M537: Heartbeat

For health reasons people should limit their efforts, for instance during sports, in order not to exceed a certain heartbeat frequency.

For years the relationship between a person’s recommended maximum heart rate and the person’s age was described by the following formula:

\[ \text{Recommended maximum heart rate} = 220 - \text{age} \]

Recent research showed that this formula should be modified slightly. The new formula is as follows:

\[ \text{Recommended maximum heart rate} = 208 - (0.7 \times \text{age}) \]

Question 1: HEARTBEAT

A newspaper article stated: “A result of using the new formula instead of the old one is that the recommended maximum number of heartbeats per minute for young people decreases slightly and for old people it increases slightly.”

From which age onwards does the recommended maximum heart rate increase as a result of the introduction of the new formula? Show your work.

Question 2: HEARTBEAT

The formula recommended maximum heart rate = 208 – (0.7 × age) is also used to determine when physical training is most effective. Research has shown that physical training is most effective when the heartbeat is at 80% of the recommended maximum heart rate.

Write down a formula for calculating the heart rate for most effective physical training, expressed in terms of age.