MATHEMATICS · GRADES 10-12

Annuities

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you work out what regular payments into a savings plan or a retirement fund will be worth over time. The same maths tells you what equal loan payments will cost you each month, so you can see the full price of borrowing before you sign. Annuities are how most real saving and borrowing actually works, in steady payments rather than one lump sum.



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Worked examples

EXAMPLE 1

Q You deposit 100 dollars at the end of each year for 2 years at 10 percent. Find the future value.

SOLUTION

First deposit grows for 1 year: 100 × 1.10 = 110 dollars.

Second deposit is made at the end, so it stays 100 dollars.

Future value = 110 + 100 = 210 dollars.

EXAMPLE 2

Q You deposit 200 dollars at the end of each year for 2 years at 5 percent. Find the future value.

SOLUTION

First deposit grows for 1 year: 200 × 1.05 = 210 dollars.

Second deposit stays 200 dollars.

Future value = 410 dollars.

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Practice questions

1 Sara deposits 100 dollars at the end of each year for 1 year at 10 percent interest. What is the future value?

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2 A student saves 50 dollars at the end of each year for 2 years at 10 percent interest. What is the account worth at the end?

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3 A worker puts the same amount into a savings plan every year. What is this series of payments called?

- **A** An ordinary annuity
- **B** An annuity
- **C** An annuity due
- **D** A lump sum

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4 A club deposits 300 dollars at the start of each year for 2 years at 10 percent interest. What is the future value?

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5 A club deposits 300 dollars at the end of each year for 2 years at 0 percent interest. What is the future value?

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6 Payments are made at the end of each period. What is this kind of annuity called?

A. An annuity due

B. A lump sum

C. An annuity

D. An ordinary annuity

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7 A saver wants 420 dollars at the end of 2 years by depositing the same amount at the end of each year at 10 percent interest. How much must she deposit each year?

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8 Payments are made at the start of each period. What is this kind of annuity called?

A. An ordinary annuity

B. A lump sum

C. An annuity due

D. An annuity

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9 **A saver deposits 100 dollars at the end of each year for 2 years at 5 percent interest. How much interest does she earn in total?**

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10 **Two friends deposit the same amount each year at the same rate, but one starts a year earlier. Why does the earlier starter end up with more?**

A Because it earns interest for longer

B Because the interest rate is higher

C Because the payments are larger

D Because the payments are made at the start

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ANSWER KEY

1. 100 dollars

2. 105 dollars

3. An annuity

4. 693 dollars

5. 600 dollars

6. An ordinary annuity

7. 200 dollars

8. An annuity due

9. 5 dollars

10. Because it earns interest for longer

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