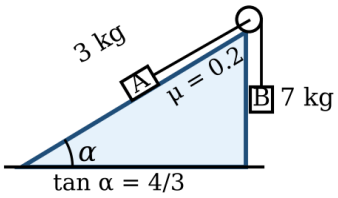
Day 221 **A Level Maths: A Tier 10-a-day**

1 The system is released from rest and A moves up the rough plane. Find (a) the acceleration, (b) the tension in the light string. Take g = 9.8. Give answers to 3 s.f. if not exact.



2 Find the exact value of

$\int_0^1 (3x - 3)^2 \, dx$.

3 X, the height (cm), is normally distributed with mean 171 and standard deviation 7.
Find (a) P(X > 186.4) (b) P(186.4 < X < 190.6), each to 3 s.f.

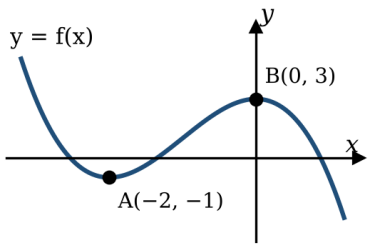
4 A is (−2, −2) and B is (−6, 6).
(a) Find the equation of the perpendicular bisector of AB, in the form ax + by = c.
(b) The perpendicular bisector meets the x-axis at P. Find the area of triangle ABP.

5 A non-uniform rod AB (length 3 m, mass 4 kg) has its centre of mass at G, AG = 1.25 m. It hangs horizontally from vertical strings at A and B. A particle of mass m kg is fixed at P, AP = 2.75 m, making the tensions equal. Find (a) m, (b) the tension. Take g = 9.8.

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6 The points A, B and C have coordinates (−1, 5, 1), (−1, 5, −3) and (−3, −3, −2).
Find angle ABC, in degrees to 1 d.p.

7 The diagram shows the curve y = f(x), with turning points A and B.
Find the coordinates of the turning points of
(a) y = f(x + 3) (b) y = f(x) − 1



8 X ~ B(60, 0.3). Use a normal approximation to estimate P(X ≥ 21) to 3 significant figures.

9 A curve has equation $3x^2y + 2y^3 - 4x = -22$.
Find $\frac{dy}{dx}$ in terms of x and y, and the gradient of the normal at (2, −1).

10 $f(x) = \frac{-12x + 4}{(1 + 2x)(1 - 2x)}$.
(a) Express f(x) in partial fractions.
(b) Hence expand f(x) up to x^2.
(c) State the range of x for which the expansion is valid.