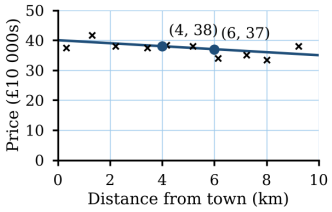
Day 172 **S Tier 10-a-day**

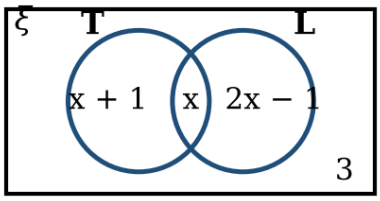
1 OA = $\mathbf{a}$ and OB = $\mathbf{b}$.
OP = $-3\mathbf{a} + 5\mathbf{b}$, OQ = $7\mathbf{a} + 7\mathbf{b}$ and OR = $27\mathbf{a} + 11\mathbf{b}$.
(a) Show that P, Q and R lie on a straight line.
(b) Work out the ratio PQ : QR in its simplest form.

2 The scatter graph shows distance from town (x) and price (y).
The line of best fit passes through (4, 38) and (6, 37).
(a) Find its equation in the form y = mx + c.
(b) Explain what its gradient tells you.



3 The price of a phone is increased by 10%.
The new price is then decreased by 25%.
Work out the overall percentage change in the price.

4 The Venn diagram shows how many of 19 students have a tablet (T) or a laptop (L).
(a) Work out the value of x.
(b) A student is chosen at random from those who have a laptop. Work out the probability that this student also has a tablet.



5 Use the iteration formula $x_{n+1} = \sqrt{2x_n + 2}$ with $x_0 = 3$ (Calculator)
to work out x_1, x_2 and x_3.
Give each answer correct to 3 decimal places.

Day 172	S Tier 10-a-day
6 Nia invests £1,000 for 3 years at 3.5% per year simple interest. Hana invests £1,000 for 3 years at 3.5% per year compound interest. Work out how much more interest Hana earns than Nia. Give your answer to the nearest penny. (Calculator)	
7 A is the point $(-4, -2)$ and B is the point $(-10, 2)$. Find an equation of the perpendicular bisector of AB. Give your answer in the form ax + by = c, where a, b and c are integers.	
8 Find the smallest positive integer k such that $225 \times k$ is a cube number.	
9 ABCD is a rectangle with AB = 10 cm and AD = 13 cm. A point P inside the rectangle is such that $AP \leq 10$ cm and P is nearer to A than to B. Work out the area of the region in which P can lie. Give your answer in terms of π and surds.	
10 The line $y = -2x + k$ is a tangent to the curve $y = x^2 + 2x + 2$. Find the value of k.	