, 227–8
  - tree diagrams 203–4, 208–17
- Probability questions, terminology 205
- Probability rules 210, 218–19
- Pythagorean identity 180–2
- Pythagorean theorem 13–14
- Quadrants** 134, 171
- Quadratic equations 120–30
- Quadratic formula 127–8, 130
- Quadratic functions 12, 93–115, 121
  - transformations 139
- Radians** 52–3, 54–63
  - converting to degrees 53, 54
- Range 65, 66, 67, 143
- Real numbers 7
- Reciprocal functions 9, 12–13, 140–1, 143–4
- Rotational symmetry 143
- Sample space** 18
- Scientific notation 7
- Sector area 48, 49, 50, 57–63
- Segment area 48, 49, 51, 57–63
- Sets 16–17, 195–6
- Sine of an angle, unit circle definition 21–3, 24
- Sine function 160
  - positive or negative? 171, 172
- Sine ratio 13–14
- Sine rule 14, 29–31, 36–7
- Sketching, cubic functions 136–8
- SOHCAHTOA 14
- Square numbers 242
- Standard form 7
- Straight line graphs 74–6, 78–80
  - and direct proportion 77
  - lines parallel to the axes 76–7
- Subsets 16
- Subtending an angle at a point 35
- Tangent function** 162–3
  - positive or negative? 172
- Tangent ratio 13–14
- Three figure bearings 15
- Transformations
  - cubic functions 139
  - general function  $y = f(x)$  146–51
  - quadratic functions 139
- Tree diagrams 18, 203–4
  - showing probabilities 208–17
- Triangle, area 14, 25–8
- Triangular numbers 242
- Trigonometric equations 175–82, 188
- Trigonometric functions 159–74
  - graph of 159–70
- Trigonometric identities
  - angle sum and difference identities 183–5
  - Pythagorean identity 180–2
- Trigonometric complementarity 184
- Trigonometric ratios 13–14
- Trigonometry 13–15, 19–20
  - accuracy in questions 15
  - applications 38–41
  - cosine rule 14, 32–5, 37–8
  - exact values 42–4, 173–5, 185–7
  - sine rule 14, 29–31, 36–7
- Turning points 94, 96, 102, 104, 142
- Union (sets)** 16
- Unit circle 21–4, 159–63
- Universal set 16
- Venn diagrams** 16–17, 197, 199
- Vertical line test 68, 152, 160
- Vertical lines 77
- x-axis intercepts** 102, 142
- $y = ax^2 + bx + c$  94, 99, 104, 106, 114–15
- $y = a(x - b)(x - c)$  94, 99, 102–3, 105
- $y = a(x - b)^2 + c$  94, 99–102, 105, 114–15
- $y = \cos x$  161, 166
- $y = f(x)$ , transformations 146–51
- $y = \sin x$  159–60, 165
- $y = \tan x$  162–3, 167
- y-axis intercepts** 74–5, 99, 102, 142
- $y^2 = x$  152, 154–5