

$$((a^r + b^r + rab)(a^r + b^r + rab))^r = (a^r + b^r + rab - rab)^r = (a^r + b^r - rab)^r$$

$$\Rightarrow (\sqrt{9} - 2 + \sqrt{9} + 2 - 2(\sqrt{9} + 2)(\sqrt{9} - 2))^r = (2\sqrt{9} - 2\sqrt{9})^r = 12 - 14\sqrt{9} = t(2 - \sqrt{9})$$

$$14(\sqrt{9} - 2) = t(2 - \sqrt{9})$$

$$\Rightarrow t = 14$$

8

$$\left(a + \frac{1}{a} + \sqrt{r}\right)\left(a + \frac{1}{a} - \sqrt{r}\right)^r = \left(a^r + \frac{1}{a^r} + \sqrt{r}\right)^r = a^r + \frac{1}{a^r} + r$$

$$= 14 - 14\sqrt{r} + \frac{1}{14 - 14\sqrt{r}} + r \rightarrow \frac{1}{14 - 14\sqrt{r}} \times \frac{(14 + 14\sqrt{r})}{(14 + 14\sqrt{r})} = \frac{14 + 14\sqrt{r}}{196 - 196} = \frac{14 + 14\sqrt{r}}{0}$$

$$\Rightarrow 14 - 14\sqrt{r} + 14 + 14\sqrt{r} + r = r^t$$

$$14 = r^t \Rightarrow \boxed{t = 14}$$

9

$$A = \sqrt[r]{r^r \sqrt[r]{r^r}} \times r^{\frac{r}{r}} = \sqrt[r]{r^r} \times r^{\frac{r}{r}} = r^{\frac{r}{r}} \times r^{\frac{r}{r}} = r^r$$

$$(rA)^{\frac{1}{r}} = (r \times r^r)^{\frac{1}{r}} = \boxed{\frac{1}{r}}$$

10

$$\sqrt[r]{a} = r \times a^{\frac{1}{r}} \Rightarrow a = r^r \times a^{\frac{1}{r}} \Rightarrow a^{\frac{r-1}{r}} = r^r \Rightarrow a = \left(r^{\frac{r}{r-1}}\right) = \frac{1}{r\sqrt{r}}$$

$$\frac{\left(\frac{1}{a} - r\right)}{1 + \sqrt{r}} = \frac{r\sqrt{r} - r}{\sqrt{r} + 1} \times \frac{(\sqrt{r} - 1)}{(\sqrt{r} - 1)} = \frac{r(\sqrt{r} - 1)^2}{r} = \frac{r(r - 2\sqrt{r} + 1)}{r} = r(r - 2\sqrt{r} + 1)$$

$$= \boxed{9 - 12\sqrt{r}}$$

11

$$(\sqrt{x+a} - \sqrt{x-r})(\sqrt{x+a} + \sqrt{x-r}) = r(\sqrt{x+a} + \sqrt{x-r}) \Rightarrow x+a - x+r = r(\sqrt{x+a} + \sqrt{x-r})$$

$$\Rightarrow \frac{a}{r} + r = (\sqrt{x+a} + \sqrt{x-r})$$

$$\Rightarrow \sqrt{x+a} + \sqrt{x-r} - r = \frac{a}{r} + r - r = \boxed{\frac{a}{r}}$$

12