Compound Interest - Worksheet

Skill

Group A - Substitution into the compound interest formula

Increase or decrease the given amount by the interest rate over the allocated time period.

Write each answer to a suitable degree of accuracy.

Remember: $A = P(1 + \frac{r}{100})^n$

1)

$P = 100$
$r =$ 10% per year
$n =$ 2 years

2)

$P = 1000$
$r =$ 5% per year
$n =$ 3 years

3)

$P = 200$
$r =-$ 2% annually
$n =$ 5 years

4)

$P = 2500$
$r =$ 6% annually
$n =$ 5 years

5)

$P = 3000$
$r =$ 3% annually
$n =$ 10 years

6)

$P = 700$
$r =-$ 6% annually
$n =$ 8 years

7)

$P = 50$
$r =$ 2.5% annually
$n =$ 6 years

8)

$P = 20$
$r =$ 1.2% monthly
$n =$ 12 months

9)

$P = 55$
$r =$ 0.9% monthly
$n =$ 5 years

10)

$P = 14$
$r =$ 3.2% per week
$n =$ 2 weeks

11)

$P = 3.5$
$r =$ 1.5% per day
$n =$ 3 weeks

12)

$P = 6 \times 10^{-4}$
$r =-$ 1.5% per week
$n =$ 3.5 years

Compound Interest - Worksheet

Group B - Compound interest with varying percentages

Change the given amount by the two different interest rates over their allocated time periods.

1)

£100
+ 10% per year for 3 years,
+ 5% per year for 2 years.

2)

£200
+ 5% per year for 3 years,
+ 2% per year for 4 years.

3)

£5000
+ 7% per year for 5 years,
+ 3% per year for 3 years.

4)

£250
+ 1% per year for 2 years,
+ 0.5% per year for 3 years.

5)

£400
+ 2.5% per year for 6 years,
+ 0.7% per year for 4 years.

6)

£70
+ 1.3% per year for 8 years,
+ 1.5% per year for 2 years.

7)

£140,000
+ 0.2% per year for 3 years,
+ 0.15% per year for 5 years.

8)

£100
+ 5% per month for 3 months,
− 2% per month for 1 month.

9)

£5000
− 8% per year for 4 years,
− 6% per year for 4 years.

10)

£1000
− 12% per year for 4 years,
− 10.8% per year for 3 years.

11)

£50
+ 5% per month for 3 years,
− 2% per month for 2 years.

12)

£1250
+ 0.7% per month for 2 years,
− 0.13% per month for 1.5 years.

Compound Interest - Worksheet

Group C - Compound interest worded problems

Calculate the value of each investment.

1)

Anna invests £100. Her investment gains 20% per year, compound interest.

What is the value of her investment after 3 years?

2)

Barry invests £10, 000. His investment loses 5% per year, compound interest.

What is the value of his investment after 2 years?

3)

Claire invests £200 into a bank account with 4% compound interest annually.

Calculate the value of her investment after 4 years.

4)

Doug invests £7500. His investment increases by 4% annually.

How much is his investment worth after 7 years?

5)

Eric invests £4000 in the stock market. His shares lose an average of 3% annually.

What is the value of his investment after 11 years?

6)

Francis invests £400. The investment increases in value by 2% annually, compound interest.

Calculate the value of the investment after 7 years.

7)

Greg invests £40. His investment increases by 2. 5% annually.

What is the value of his investment after 4 years?

8)

Hermione invests £10. Her investment increases by 0. 4%, compounded monthly.

What is the value of her investment after 7 years?

9)

Imogen invests £25. She predicts that her investment will rise by 1. 7% per month.

Calculate the expected value of the investment after 3 years.

10)

Jerry invests £26. Unfortunately he loses an average of 5. 4% per week..

What is the value of his investment after 3 weeks?

11)

Karl invests £8. 7 million. His investment dramatically increases by 17. 5% per day.

How much is his investment worth in 4 weeks? Write your answer in £millions.

12)

Louis invests £4.3×10^3 and returns a 0. 25% profit per month.

How much is his investment worth after 4. 5 years?

Compound Interest - Worksheet

Applied

1) **(a)** Sophie invests £400 in a bank account with an annual compound interest rate of 2%. Calculate the amount of interest she will earn after 8 years.

(b) How many years will it take Sophie to have £450 in the account?

2) **(a)** Claire can borrow £150,000 for a mortgage over 20 years. The bank charges her 2% interest, every year until the mortgage is paid off. How much money will Claire owe the bank in total?

(b) Claire decides to borrow £130,000. How much money has she saved in total over the 20 years?

3) **(a)** The price of coffee per kilogram increases by 2% per year, compounded monthly. If the price for $1kg$ of coffee was £9.00 in January, how much would it cost in July?

(b) The amount of milk a farm produces per year increases by 4% annually. If the farm produced $1000L$ of milk per week, how much more milk will be produced per week in 2 years?

4) **(a)** Aaron deposited some money into a new savings account with a compound interest rate of 2% per year. After 6 years, he had £2252.32 in his account. How much money did he invest originally?

(b) Aaron had to withdraw £300 from his account, which made the interest rate drop to 0.8%. How much money will Aaron have after another 3 years with no more deposits or withdrawals?

Compound Interest - Exam Questions

1) Investment A: Save £200 per month for 2 years. 3.7% interest added to the total amount saved.

Investment B: Invest £4200
Compound interest of 9% per year.

After 2 years, how much more is investment B than A?

.....
(4 marks)

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2) **(a)** David buys a second hand car for £8000. The car depreciates in value by 12% per year, compound interest.
Which calculation works out the total value of the car after 5 years?

$8000 \times 12 \times 5$ $\quad$ $8000 \times 0.88 \times 5$

8000×1.12^5 $\quad$ 8000×0.88^5

.....
(1)

(b) After 5 years, he sells the car for £4500. How much profit does David make compared to the expected value of the car at this time?

.....
(1)
(2 marks)

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3) **(a)** The population of flamingos in a lake is 2300. The population grows by 3.2% per year. What is the population after 5 years?

.....
(2)

(b) How many years will it be before the population surpasses 3200?

.....
(2)
(4 marks)

Compound Interest - Exam Questions

4) **(a)** On the 6^{th} April 2018, Reuben invested some money in a bank account. The bank pays 1.6% compound interest per year.

On the 6^{th} April 2019, Reuben withdrew £300 from the account.

On the 6^{th} April 2020, Reuben had £727.46 in the account.

How much money did Reuben originally invest in the account?

.....

(3)

(b) If Reuben left the account to gain interest for a further 3 years, how much money would Reuben expect to have invested if the interest rate does not change?

.....

(2)

(5 marks)

Compound Interest - Answers

	Question	Answer
	Skill Questions	
Group A	Increase the given amount by the interest rate over the allocated time period. Write each answer to a suitable degree of accuracy. Remember: $A = P(1 + \frac{r}{100})^n$ **1)** $P = 100, r = 10\%$ per year, $n = 2$ years **2)** $P = 1000, r = 5\%$ per year, $n = 3$ years **3)** $P = 200, r = -2\%$ annually, $n = 5$ years **4)** $P = 2500, r = 6\%$ annually, $n = 5$ years **5)** $P = 3000, r = 3\%$ annually, $n = 10$ years **6)** $P = 700, r = -6\%$ annually, $n = 8$ years **7)** $P = 50, r = 2.5\%$ annually, $n = 6$ years **8)** $P = 20, r = 1.2\%$ monthly, $n = 12$ months **9)** $P = 55, r = 0.9\%$ monthly, $n = 5$ years **10)** $P = 14, r = 3.2\%$ per week, $n = 2$ weeks **11)** $P = 3.5, r = 1.5\%$ per day, $n = 3$ weeks **12)** $P = 6 \times 10^{-4}, r = -1.5\%$ per week, $n = 3.5$ years	**1)** 121 **2)** 1157.63 **3)** 180.78 **4)** 334.56 **5)** 4031.75 **6)** 426.70 **7)** 57.98 **8)** 23.08 **9)** 94.15 **10)** 14.91 **11)** 4.78 **12)** 3.83×10^{-5}
Group B	Change the given amount by the two different interest rates over their allocated time periods. **1)** £100, + 10% per year for 3 years, + 5% per year for 2 years. **2)** £200, + 5% per year for 3 years, + 2% per year for 4 years. **3)** £5000, + 7% per year for 5 years, + 3% per year for 3 years.	**1)** £146.74 **2)** £250.61 **3)** £7663.03

Compound Interest - Answers

Group B continued	**4)** £250, + 1% per year for 2 years, + 0.5% per year for 3 years.	**4)** £258.87
	5) £400, + 2.5% per year for 6 years, + 0.7% per year for 4 years.	**5)** £477.00
	6) £70, + 1.3% per year for 8 years, + 1.5% per year for 2 years.	**6)** £79.97
	7) £140,000, + 0.2% per year for 3 years, + 0.15% per year for 5 years.	**7)** £141901.17
	8) £100, + 5% per month for 3 months, − 2% per month for 1 month.	**8)** £113.45
	9) £5000, − 8% per year for 4 years, − 6% per year for 4 years.	**9)** £2796.62
	10) £1000, − 12% per year for 4 years, − 10.8% per year for 3 years.	**10)** £425.62
	11) £50, + 5% per month for 3 years, − 2% per month for 2 years.	**11)** £178.32
	12) £1250, + 0.7% per month for 2 years, − 0.13% per month for 1.5 years.	**12)** £1443.60
Group C	Calculate the value of each investment.	
	1) Anna invests £100. Her investment gains 20% per year, compound interest.. What is the value of her investment after 3 years?	**1)** £172.80
	2) Barry invests £10,000. His investment loses 5% per year, compound interest. What is the value of his investment after 2 years?	**2)** £9025
	3) Claire invests £200 into a bank account with 4% compound interest annually. Calculate the value of her investment after 4 years.	**3)** £233.97

Compound Interest - Answers

Group C continued	**4)** Doug invests £7500. His investment increases by 4% annually. How much is his investment worth after 7 years?	**4)** £9869.49
	5) Eric invests £4000 in the stock market. His shares lose an average of 3% annually. What is the value of his investment after 11 years?	**5)** £2861.21
	6) Francis invests £400. The investment increases in value by 2% annually, compound interest. Calculate the value of the investment after 7 years.	**6)** £459.47
	7) Greg invests £40. His investment increases by 2.5% annually. What is the value of his investment after 4 years?	**7)** £44.15
	8) Hermione invests £10. Her investment increases by 0.4%, compounded monthly. What is the value of her investment after 7 years?	**8)** £13.98
	9) Imogen invests £25. She predicts that her investment will rise by 1.7% per month. Calculate the expected value of the investment after 3 years.	**9)** £45.87
	10) Jerry invests £26. Unfortunately he loses an average of 5.4% per week. What is the value of his investment after 3 weeks?	**10)** £22.01
	11) Karl invests £8.7 million. His investment dramatically increases by 17.5% per day. How much is his investment worth in 4 weeks? Write your answer in £ millions.	**11)** £795.39 million
	12) Louis invests £ 4.3×10^3 and returns a 0.25% profit per month. How much is his investment worth after 4.5 years?	**12)** £4920.68

Compound Interest - Answers

	Question	Answer
	Applied Questions	
1)	**a)** Sophie invests £400 in a bank account with an annual compound interest rate of 2%. Calculate the amount of interest she will earn after 8 years.	**a)** £68.66
	b) How many years will it take Sophie to have £450 in the account?	**b)** 6 years
2)	**a)** Claire can borrow £150,000 for a mortgage over 20 years. The bank charges her 2% interest, every year until the mortgage is paid off. How much money will Claire owe the bank in total?	**a)** £222,892.11
	b) Claire decides to borrow £130,000. How much money has she saved in total over the 20 years?	**b)** £29,718.95
3)	**a)** The price of coffee per kilogram increases by 2% per year, compounded monthly. If the price for $1kg$ of coffee was £9.00 in January, how much would it cost in July?	**a)** £9.09
	b) The amount of milk a farm produces per year increases by 4% annually. If the farm produced 1000L of milk per week, how much more milk will be produced per week in 2 years?	**b)** $81.6L$
4)	**a)** Aaron deposited some money into a new savings account with a compound interest rate of 2% per year. After 6 years, he had £2252.32 in his account. How much money did he invest originally?	**a)** £2000
	b) Aaron had to withdraw £300 from his account, which made the interest rate drop to 0.8%. How much money will Aaron have after another 3 years with no more deposits or withdrawals?	**b)** £1999.55

Compound Interest - Mark Scheme

	Question	Answer	
	Exam Questions		
1)	Investment A: Save £200 per month for 2 years. 3.7% interest added to the total amount saved. Investment B: Invest £4200 Compound interest of 9% per year. After 2 years, how much more is investment B than A?	**(a)** Investment A: $200 \times 24 \times 1.037$ or £4977.60 4200×1.09^2 £4990.02 $4990.02 - 4977.42 = £12.42$	**(1)** **(1)** **(1)** **(1)**
2) (a)	David buys a second hand car for £8000. The car depreciates in value by 12% per year, compound interest. Which calculation works out the total value of the car after 5 years? $8000 \times 12 \times 5$ $8000 \times 0.88 \times 5$ 8000×1.12^5 8000×0.88^5	**(a)** 8000×0.88^5	**(1)**
(b)	After 5 years, he sells the car for £4500. How much profit does David make compared to the expected value of the car at this time?	**(b)** £278.14	**(1)**
3) (a)	The population of flamingos in a lake is 2300. The population grows by 3.2% per year. What is the population after 5 years?	**(a)** $2300 \times (1 + \frac{3.2}{100})^5$ 2692	**(1)** **(1)**
(b)	How many years will it be before the population surpasses 3200?	**(b)** 2300×1.032^{11} oe 11 years	**(1)** **(1)**

Compound Interest - Mark Scheme

4) (a)	On the 6^{th} April 2018, Reuben invested some money in a bank account. The bank pays 1.6% compound interest per year. On the 6^{th} April 2019, Reuben withdrew £300 from the account. On the 6^{th} April 2020, Reuben had £727.46 in the account. How much money did Reuben originally invest in the account?	**(a)** $727.46 \div 1.016$ $= 716.003937$ $716 + 300 = 1016.003937$ $1016.003937 \div 1.016$ $= 1000.003875$ $= £1000$	**(1)** **(1)** **(1)** **(1)**
4) (b)	If Reuben left the account to gain interest for a further 3 years, how much money would Reuben expect to have invested if the interest rate does not change?	**(b)** 727.46×1.016^3 762.939749 $= £762.94$	**(1)** **(1)**