Childminding

Reasoning in the classroom

Support materials for teachers

Year 6

Llywodraeth Cymru
Welsh Government

Year 6 Reasoning in the classroom – Childminding

These Year 6 activities encourage learners to use a wide range of mathematical skills within real-life contexts.

Activity 1

Childminding
Learners solve a multi-step problem that involves time, money and interpreting information.
Includes:
- Childminding question
- Markscheme

Activity 2

How many adults?
They compare how childcare varies across five different countries, including Wales.
Includes:
- Explain and question – instructions for teachers
- Whiteboard – How many adults? 1
- Whiteboard – How many adults? 2
- Whiteboard – How many adults? 3
- Resource sheet – Nursery school, how many adults?

Activity 3

Will I be rich?
They consider the total amount that they might expect to earn in their working life.
Includes:
- Explain and question – instructions for teachers
- Whiteboard – Will I be rich?

Reasoning skills required

Identify
Learners select the appropriate mathematics and determine which techniques to use.

Communicate
They discuss and explain their work clearly, using appropriate mathematical language.

Review
They review their work and consider whether their findings are reasonable.

Procedural skills
- **Time**
- **Money**
- **Multiplication and division**
- **Use of a calculator**
- **Ratio**

Numerical language
- **Ratio**
- **Multiple**
- **Digits**

Childminding

Activity 1 – Childminding

Outline

Learners solve a multi-step problem using their knowledge of time and money. They also interpret information provided in tabular form.

You will need

Q **Childminding question**
One page for each learner

M **Markscheme**

Gwenan looks after children at these times in the week.

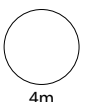|	Mon	Tues	Wed	Thurs	Fri
David	9am to 1pm	–	9am to 1pm	9am to 1pm	–
Minnie	8am to 5pm	8am to 5pm	8am to 5pm	8am to 5pm	8am to 5pm
Marc	–	1pm to 5pm	–	–	1pm to 5pm
Rhian	1pm to 5pm	–	1pm to 5pm	1pm to 5pm	–

For each child I am paid **£3.75** an hour.

Altogether, how much is Gwenan paid each week?

£

4m

Activity 1 – Childminding – Markscheme

Marks	Answer	
4m	**£288.75** (accept £289 and £290)	
Or 3m	Answer between **£270.00** and **£307.50** inclusive	◄ **Probable correct method, but with minor slips**
	Or	
	Shows **77 × 3.75**	◄ **Number of hours × rate per hour**
	Or	
	Shows both **48.75** and **63.75**	◄ **Reads the table vertically to find the pay per day for Tues (or Fri) and Mon (or Wed, or Thurs)**
	Or	
	Shows **30**, **45** and **168.75**	◄ **Reads the table horizontally to find the pay per child for Marc, David (or Rhian) and Minnie**
Or 2m	Shows **48.75** or **63.75**	
	Or	
	Shows any two of **30**, **45** and **168.75**	
	Or	
	Shows **77**	◄ **Total number of hours worked**
Or 1m	Shows **30** or **168.75** or **£45** (must have £ sign for 45 as this value is also hours per child)	
	Or	
	Shows both **13** and **17**	◄ **Reads the table vertically and finds the hours per day**
	Or	
	Shows any two of **8**, **12** and **45**	◄ **Reads the table horizontally and finds the hours per child**

Activity 1 – Childminding – Exemplars

1x = £3.75 2x = £7.00 3x = £10.75 4x = £15.00 15 + 15 + 15 + 15 5x 18.75 6x 22.50 £45 7x 26.25 8x 3000 9x 33.75 10x 37.50 (£1500) x 2 = 30 (30) (£45) (£45) (£68.75) £ 288.75	**Correct; 4 marks** • This learner would benefit from working more efficiently (multiplication is done by adding on) and improving their numerical communication. Nonetheless, the solution is correct.

	Mon	Tues	Wed	Thur	Fri	
David	9am to 1pm	–	9am to 1pm	9am to 1pm	–	56.27
Minnie	8am to 5pm	8am to 5pm	8am to 5pm	8am to 5pm	8am to 5pm	168.75
Marc	–	1pm to 5pm	–	–	1pm to 5pm	30
Rhian	1pm to 5pm	–	1pm to 5pm	1pm to 5pm	–	45

56.27 + 168.75 + 30 + 45 = 300.02

£ 300.02

Shows 30, 45 and 168.75; 3 marks

• This learner reads the table horizontally and finds the correct pay per day for Minnie, Marc and Rhian. David's total is incorrect. This shows the importance of reviewing work.

On Monday she does 4 + 8 + 4 = 16 so she gets 16 x £3.75 = £60 On Tuesday she does 8 + 4 = 12 so she gets 12 x £3.75 = £45 On Wednesday she does 4 + 8 + 4 = 16 so she gets 16 x £3.75 = £60 On Thursday she does 8 + 4 = 12 so she gets 12 x £3.75 = £45 On Friday she does 4 + 8 + 4 = 16 so she gets 16 x £3.75 = £60 £60 + £45 + £60 + £45 + £60 = £270 £ 270	**Answer £270; 3 marks** • This learner reads the table vertically but writes 8am to 5pm as 8 hours rather than 9 hours. The work is clearly laid out, but it would be more efficient to multiply Monday's total by 3 and Tuesday's total by 2.

4 4 4 45 9 9 9 9 9 32 4 4 4 4 4 £ 77	**Shows 77; 2 marks** • The number of hours has been worked out correctly but the final step of multiplying by the cost per hour is omitted.

David x3 4 x £3.75 = £15.00 = £45.00 + = £175 Minnie 9 x £3.75 = £33.75 x 4 = £135 Marc 5 x £3.75 = £18.75 x 2 = £37.05 rhian 5 x £3.75 = £18.75 x 3 = £56.25 £ 16624.50	**Shows £45; 1 mark** • This work is clearly set out but although the correct value is shown for David, the others are incorrect. It is not clear how £16624.50 has been found; it shows a lack of understanding about rates of pay in the real world!

Activity 1 – Childminding – Exemplars (continued)

Incorrect; 0 marks

Understanding what this learner is doing is difficult as there is no accompanying text. By not using a calculator, this learner made the task much too difficult, resulting in no marks. Knowing when to use a calculator is an important numerical skill.

	Mon	Tues	Wed	Thur	Fri
David	9am to 1pm	9am to 1pm	9am to 1pm	9am to 1pm	9am to 1pm
Minnie	8am to 5pm	8am to 5pm	8am to 5pm	8am to 5pm	8am to 5pm
Marc	1pm to 5pm	1pm to 5pm	1pm to 5pm	1pm to 5pm	1pm to 5pm
Rhian	1pm to 5pm	_ ?	1pm to 5pm	1pm to 5pm	_ ?

For each child I am paid **£3.75** an hour.

Altogether, how much is Gwenan paid each week?
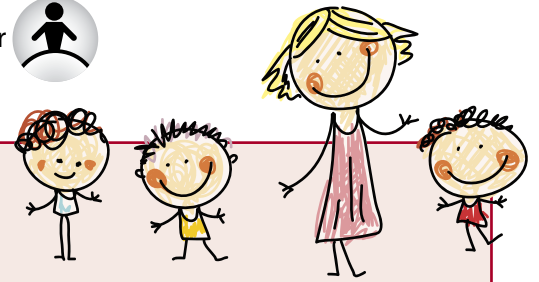
£

Incorrect; 0 marks

The inclusion of additional times on the table shows that this learner does not understand information presented in tabular form. This is a common error.

How many adults?

Activity 2 – How many adults?

Outline

This activity is designed to carry on from **Activity 1 – Childminding**.

Learners use real data to compare centre-based childcare across five different countries, including Wales.

You will need

WB	Whiteboard – How many adults? 1
WB	Whiteboard – How many adults? 2
WB	Whiteboard – How many adults? 3
R	Resource sheet – Nursery school, how many adults?

Activity 2 – How many adults?

Explain

Show **How many adults? 1** on the whiteboard, and tell learners that governments have laws about the minimum number of adults who must be with children at nursery schools. The more children there are, the more adults are needed, but the number of adults needed changes as the children get older.

Show **How many adults? 2** on the whiteboard and ask how many adults there must be. *(At least 2 for 6 children. Explain why at least 3 adults are needed for 8 children by saying that you can't have part of an adult.)* Then show **How many adults? 3** and ask how many children the 4 adults can look after. *(Up to 12)*

Now give learners the resource sheet **Nursery school, how many adults?** and explain that different countries have different laws. Make sure that learners understand the meaning of a ratio, e.g. 1 : 4, and ask them to work on the tasks shown.

Learners then work in their groups to solve the tasks.

Question

- Why do you think the ratios change for older children?

- How does the number of babies (up to one year) that 1 adult can look after vary in different countries?

- In France, 1 adult can look after 8 children that are one year old. In Finland, how many adults would you need for 8 children? *(At least 2)* What about in Wales? *(At least 3)*

- How are you working out the answers to task 1? Which ratios are easy to work out? Which are harder? Why?

- In task 2, what other numbers of children would be good for a nursery class in Wales to have? Why? *(24 is a good number because it is a multiple of 3, 4 and 8 so every adult is looking after the maximum number of children. Any other multiple of 3, 4 and 8, e.g. 48, would also be efficient.)*

Nursery schools

For one year olds in Wales,

there must be at least

1 adult for every 3 children.

1 adult for every 3 children.

6 children . . . how many adults?

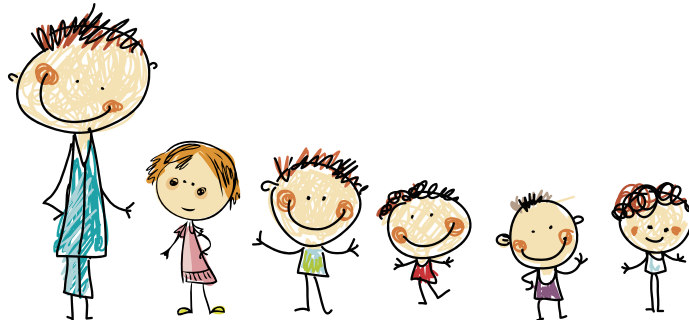8 children . . . how many adults?

1 adult for every 3 children.

4 adults . . . how many children?

	0 years old	1 year old	2 years old	3 years old	4 years old
Wales	1 : 3	1 : 3	1 : 4	1 : 8	1 : 8
France	1 : 5	1 : 8	1 : 8	1 : 8	1 : 8
Netherlands	1 : 4	1 : 5	1 : 6	1 : 8	1 : 10
Finland	1 : 4	1 : 4	1 : 4	1 : 7	1 : 7
Norway	1 : 8	1 : 8	1 : 8	1 : 17	1 : 17

Example: 1 : 5

There must be at least
1 adult for every 5 children.

Task 1: A nursery wants to have 20 children in each age group.
How many adults do they need?
How does this vary in different countries?

Task 2: Some adults plan to open a new nursery in Wales.
They want to have the same number of children in each age group.
Why would 24 be a good number of children to have?

What would be good numbers of children for other countries to have,
and why?

Will I be rich?

Activity 3 – Will I be rich?

Outline

This activity is designed to carry on from **Activity 2 – How many adults?** and/or from **Activity 1 – Childminding**.

Learners work out how much they might expect to earn in their lifetime, based on current average earnings in Wales.

They choose how to present their findings to the rest of the class. Materials can then be displayed in the classroom.

You will need

WB   **Whiteboard – Will I be rich?**

Activity 3 – Will I be rich?

Explain

Remind learners of the childminder in Activity 1, who earned £288.75 per week. Was this more, or less, than learners expected an adult to earn?

(Note: In October 2013 the minimum wage for adults aged 21 and over increased to £6.31 per hour. Working out how much an adult on the minimum wage might earn per week is a useful numerical activity, but this may be a sensitive topic for learners whose parents or carers are unemployed.)

Show learners **Will I be rich?** on the whiteboard *(source: WalesOnline, 22 November 2012)*.

Then ask them to work in groups/pairs to find out whether or not a million pounds is achievable. They will need to make some assumptions, e.g. the age at which they start and finish working. Remind them to show those assumptions, and their calculations, clearly when recording their findings.

Learners then compare findings and discuss.

Question

- What assumptions are you making? Have you written them down clearly?

- What calculations are you doing? Have you written them down clearly and have you checked them?

- What does a million look like when it is written using digits? What about ten million? Or one tenth of a million?

- Now that you know a million pounds is too much, how are you going to work out what the average wage would need to be? How do you 'undo' multiplication? How does that help?

- In real life, would you earn the same amount all of your life? Why not? What does inflation mean?

- If I earn twice as much as you and we both get a 10% pay rise, do we get the same amount extra? Why not?

Extension

- Suppose each year you had a 1% pay rise. So in year 1, you earned £369.35 per week, then in year 2 you earned 1% more, and so on. How many years would it take you to earn a million pounds in total? *(The use of a spreadsheet is recommended.)*
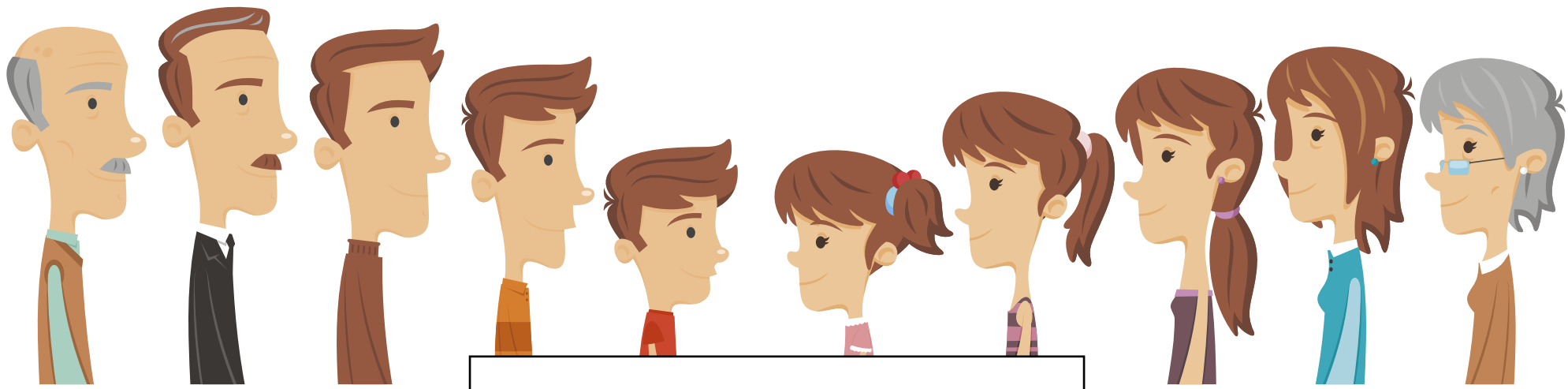
Average pay in Wales is
£369.35 per week

If you earned this amount every week for all of your working life,
in total would you earn a million pounds?

If not, what would your average pay per week need to be
for you to earn a million pounds in total?