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9. The parabola C has cartesian equation $y^2 = 4ax$, where a is a positive constant.

The point $P(ap^2, 2ap)$ lies on C.

The line l is the normal to C at the point P.

The line l passes through the point B with coordinates $(10a, 0)$.

Given that $p > 0$

(a) use calculus to find, in terms of a only, the coordinates of P.

(7)

The point S is the focus of the parabola C.

(b) Find, in terms of a, the exact area of triangle SBP.

(2)

A circle has equation

$$(x - 10a)^2 + y^2 = \frac{9}{4}a^2$$

Given that the line l cuts this circle at the point R, where $y > 0$

(c) find, in terms of a, the distance PR.

(3)

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