3.7 Fields and their Consequences: 10-minute Pack

AQA 7408 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A straight wire of length 0.25 m carries a current of 4.5 A. It is placed perpendicular to a uniform magnetic field of flux density 0.18 T.

(a) Calculate the force on the wire due to the magnetic field. Use F = BIL. **(2)**

(b) The current flows from left to right and the magnetic field points into the page. State the direction of the force on the wire and explain how you determined it. **(2)**

(c) The wire is now turned so that it makes an angle of 30 degrees with the magnetic field (rather than being perpendicular to it). Calculate the new force on the wire. Use F = BIL sin(θ). **(3)**

(Total for Question 1 is 7 marks)

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Mark scheme · 3.7 Fields and their Consequences: 10-minute Pack

Question 1

(a) correct substitution F = 0.18 x 4.5 x 0.25	**M1**
(a) F = 0.20 N (cao)	**A1**

(a) Answer: F = 0.2025 N (awrt 0.20 N)

(b) the force acts vertically upwards (in the plane of the page)	**B1**
(b) found using Fleming's left-hand rule: First finger = Field (into page), seCond finger = Current (left to right), thuMb = force/Motion, giving an upward force	**B1**

(b) Answer: Force acts vertically upwards, found using Fleming's left-hand rule

(c) correct substitution F = 0.18 x 4.5 x 0.25 x sin(30)	**M1**
(c) sin(30) = 0.5 used correctly	**M1**
(c) F = 0.10 N (cao)	**A1**

(c) Answer: F = 0.101 N (awrt 0.10 N)

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