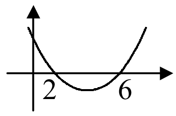
1 **a** $4 > \frac{3}{2}y$

$y < \frac{8}{3}$

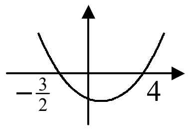
b $(x - 2)(x - 6) \geq 0$



$\therefore\ x \leq 2$ or $x \geq 6$

2 $2n^2 - 5n - 12 < 0$

$(2n + 3)(n - 4) < 0$



$-\frac{3}{2} < n < 4$

n integer $\therefore\ n = -1, 0, 1, 2, 3$

3 **a** $(x + 8) \geq 1.5 \times x$

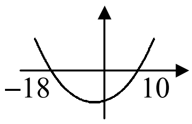
$8 \geq 0.5x$

$x \leq 16$

b $x(x + 8) \geq 180$

$x^2 + 8x - 180 \geq 0$

$(x + 18)(x - 10) \geq 0$



$x \leq -18$ or $x \geq 10$

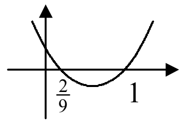
but $x > 0$ (width > 0)

and $x \leq 16$ $\therefore$ $10 \leq x \leq 16$

4 $9x^2 - 6x + 1 < 5x - 1$

$9x^2 - 11x + 2 < 0$

$(9x - 2)(x - 1) < 0$



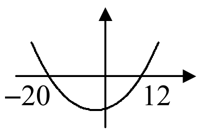
$\frac{2}{9} < x < 1$

5 $x = y + 8$

sub. $y(y + 8) \leq 240$

$y^2 + 8y - 240 \leq 0$

$(y + 20)(y - 12) \leq 0$



$-20 \leq y \leq 12$

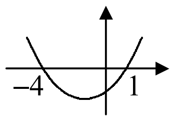
$x + y = y + 8 + y = 2y + 8$

$\therefore$ max value of $(x + y) = 2(12) + 8 = 32$

6 $3t^2 - 11t - 4 \geq 2t^2 - 14t$

$t^2 + 3t - 4 \geq 0$

$(t + 4)(t - 1) \geq 0$



$t \leq -4$ or $t \geq 1$

7 **a** $2x^2 + 2x - kx + 8 = 0$

real and distinct roots

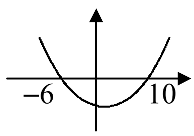
$\therefore\ b^2 - 4ac > 0$

$(2 - k)^2 - 64 > 0$

$4 - 4k + k^2 - 64 > 0$

$k^2 - 4k - 60 > 0$

b $(k + 6)(k - 10) > 0$



$k < -6$ or $k > 10$

8 let height be h $\therefore\ h^2 = (3r - 4)^2 - r^2$

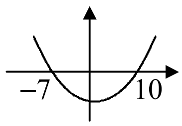
but $h \leq 24$

$\therefore\ h^2 \leq 24^2$

$(3r - 4)^2 - r^2 \leq 576$

$r^2 - 3r - 70 \leq 0$

$(r + 7)(r - 10) \leq 0$



$-7 \leq r \leq 10$

$\therefore$ maximum value of $r = 10$