**7.**

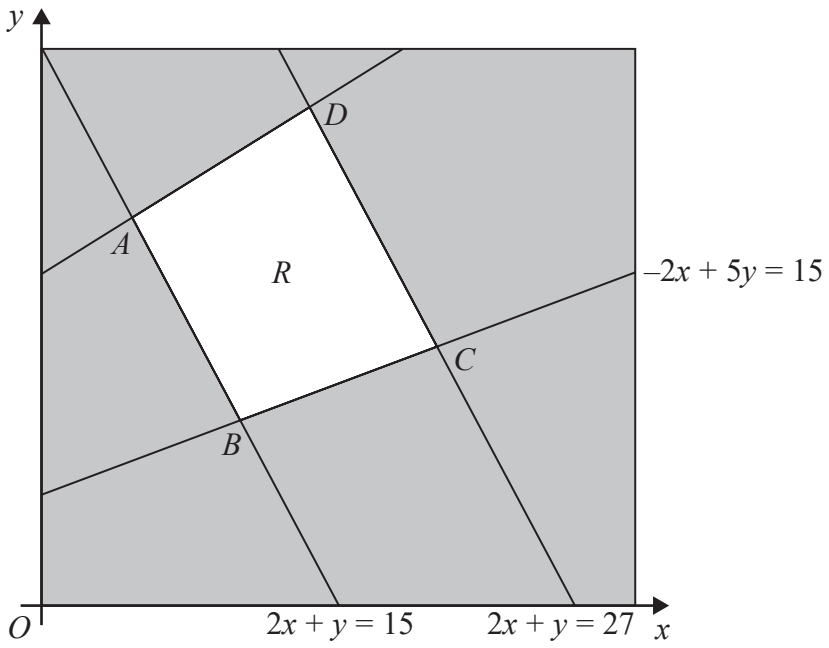



**Figure 4**

Figure 4 shows the constraints of a linear programming problem in $x$ and $y$, where $R$ is the feasible region.

The equations of three of the lines, and the four intersection points, $A$, $B$, $C$ and $D$, are shown.

The four vertices of $R$ are $A\left(\frac{9}{4},\frac{21}{2}\right)$, $B(5,5)$, $C(10,7)$ and $D\left(\frac{27}{4},\frac{27}{2}\right)$.

(a) Determine the inequalities that define $R$.

**(4)**

The objective function, $P$, is given by

$$P = 2x + ky$$

where $k$ is a positive constant.

Given that the minimum value of $P$ is at least half of the maximum value of $P$,

(b) determine the range of possible values of $k$.

**(5)**

**(Total for Question 7 is 9 marks)**

**TOTAL FOR PAPER IS 75 MARKS**

**7.**

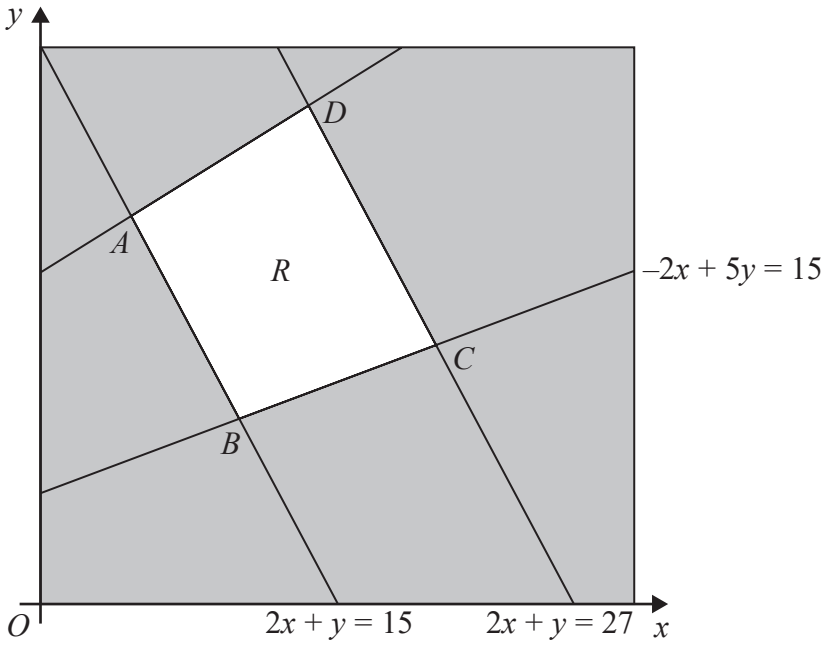



**Figure 4**

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**Question 7 continued**

**Question 7 continued**

**(Total for Question 7 is 9 marks)**

**TOTAL FOR PAPER IS 75 MARKS**

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