**1.** **In this question you must show all stages of your working.**
**Solutions relying on calculator technology are not acceptable.**

Find the set of values of $x$ for which

(a) $4(x - 5) < 2x - 9$

**(2)**

(b) $x(2x - 5) \leqslant 63$

**(3)**

(c) $4(x - 5) < 2x - 9$ **and** $x(2x - 5) \leqslant 63$

**(1)**

**(Total for Question 1 is 6 marks)**

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**2.** **In this question you must show all stages of your working.**
**Solutions relying on calculator technology are not acceptable.**

(i) Using the laws of indices, solve the equation

$$4^{2y+1} = \frac{32^{4y}}{2}$$

**(3)**

(ii) Solve the equation

$$x\sqrt{27} + 21 = \frac{6x}{\sqrt{3}}$$

writing the answer in the form $a\sqrt{b}$ where $a$ and $b$ are integers.

**(4)**

**(Total for Question 2 is 7 marks)**

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**3.** $$f(x) = \frac{\left(4 + 3\sqrt{x}\right)^2}{x} \qquad x > 0$$

(a) Find $f'(x)$, writing the answer in simplest form.

**(5)**

(b) Hence find an equation of the tangent to the curve $y = f(x)$ at the point (4, 25).

Write the answer in the form $y = mx + c$, where $m$ and $c$ are constants to be found.

**(3)**

**(Total for Question 3 is 8 marks)**

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**4.**

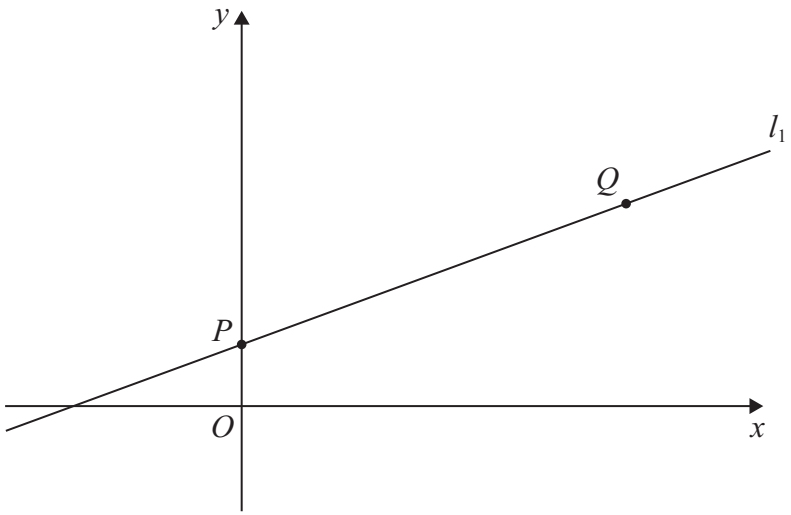



**Figure 1**

The line $l_1$, shown in Figure 1, has equation $2y = 3x + 8$
The line $l_1$ intersects the $y$-axis at the point $P$ and passes through the point $Q$ with $x$ coordinate 6

(a) Find

(i) the coordinates of $P$,

(ii) the coordinates of $Q$.

**(2)**

The line $l_2$ is perpendicular to $l_1$ and passes through the point $Q$.

(b) Find an equation for $l_2$, writing the answer in the form $ax + by + c = 0$, where $a$, $b$ and $c$ are integers.

**(4)**

The line $l_2$ cuts the $x$-axis at the point $R$.

(c) Find the area of quadrilateral $OPQR$, making the method clear.

**(3)**

**(Total for Question 4 is 9 marks)**