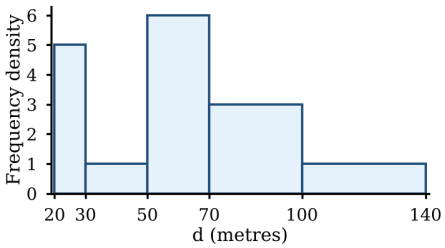
Day 329 **A Level Maths: A Tier 10-a-day**

1 A car costs £18000 new. Its value falls by 12% each year, so after t years its value is £V.
(a) Write down V in terms of t. (b) Find, to 3 s.f., the time when the value is £6000.

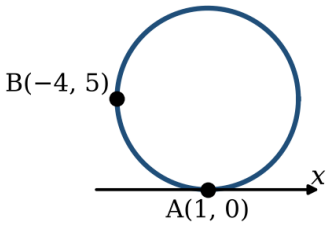
2 A stone is projected vertically upwards from the ground. It passes a ledge 1 s after projection and again 5 s after projection. Find (a) the speed of projection, (b) the height of the ledge, (c) the greatest height. Take g = 9.8.

3 The histogram shows the distances thrown, d (in metres), of a sample.
(a) How many were in the class $50 \leq d < 70$?
(b) Estimate how many had $45 < d < 120$.



4 Solve $7^{3x-2} = 3^{3x-3}$.
Give your answer to 3 significant figures.

5 Express $\frac{-15x - 10}{(x + 1)(2x + 1)}$ in partial fractions.

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6 A 900 kg car tows a 500 kg trailer by a light tow-bar on a horizontal road. Driving force 1500 N; resistances 600 N (car), 200 N (trailer). Find (a) the acceleration and the tow-bar tension. At 12 m s^{-1} the tow-bar breaks. (b) How far does the trailer then travel?	
7 The line l has equation $x - 3y = -2$. (a) Find the coordinates of the foot of the perpendicular from P(−6, −4) to l. (b) Hence find the shortest distance from P to l, in exact form.	
8 (a) Express $21\cos x - 20\sin x$ in the form $R\cos(x + \alpha)$, where $R > 0$ and $0° < \alpha < 90°$. Give α to 1 d.p. (b) Solve $21\cos x - 20\sin x = -14$ for $0° \leq x < 360°$, giving answers to 1 d.p.	
9 The diagram shows a circle that touches the x-axis at A(1, 0) and passes through B(−4, 5). Find the equation of the circle. 	
10 X ~ B(22, p). H_0: p = 0.3 is tested against H_1: p > 0.3 using a 5% significance level. (a) Find the critical region. (b) State the probability of a Type I error. (c) Find the probability of a Type II error when p = 0.5 (3 s.f.).	