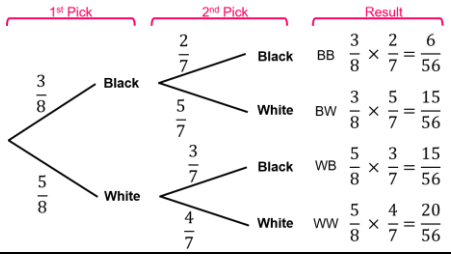
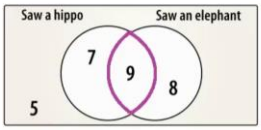
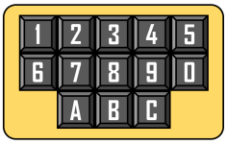
Topic	Worked Example	Sparx Code
Calculating with surds	Simplify: $\sqrt{63}$ $\sqrt{9 \times 7}$ $\sqrt{9} \times \sqrt{7}$ $3 \times \sqrt{7} = 3\sqrt{7}$ | | 0° | 30° | 45° | 60° | 90° | | sin | 0 | $\frac{1}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{3}}{2}$ | 1 | | cos | 1 | $\frac{\sqrt{3}}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{1}{2}$ | 0 | | tan | 0 | $\frac{\sqrt{3}}{3}$ | 1 | $\sqrt{3}$ | Undefined |	U338, U633, U872, U499, U707, U319
Completing the square	Write in the form $(x + a)^2 + b$ where a and b are integers $x^2 + 4x - 15 = 0$ $(x + 2)^2 \quad -15 \quad = 0$ $= (x + 2)(x + 2)$ | | x | $+2$ | | x | x^2 | $+2x$ | | $+2$ | $+2x$ | $+4$ | $= x^2 + 4x + 4$ What do we do to make this -15 -19 $(x + 2)^2 - 19 = 0$	U589
Using the quadratic formula	Any quadratic equation of the form, $ax^2 + bx + c = 0$ can be solved by substituting the values of a, b and c into the formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	U665
Using the sine rule	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ Find x to 2 dp. A, 34°, 12 cm, b, B, 18°, x, a $\frac{x}{\sin 34} = \frac{12}{\sin 18}$ $x = \sin 34 \frac{12}{\sin 18}$ $x = 21.72$ cm	U952
Using the cosine rule	Find x. a x, b, 4 cm, 65°, 7 cm c, A $a^2 = b^2 + c^2 - 2bc \cos A$ $x^2 = 4^2 + 7^2 - (2 \times 4 \times 7 \times \cos 65)$ $x^2 = ANS$ $x = \sqrt{ANS} =$ 6.4 cm	U591
Using the area rule	Calculate the area of triangle ABC A, c, 9 cm, b, 43°, B, C, 7 cm a $Area = \frac{1}{2} ab \sin C$ $= \frac{1}{2} \times 7 \times 9 \times \sin 43°$ $= 21.5$ cm² (3 sf)	U592
Histograms	Frequency Density = $\frac{\text{Frequency}}{\text{Class width}}$ Test results for Year 9. | Mark, m | Frequency | Group Width | Frequency Density F ÷ W | | $0 < m \leqslant 50$ | 25 | 50 | 0.5 | | $50 < m \leqslant 60$ | 15 | | | | $60 < m \leqslant 80$ | 20 | | | | $80 < m \leqslant 100$ | 10 | | |	U185, U814, U983, U267

Higher (Grades 6 – 9)

Linear Graphs	**1)** Find the gradient of the line. **2)** Pick a coordinate. Substitute coordinate values & gradient to find c. **3)** Use gradient and y-intercept to form the equation.	U477, U848
Probability Trees	There are 3 black and 5 white marbles in the box. One is picked – **and not replaced** – then another is picked. 	U558, U729, U806
Algebraic proportion	y is directly proportional to x. When $x = 6$, $y = 24$ Write an equation connecting y and x. $y = kx$ $24 = k \times 6$ $4 = k$ $y = 4x$ y is inversely proportional to x. $y = 6$ when $x = 5$ Write a formula for y in terms of x $y = \frac{k}{x}$ $6 = \frac{k}{5}$ $30 = k$ $y = \frac{30}{x}$	U640, U407, U364, U138
Venn Diagrams	 $P(\text{saw both}) = \frac{\text{number of people that saw both a hippo and an elephant}}{\text{total number of people}}$ How many people saw both a hippo and an elephant? 9 How many people were there in total? 29 Work out the probability Simplify if possible $\frac{9}{29}$ ans	U476, U699, U748
Calculate with bounds	A = 120 correct to the nearest 10 B = 50 correct to the nearest 10 a) Find the maximum value of (A x B) b) Find the minimum value of (A x B) 120: UB: 125, LB: 115 50: UB: 55, LB: 45 a) Maximum (A x B) = 125 x 55 = 6875 b) Minimum(A x B) = 115 x 45 = 5175	U587
Recurring decimals to fractions	$0.\dot{4}$ $1x = 0.44\ldots$ $\times 10$ $10x = 4.44\ldots$ Subtract $1x$ $9x = 4$ $\div 9$ $x = \frac{4}{9}$ Simplify if possible. $0.1\dot{6}$ $1x = 0.1666\ldots$ $\times 10$ $10x = 1.666\ldots$ Subtract $1x$ $9x = 1.5$ $\div 9$ $x = \frac{1.5}{9} = \frac{15}{90} = \frac{1}{6}$ Simplify if possible.	U689
Product Rule	A safe has a keypad & a 4-character code.  e.g. 2686 ✗ 2683 ✓ The code starts with a number & has **no repeated characters**. How many different codes are there? 1st Character: 10 options 2nd Character: 12 options 3rd Character: 11 options 4th Character: 10 options 10 × 12 × 11 × 10 = 13,200 total possibilities	U369