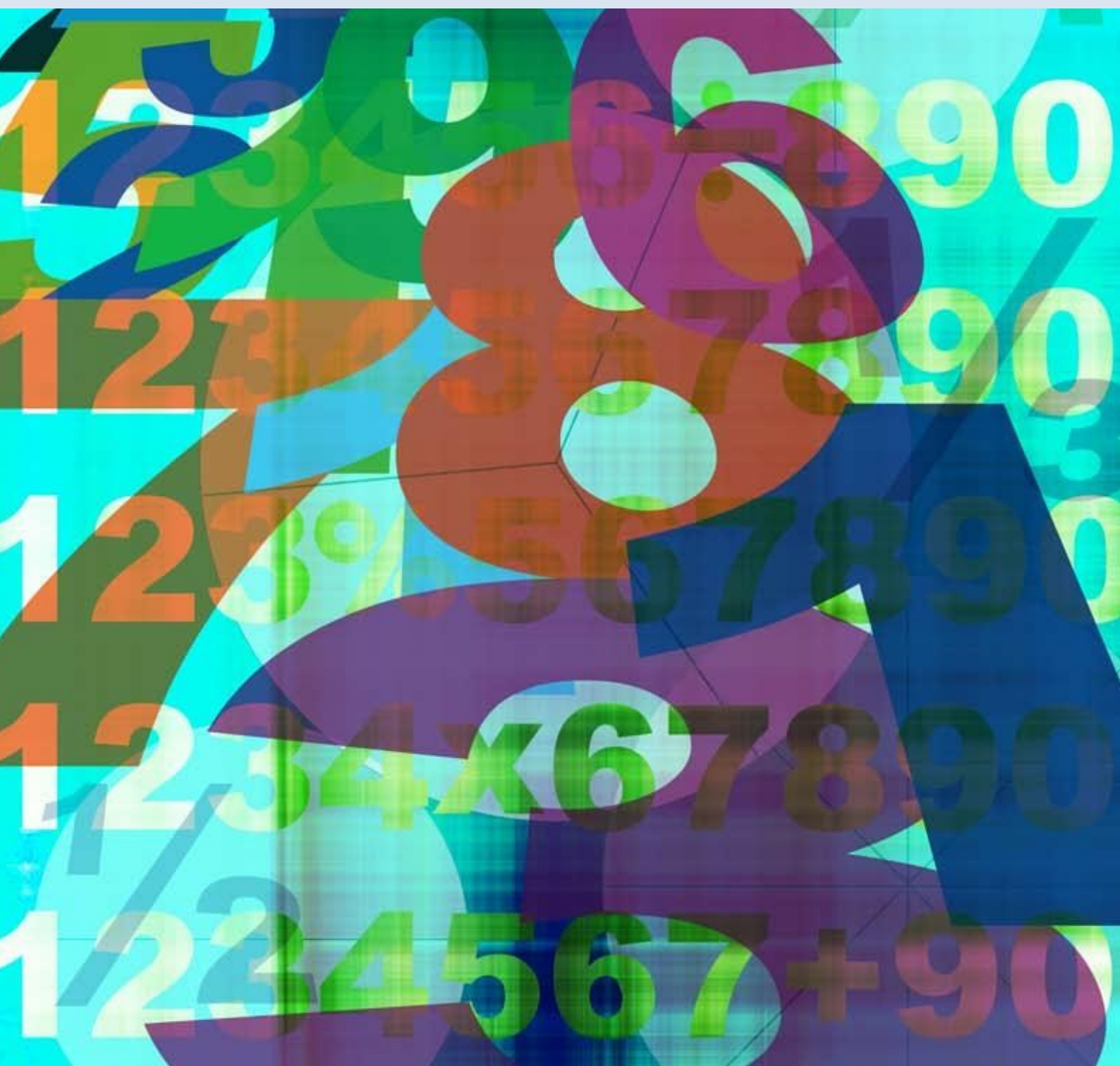


Answers to tasks in Learner Pack

Functional Mathematics

Level 4 Unit 1: Number



Functional Mathematics Level 4 Unit 1: Answers to tasks in Learner Pack

Acknowledgements

Acknowledgements

This booklet is part of a pack of resources for Functional Mathematics Level 4 which FÁS commissioned for use in their training programmes. A similar set of resources has been developed for Functional Mathematics Level 3.

A team from the National Adult Literacy Agency (NALA) and the National Centre for Excellence in Mathematics and Science Teaching and Learning (NCEMS-TL) developed and edited the materials.

NALA:

Bláthnaid Ní Chinnéide
Mary Gaynor
Fergus Dolan
John Stewart
Dr Terry Maguire (Institute of Technology, Tallaght)

NCEMS-TL:

Prof. John O'Donoghue
Dr. Mark Prendergast
Dr. Miriam Liston
Dr. Niamh O'Meara

FÁS:

John O'Neill
Louise MacAvin

We are grateful to Kathleen Cramer and her team in Newbridge Youth Training and Development Centre who gave feedback on extracts from the Level 3 materials.

Functional Mathematics Level 4 Unit 1: Answers to tasks in Learner Pack
Answers for Activity N1: Mountain climbing

Activity

Mountain climbing

N1

Task 1

a) Mount Brocken: 1,142

1 thousand

1 hundred

4 ten

2 ones or units

Torre de Cerrado: 2,648

2 thousands

6 hundreds

4 tens

8 ones

Mount Ortler: 3,902

3 thousands

9 hundreds

0 tens

2 ones

b) Spanish Mountain Range (Torre de Cerrado) = 2,648 metres.

Rounded to the nearest ten: 2,650 since $8 > 5$

Italian Mountain Range (Mount Ortler) = 3,902

Rounded to the nearest hundred: 3,900 since $0 < 5$

German Mountain Range (Mount Brocken) = 1,142

Rounded to the nearest thousand = 1,000 since $1 < 5$.

Functional Mathematics Level 4 Unit 1: Answers to tasks in Learner Pack

Answers for Activity N1: Mountain climbing

c) First we will round Mount Brocken to the nearest ten

Mount Brocken = 1,142

To the nearest ten = 1,140 (since $2 < 5$)

Carrantuohill = 1,038

To the nearest ten = 1040 (since $8 > 5$)

Difference (to the nearest ten) = $1,140 - 1040$

Difference (to the nearest ten) = 100 metres.

d) In 2013 members of On Top of the World will climb four mountains.

We will round the height of each of these mountains to the nearest hundred and add our answers to estimate the total number of metres climbed to the nearest hundred.

Mount Brocken = 1,100 metres

Torre de Cerrado = 2,600 metres

Mount Ortler = 3,900 metres

Croagh Patrick = 800 metres.

⇒ Approximate number of metres climbed = $1,100 + 2,600 + 3,900 + 800$

Number of metres climbed (to the nearest hundred) = 8,400 metres.

Option 2.

The other option is to add the heights of all the mountains together and then round that figure off to the nearest hundred.

$1,142 + 2,648 + 3,902 + 764 = 8456$.

Number of metres climbed is 8,500 to nearest hundred.

Functional Mathematics Level 4 Unit 1: Answers to tasks in Learner Pack
Answers for Activity N1: Mountain climbing

Task 2

Mountain Name	Actual Height	Height to the nearest ten	Height to the nearest hundred
Mount Everest	8,848 metres	8,850 metres	8,900 metres
K2	8,611 metres	8610 metres	8,600 metres
Kanchenjunga	8,586 metres	8,590 metres	8,600 metres
Lhotse	8,516 metres	8,520 metres	8,500 metres
Makalu	8,485 metres	8,490 metres	8,500 metres

Answers for Activity N2: Calculations

Activity

Calculations

N2

Task 1

a) Total bills is $€76.50 + €64.20 = 140.70$

Divided evenly between 2: $140.70 \div 2 = €70.35$

Each brother has to pay **€70.35**

b) Danny pays three quarters of gas bill

$\frac{3}{4}$ of 76.50

$$\frac{3}{4} = 0.75$$

$$0.75 \times 76.50 = \mathbf{€57.38}$$

Danny pays 30% of electricity bill, that is, 30 % of €64.20

$$30\% = 0.3$$

$$0.3 \times 64.2 = \mathbf{€19.26}$$

Danny pays altogether $€57.38 + €19.26 = \mathbf{€76.64}$

c) Danny's brother owes him $€76.64 - €70.35 = \mathbf{€6.29}$

Answers for Activity N2: Calculations

Task 2

$$\text{Area} = (\text{Width})^2.$$

We know that the area is 7.29m^2 .

$$7.29\text{m}^2 = (\text{Width})^2$$

So, to find the width we need to find the square root of both sides.

$$\sqrt{7.29\text{m}^2} = \sqrt{(\text{width})^2}$$

$$\sqrt{7.29\text{m}^2} = \text{width}$$

In your calculator press $\sqrt{\quad}$ then press 7.29 =

This will give you an answer of 2.7.

Therefore the width of the room is 2.7m.

Task 3

$$A = \pi r^2$$

$$A = \pi(3)^2$$

$$A = \pi(9)$$

$$A = 28.27$$

To the nearest square mile, the area of the region in which students do not pay a fee for the school bus is 28 square miles.

Functional Mathematics Level 4 Unit 1: Answers to tasks in Learner Pack
Answers for Activity N3: The solar system

Activity

The solar system

N3

Task 1

The distance between Pluto and Earth is 5.913×10^9 .

- a) In standard form this distance is 5,913,000,000 kilometres.
- b) In words this distance is five thousand, nine hundred and thirteen million.

Task 2

- a) The distance between the Sun and the Earth is 92,900,000 kilometres.

In words this is ninety two million, nine hundred thousand kilometres.

In scientific notation this is 9.29×10^7 .

- b) The distance between the Sun and the Moon is 150,000,000 kilometres.

In words this is one hundred and fifty million kilometres.

In scientific notation this is 1.5×10^8 .

Functional Mathematics Level 4 Unit 1: Answers to tasks in Learner Pack
Answers for Activity N3: The solar system

Task 3

a) The distance between the Earth and the Moon is 384,400 kilometres.

In words this is three hundred and eighty four thousand, four hundred kilometres.

In scientific notation this is 3.844×10^5 .

b) The distance between the Moon and Mars is 42,100,000 kilometres.

In words this is forty two million and one hundred thousand kilometres.

In scientific notation this is 4.21×10^7 .

Functional Mathematics Level 4 Unit 1: Answers to tasks in Learner Pack
Answers for Activity N4: Cost of construction -

Activity **Cost of construction** N4

Task 1

- a) Actual cost = £496,000,000
Estimated cost = £280,000,000
Difference = 496,000,000 – 280,000,000 = 216,000,000
Percentage Error = $\frac{216000000}{496000000} \times \frac{100}{1} \%$
Percentage Error = **43.55%**
- b) Actual cost = \$102,000,000
Estimated cost = £7,000,000
Difference = 102,000,000 – 7,000,000 = 95,000,000
Percentage Error = $\frac{95000000}{102000000} \times \frac{100}{1} \%$
Percentage Error = **93.14%**
- c) Actual cost = \$14,600,000,000
Estimated cost = £2,800,000,000
Difference = 14,600,000,000 – 2,800,000,000 = 11,800,000,000
Percentage Error = $\frac{11800000000}{14600000000} \times \frac{100}{1} \%$
Percentage Error = **80.82%**
- d) Actual total cost of all three projects =
496,000,000 + 102,000,000 + 14,600,000,000 = 15,198,000,000
Estimated total cost of all three projects =
280,000,000 + 7,000,000 + 2,800,000,000 = 3,087,000,000
Difference = 15,198,000,000 – 3,087,000,000 = 12,111,000,000
Percentage Error = $\frac{12110000000}{15198000000} \times \frac{100}{1} \%$
Percentage Error = **79.69%**

Answers for Activity N5: Interest

Activity

Interest

N5

Task 1

$$I = \frac{R}{100} \times P \times T$$

I = simple interest

R = 3%

P = 2,500

T = 5

$$I = \frac{3}{100} \times 2,500 \times 5$$

$$I = \frac{3}{100} \times 12,500$$

$$I = 0.03 \times 12,500$$

$$I = 375$$

Interest = €375.

Task 2

Total cost of repayments = $24 \times €22.50 = €540$

Original cost of dish washer was €470

Interest = $€540 - €470 = €70$

Answers for Activity N5: Interest

Task 3

a) Diarmuid needs to borrow: €9000 - €5000 = **€4000**

b) €4,800 - €4,000 = €800. He paid back €800 interest.

c) $I = 800$

$R = ?$

$P = 4000$

$T = 5$

$$800 = \frac{R}{100} \times 4000 \times 5$$

$$800 = \frac{R}{100} \times 20000$$

$$80000 = R \times 20000$$

$$R = \frac{80000}{20000}$$

$$R = 4\%$$

The rate of Diarmuid paid was 4%

Answers for Activity N6: Banking options

Activity

Banking options

N6

Task 1

a) $A = \text{Amount}$ $R = 4.2\%$ $P = 5,800$ $T = 3$

$$A = P \left(1 + \frac{R}{100} \right)^n$$

$$A = 5,800 \left(1 + \frac{4.2}{100} \right)^3$$

$$A = 5,800 (1 + 0.042)^3$$

$$A = 5,800 (1.042)^3$$

$$A = 5,800 (1.131)$$

$$A = 6,559.8$$

Amount = Principal + Interest

Therefore:

Interest = Amount – Principal

Interest = €6,559.80 - €5,800 = **€759.80**

Functional Mathematics Level 4 Unit 1: Answers to tasks in Learner Pack

Answers for Activity N6: Banking options

b) $A = \text{Amount}$ $R = 4.2\% \div 4 = 1.05\%$

$P = 5,800$ $n = 4$ times per year, for 3 years $n = 4 \times 3 = 12$

$$A = P \left(1 + \frac{R}{100} \right)^n$$

$$A = 5,800 \left(1 + \frac{1.05}{100} \right)^{12}$$

$$A = 5,800 (1 + 0.0105)^{12}$$

$$A = 5,800 (1.0105)^{12}$$

$$A = 5,800 (1.134)$$

$$A = 6,577.20$$

Amount = Principal + Interest

Therefore:

Interest = Amount – Principal

Interest = €6,577.20 - €5,800 = **€777.20**

Answers for Activity N6: Banking options

Task 2

Compound Interest

A = 6,000 R = 3% p.a. $\div 4 = 0.75\%$ quarterly

P = principal n = four times a year, 2 years $\times 4 = 8$ periods

$$A = P \left(1 + \frac{R}{100} \right)^n$$

$$6,000 = P \left(1 + \frac{0.75}{100} \right)^8$$

$$6,000 = P (1 + 0.0075)^8$$

$$6,000 = P (1.0075)^8$$

$$6,000 = P(1.0616)$$

$$\frac{6,000}{1.0616} = \frac{P(1.0616)}{1.0616}$$

$$5,651.85 = P$$

Therefore Laura had **€5,651.85**.

Answers for Activity N6: Banking options

Task 3

Compound Interest

$A = 8,000$ $R = 4\%$ p.a. $\div 4 = 1\%$ quarterly

$P =$ principal $n =$ four times a year, 2 years $\times 4 = 8$ periods

$$A = P \left(1 + \frac{R}{100} \right)^n$$

$$8000 = P \left(1 + \frac{1}{100} \right)^8$$

$$8000 = P(1 + 0.01)^8$$

$$8000 = P(1.01)^8$$

$$8000 = P(1.083)$$

$$\frac{8000}{1.083} = P$$

$$P = 7386.84$$

Ronan needs to lodge €7,386.84.

Answers for Activity N6: Banking options

Task 4

$$A = P\left(1 + \frac{R}{100}\right)^n$$

$$A = 315.70\left(1 + \frac{3.5}{100}\right)^1$$

$$A = 315.7(1 + 0.035)$$

$$A = 315.7(1.035)$$

$$A = 315.7(1.035)$$

$$A = 326.75$$

Interest = Amount - Principal

$$\text{Interest} = \text{€}326.75 - \text{€}315.70 = \text{€}11.05$$

Answers for Activity N7: Pay slips

Activity

Pay slips

N7

Task 1

Basic Salary of €1100

10% commission on any sales

10% of €2700

10% = 0.1

$0.1 \times 2700 = 270$

Gross monthly pay = Basic salary + 10% of any sales

Gross monthly pay = €1100 + €270 = **€1370**

Answers for Activity N7: Pay slips

Task 2

Name: Deirdre Staff Number: PRSI Number: Date:	Deductions												
Pay Basic Pay: 39 x €10.80 Overtime: 5 hours x time and a half Gross Pay = <input style="width: 100px;" type="text" value="502.20"/>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">USC 4%</td> <td style="width: 30%; text-align: right;"><input style="width: 80%;" type="text" value="20.09"/></td> </tr> <tr> <td>PAYE 20%</td> <td style="text-align: right;"><input style="width: 80%;" type="text" value="78.24"/></td> </tr> <tr> <td>PRSI 4%</td> <td style="text-align: right;"><input style="width: 80%;" type="text" value="15.65"/></td> </tr> <tr> <td>Pension €10.30</td> <td style="text-align: right;"><input style="width: 80%;" type="text" value="10.30"/></td> </tr> <tr> <td> Total Deductions</td> <td style="text-align: right;"> <input style="width: 80%;" type="text" value="124.28"/></td> </tr> <tr> <td> Net Pay</td> <td style="text-align: right;"> <input style="width: 80%;" type="text" value="377.92"/></td> </tr> </table>	USC 4%	<input style="width: 80%;" type="text" value="20.09"/>	PAYE 20%	<input style="width: 80%;" type="text" value="78.24"/>	PRSI 4%	<input style="width: 80%;" type="text" value="15.65"/>	Pension €10.30	<input style="width: 80%;" type="text" value="10.30"/>	 Total Deductions	 <input style="width: 80%;" type="text" value="124.28"/>	 Net Pay	 <input style="width: 80%;" type="text" value="377.92"/>
USC 4%	<input style="width: 80%;" type="text" value="20.09"/>												
PAYE 20%	<input style="width: 80%;" type="text" value="78.24"/>												
PRSI 4%	<input style="width: 80%;" type="text" value="15.65"/>												
Pension €10.30	<input style="width: 80%;" type="text" value="10.30"/>												
 Total Deductions	 <input style="width: 80%;" type="text" value="124.28"/>												
 Net Pay	 <input style="width: 80%;" type="text" value="377.92"/>												

Deirdre's Gross Pay:

$$39 \text{ hours at } \text{€}10.80 = \text{€}421.20$$

$$\text{Time and a half rate of pay} = (\text{€}10.80) \div 2 + \text{€}10.80 = \text{€}16.20$$

$$5 \text{ hours at } \text{€}16.20 = \text{€}81$$

$$\text{Gross pay} = \text{€}421.20 + \text{€}81 = \text{€}502.20$$

USC:

4% of gross income

$$0.04 \times \text{€}502.20 = 20.09$$

$$\text{USC} = \text{€}20.09$$

PAYE:

PAYE is calculated on gross income – tax credit

$$\text{€}502.20 - \text{€}111 = \text{€}391.20$$

PAYE rate is 20%

$$0.2 \times \text{€}391.20$$

$$\text{PAYE} = \text{€}78.24$$

Answers for Activity N7: Pay slips

PRSI:

PRSI is calculated on gross income – tax credit, that is, €391.20

PRSI rate is 4%

$$0.04 \times €391.20 = 15.65$$

$$\text{PRSI} = €15.65$$

Total Deductions:

$$\text{USC} = €20.09$$

$$\text{PAYE} = €78.24$$

$$\text{PRSI} = €15.65$$

$$\text{Pension} = €10.30$$

$$\text{Sum of deductions} = €124.28$$

$$\text{Net Pay} = \text{Gross Pay} - \text{Total Deductions} = €502.20 - €124.28$$

$$\text{Net Pay} = €377.92$$

Answers for Activity N8: Profit or loss

Activity

Profit or loss

N8

Task 1

Gross Profit = Income – Cost of Goods

Gross Profit = €42,528 – €21,494.57 = **€21,033.43**

Task 2

Profit and loss account

Total Payments (money received) €42,650

Profit: €42,650

Operating Costs

Road Tax & Insurance: €4,500

Maintenance & Diesel: €17,620

Advertising: €775

€22,895

Net profit: €19,755

Sean's salary is **€19,755**

Answers for Activity N8: Profit or loss

Task 3

Cost of labour = €9.80 x 6.5 = €63.70

Cost of materials = €22.60 x 3 = €67.80

Total cost of job = €63.70 + €67.80 = **€131.50**

Answers for Activity N9: The transfer window

Activity **The Transfer window** N9

Task 1

Profit = Selling Price - Cost Price

Profit = 50 million – 20 million = £30 million

Percentage Profit:

$$\frac{\textit{Profit}}{\textit{Cost Price}} \times 100$$

$$\frac{30}{20} \times 100$$

$$= \frac{3000}{20}$$

$$= 150\%$$

Liverpool made a percentage profit of **150%**

Answers for Activity N9: The transfer window

Task 2

a) Chelsea's percentage loss:

$$\text{Loss} = \text{Cost Price} - \text{Selling Price}$$

$$\text{Loss} = 17 \text{ million} - 5 \text{ million} = \text{£}12 \text{ million}$$

Percentage Loss:

$$\frac{\text{Loss}}{\text{Cost Price}} \times 100$$

$$= \frac{12}{17} \times 100$$

$$= \frac{1200}{17}$$

$$= 70.58823\%$$

$$= 70.59\%$$

Chelsea made a percentage loss of **70.59%**

Answers for Activity N9: The transfer window

b) Newcastle's percentage loss:

$$\text{Loss} = \text{Cost Price} - \text{Selling Price}$$

$$\text{Loss} = 5 \text{ million} - 2.5 \text{ million} = \text{£}2.5 \text{ million}$$

Percentage Loss:

$$\frac{\text{Loss}}{\text{Cost Price}} \times 100$$

$$= \frac{2.5}{5} \times 100$$

$$= \frac{250}{5}$$

$$= 50\%$$

Newcastle made a percentage loss of **50%**

Answers for Activity N9: The transfer window

Task 3

- a) Newcastle bought Given for €1.5 million and sold for €7 million, thus making a profit.

$$\text{Profit} = \text{Selling Price} - \text{Cost Price}$$

$$\text{Profit} = 7 \text{ million} - 1.5 \text{ million} = \text{€}5.5 \text{ million}$$

Percentage Profit:

$$\frac{\text{Profit}}{\text{Cost Price}} \times 100$$

$$\frac{5.5}{1.5} \times 100$$

$$= \frac{550}{1.5}$$

$$= 366.66667\%$$

$$= 366.67\%$$

Newcastle made a percentage profit of **366.67%**

Answers for Activity N9: The transfer window

- b) Manchester City bought Given for €7 million and made a percentage loss of 50 % when they sold him.

$$\text{Percentage Loss} = \frac{\text{Loss}}{\text{Cost Price}} \times 100$$

$$50 = \frac{\text{Loss}}{7} \times 100$$

$$350 = \text{Loss} \times 100$$

$$\text{Loss} = \frac{350}{100}$$

$$= 3.5 \text{ million}$$

Manchester City made a loss of **£3.5million** on the sale.

- c) Selling Price = Cost Price – Loss

$$\text{Selling Price} = 7 \text{ million} - 3.5 \text{ million}$$

$$\text{Selling Price} = \mathbf{£3.5 \text{ million}}$$

Answers for Activity N10: Value Added Tax

Activity

Value Added Tax

N10

Task 1

a) Standard rate = 23%

Reduced Rate = 13.5%

First we must work out the VAT Payable on each of these items.

Chocolate Cake: 13.5% of 4.50 = $0.135 \times 4.5 = 0.6075$

VAT Payable = **61 cent**

Six Pack of Beer = 23% of 10 = $0.23 \times 10 = 2.3$

VAT Payable = **€2.30**

Talcum Powder = 23% Of 3.25 = $0.23 \times 3.25 = 0.7475$

VAT Payable = **75 cent**

Now to find out the selling price of these products we must add the VAT to the cost price.

Chocolate Cake = $4.50 + 0.61$

Selling Price = **€5.11**

Six Pack of Beer = $10 + 2.3$

Selling Price = **€12.30**

Talcum Powder = $3.25 + 0.75$

Selling Price = **€4.00**

b) We know the VAT payable per chocolate cake is 61 cent and so if someone were to buy two chocolate cakes:

VAT Payable = $0.61 \times 2 = 1.22$

Similarly we know that the VAT Payable on a six pack of beer is 2.30 and so if someone were to buy two six packs:

VAT Payable = $2.30 \times 2 = 4.60$

⇒ Total VAT payable on this purchase = $1.22 + 4.60 = \mathbf{€5.82}$

Answers for Activity N10: Value Added Tax

- c) Revised Standard rate = 20%
Revised Reduced Rate = 11%

First we must work out the new VAT payable on each of the items:

Chocolate Cake: 11% of 4.50 = $0.11 \times 4.5 = 0.495$

VAT Payable = **50 cent**

Six Pack of Beer = 20% of 10 = $0.2 \times 10 = 2$

VAT Payable = **€2.00**

Talcum Powder = 20% of 3.25 = $0.2 \times 3.25 = 0.65$

VAT Payable = **65 cent**

Now we can find out the revised selling price of these products. To do this we **add the VAT to the cost price**:

Chocolate Cake = $4.50 + 0.50$

Selling Price = **€5.00**

Six Pack of Beer = $10 + 2$

Selling Price = **€12.00**

Talcum Powder = $3.25 + 0.65$

Selling Price = **€3.90**

Now we can calculate the difference between the original and revised prices. To do this we **subtract the revised price from the original price**:

Difference in price of chocolate cake = $5.11 - 5 = 11$ cent

Difference in price of beer = $12.3 - 12 = 30$ cent

Difference in price of talcum powder = $4 - 3.9 = 10$ cent

Answers for Activity N10: Value Added Tax

Task 2

- a) The total cost of the spa day for two people = $65 \times 2 = \text{€}130$.

Total cost = Original Price + VAT

$$\Rightarrow 113.5\% = 130$$

$$\frac{113.5}{113.5}\% = \frac{130}{113.5}$$

$$1\% = 1.1454$$

$$(1 \times 13.5)\% = (1.1454 \times 13.5)$$

$$13.5\% = 15.4629$$

The total VAT paid on this Spa Day vouchers was **€15.46**

- b) Total cost of hotel = 180

$$\Rightarrow 109\% = 180$$

$$\frac{109}{109}\% = \frac{180}{109}$$

$$1\% = 1.65$$

$$(1 \times 100)\% = (1.65 \times 100)$$

$$100\% = 165$$

The total cost of the hotel excluding VAT was **€165**

Answers for Activity N10: Value Added Tax

c) The total cost of the hotel excluding VAT was **€165**

The total cost of the spa day excluding VAT = $130 - 15.46 = \mathbf{€114.54}$

The total cost of the Spa Day and hotel stay excluding VAT was
 $114.54 + 165 = \mathbf{€279.54}$

Task 3

Answers will vary according to items purchased.



Ireland's EU Structural Funds
Programmes 2007 - 2013

Co-funded by the Irish Government
and the European Union

