<u>Magnetic Force</u>   ***SOLUTIONS***

1.

a)   out of the page   b)   to the left

c)   towards the top of the page   d)   into the page

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2.

a) Force is proportional to sinθ, where θ is the angle between direction of the current and the direction of the magnetic field.

If θ is 0° (parallel) or 180° (antiparallel), sinθ = 0 so F = 0.

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b)
$$F = I\Delta l B \sin\theta$$
$$= 0.951 \times 20.1 \times 10^{-2} \times 4.99 \times 1$$
$$= 0.954\text{N (3 s.f.)}$$

/2

c) $B = \dfrac{F}{I\Delta l \sin\theta}$

$$= \dfrac{0.954}{0.951 \times 20.1 \times 10^{-2} \times \sin(25.0°)}$$
$$= 11.8 \text{ T (3 s.f.)}$$

/2

d) $\theta = \sin^{-1}\left(\dfrac{F}{I\Delta l B}\right)$

$$= \sin^{-1}\left(\dfrac{0.954 \times 2}{0.951 \times 20.1 \times 10^{-2} \times 11.8}\right)$$
$$= 57.7° \text{ (3 s.f.)}$$

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