Q1.

Describe how you could show that the Earth has a magnetic field.

(2)

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(Total for question = 2 marks)

Q2.

A student uses iron filings to show the pattern of a magnetic field around a bar magnet.

Figure 2 shows the pattern the student produced.

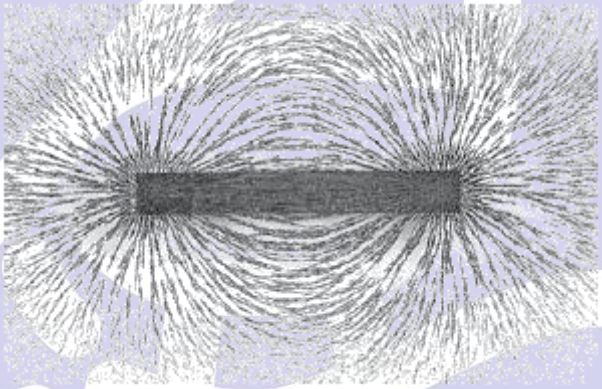

Figure 2

(i) Describe how you can tell from Figure 2 where the magnetic field is strongest.

(2)

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(ii) The bar magnet is placed on a sheet of paper. Describe how the student could plot the shape and show the direction of the magnetic field around the magnet.

(3)

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(Total for question = 5 marks)

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Q3.

A student uses plotting compasses to investigate the magnetic field between the poles of two bar magnets.

Figure 5 shows **one** of the plotting compasses and **one** of the bar magnets.

Figure 5

The student places the two magnets on a piece of paper with a pole of one magnet a few centimetres away from a pole of the other magnet.

The student places 20 plotting compasses on the paper near the magnets.

Figure 6 shows the direction in which each of the plotting compasses points.

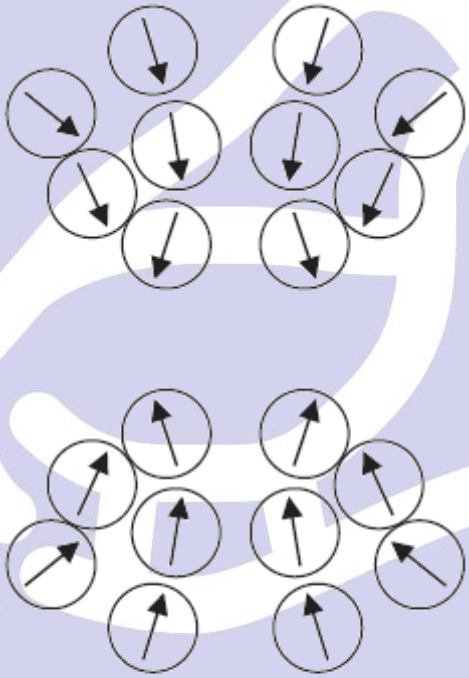

Figure 6

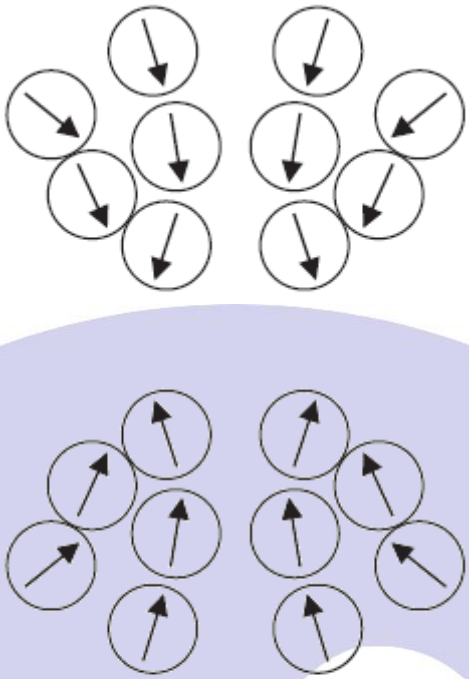

Figure 6

(i) Draw two rectangles on Figure 6 to show the positions of the two bar magnets.
Label the N-pole and the S-pole of each magnet.

(2)

(ii) The student wants to determine the shape of the magnetic field for a larger area around the magnets.
Describe how the student should continue the investigation using just one plotting compass.

(3)

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(Total for question = 5 marks)

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Q4.

Figure 13 represents the Earth.

Figure 13 shows **two** magnetic compass needles placed near to the Earth's surface, at points Q and T.

Each magnetic compass needle can rotate about its central dot.

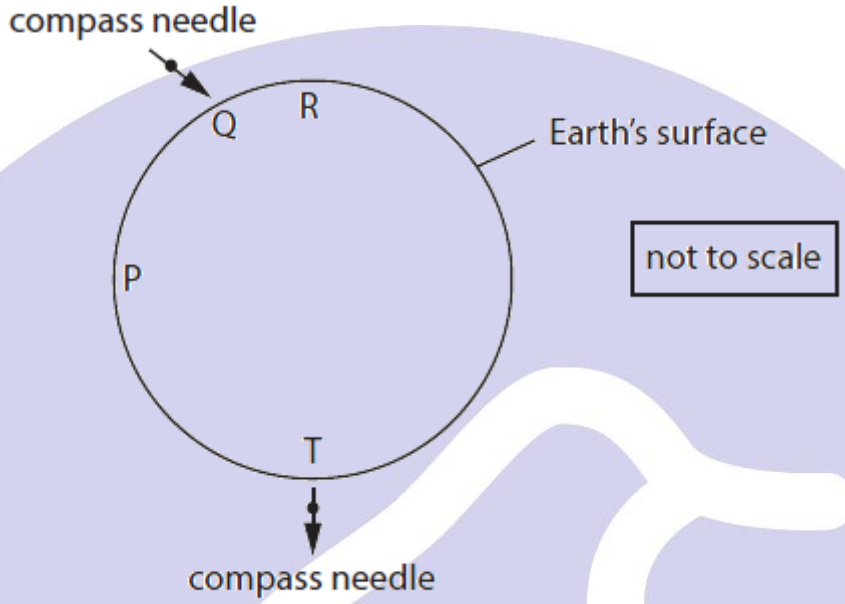

Figure 13

(i) A compass needle is placed at point P and another at point R, near to the Earth's surface.

On Figure 13, draw an arrow at point P and an arrow at point R to show the direction of the compass needle at each point.

(2)

(ii) Explain why the arrows point in the directions you have drawn in part (i).

You may draw on Figure 13 to help your answer.

(3)

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(Total for question = 5 marks)

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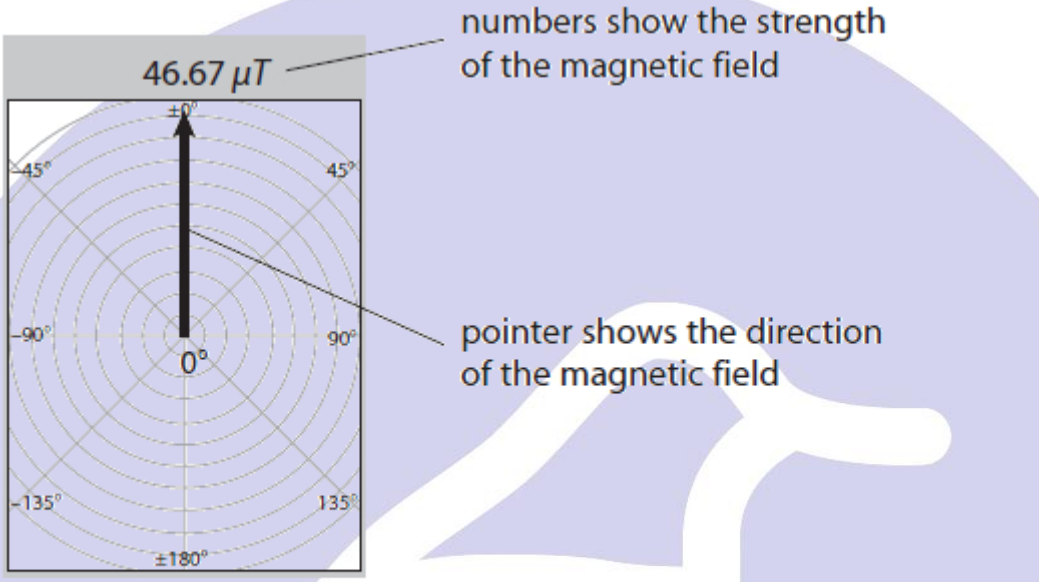
Q5.

A student's mobile phone has an app to measure a magnetic field.

The student places the phone on a table and rotates the phone until it is pointing north.

There are no magnets near to the phone.

Figure 3 shows the display on the screen of the phone.



(Source: adapted from MGS Lite app for iPhone)

Figure 3

(i) State why the strength of the magnetic field shown is not zero.

(1)

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The student places a magnet near to the phone on the table.

Figure 4 shows the magnet and the new display on the screen.

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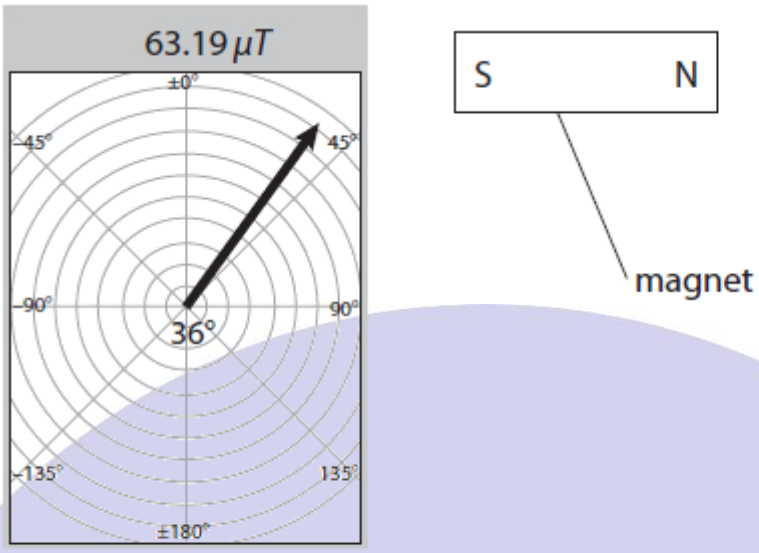

(Source: adapted from MGS Lite app for iPhone)

Figure 4

(ii) State **two** changes in the magnetic field measured by the phone from Figure 3 to Figure 4.

(2)

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2 .....

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(iii) Describe how the student could use the mobile phone to investigate the strength of the magnetic field at different distances from the magnet.

(3)

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(Total for question = 6 marks)

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Q6.

Figure 5 shows the directions of some plotting compass needles placed at different points near the Earth's surface.

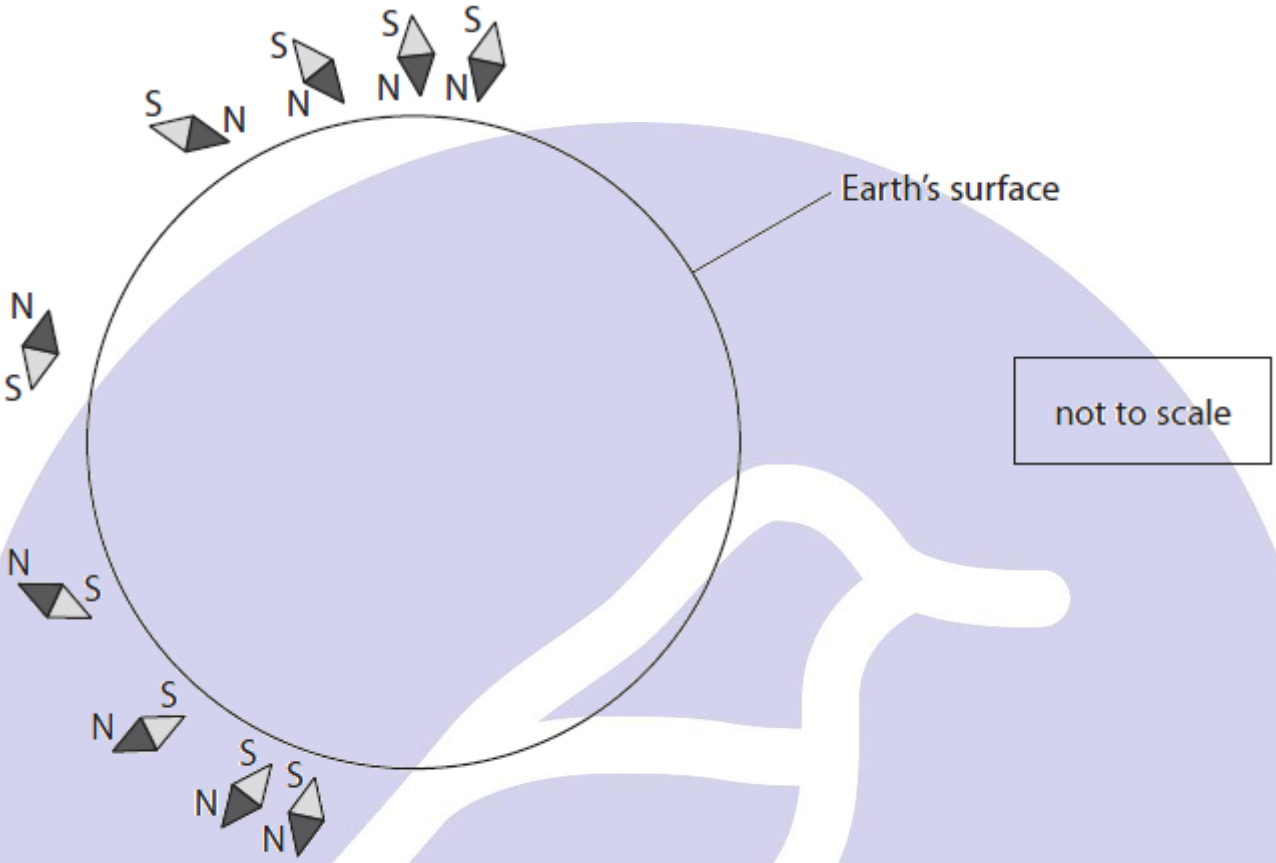

Figure 5

(i) Sketch, on Figure 5, the Earth's magnetic field outside and inside the Earth.

(2)

(ii) State which part of the Earth generates its magnetic field.

(1)

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(Total for question = 3 marks)

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