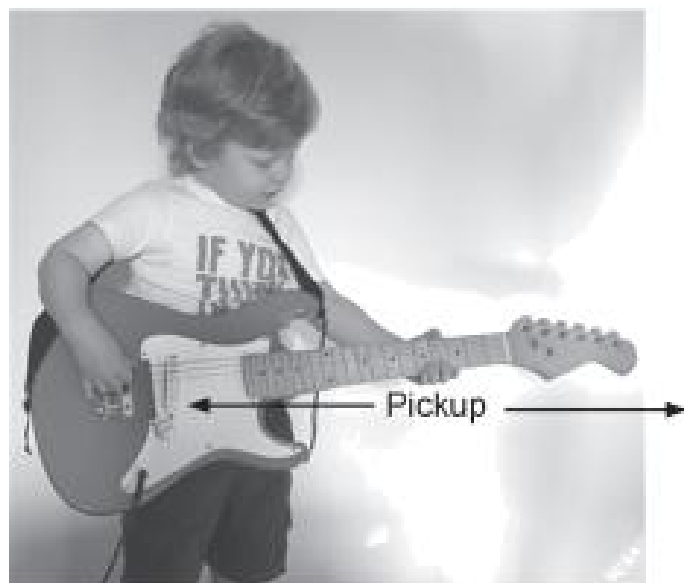


Question 16

(13 marks)

An electric guitar pickup works by converting the vibrations of the strings to an electrical current which is then amplified. The amplified current is then sent to a speaker that converts the fluctuations in the current to sound.



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- (a) Refer to the diagram to explain how the vibration of a metal string is converted to an electrical current that varies at the string's frequency. (5 marks)

- (b) Using an appropriate formula, describe **two** changes to the design of the pickup that would enable it to supply a larger potential difference. (3 marks)

- (c) If the pickup is removed from the guitar, the strings will oscillate for longer before becoming motionless. Explain what makes the guitar strings come to rest quicker with the pickup in place. (2 marks)

- (d) A 5.50 cm section of wire is moved at 25.0 m s^{-1} through a magnetic field of 43.0 mT. Calculate the maximum potential difference generated and give its units. (3 marks)