7.

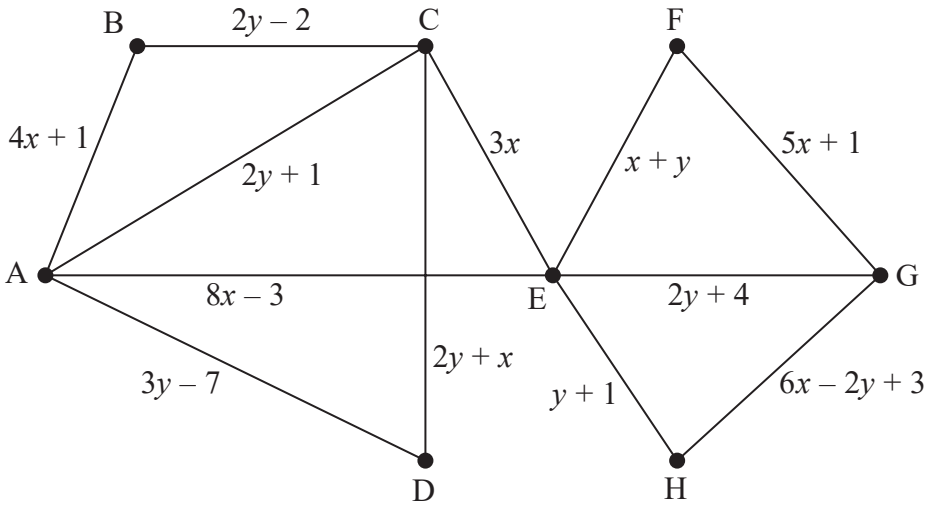


Figure 5

Figure 5 shows a weighted graph that contains 12 arcs and 8 vertices.

It is given that

- no two arcs have the same weight
- x and y are positive integers
- arc CD is not in the minimum spanning tree for the graph

(a) Explain why $y < x + 7$

(2)

It is also given that when Prim's algorithm, starting at A, is applied to the weighted graph, AB is the first arc selected.

(b) Show that $y > 2x$ and write down and simplify two further constraints on the values of x and y.

(3)

(c) Represent these four constraints on Diagram 1 in the answer book.

(4)

(d) Using Diagram 1 **only**, write down the possible pairs of values that x and y can take in the form (x, y).

(2)

The minimum spanning tree for the weighted graph in Figure 5 has total weight 73
Six of the seven arcs in the minimum spanning tree are AB, AD, BC, CE, EF and GH.

(e) Determine the value of x and the value of y. You must make your method and working clear.

(4)

(Total 15 marks)

TOTAL FOR PAPER: 75 MARKS

END