1 Solve each of the following inequalities.

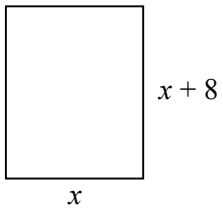
a $\frac{1}{2}y + 3 > 2y - 1$

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 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

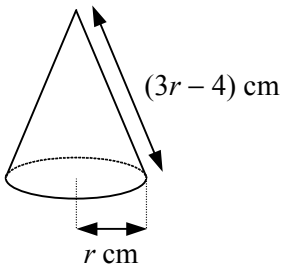
$$(3t + 1)(t - 4) \geq 2t(t - 7).$$

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.