

9(a)

$$fg(x) = f(g(x))$$

$$f\left(\frac{20}{x-5}\right) = \frac{20}{x-5} + 4$$

Domain:

Must satisfy both $x \geq 6$ and $\frac{20}{x-5} \geq 10$

M1 May be
stated or
implied

B1

M1

9(a) cont.	$\frac{20}{x-10} \geq 10$ $20 \geq 10x - 50$ $70 \geq 10x$ $7 \geq x$ Hence, domain is $6 \leq x \leq 7$ Since $y = \frac{20}{x-5} + 4$ is $y = \frac{1}{x}$ after a stretch and a translation, the extrema of the range occur at the ends of the domain's interval may be stated or implied A graph is also sufficient to convey this At least one of, $\frac{20}{6-5} + 4 = 24 \quad \text{or} \quad \frac{20}{7-5} + 4 = 14$ Range: $14 \leq fg(x) \leq 24$	B1 M1 M1 B1 [7]
9(b)	If the domain for $g(x)$ is changed to $x < p$ then the output from $f(x)$ must also be less than p Hence, $x + 4 < p$ $x < p - 4$ We also still have the original restriction for $f(x)$ as $x \geq 10$ Putting these together, for $gf(x)$ to be possible, $10 \leq x \leq p - 4$ Hence, largest value of p where $gf(x)$ cannot be formed is 14	M1 May be stated or implied B1 B1 A1 [4] [11 marks]