Question 1

Question 4 **(Suggested maximum time: 10 minutes)**

Dermot has €5,000 and would like to invest it for two years. A special savings account is offering a rate of 3% for the first year and a higher rate for the second year, if the money is retained in the account. Tax of 41% will be deducted each year from the interest earned.

(a) How much will the investment be worth at the end of one year, after tax is deducted?

At the end of the first year, the gross interest earned will be 3% of the sum invested, so $5000 \times \frac{3}{100} = €150$. We must deduct 41% tax from the gross interest, so $150 - \left(150 \times \frac{41}{100}\right) = 150 - 61.50 = €88.50$ is the net interest earned. Thus at the end of the first year, the investment will contain the original amount plus the net interest earned: $5000 + 88.50 = €5{,}088.50$

(b) Dermot calculates that, after tax has been deducted, his investment will be worth €5,223.60 at the end of the second year. Calculate the rate of interest for the second year. Give your answer as a percentage, correct to one decimal place.

Firstly, note that instead of calculating 41% of the interest and then subtracting the tax, to find the net interest we can just find 59% of the gross interest.

The value of the investment at the start of the second year is the same as the value at the end of the first year. Let our new rate of interest be denoted by $i\%$. The gross interest earned at the end of the second year will be $5088.50 \times \frac{i}{100}$. The net interest earned at the end of the second year will be $5088.50 \times \frac{i}{100} \times \frac{59}{100}$. Thus the value of the investment at the end of the second year will be the net interest plus the value at the start of the second year:

$$5088.50 + \left(5088.50 \times \frac{i}{100} \times \frac{59}{100}\right) = 5223.60$$

$$\Leftrightarrow \quad 5088.50\left(1 + \frac{i}{100} \times \frac{59}{100}\right) = 5223.60$$

$$\Leftrightarrow \quad 1 + \frac{i}{100} \times \frac{59}{100} = \frac{5223.60}{5088.50}$$

$$\Leftrightarrow \quad \frac{i}{100} \times \frac{59}{100} = \frac{5223.60}{5088.50} - 1$$

$$\Leftrightarrow \quad i = \frac{10000}{59}\left(\frac{5223.60}{5088.50} - 1\right)$$

Thus, the rate of interest is $i = 4.5\%$ correct to one decimal place.

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Question 2

(i) Find the amount of USC that was deducted from Elena's gross income last year.

USC @ 2%: $0\cdot02\times10036=€200\cdot72.$

USC @ 4%: $16016-10036=€5980,$ and $0\cdot04\times5980=€239\cdot20.$

USC @ 7%: $36960-16016=€20944,$ and $0\cdot07\times20944=€1466\cdot08.$

Total USC $=€1906.$

(ii) The standard rate of income tax was 20% and the higher rate was 41%.
The standard rate cut-off point was €32 800.
Elena paid a total of €4965·60 income tax last year.

Find Elena's tax credits for the year.

Tax @ 20%: $0\cdot20\times32800=€6560\cdot00.$

Tax @ 41%: $36960-32800=€4160,$ and $0\cdot41\times4160=€1705\cdot60.$

Gross Tax: $€8265\cdot60.$

Tax Credits: $8265\cdot60-4965\cdot60=€3300.$

(iii) Find Elena's total deduction (USC and income tax) as a percentage of her gross income.
Give your answer correct to the nearest percent.

Total Deductions: $1906+4965\cdot60=€6871\cdot60.$

Total Deductions as % of Gross Income:

$$\frac{6871\cdot60}{36960}\times100=18\cdot59\ldots=19\%,$$ correct to the nearest percent.

8·65 × 0·7 = 6·055 which is 6·06 correct to two dps.
Or any other check.

(b) The government has decided that it is going to reduce all minimum wage rates by 6%. Calculate the new minimum wage for an experienced adult worker, correct to two decimal places, after this reduction.

8·65 × 0·94 = €8·13

(c) John is an experienced adult worker. After the reduction he says "If the minimum wage were to be increased by 6% then I would be back earning €8·65 per hour."
Is John's statement correct? Explain your answer.

No.
8·13 × 1·06 = €8·62
This is not as high as the original starting point.

Question 4

(a) Mary was going to America for a few months. She changed €1200 into US Dollars using the exchange rate in the table.

(i) How many dollars should she receive at this exchange rate?

$€1200 \times 1{\cdot}405 = \$1685{\cdot}4$

(ii) The bank charged 3% commission on the transaction. How many dollars did she receive?

$\$1685 \times 0{\cdot}97 = \$1634{\cdot}84$

(b) On returning to Ireland Mary had \$3060. She changed this amount into euro. The bank again charged her 3% commission on the transaction. She received €2047.
Find the exchange rate on that day, correct to two decimal places.

$$\frac{2047}{97} \times 100 = 2110{\cdot}3$$
$$2110{\cdot}3 \times R = 3060$$
$$R = 1{\cdot}45$$

$$360 \times 0{\cdot}03 = 91{\cdot}8$$
$$3060 - 91{\cdot}8 = 2968{\cdot}2$$
$$\frac{2968{\cdot}2}{2047} = 1{\cdot}45$$

(c) David changed a certain amount of sterling into euro at the exchange rate in the table above. A few days later he again changed the same amount of sterling into euro at a different exchange rate. He received fewer euro this time. No commission was charged on these transactions. Write down one possible value for the exchange rate for the second transaction.

1 Euro = £ 0·87315
=> £1 = 1·1453 Euro

€1 = anything greater than 0·87315

£1 = anything less than €1·1453