

1 Solve each of the following inequalities.

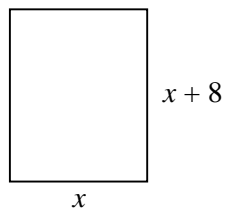
a  $\frac{1}{2}y + 3 > 2y - 1$

b  $x^2 - 8x + 12 \geq 0$

2 Find the set of integers,  $n$ , for which

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

3



The diagram shows a rectangular birthday card which is  $x$  cm wide and  $(x + 8)$  cm tall.

Given that the height of the card is to be at least 50% more than its width,

a show that  $x \leq 16$ .

Given also that the area of the front of the card is to be at least  $180 \text{ cm}^2$ ,

b find the set of possible values of  $x$ .

4 Find the set of values of  $x$  for which

$$(3x - 1)^2 < 5x - 1.$$

5 Given that  $x - y = 8$ ,

and that  $xy \leq 240$ ,

find the maximum value of  $(x + y)$ .

6 Solve the inequality

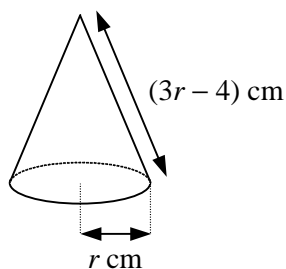
$$(3t + 1)(t - 4) \geq 2t(t - 7).$$

7 Given that the equation  $2x(x + 1) = kx - 8$  has real and distinct roots,

a show that  $k^2 - 4k - 60 > 0$ ,

b find the set of possible values of  $k$ .

8



A party hat is designed in the shape of a right circular cone of base radius  $r$  cm and slant height  $(3r - 4)$  cm.

Given that the height of the cone must not be more than 24 cm, find the maximum value of  $r$ .