Money, bills, interest and tax

Junior Cycle · Higher Level

Understand the idea

How to start

Profit is money gained: selling price minus cost price. A percentage needs a clearly named starting amount.

1. Write down the amount, rate and time given in the question.
2. Choose the starting amount for the percentage: cost price, selling price or original balance.
3. Calculate each charge or deduction separately before finding the final total.

Key terms & definitions

Principal
The original sum invested or borrowed.

Gross pay
Pay before deductions.

Net pay
Pay after deductions.

Tax credit
An amount subtracted from calculated tax, subject to the rules stated.

Key ideas

• Profit is selling price minus cost price. Loss is cost price minus selling price.

• Mark-up uses cost price as its base; margin uses selling price. State which base you use.

• For compound growth, multiply by the same growth factor each period: $A = P(1 + r)^n$, where r is a decimal rate.

• For depreciation, use $A = P(1 - r)^n$. Simple interest is $I = Prt$ when the rate and time units match.

• A bill may have a standing charge, usage charges, discounts and tax. Follow the order stated.

• Net pay is gross pay minus deductions. Tax bands apply only to the part of pay within each band. All rates here are fictional teaching examples.

Quick reminder

• Mark-up uses cost price; margin uses selling price.

• Compound interest applies the multiplier once per period.

• Use only the fictional tax rules and bands given in the question.

Worked examples

Example 01 · Profit, loss and percentage profit on cost price

A shop buys an item for €20 and sells it for €25. What is the profit?

Cost price	€20
Selling price	€25
Profit	€5

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

Selling price = €25. Cost price = €20.	**Step 1** Identify the two prices before subtracting.
profit = 25 − 20 = 5	**Step 2** Profit is the selling price minus the original cost.
The profit is €5.	**Step 3** The positive result shows the shop gained money.

Think about it: Before moving on: which price is the percentage profit worked out from, and why?

Example 02 · VAT and net pay

A price before VAT is €40. VAT at 10% is added. What is the price including VAT?

Price before VAT	€40
VAT at 10%	€4
Price including VAT	€44

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

€40 × 10% = €4	**Step 1** VAT = price before VAT × rate
€40 + €4 = €44	**Step 2** Price including VAT = price before VAT + VAT

Think about it: Before moving on: why is the price before VAT not found by taking 20% off the price including VAT?

Example 03 · Bills with a standing charge and a charge per unit

An electricity bill has a standing charge of €20. Each unit costs 25 cent, and 100 units are used. What is the total bill?

Standing charge	€20
100 units at 25 cent	€25
Total bill	€45

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

100 × 25 ÷ 100 = €25	**Step 1** Charge for the units = number of units × cost per unit (in cent) ÷ 100
€20 + €25 = €45	**Step 2** Total bill = standing charge + charge for the units

Think about it: Before moving on: why must the cost per unit be multiplied by the number of units before anything else is added?

Example 04 · Splitting a bill equally

A bill of €120 is shared equally between 3 people. How much does each person pay?

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

$€120 \div 3 = €40$	**Step 1** Each person pays an equal share

Think about it: Before moving on: how can you check that each share is right?

Example 05 · Compound interest

€100 is invested at 20% compound interest per year. What is the amount after 2 years?

Start	End of year 1	End of year 2
€100	€120	€144

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

$20\% = 0.20$	**Step 1** Change the annual percentage to a decimal.
$1 + 0.20 = 1.20$	**Step 2** Keep the whole balance, 100%, and add 20%. This gives the growth multiplier.
$100 \times 1.20 = 120$	**Step 3** At the end of year 1, the balance is €120.
$120 \times 1.20 = 144$	**Step 4** For year 2, apply the interest to the new balance, not just the original €100.
The amount after 2 years is €144.	**Step 5** Compound interest includes interest on earlier interest.

Think about it: Before moving on: why is the amount after two years not the same as the start amount plus two years of simple interest?

Example 06 · Cost of one item (unit price)

Pack A costs €300 and contains 6 items. What is the cost of one item?

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

€300 ÷ 6 = €50	**Step 1** Cost per item = pack cost ÷ number of items

Think about it: Before moving on: why can the cheaper pack not always be the better value?

Example 07 · Mark-up on cost price

An item costs €200 to buy. The shop marks it up by 10% on the cost price. What is the selling price?

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

10% of €200 = €20	**Step 1** Mark-up is a percentage of the cost price
€200 + €20 = €220	**Step 2** Add the mark-up to the cost price

Think about it: Before moving on: why is the mark-up a percentage of the cost price, and why is it added rather than taken off?

Example 08 · Mark-up on cost price — another example

An item costs €200 to buy. The shop marks it up by 20% on the cost price. What is the selling price?

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

20% of €200 = €40	**Step 1** Mark-up is a percentage of the cost price
€200 + €40 = €240	**Step 2** Add the mark-up to the cost price

Example 09 · Margin on selling price

An item sells for €200. The margin is 10% of the selling price. What is the cost price?

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

10% of €200 = €20	**Step 1** Margin is a percentage of the selling price, so the profit is
€200 − €20 = €180	**Step 2** Take the profit off the selling price

Think about it: Before moving on: why is margin measured against the selling price, and how does that differ from mark-up?

Example 10 · Margin on selling price — another example

An item sells for €200. The margin is 20% of the selling price. What is the cost price?

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

20% of €200 = €40	**Step 1** Margin is a percentage of the selling price, so the profit is
€200 − €40 = €160	**Step 2** Take the profit off the selling price

Example 11 · Compound interest over more than 3 years

€300 is invested at 2% compound interest per year. What is the amount after 6 years? Give your answer to the nearest cent.

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

$€300 \times (1.02)^6$	**Step 1** Multiply the amount by (1) rate) once for each year

$= €337.85$	**Step 2** Round to the nearest cent

Think about it: Before moving on: why is the power the number of years, and not the number of years minus one?

Example 12 · Compound interest over more than 3 years — another example

€400 is invested at 2% compound interest per year. What is the amount after 6 years? Give your answer to the nearest cent.

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

$€400 \times (1.02)^6$	**Step 1** Multiply the amount by (1) rate) once for each year
$= €450.46$	**Step 2** Round to the nearest cent

Example 13 · Net pay with two tax rates and other deductions

In this fictional tax system, gross weekly pay is €800. Income tax is 20% on the first €700 and 40% on the rest. A further deduction of 2% of gross pay is taken. What is the net weekly pay?

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

$0.20 \times 700 = 140$	**Step 1** Tax the first €700 at 20%.
$800 - 700 = 100$	**Step 2** Find the part of gross pay above the first band.
$0.40 \times 100 = 40$	**Step 3** Tax only that remaining part at 40%.
$140 + 40 = 180$	**Step 4** Add the two income-tax amounts.
$0.02 \times 800 = 16$	**Step 5** The further deduction is 2% of gross pay.

$800 - 180 - 16 = 604$	**Step 6** Subtract income tax and the other deduction from gross pay. Net weekly pay is €604.

Think about it: Before moving on: why is the 40% rate applied only to the part of the pay above the band?

Example 14 · Net pay with two tax rates and other deductions — another example

In this fictional tax system, gross weekly pay is €900. Income tax is 20% on the first €500 and 40% on the rest. A further deduction of 2% of gross pay is taken. What is the net weekly pay?

Why this method?

Identify the starting amount and the base for each percentage. Apply each charge or change in the order stated.

$0.20 \times 500 = 100$	**Step 1** Tax the first €500 at 20%.
$900 - 500 = 400$	**Step 2** Find the part of gross pay above the first band.
$0.40 \times 400 = 160$	**Step 3** Tax only that remaining part at 40%.
$100 + 160 = 260$	**Step 4** Add the two income-tax amounts.
$0.02 \times 900 = 18$	**Step 5** The further deduction is 2% of gross pay.
$900 - 260 - 18 = 622$	**Step 6** Subtract income tax and the other deduction from gross pay. Net weekly pay is €622.

Common mistake

Applying the higher tax rate to the whole income. When a question gives two tax bands, calculate tax on each band separately. Only the amount above the stated threshold uses the higher rate.

Exam technique

Show money to two decimal places at the end; retain calculator precision in intermediate steps.

Try it yourself

Work on paper before checking the answers at the end. These questions are for self-checking, not submitted homework.

Question 1

A shop buys an item for €30 and sells it for €42. What is the profit?

Cost price	€30
Selling price	€42
Profit	€12

Question 2

A price before VAT is €70. For this question, use a VAT rate of 20%. What is the price including VAT?

Price before VAT	€70
VAT at 20%	€14
Price including VAT	€84

Question 3

An electricity bill has a standing charge of €25. Each unit costs 30 cent, and 200 units are used. What is the total bill?

Standing charge	€25
200 units at 30 cent	€60
Total bill	€85

Question 4

A bill of €280 is shared equally between 4 people. How much does each person pay?

Question 5

€500 is invested at 10% compound interest per year. What is the amount after 2 years?

Start	End of year 1	End of year 2
€500	€550	€605

Question 6

Pack M costs €360 and contains 8 items. What is the cost of one item?

Question 7

An item costs €600 to buy. The shop marks it up by 15% on the cost price. What is the selling price?

A. €615

B. €690

C. €510

D. €90

Question 8

An item sells for €500. The margin is 40% of the selling price. What is the cost price?

A. €460

B. €700

C. €300

D. €200

Question 9

€350 is invested at 5% compound interest per year. What is the amount after 4 years? Give your answer to the nearest cent.

A. €405.17

B. €425.43

C. €367.50

D. €420.00

Question 10

In this fictional tax system, gross weekly pay is €920. Income tax is 20% on the first €600 and 40% on the rest. A further deduction of 10% of gross pay is taken. What is the net weekly pay?

A. €672

B. €460

C. €644

D. €580

Watch an explanation

Tulla Maths — Income tax and USC: the calculation method

Corbettmaths — Percentages: compound interest

Open the website chapter to load the embedded players. Use the rates and rules in your question for financial examples.

Self-check answers

Question 1

12

Question 2

84

Question 3

85

Question 4

70

Question 5

605

Question 6

45

Question 7

€690

Question 8

€300

Question 9

€425.43

Question 10

€580

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