COMPOUND INTEREST

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

Compound interest: each year's interest is worked out on the NEW balance.

£200 saved at 10% a year:

£200	£20	Year 1: 10% of £200 = £20 → £220
£220	£22	Year 2: 10% of £220 = £22 → £242

1 £400 is saved at 10% compound interest. Complete the table.

YEAR	START	10% INTEREST	END
1	£400	£40	£440
2	£440		
3			

2 £1000 is saved at 10% interest for 2 years. Complete the second bar, then find each total.

Simple (same each year)

£1000	£100	£100

After 2 years: £ ____

Compound (on the new balance)

£1000	£100	

After 2 years: £ ____

3 £500 is saved at 10% compound interest. Use the multiplier.

A 10% increase is the same as × ____

500 → × 1.1 → ____ → × 1.1 → ____

after 1 year after 2 years

4 Write each one using a power.

a) 1.1 × 1.1 × 1.1 = **1.1** ____

b) £200 × 1.1 × 1.1 = £200 × **1.1** ____ = £ ____

COMPOUND INTEREST

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

Compound interest is added to the balance, so the next year's interest is bigger.

Final balance = principal × multiplier$^{\text{years}}$

e.g. £500 at 4% for 3 years: 500 × **1.04^3** = **£562.43**

1 £600 is saved at 5% compound interest. Complete the table. Round to the nearest penny.

YEAR	START	5% INTEREST	END
1	£600	£30	£630
2	£630		
3			

2 Write the multiplier and the number of years. Then work out the final balance.

a) £800 at 3% for 2 years **800 ×** ☐$^{\square}$ = £☐

b) £2000 at 4% for 3 years **2000 ×** ☐$^{\square}$ = £☐

c) £150 at 10% for 4 years **150 ×** ☐$^{\square}$ = £☐

3 £1000 is saved for 3 years at 6% per year.

Simple interest: final balance = £☐

Compound interest: final balance = £☐

Difference = £☐

4 £2500 is saved for 2 years at 2% compound interest.

a) Final balance = 2500 × **1.02^2** = £☐

b) Interest earned = £☐

COMPOUND INTEREST

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

Final amount = principal × $(1 + r/100)^n$ for r% over n years. Interest only = final amount − principal. Compound interest grows faster than simple interest because the interest also earns interest.

FLUENCY

1 Use a calculator. Give answers to the nearest penny.

a) £3500 at 2.4% compound interest for 5 years: final balance ☐

b) £12 000 at 4.5% compound interest for 3 years: final balance ☐

c) A loan of £5000 at 7% compound interest for 2 years: amount owed ☐

d) £750 at 3.5% compound interest for 4 years: interest earned ☐

2 Interpret the calculation.

The calculation $500 \times \mathbf{1.04}^{\mathbf{3}}$ works out the balance of a savings account.

a) Principal = £ ☐ b) Rate = ☐ % c) The 3 means ☐

REASONING

3 Check the multiplier.

Pip says, "The multiplier for 1.2% compound interest is 1.12."

Is Pip correct? Explain, and give the correct multiplier.

.....

4 Compare simple and compound interest.

Explain why compound interest grows faster than simple interest.

Use £1000 at 10% for 2 years to support your answer.

.....

.....

COMPOUND INTEREST

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Circle your answer.

If it is sometimes true, give an example of when it is true and when it is not.

a) Compound interest earns more than simple at the same rate. ALWAYS SOMETIMES NEVER

b) Compound interest is the same amount every year. ALWAYS SOMETIMES NEVER

c) 500×1.03^2 gives the balance after 2 years at 3%. ALWAYS SOMETIMES NEVER

d) At 5% compound interest, money doubles in 10 years. ALWAYS SOMETIMES NEVER

PROBLEM SOLVING

2 £2000 is saved at a fixed rate of compound interest. After 2 years the balance is £2163.20. Find the interest rate.

Interest rate = ☐ % per year

3 £5000 is saved for 3 years. Which bank gives the bigger final balance, and by how much?

Bank A: 4% compound interest. **Bank B: 4.2% simple interest.**

Bank ☐ gives more, by £ ☐

★ CHALLENGE FOR ALL

4 £1000 is saved at 6% compound interest per year. After how many whole years will the balance first be more than £1500?

Number of whole years = ☐

COMPOUND INTEREST

ANSWERS

BUILDING BLOCKS

1 Year 2: £44, £484 · Year 3: £484, £48.40, £532.40

2 Simple: £1200 · Compound: second year £110, total £1210

3 × 1.1 · £550 · £605

4 a) 1.1^3 b) £200 × 1.1^2 = £242

SUPPORT

1 Year 2: £31.50, £661.50 · Year 3: £661.50, £33.08, £694.58

2 a) 800 × 1.03^2 = £848.72 b) 2000 × 1.04^3 = £2249.73 c) 150 × 1.1^4 = £219.62

3 Simple: £1180 · Compound: 1000 × 1.06^3 = £1191.02 · Difference: £11.02

4 a) £2601 b) £101

CORE

1 a) £3940.65 b) £13 693.99 c) £5724.50 d) £860.64 – £750 = £110.64

2 a) £500 b) 4% c) the number of years (3 years)

3 No. 1.2% = 0.012, so the multiplier is 1.012; 1.12 is the multiplier for 12%.

4 Simple: £100 + £100 = £1200. Compound: £100 then £110 (10% of £1100) = £1210. With compound interest, the interest is added to the balance, so each year's interest is worked out on a bigger amount.

GREATER DEPTH

1 a) Sometimes: equal after 1 year, more after 2 or more years b) Never (it grows each year) c) Always d) Never (1.05^{10} = 1.63...)

2 2163.20 ÷ 2000 = 1.0816 = 1.04^2, so the rate is 4%

3 A: 5000 × 1.04^3 = £5624.32. B: 5000 + 3 × £210 = £5630. Bank B gives more, by £5.68.

4 1.06^6 = 1.418... (£1418.52); 1.06^7 = 1.503... (£1503.63): 7 years