BOARD OF STUDIES
NEW SOUTH WALES

(a) (i) $T_n = a + (n-1)d$

$n = ?$ $a = 2$, $d = 1.5$

$32 = 2 + (n-1)1.5$

$32 = 2 + 1.5n - 1.5$

$31.5 = 1.5n$

$n = 21.$

$\therefore$ Catrine thrown the stick 21 times.

(ii) $S_n = \frac{n}{2}[2a + (n-1)d]$

$S_{21} = \frac{21}{2}[2(2) + (21-1)1.5]$

$= \frac{21}{2}[4 + 30]$

$= 357$ — For starting journey.

$\therefore$ $357 \times 2 = 714$ m — whole journey.

(b) $l = r\theta.$

$38 = 20\theta$

$\theta = \frac{19}{10}^c$ (radians)

$\pi^c = 180$

$\therefore$ $1^c = \frac{180}{\pi}$

$\therefore$ $\theta = \frac{19}{10} \times \frac{180}{\pi}$

$= 108^\circ 51' 43'$

$= 109^\circ$

BOARD OF STUDIES
NEW SOUTH WALES

(e) (i) $y = x^2 - 8x + 4$

$\frac{dy}{dx} = 2x - 8 = 0$, for stationary points/vertex.

$2x = 8.$

$x = 4.$

when $x = 4$, $y = 4^2 - 8(4) + 4$

$= 16 - 32 + 4.$

$= -12$

$\therefore$ Vertex has coordinates $(4, -12)$

(ii) focus $(0, a)$

$x^2 = 4ay$

$x^2 = 8x + y - 4.$

$4ay = 8x + y - 4.$

$a = \frac{8x + y - 4}{4y}$

$a = \frac{2x}{y} + \frac{1}{4} - \frac{1}{y}$

$(0, \frac{2x}{y} + \frac{1}{4} - \frac{1}{y})$