(8) No real roots so $b^2 - 4ac < 0$

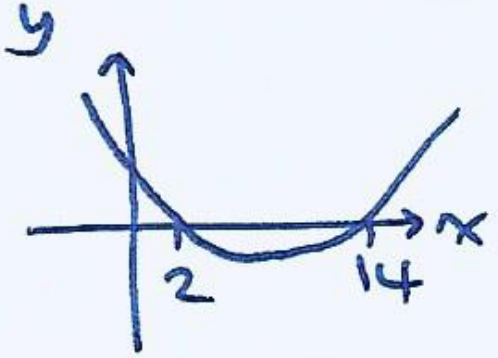
$$(m-4)^2 - 4(1)(2m-3) < 0$$

$$m^2 - 8m + 16 - 4(2m-3) < 0$$

$$m^2 - 8m + 16 - 8m + 12 < 0$$

$$m^2 - 16m + 28 < 0$$

$$(m-2)(m-14) < 0$$



$$2 < m < 14$$

Question			Generic scheme	Illustrative scheme	Max mark
8.			$\bullet^1$ use discriminant $\bullet^2$ apply condition $\bullet^3$ identify roots of quadratic expression $\bullet^4$ state range with justification	$\bullet^1$ $(m-4)^2-4(1)(2m-3)$ $\bullet^2$ $(m-4)^2-4(1)(2m-3)<0$ $\bullet^3$ 2, 14 $\bullet^4$ $2<m<14$ with eg labelled sketch or table of signs	4

Notes:

1. At $\bullet^1$, treat the inconsistent use of brackets: For example $m-4^2-4(1)(2m-3)$ or $(m-4)^2-4\times1\times2m-3$ as bad form only if the candidate deals with the unbracketed terms correctly in the next line of working.
2. Where candidates express a, b and c in terms of m, and then state $b^2-4ac<0$, award $\bullet^2$.
3. If candidates have the condition 'discriminant >0', 'discriminant ≤ 0' or 'discriminant ≥ 0', then $\bullet^2$ is lost but $\bullet^3$ and $\bullet^4$ are available.
4. Ignore the appearance of $b^2-4ac=0$ where the correct condition has subsequently been applied.
5. If candidates only work with the condition 'discriminant $=0$', then $\bullet^2$ and $\bullet^4$ are unavailable.
6. Accept the appearance of 2 and 14 within inequalities for $\bullet^3$.
7. At $\bullet^4$ accept "$m>2$ and $m<14$" or "$m>2$, $m<14$" together with the required justification.
8. For the appearance of x in any expression of the discriminant, no further marks are available.

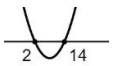
Commonly Observed Responses:

Candidate A - no expressions for a, b and c

No real roots $b^2-4ac<0$

$m^2-16m+28=0$ $\bullet^1$ ✓

$m=2, m=14$ $\bullet^3$ ✓

$2<m<14$  $\bullet^2$ ✓ $\bullet^4$ ✓

In this case $\bullet^2$ is only available where $\bullet^4$ is awarded

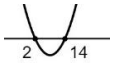
Candidate B

$(m-4)^2-4(1)(2m-3)$ $\bullet^1$ ✓

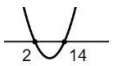
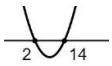
$m^2-16m+28=0$

$m=2, m=14$ $\bullet^3$ ✓

$b^2-4ac<0$

$2<m<14$  $\bullet^2$ ✓ $\bullet^4$ ✓

In this case $\bullet^2$ is only available where $\bullet^4$ is awarded

Question	Generic scheme	Illustrative scheme	Max mark
8. (continued)			
Candidate C $(m-4)^2-4(1)(2m-3)$ $\bullet^1$ ✓ $b^2-4ac=0$ $m^2-16m+28=0$ $m=2,\ m=14$ $\bullet^3$ ✓ $m^2-16m+28<0$ $\bullet^2$ ✓ $2<m<14$  $\bullet^4$ ✓		**Candidate D** $(m-4)^2-4(1)(2m-3)$ $\bullet^1$ ✓ $m^2-16m+28=0$ $\bullet^2$ ✗ $m=2,\ m=14$ $\bullet^3$ ✓ $2<m<14$  $\bullet^4$ ✓$_2$	
Candidate E - not solving a quadratic $m-4^2-4(1)(2m-3)<0$ $\bullet^1$ ✗ $\bullet^2$ ✓ $\bullet^3$ ✗ $-7m-4<0$ $m>-\frac{4}{7}$ $\bullet^4$ ✓$_2$			