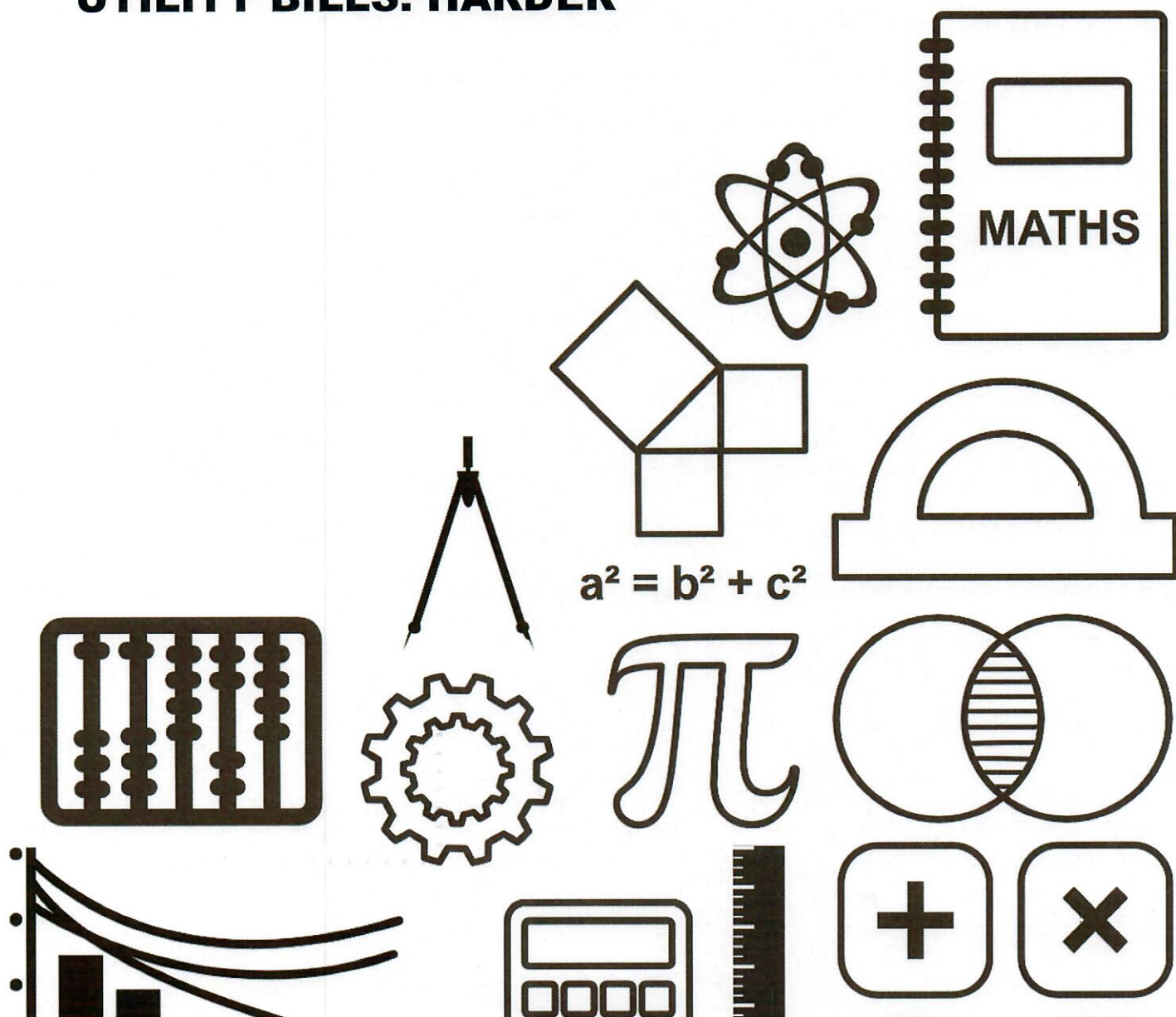


MATHSDIY

GCSE TOPIC BOOKLET UTILITY BILLS: HARDER

SOLUTIONS



1. Mr. Jones' electricity account with Welsh Energy, with some of the entries removed, is shown below.
He pays for his electricity by monthly direct debit payments. He gets a discount of £24.25 for paying in that way. Use the information given on the account to complete all of the missing entries and to calculate the balance in Mr. Jones' account.

Welsh Energy Account			Electricity		
Period: 1st March 2009 to 31st May 2009					
J Jones 13 Richmond Road Newport					
Meter reading last time	Meter reading this time	Tariff C-Customer reading E-Estimated reading	Units used	Price of each unit in pence	Amount £
7354	9734	Units used	2380	11.25	267.75
		Quarterly charge			27.14
		Total charges			294.89
		VAT at 5% of the total charge			14.74
		Balance from previous quarter			21.37 CR
		Total to pay			288.26
Payments received					
		Direct Debit Discount			24.25 CR
		Payment received 18th March 2009			85.00 CR
		Payment received 18th April 2009			85.00 CR
		Payment received 18th May 2009			85.00 CR
		Balance to carry forward to next quarter			9.01

Working

$$9734 - 7354 = 2380$$

$$2380 \times 11.25p = 26775p \div 100 = £267.75$$

$$267.75 + 27.14 = 294.89$$

$$VAT = \frac{5}{100} \times 294.89 = 14.7445 = £14.74$$

$$14.74 + 294.89 - 21.37 = £288.26$$

$$(3 \times 85) + 24.25 = 279.25$$

$$288.26 - 279.25 = £9.01$$

[6]

2. Mr Lucas received an electricity bill from R.H.T. Electricity Company. The bill, with some of the entries removed, is shown below.

Use the information given on the bill to complete all of the missing entries and calculate the total amount that Mr Lucas has to pay.

R.H.T. Electricity Company					
Bill period 31 st January 2010 to 1 st May 2010					
Mr Lucas 3 Hill Road Cwm CM34 7XX					
INVOICE					
Meter reading last time	Meter reading this time	Tariff C-Customer reading E-Estimated reading	Units used	Price of each unit in pence	Amount £
4318C	4878C	Units used	560	23.2	129.92
		Quarterly charge			28.88
		Total charge before V.A.T.			158.80
		V.A.T. at 5% of the total charge			7.94
		Total charge including V.A.T.			166.74
		Previous amount owing			12.00
		Amount to pay			178.74

Working. $4878 - 4318 = 560$
 $560 \times 23.2 = 12992p = \pounds 129.92$
 $129.92 + 28.88 = \pounds 158.80$
 $\frac{5}{100} \times 158.80 = \pounds 7.94$
 $158.80 + 7.94 = \pounds 166.74$
 $166.74 + 12 = \pounds 178.74$

[6]

3. (a) You will be assessed on the quality of your written communication in this part of the question.

Valley Water Company measures the water used by a household in cubic metres.

There is a quarterly standing charge of £7.45.

The first 25 cubic metres of water used are charged at a rate of 93 pence per cubic metre.

All further water used is charged at the rate of 132 pence per cubic metre.

Calculate the quarterly water bill for a household using 46 cubic metres of water.

$$\begin{array}{r}
 \boxed{46} \\
 \swarrow \quad \searrow \\
 25 \times 93 \qquad 21 \times 132 \\
 = 2325p \qquad = 2772p \\
 \text{Total water charges} = 2325p + 2772p = 5097p \\
 = \underline{\underline{£50.97}} \\
 \text{Add standing charge} \rightarrow \underline{\underline{£50.97}} + 7.45 = \underline{\underline{£58.42}}
 \end{array}$$

[6]

- (b) A different water company, Trevi Water, has a different scale of charges.

Trevi Water:

- Quarterly standing charge £4
- First 10 cubic metres per quarter at £1.50 per cubic metre
- All further water charged at £2 per cubic metre

Write down, in its simplest form, an expression for the quarterly bill in pounds for a Trevi Water customer who uses x cubic metres of water, where $x > 10$.

$$\begin{array}{r}
 4 + 1.5(10) + 2(x-10) \\
 = 4 + 15 + 2x - 20 \\
 = \underline{\underline{2x - 1}}
 \end{array}$$

[4]

4. Mr Jones' electricity quarterly statement from Welsh Energy is shown below.
Some of the entries have been removed.
He pays for his electricity by monthly direct debit payments.
He gets a discount of £27.50 for paying by direct debit.
Use the information given on the statement to complete all of the missing entries and to calculate the balance of Mr Jones' account.

Welsh Energy		Electricity Statement		
		Period: 1 st July 2012 to 30 th September 2012		
A Jones 54 Forest View Swansea				
Meter reading last time	Meter reading this time	Units used	Price of each unit in pence	Amount £
4267	4921	654	26.5	173.31
		Units used		
		Quarterly charge		30.45
		Total charge		203.76
		VAT at 5% of the total charge		10.19
		Balance from previous quarter		42.36 CR
		Total to pay		171.59
		Payments received		
		Direct Debit Discount		27.50 CR
		Payment received 18th July 2012		55.00 CR
		Payment received 18th August 2012		55.00 CR
		Payment received 18th September 2012		55.00 CR
		Balance to carry forward to next quarter		20.91 CR

Working

$$4921 - 4267 = 654$$

$$654 \times 26.5 = 17331p \div 100 = \pounds 173.31$$

$$173.31 + 30.45 = \pounds 203.76$$

$$\frac{5}{100} \times 203.76 = 10.188 = \pounds 10.19 \text{ (nearest penny)}$$

$$203.76 + 10.19 - 42.36 = \pounds 171.59$$

$$171.59 - (27.50 + 55.00 + 55.00 + 55.00) = -20.91$$

$$= \pounds 20.91 \text{ credit}$$

[6]

5. Mr. Williams' electricity account with Energy UK, with some of the entries removed, is shown below.
He pays for his electricity by monthly direct debit payments. He gets a discount of £26.25 for paying in that way. Use the information given on the account to complete all of the missing entries and to calculate the balance in Mr Williams' account.

Energy UK			Electricity Account		
			Period: 1 st July 2010 to 30 th September 2010		
Mr. Williams 54 Alder Road Cardiff					
Meter reading last time	Meter reading this time	Tariff C-Customer reading E-Estimated reading	Units used	Price of each unit in pence	Amount £
4865	6469	Units used	1604	12.5	200.50
		Quarterly charge			30.26
		Total charge before V.A.T.			230.76
		V.A.T. at 5% of the total charge			11.54
		Balance from previous quarter			17.82
		Total to pay			260.12
Payments received					
		Direct Debit Discount			26.25 CR
		Payment received 28 th July 2010			80.00 CR
		Payment received 28 th August 2010			80.00 CR
		Payment received 28 th September 2010			80.00 CR
		Balance to carry forward to next quarter			6.13 CR

Working.

$$\begin{aligned}
 6469 - 4865 &= 1604 & 1604 \times 12.5 &= 20050p \\
 & & &= \pounds 200.50 \\
 \pounds 200.50 + \pounds 30.26 &= \pounds 230.76 \\
 \frac{5}{100} \times 230.76 &= \pounds 11.538 = \pounds 11.54 \text{ (nearest penny)} \\
 \pounds 230.76 + \pounds 17.82 + \pounds 11.54 &= \pounds 260.12 \\
 \pounds 260.12 - (26.25 + 3 \times 80) &= -\pounds 6.13, \pounds 6.13 \text{ credit}
 \end{aligned}$$

[6]

6.

- (a) Mrs Ridgley is considering changing her electricity supplier from B Line Utilities to Domestic Utilities.
She usually uses 2400 units each year. $\rightarrow 365$ days
She has found the following information.

B Line Utilities:

standing charge 15.07p per day
cost per unit 11.51p

Domestic Utilities:

standing charge 15.82p per day
cost per unit 11.32p

Should Mrs Ridgley change her supplier?

You must show all your working and give reasons for your answer based on the possible savings made on her yearly bill.

B Line Utilities

$$2400 \times 11.51p = 27624p = \underline{\underline{£276.24}}$$

$$365 \times 15.07p = 5500.55p = \underline{\underline{£55.01}} \text{ (nearest penny)}$$

$$\underline{\underline{\text{Yearly bill}}} = \underline{\underline{£276.24}} + \underline{\underline{£55.01}} = \underline{\underline{£331.25}}$$

Domestic Utilities

$$2400 \times 11.32 = 27168p = \underline{\underline{£271.68}}$$

$$365 \times 15.82 = 5774.3p = \underline{\underline{£57.74}} \text{ (nearest penny)}$$

$$\underline{\underline{\text{Yearly bill}}} = \underline{\underline{£271.68}} + \underline{\underline{£57.74}} = \underline{\underline{£329.42}}$$

Yes. Mrs Ridgley should change supplier

$$\underline{\underline{£331.25 - £329.42 = £1.83 \text{ will be saved}}}$$

or

No. The prices are so similar it isn't worth bothering.

[7]

(b) Mrs Ridgley finds out later on, that VAT at 5% is payable on the cost of the standing charge and the units used.

Would this affect her decision? You must give a reason for your answer.

No. This would not alter which supplier is the most expensive. The prices would still end up quite similar, with Domestic being slightly cheaper. It is personal choice whether you think it is worth the effort of changing.

[1]