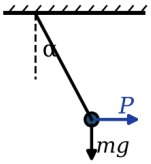
Day 238 **A Level Maths: B Tier 10-a-day**

1 A particle of mass 6 kg hangs in equilibrium on a light string inclined at α to the vertical, held by a horizontal force P N, as shown. $\tan\alpha = \frac{8}{15}$.
Take g = 9.8 m s^{-2}.
Find the tension in the string and the value of P.

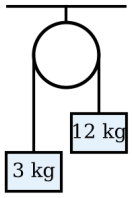


2 The random variable X has E(X) = 8 and Var(X) = 2.
Find (a) E(4X − 1),
(b) Var(4X − 1), (c) $E(X^2)$.

3 Simplify $\frac{(2x^2)^2 \times 5x^4}{x^6}$.

4 Find the exact value of $\arccos(\cos\frac{2\pi}{3})$.

5 Particles of mass 3 kg and 12 kg hang on a light string over a smooth fixed pulley, as shown, and are released from rest. Take g = 9.8 m s^{-2}.
Find the acceleration and the tension in the string.



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6 The line l has equation $y = 2x + 5$. The point P is $(3, -4)$. (a) Find the line through P perpendicular to l, as $ax + by + c = 0$ with integer a, b, c. (b) Find the foot F and the exact distance PF.	
7 A sector of a circle has area 11.25 cm^2 and angle 0.9 radians. Find (a) the radius, (b) the perimeter of the sector.	
8 The random variable X is normally distributed. $P(X < 30) = 0.1587$ and $P(X > 60) = 0.0228$. Find the mean and standard deviation (3 s.f.).	
9 Find the coefficient of x^2 in the expansion of $(1 + x)(2 - 2x)^6$.	
10 Given that $\sin A = \frac{7}{25}$ and $\sin B = \frac{9}{41}$, where A and B are acute, find the exact value of $\sin(A + B)$.	