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

1 Summary statistics for the daily total rainfall (mm) in the same month are:
Heathrow: mean 11.5, standard deviation 5.9;
Leuchars: mean 22, standard deviation 4.8.
Make two comparisons.

2 The curve y = f(x) has a minimum point at $(-2, -4)$.
Find the coordinates of the corresponding point on:
(a) y = f(2x)
(b) y = f(−x)
(c) y = −f(x)

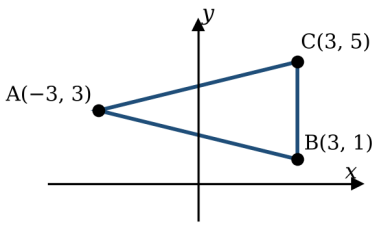
3 For small θ (in radians), use the small angle approximations to find the value that

$$\frac{\sin 2\theta \tan 4\theta}{1 - \cos 4\theta}$$

approaches as $\theta \to 0$.

4 A stone is dropped from rest from the top of a cliff. In the last second before it hits the sea it falls 63.7 m. Find the height of the cliff. Take g = 9.8.

5 The diagram shows triangle ABC.
(a) Find the equation of the line through C perpendicular to AB.
(b) Hence find the coordinates of D, the foot of the perpendicular from C to AB, and the area of triangle ABC.



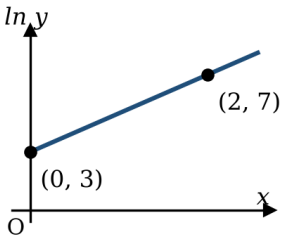
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6 $y = (4x + 2)e^{-2x}$.
Find the exact coordinates of the stationary point and determine its nature.

7 10% of people have a disease. The screening test is positive for 96% of those who have it and for 10% of those who do not.
(a) Find the probability that a person tests positive.
(b) Given a positive test, find the probability that the person has the disease (3 s.f.).

8 The line $y = kx + 2$ is a tangent to the curve $y = x^2 - 5x + 11$.
(a) Find the possible values of k.
(b) For the larger value of k, find the coordinates of the point of contact.

9 The diagram shows the graph of ln y against x for $y = A\,b^x$.
Find the exact values of A and b.



10 The system is released from rest. Find (a) the magnitude of the acceleration and which particle moves down, (b) the tension. Take g = 9.8. Give answers to 3 s.f. if not exact.

