Day 282 **IGCSE 10-a-day**

1 $f(x) = 4x + 1$ and $g(x) = x^2 + 4$

(a) Find $gf(x)$. Give your answer in the form $ax^2 + bx + c$.

(b) Solve $gf(x) = 229$

2 A particle moves in a straight line. After t seconds its displacement from O is s metres, where

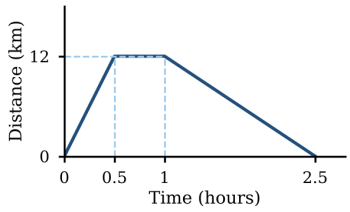
$s = 8t^{\frac{3}{2}} + 2t^2$ $(t \geq 0)$

Find the velocity and the acceleration of the particle when $t = 9$.

3 The graph shows Isla's cycle ride to a café and back.

(a) Work out Isla's speed on the way back.

(b) Work out Isla's average speed for the whole ride, including the stop.

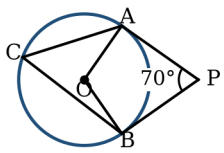


4 PA and PB are tangents to a circle, centre O. C is a point on the circle. Angle APB = 70°.

(a) Work out the size of angle AOB.

(b) Work out the size of angle ACB.

The diagram is not drawn accurately.

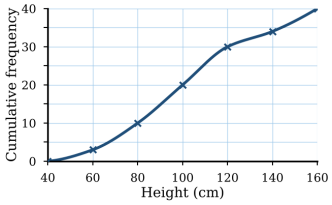


5 Expand and simplify $(6 + 3\sqrt{10})(5 - 3\sqrt{10})$

Give your answer in the form $p + q\sqrt{10}$

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6 The cumulative frequency graph shows the heights, in cm, of 40 plants.
(a) Find the median. (b) Find the interquartile range.
(c) How many plants are taller than 100?



7 The tangent at the point P on the curve $y = -x^2 + 4x + 5$ is perpendicular to the line $x + 8y = 5$.
Find the coordinates of P.

8 The radius of a circle is increased by 60%.
Work out the percentage change in the area of the circle.

9 Points A and B are on level ground, 39 m apart, with B between A and the foot of a tower.
The angle of elevation of the top of the tower is 34° from A and 52° from B.
Work out the height of the tower. Give your answer to 3 significant figures. (Calculator)

10 $f(x) = x^3 + kx^2 + 3x + 2$, where k is a constant.
Given that f is an increasing function for all values of x, find the range of possible values of k.