11. MAGNETIC FIELD: Ampere's circuital law - answers

11.1. $r < R$: $B = \frac{\mu_0 I}{2\pi R^2} r$

$r > R$: $B = \dfrac{\mu_0 I}{2\pi r}$

11.2. $r < R$: $B = 0$

$r > R$: $B = \frac{\mu_0 I}{2\pi r}$

11.3.

a) $r < R_1$: $B = 0$

$R_1 < r < R_2$: $B = \frac{\mu_0 I}{2\pi r}$

$r > R_2$: $B = \frac{\mu_0 I}{\pi r}$

b) $r < R_1$: $B = 0$

$R_1 < r < R_2$: $B = \frac{\mu_0 I}{2\pi r}$

$r > R_2$: $B = 0$

11.4. $r < R_2$: $B = 0$; $R_2 < r < R_1$: $B = \frac{\mu_0 I(r^2 - R_2^2)}{2\pi(R_1^2 - R_2^2)r}$; $r > R_1$: $B = \frac{\mu_0 I}{2\pi r}$

11.5.

a) $B = 0$ at a distance $x = a/3$ from conductor no 2, between,

b) $B = 0$ at a distance $x = a$ from conductor no 2, outside.

11.6. $\frac{W}{l} = \frac{\mu_0 I_1 I_2}{2\pi} \ln 2$

11.7. $B = \mu_0 n I$

11.8. $r < R_2$: $B = 0$

$R_2 < r < R_1$: $B = \frac{\mu_0 n I}{2\pi r}$

$r > R_1$: $B = 0$

11.9. $B = \frac{\mu_0 I}{2}$