

**Example 4: Determining an Unknown Interest Rate**

Laura has invested \$15 500 in a registered Education Savings Plan. She wants her investment to grow to at least \$50 000 by the time her newborn enters university, in 18 years. What interest rate, compounded annually, will result in a future value of \$50 000? Round your answer to two decimal places.

**Solution:**

$$FV = P\left(1 + \frac{r}{n}\right)^{nt}$$

$$\frac{50\,000}{15\,500} = \frac{15\,500}{15\,500} \left(1 + \frac{r}{1}\right)^{1 \cdot 18}$$

$$3.2258... = (1+r)^{18}$$

$$\sqrt[18]{3.2258...} = 1+r$$

$$1.0672... = 1+r$$

$$0.0672... = r$$

$$6.72\% = r$$

Or re-arrange for 'r':

$$FV = P\left(1 + \frac{r}{n}\right)^{nt}$$

$$\frac{FV}{P} = \left(1 + \frac{r}{n}\right)^{nt}$$

$$\sqrt[nt]{\frac{FV}{P}} = 1 + \frac{r}{n}$$

$$\sqrt[nt]{\frac{FV}{P}} - 1 = \frac{r}{n}$$

$$\left(\sqrt[nt]{\frac{FV}{P}} - 1\right) \cdot n = r$$

$$r = \left(\sqrt[18]{\frac{50\,000}{15\,500}} - 1\right) \cdot 1$$

$$= \left(\sqrt[18]{3.2258...} - 1\right) \cdot 1$$

$$= 0.0672$$

$$= 6.72\%$$

*\* Practice: Pages 478-479 Questions 4, 5a, 6, 7, 11a*

5. Joseppie is planning to buy a new snowmobile in 2 years. He intends to spend no more than \$17 000. He has \$9000 to invest in an account that compounds interest quarterly.
- a) What rate of interest will Joseppie need to find in order to meet his goal? Is his plan reasonable?

11. Lucy is investing \$3000. She wants it to grow to \$7000 in 10 years.
- a) What annual rate of interest, compounded quarterly, does Lucy need to meet her goal? Round your answer to two decimal places.