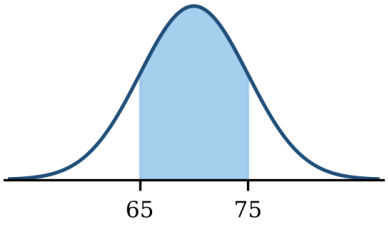
Day 215 **A Level Maths: B Tier 10-a-day**

1 $X \sim N(70, 5^2)$. The shaded area on the diagram represents the probability that X lies between two values.
Find this probability to 3 significant figures.



2 A boat moves with constant velocity $(-8\mathbf{i} + 15\mathbf{j})$ m s^{-1}, where $\mathbf{i}$ and $\mathbf{j}$ are unit vectors east and north.
Find its speed and the acute angle its direction makes with $\mathbf{i}$, to 1 d.p.

3 The random variable X has E(X) = 8 and Var(X) = 4.
Find (a) $E(-3X - 4)$,
(b) $Var(-3X - 4)$, (c) $E(X^2)$.

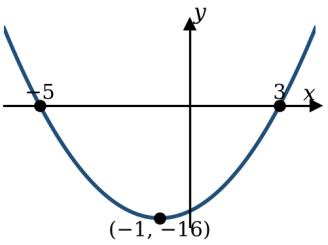
4 Find the exact value of
$\int_0^{\frac{\pi}{2}} \frac{\cos x}{\sin x + 3}\, dx$,
giving your answer in the form a ln b.

5 Show that the equation $2x^2 + 2x + 3 = 0$ has no real roots.

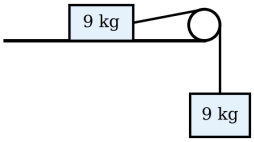
Day 215 **A Level Maths: B Tier 10-a-day**

6 Solve $\cos 2x = 5 \sin x - 2$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary.

7 The diagram shows the curve $y = f(x)$, a quadratic.
(a) Find the coordinates of the local maximum point of $y = |f(x)|$.
(b) How many solutions has $|f(x)| = 21$?



8 A particle of mass 9 kg lies on a smooth horizontal table. It is attached by a light string over a smooth pulley at the edge of the table to a particle of mass 9 kg hanging freely.
Take $g = 9.8$ m s^{-2}.
The system is released from rest. Find the acceleration and the tension in the string.



9 Line l_1: $\mathbf{r} = \begin{pmatrix} 0 \\ 4 \\ 10 \end{pmatrix} + \lambda \begin{pmatrix} 0 \\ -1 \\ -2 \end{pmatrix}$.
Line l_2: $\mathbf{r} = \begin{pmatrix} -4 \\ 5 \\ 0 \end{pmatrix} + \mu \begin{pmatrix} 2 \\ -2 \\ 2 \end{pmatrix}$.
Show that l_1 and l_2 intersect and find the point.

10 A geometric series has second term -16 and fifth term 2.
Find (a) the common ratio, (b) the first term, (c) the sum to infinity.