RATIO

1 A football club sells tickets at different prices dependent on age group.

(a) (i) At one game, the club sold tickets in the ratio

under 18 : 18 to 60 : over 60 = 2 : 7 : 3.

There were 6100 tickets sold for people aged under 18.

Calculate the **total** number of tickets sold for the game.

.... [3]

(ii) Calculate the percentage of tickets sold for people aged under 18.

....% [1]

(b) The table shows the football ticket prices for the different age groups.

Age	Price
Under 18	$15
18 to 60	$35
Over 60	$18

At a **different** game there were 42 600 tickets sold.

- 14% were sold to people aged under 18
- $\frac{2}{3}$ of the tickets were sold to people aged 18 to 60
- The remainder were sold to people aged over 60

Calculate the total amount the football club receives from ticket sales for this game.

$ .... [5]

(c) In a sale, the football club shop reduced the price of the football shirts to $23.80 .
An error was made when working out this sale price.
The price was reduced by 30% instead of 20%.

Calculate the correct sale price for the football shirt.

$.. [5]

MARKING SCHEME:

(a)	**(i)**	36 600	3	**M2** for $6100 \div 2 \times (2 + 7 + 3)$ oe or **M1** for $6100 \div 2$ soi
	(ii)	$16\frac{2}{3}$ or 16.7 [16.66 to 16.67]	1	
(b)		1 231 708 final answer nfww	5	**M4** for $5964 \times 15 + 28\,400 \times 35 + 8236 \times 18$ or **M3** for 5964×15 **and** $28\,400 \times 35$ or for $5964 \times 15 + 42\,600 \times$ *their* decimal $\frac{2}{3} \times 35 + (42\,600 - 5964 - 42\,600 \times$ *their* decimal $\frac{2}{3}) \times 18$ or **M2** for 5964×15 **or** $28\,400 \times 35$ or for $42\,600 \times$ *their* decimal $\frac{2}{3} \times 35$ or **M1** for $0.14 \times 42\,600$ or $42\,600 \div 3 \times 2$
(c)		27.2[0] nfww	5	**M2** for $23.80 \div 0.7$ oe or **M1** for 23.80 associated with 70% oe and **M2** for *their* $(23.80 \div 0.7) \times 0.8$ or **M1** for *their* $(23.80 \div 0.7) \times 0.2$

2 An energy company charged these prices in 2013.

Electricity price	Gas price
23.15 cents per day plus 13.5 cents for each unit used	24.5 cents per day plus 5.5 cents for each unit used

(a) (i) In 90 days, the Siddique family used 1885 units of **electricity**.

Calculate the total cost, in dollars, of the electricity they used.

$ .... [2]

(ii) In 90 days, the **gas** used by the Khan family cost $198.16 .

Calculate the number of units of gas used.

.... units [3]

(b) In 2013, the price for each unit of electricity was 13.5 cents.
Over the next 3 years, this price increased exponentially at a rate of 8% per year.

Calculate the price for each unit of electricity after 3 years.

.... cents [2]

(c) Over these 3 years, the price for each unit of gas increased from 5.5 cents to 7.7 cents.

(i) Calculate the percentage increase from 5.5 cents to 7.7 cents.

.... % [3]

(ii) Over the 3 years, the 5.5 cents increased exponentially by the same percentage each year to 7.7 cents.

Calculate the percentage increase **each year**.

.... % [3]

(d) In 2015, the energy company divided its profits in the ratio

shareholders : bonuses : development $= 5 : 2 : 6$.

In 2015, its profits were $390 million.

Calculate the amount the company gave to shareholders.

$ .... million [2]

(e) The share price of the company in June 2015 was $258.25 .
This was an increase of 3.3% on the share price in May 2015.

Calculate the share price in May 2015.

$ .... [3]

MARKING SCHEME:

(a)(i)	275.31	**2**	**M1** for $90 \times 23.15 + 1885 \times 13.5$ oe
(a)(ii)	3202	**3**	**M2** for $\dfrac{198.16 - 90 \times 0.245}{0.055}$ oe **M1** for 90×0.245 or 90×24.5 oe
(b)	17.[0] or 17.00 to 17.01	**2**	**M1** for $13.5 \times \left(1 + \dfrac{8}{100}\right)^3$
(c)(i)	40	**3**	**M2** for $\dfrac{7.7 - 5.5}{5.5}$ [$\times 100$] oe or $\dfrac{7.7}{5.5} \times 100$ or **M1** for $\dfrac{7.7}{5.5}$ oe
(c)(ii)	11.9 or 11.86 to 11.87	**3**	**M2** for $\sqrt[3]{\dfrac{7.7}{5.5}}$ oe or **M1** for $5.5 \times x^3 = 7.7$ oe
(d)	150 [million] oe	**2**	**M1** for 390 [million] $\div (5 + 2 + 6)$
(e)	250 nfww	**3**	**M2** for $258.25 \div ((100 + 3.3) \div 100)$ or **M1** for 258.25 associated with 103.3[%]

3 **(a)** Annie and Dermot share $600 in the ratio 11 : 9.

    (i) Show that Annie receives $330.

[1]

    (ii) Find the amount that Dermot receives.

$ .... [1]

Q1 **(b)** **(i)** Annie invests $330 at a rate of 1.5% per year compound interest.

        Calculate the amount that Annie has after 8 years.
        Give your answer correct to the nearest dollar.

$ .... [3]

    (ii) Find the amount of **interest** that Annie has, after the 8 years, as a percentage of the $330.

.... % [2]

4 **(c)** Dermot has $70 to spend.
He spends $24.75 on a shirt.

   (i) Find $24.75 as a fraction of $70.
       Give your answer in its lowest terms.

.... [1]

   (ii) The $24.75 is the sale price after reducing the original price by 10%.

       Calculate the original price.

$ .... [3]

(d) After one year, the value of Annie's car had reduced by 20%.
At the end of the second year, the value of Annie's car had reduced by a further 15% of its value at the end of the first year.

   (i) Calculate the overall percentage reduction after the two years.

.... % [2]

   (ii) After three years the overall percentage reduction in the value of Annie's car is 40.84%.

       Calculate the percentage reduction in the third year.

.... % [2]

MARKING SCHEME:

(a)(i)	$600 \div (11+9) \times 11$ [$=330$] with no errors seen	**M1**	Could be in separate steps
(a)(ii)	270	**1**	
(b)(i)	372 cao nfww	**3**	**B2** for answer 371.7… or **M1** for $330 \times \left(1 + \dfrac{1.5}{100}\right)^8$ oe not spoiled After zero scored, **SC1** for answer 42 or 41.7…
(b)(ii)	12.6 or 12.7 or 12.63 to 12.73	**2**	**M1** for $\dfrac{their\,\textbf{(b)(i)} - 330}{330}$ or $\dfrac{their\,\textbf{(b)(i)}}{330} \times 100$ soi by 112.7 or 113 After zero scored, **SC1** for answer 12%
(c)(i)	$\dfrac{99}{280}$ cao final answer	**1**	
(c)(ii)	27.5[0]	**3**	**M2** for $24.75 \div \dfrac{100-10}{100}$ oe or **M1** for recognising 24.75 as 90[%] oe
(d)(i)	32 cao	**2**	**M1** for $\left(1 - \dfrac{20}{100}\right)\left(1 - \dfrac{15}{100}\right)[x]$ oe or for $0.15 \times 0.8\ [x]$ oe
(d)(ii)	13 cao	**2**	**M1** for $\left(1 - \dfrac{20}{100}\right)\left(1 - \dfrac{15}{100}\right) \times x = 40.84 - 32$ oe seen or for $their\,\textbf{(d)(i)} + \left(1 - \left(\dfrac{their\,\textbf{(d)(i)}}{100}\right)\right)x = 40.84$ oe

5 Adele, Barbara and Collette share $680 in the ratio 9 : 7 : 4.

(a) Show that Adele receives $306.

[1]

(b) Calculate the amount that Barbara and Collette each receives.

Barbara $ ....

Collette $ .... [3]

(c) Adele changes her $306 into euros (€) when the exchange rate is €1 = $1.125 .

Calculate the number of euros she receives.

€ .... [2]

(d) Barbara spends a total of $17.56 on 5 kg of apples and 3 kg of bananas.
Apples cost $2.69 per kilogram.

Calculate the cost per kilogram of bananas.

$ .... [3]

(e) Collette spends half of her share on clothes and $\frac{1}{5}$ of her share on books.

Calculate the amount she has left.

$ .... [3]

MARKING SCHEME:

(a)	$\dfrac{9}{9+7+4} \times 680$	1	
(b)	238 136	3	**B2** for 238 or 136 or **M1** for $\dfrac{7}{9+7+4} \times 680$ oe or $\dfrac{4}{9+7+4} \times 680$ oe seen
(c)	272	2	**M1** for $306 \div 1.125$
(d)	1.37	3	**M2** for $(17.56 - 5 \times 2.69) \div 3$ or **M1** for $17.56 - 5 \times 2.69$ or **B1** for 13.45 [cost of apples]
(e)	40.8[0]	3	**3FT** for $0.3 \times$ *their* 136 from part **(b)** or **M2** for *their* $136(\dfrac{1}{2} + \dfrac{1}{5})$ or better or **M1** for *their* $136 \times \dfrac{1}{2}$ or *their* $136 \times \dfrac{1}{5}$ or **B1** for 68 or 27.2 or $\dfrac{3}{10}$ or 0.3 seen