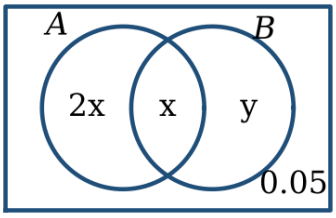
| Day 292 | A Level Maths: S Tier 10-a-day |
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**1** Express $\sqrt{16 - 6\sqrt{7}}$ in the form $a - b\sqrt{7}$, where a and b are positive integers.

**2** A ball is projected from a point O on horizontal ground at 45° to the horizontal. The ball just passes over the top of a vertical wall of height 28.8 m, at a horizontal distance of 80 m from O. Find (a) the speed of projection, (b) the greatest height of the ball above the ground, to 3 s.f. Take g = 9.8 m $s^{-2}$.

**3** f(x) = −x + 2 and $g(x) = x^2 - 1$.
Solve fg(x) = gf(x).

**4** The Venn diagram shows probabilities; A and B are independent.
Find x and y.




**5** A chord AB of a circle, centre O and radius 8 cm, subtends an angle of $\frac{\pi}{2}$ at O.
Find the exact area and the exact perimeter of the minor segment cut off by AB.

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| **6** Solve $2^{2x} - 5 \times 2^{x} + 4 = 0$. | |
| **7** A curve has parametric equations $x = \ln t$, $y = t^2 - 4t$, $t > 0$.<br>Find the equation of the tangent where $t = 1$, in the form $y = mx + c$. | |
| **8** A particle is projected at 9 m $s^{-1}$ up a line of greatest slope of a rough plane inclined at $\alpha$ to the horizontal, where $\sin\alpha = \frac{4}{5}$ and $\mu = 0.95$.<br>Find (a) the distance it travels up the plane, to 3 s.f., (b) its speed on returning to its starting point. Take $g = 9.8$ m $s^{-2}$. | |
| **9** $\frac{dy}{dx} = \frac{6x^2}{y}$, $y > 0$, and $y = 7$ when $x = 0$.<br>Find y in terms of x, and the value of y when $x = 2$. | |
| **10** A game costs £1. Two fair dice are rolled: a total of at least 12 wins £14, a total of at most 4 wins £2, otherwise nothing.<br>(a) Find the expected profit.<br>(b) Find the standard deviation of the profit (3 s.f.).<br>(c) Find the stake that makes the game fair. | |