



Developing **number**

Optional Skills Assessment Materials

Time



Optional Skills Assessment Materials

Developing number

Audience	Teachers at Key Stage 2, in particular those with Year 5 classes; local authorities; tutors in initial teacher training; and others with an interest in education.
Overview	These new materials support learning, teaching and assessment of learners' skills in Year 5. They are designed to assist schools in implementing the revised school curriculum and its frameworks.
Action required	Schools' senior managers and local authority advisers are requested to raise awareness of these new materials within their schools, and to encourage teachers to use the materials to support their focus on developing learners' skills.
Further information	Enquiries about this document should be directed to: Curriculum and Assessment Division Department for Children, Education, Lifelong Learning and Skills Welsh Assembly Government Cathays Park Cardiff CF10 3NQ Tel: 0800 083 6003 e-mail: C&A3-14.C&A3-14@wales.gsi.gov.uk
Additional copies	Can be obtained from: Tel: 0845 603 1108 (English medium) 0870 242 3206 (Welsh medium) Fax: 01767 375920 e-mail: dcells1@prolog.uk.com Or by visiting the Welsh Assembly Government's website www.wales.gov.uk/educationandskills
Related documents	<i>Optional Skills Assessment Materials for Year 5 – An overview;</i> <i>Optional Skills Assessment Materials: Developing communication;</i> <i>Optional Skills Assessment Materials: Developing thinking</i> (Welsh Assembly Government, 2009) These materials are also available in Welsh.

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Overview

Three related activities based around a central theme of time are provided:

- **Activity 1: The year on Earth**
- **Activity 2: The changing year**
- **Activity 3: Time zones**

In Activity 1, learners consider ways in which the passage of time on Earth is measured. Learners also consider rules that may be used to determine whether or not a given year is a leap year and the reason why leap years are necessary.

In Activity 2, learners consider the implications of measuring time when there are only 88 days in a year. Learners are also asked to carry out calculations, some of which are in unfamiliar contexts where there are no longer 365 days in a year.

In Activity 3, learners investigate the different times that clocks are set to in various places on Earth and the reason for this. The computer software **Time tracker** is provided to support this investigation. Learners also plan a 'world' tour, identifying time differences between the cities they choose to visit and distances travelled.

These activities are not timed assessment tasks, so you should feel free to adapt the materials provided to suit the needs of your learners.

The timings given at the beginning of each activity are suggestions. Some activities may take less time, while others may take considerably more. This will depend on the routes learners take and their interest in the activity itself.



Learner groupings

To promote collaborative learning, most activities are best undertaken by groups or pairs of learners who should be encouraged to share and discuss their ideas. At appropriate times, these groups could come together to present and compare their findings and the methods they use.

At other times, you may wish learners to work individually to provide evidence of their knowledge and skills. Consequently, the worksheets that accompany the activities can be used with groups, pairs or individuals as you consider appropriate.

Links to the skills framework

As learners engage with these materials they will generate evidence that contributes to their individual skills profile.

The 'Developing number across the curriculum' section of the skills framework has three main elements: **Use mathematical information**, **Calculate** and **Interpret and present findings**, with each of these sub-divided into a further two or three strands. These strands are referred to as 'principles' in the skills framework and are shown below.

Use mathematical information

- Using numbers
- Measuring
- Gathering information

Calculate

- Using the number system
- Using a variety of methods

Interpret and present findings

- Talking about and explaining work
- Comparing data
- Recording and interpreting data and presenting findings

Each principle contains six cells that correspond to stages in the development of the related skill. For example, the six cells identified in the **Measuring** principle are shown below.

Compare two or more objects by direct comparison of physical properties.	Measure and compare length and mass; order events in time.	Choose and use everyday units of measure and familiar measuring equipment; read scales to an appropriate degree of accuracy.	Use more precise measuring equipment with finer calibrations. Make reasonable estimates of a range of measures in everyday situations. Use correct units for compound measures such as volume, density or speed.	Read scales on a range of measuring equipment to given levels of accuracy.	Make accurate and reliable observations choosing suitable equipment; measure in a variety of appropriate units.
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Evidence generated by the activities can be linked with cells to provide an indication of an individual learner's progress in the related skill area.

However, when doing this you should bear in mind the following points:

- The evidence generated by the activities will be a small part of the overall evidence that is available to you.
- Much evidence will be generated during other day-to-day learning and teaching; significant elements of this should also contribute to the learner's skills profile.
- The evidence generated by any activity is likely to contribute to a variety of principles and cells.

This final point is of particular importance when you review the **What to look for** section included with each of the activities.

These sections are designed to make evidence gathering more manageable by deliberately focusing on just two or three of the eight principles. However, this means that only some of the evidence that emerges is being considered.

As your familiarity with each of the activities increases, you may find that you are able to incorporate more of the available evidence into a variety of other principles and/or cells.

Links to the curriculum

Science

Range: The sustainable Earth

1. the daily and annual movements of the Earth and their effect on day and year length

ICT

Skills: Find and analyse information

2. find information from a variety of sources for a defined purpose
3. select suitable information and make simple judgements about sources of information

Geography

Skills: Locating places, environments and patterns

1. identify and locate places and environments using globes, atlases and maps

Mathematics

Skills: 1. Solve mathematical problems

- select and use the appropriate mathematics, materials, units of measure and resources to solve problems in a variety of contexts

English (Oracy)

Skills:

3. communicate clearly and confidently, expressing opinions, adapting talk to audience and purpose, using appropriate gesture, intonation and register in order to engage the listener
4. develop their awareness of the social conventions of conversation and discussion

PSE

Skills: Developing thinking

- form personal opinions and make informed decisions

PSE

Skills: Developing communication

- listen carefully, question and respond to others

PSE

Skills: Working with others

- work cooperatively to solve problems

Activity 1: The year on Earth



Links to the skills framework

In order to make evidence gathering more manageable, it is suggested that you concentrate initially on each of the principles shown as a main focus in the table below.

Use mathematical information

- Using numbers
- Measuring
- Gathering information

Calculate

- Using the number system
- Using a variety of methods

Interpret and present findings

- Talking about and explaining work
- Comparing data
- Recording and interpreting data and presenting findings

Key

- Main focus ● Incidental focus
- No intentional focus

The **What to look for** section at the end of this activity provides an indication of some of the evidence that you might expect and the cells with which this evidence might be matched. However, it is important to appreciate that a range of other evidence may also be generated and that this may be more validly associated with other principles and/or cells.

Context

This activity is in two parts. Consequently, you may wish to spread it over two or more sessions.

In the first part of the activity, learners are asked to consider how the passage of time on Earth is measured. At one level, this may simply result in learners recalling a series of number facts, for example, 'Sixty minutes in an hour', 'Fourteen days in a fortnight', etc. At another level, it can provide the stimulus for some challenging computational work, for example, 'How many hours are there in a day? ...a week? ...a month?'.

The second part of the activity is based around leap years and provides further opportunities for learners to demonstrate their computational skills, as well as talking about and explaining their work.

Resources

Two activity sheets and one worksheet are provided.

Each group of learners will require a copy of Activity sheet 1 and, depending on your organisational preference, each group or individual learner will also require a copy of the worksheet.

The second activity sheet can be used to challenge some groups of learners further, if you consider this to be appropriate.

If you consider it appropriate, you may choose to provide calculators.

Activity 1 | The year on Earth

Developing the activity (part 1)

- Display Activity sheet 1 on the whiteboard and/or distribute a copy to each group of learners.
- Stimulate whole-class discussion and thinking by asking questions such as:
 - What does the activity sheet show?
 - Why is only part of the Sun shown?
 - What does 'orbit' mean?
 - What other planets orbit the Sun?
- As learners provide feedback, encourage other learners to comment and/or ask further questions.
- After the general introduction, ask learners to work in groups to produce as many facts as they can about time and the way it is measured.
- Although this is a group activity, each learner should initially take a turn suggesting a fact, e.g. 'Seven days in a week', 'Fifty-two weeks in a year', etc.
- The groups should be allowed to work with minimum input from you. However, if learners lack ideas, or need to be challenged to develop ideas further, make appropriate interventions, e.g. 'Can you work out the number of seconds in an hour? ...a day? ...a year?', 'How old are you in months? ...weeks? ...days?', etc.
- Careful observation of learners as they work will provide opportunities for gathering evidence relating to thinking, communication and number skills.

Time	Activity 1: The year on Earth	Activity sheet 1
It takes about $365\frac{1}{4}$ days for the planet Earth to orbit the Sun. This is a year on Earth. 		
What else do you know about time and the way it is measured? Some things to think about: • The number of months, weeks and days in a year. • The number of seasons in a year and the way the seasons are made up. • The number of hours, minutes and seconds in a day. Record your results. You may be asked to share these with other groups.		

- When all groups have completed their deliberations, bring them back together to share and compare their results.
- Selecting particular learners and asking appropriate questions, e.g. 'How many years are there in a decade? ...a century? ...a millennium?', will allow you to gather further evidence.
- Following the reporting back session, you may wish to allow further time for learners to follow up the ideas discussed.

Some examples of classroom practice

One teacher reported that, when discussing Activity sheet 1, learners were particularly interested in the size of the Sun in relation to the Earth. This promoted useful discussion about the size of the other planets and the Sun – information that the teacher was able to access from the internet and display on the whiteboard.

All learners then undertook the activity enthusiastically, working in mixed ability groups and producing a range of responses. The teacher noted that interest was maintained as learners were able to contribute at their own level.

Another teacher reported that her learners were able to identify common units of time in everyday use and state appropriate relationships between these. One group became particularly interested in the number of seconds in an hour, a day, a week, etc. and spent some time in working out the number of seconds in a month of 30 days, 31 days, 28 days and 29 days.

When reporting back, this group was challenged by another group, who claimed that the number of seconds in a year should be 29 030 400 and not the 31 536 000 that had been reported.

The difference was resolved when the first group explained that they had calculated the number of seconds in a day (86 400) and multiplied by 365, while the second group had found the number of seconds in a day and then multiplied by 7 (days in a week), by 4 (weeks in a month) and 12 (months in a year). Although different answers had been obtained, both groups were able to appreciate that they had carried out their calculations accurately based upon the logic they had applied and that the second group's answer was only an approximation.

Handwritten notes from a learner:

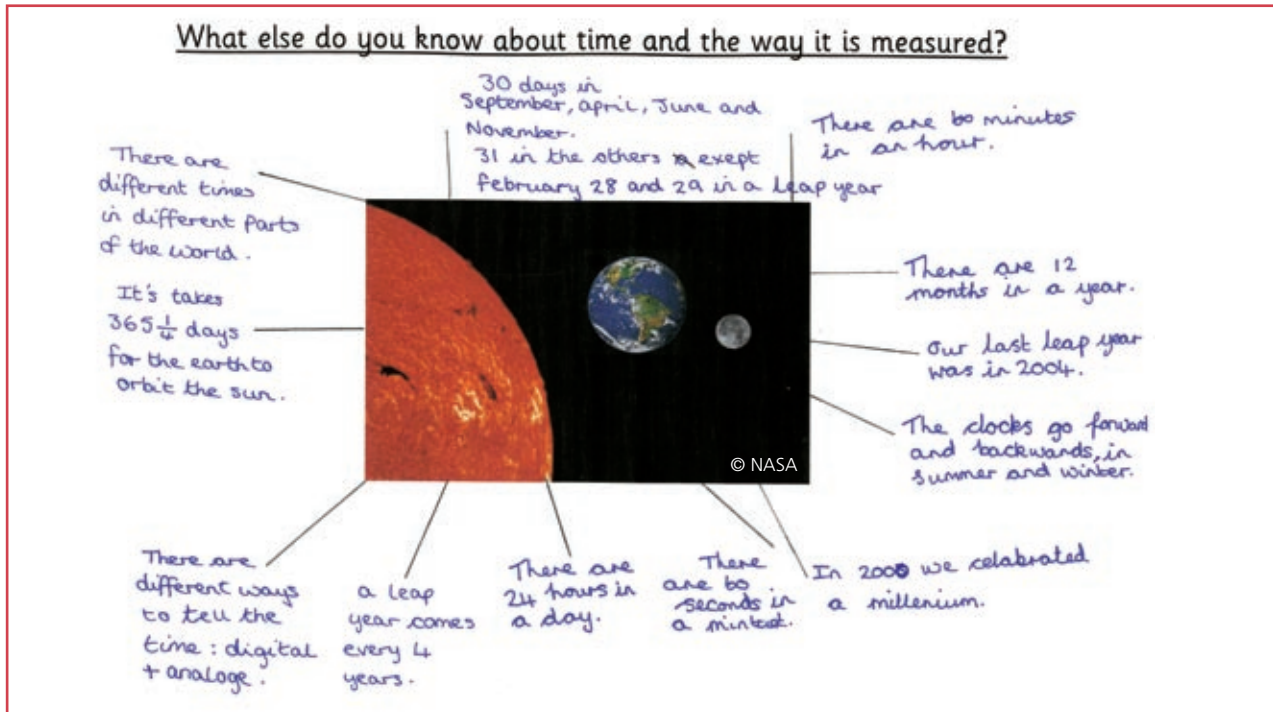
- 24 hours in a day.
- 12 months in a year.
- 4 seasons in a year.
- 86 400 seconds in a day.
- 1440 mins in a day.
- 60 mins in an hour.
- 60 seconds in a minute.
- 7 days in a week.
- 4 weeks approx in a month.
- 48 weeks in a year.
- 10 years in a decade.
- 1000 years in a millennium.
- 100 years in a century.
- 10 decades in a century.

Handwritten calculations from a learner:

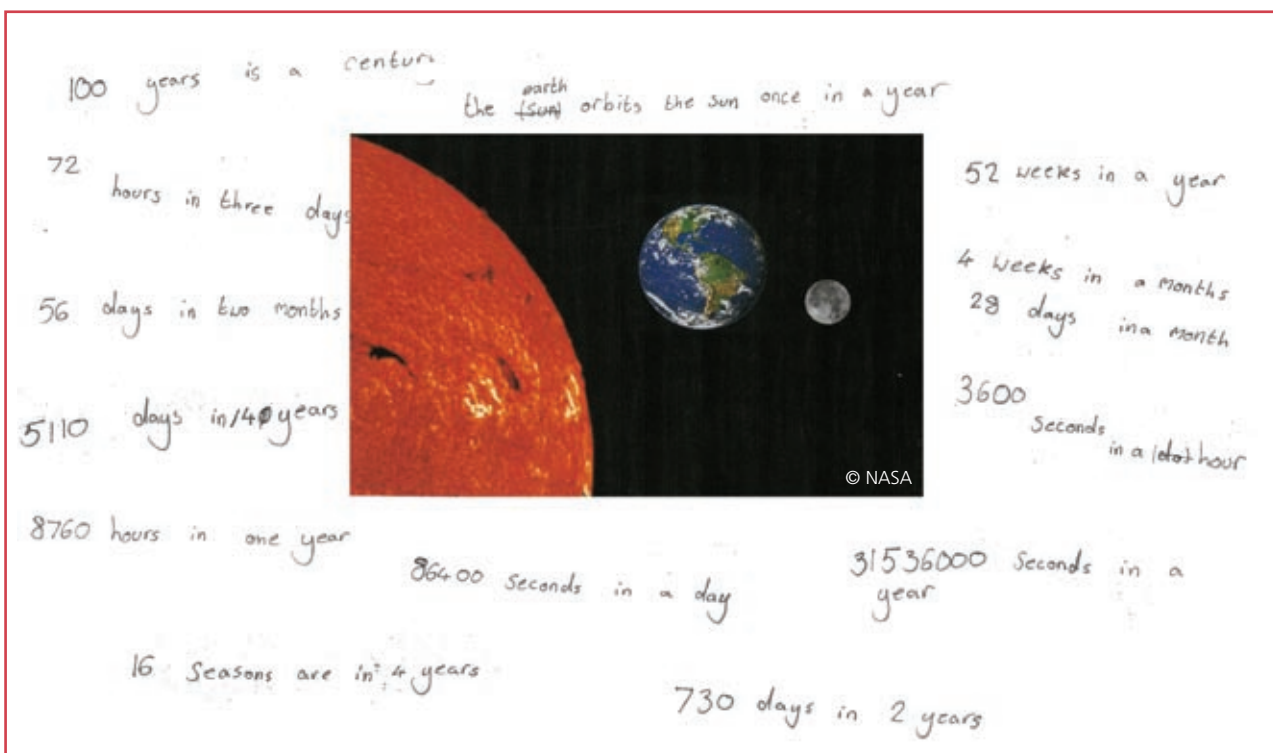
- 60 min = 1 hr
- 24 hr = 1 Day
- 300 min = 5 hr
- 600 min = 10 hr
- 1440 min = 1 Day
- 100 Yrs = 1 Century
- 1000 Yrs = 1 Millennium
- 10 Yrs = 1 Decade.
- 60 sec = 1 min
- ~~86 400~~ 365 Days = 1 yr
- 86 400 sec = 1 day
- 604 800 sec = 1 wk
- 2 592 000 sec = 1 Mth (30 Days)
- 2 678 400 sec = 1 Mth (31 Days)
- 2 419 200 sec = 1 Mth (28 Days)
- 2 505 600 sec = 1 Mth (29 Days)
- 31 536 000 sec = 1 yr
- 315 360 000 sec = 1 Decade
- 3600 sec = 1 hr

Activity 1 | The year on Earth

A third teacher decided not to use Activity sheet 1, but to link her introduction to work she had recently completed in science lessons. She also produced her own recording sheet, which prompted an interesting set of responses from her learners, an example of which is shown below.



During the reporting back session, the teacher focused attention on opportunities that exist for exploiting number work by asking questions such as, 'If there are 12 months in one year, how many months are there in three years?' and 'If there are 24 hours in one day, how many hours are there in seven days?'. Following the reporting back session, learners were given the opportunity to record similar relationships of their own.



Developing the activity (part 2)

- The second part of the activity is based around leap years. If learners have not already discussed leap years, provide a brief introduction, asking relevant questions to stimulate whole-class discussion and thinking.
- For example, does anyone have a family member or a friend born on the twenty-ninth of February? If so, how old is that person? Can they explain why an extra day is needed during a leap year? When do leap years occur?

Leap years are a consequence of the Earth's orbit of the Sun being slightly less than $365\frac{1}{4}$ days (365.2425... days). To ensure that our calendar remains in phase with the seasons, it is necessary to add 97 days every 400 years, which is approximately one day every four years.

- If necessary, tell learners that 2004, 2008 and 2012 are all leap years. Ask learners to identify some leap years after 2012. Can they find leap years before 2004? How do they know that these are leap years?
- You can make this task more accessible by focusing learners' attention on the relevant digits, e.g. 'Two thousand and **four**, two thousand and **eight**, two thousand and **twelve**. **Four, eight, twelve**. What numbers come next in this pattern?'
- To help further, you could ask learners to draw a number line or display one on the whiteboard.



- Next, display the worksheet on the whiteboard and/or distribute a copy to each group, pair or individual as you consider appropriate.

Time	Activity 1: The year on Earth	Worksheet
Name(s):		
Is it a leap year?		
 		
~~1964~~	1964	1565
~~2007~~		1962
2004		1801
1501		1844
2000		1744
1666		1480
1923		1360
1256		1200
Explain how you found your answers.		

- Stimulate whole-class discussion and thinking by asking questions such as:
 - What do you think you have to do?
 - What do the faces mean?
 - Why are some numbers crossed out?
 - What are the extra numbers for?
- Once learners have negotiated an understanding of what is required, ask them to complete the worksheet in groups, pairs or individually according to your organisational preference.
- When learners have had sufficient time to engage with the task, bring them back together to share and compare the methods they have used.

Activity 1 | The year on Earth

- During the activity, or while learners are reporting back, you may wish to show them a quick method for determining whether a four-digit number is divisible by 4 (see below).

Is 1916 divisible by 4?

Look at the last two digits of 1916

16 can be divided exactly by 4

So 1916 can be divided exactly by 4

- If appropriate, ask learners to check their results using this method.

- Can anyone explain why the quick method works?

The explanation is based around the fact that $1916 = 1900 + 16 = 19 \times 100 + 16$.

Since 100 is divisible by 4, it follows that any multiple of 100 (in this case 19×100) will also be divisible by 4.

It only remains to check that 16 can be divided exactly by 4 to confirm that 1916 is divisible by 4.

A similar explanation is valid for any number with three or more digits.

Developing the activity (a further challenge)

- Distribute a copy of Activity sheet 2 to those groups of learners for whom you consider it to be appropriate.

Time	Activity 1: The year on Earth	Activity sheet 2															
Some years that can be divided by 4 are not leap years. This chart can be used to identify leap years.																	
<pre> graph TD A[Write down the year.] --> B{Can the year be divided by 4?} B -- NO --> C[It is not a leap year.] B -- YES --> D{Can the year be divided by 100?} D -- NO --> E[It is a leap year.] D -- YES --> F{Can the year be divided by 400?} F -- YES --> G[It is a leap year.] F -- NO --> H[It is not a leap year.] </pre>																	
Use the chart to check whether the following years are leap years.																	
<table border="1"> <tbody> <tr> <td>2000</td> <td>2104</td> <td>1700</td> <td>2200</td> <td>2400</td> </tr> <tr> <td>1926</td> <td>1748</td> <td>1586</td> <td>1242</td> <td></td> </tr> <tr> <td>1500</td> <td>1800</td> <td>1600</td> <td>2313</td> <td>1910</td> </tr> </tbody> </table>			2000	2104	1700	2200	2400	1926	1748	1586	1242		1500	1800	1600	2313	1910
2000	2104	1700	2200	2400													
1926	1748	1586	1242														
1500	1800	1600	2313	1910													
Find other years that can be divided by 4, but are not leap years.																	

- Explain that most years that can be divided by 4 are leap years, but some are not. You may wish to explain that this is because the Earth's orbit of the Sun takes slightly less than $365 \frac{1}{4}$ days (see page 9).
- Allow time for the groups to engage with the task before bringing them back together to discuss their findings.
- Were any groups able to find other years that can be divided exactly by 4, but are not leap years? If so, can they articulate a rule for identifying these years?

The last two numbers will need to be noughts and the first two numbers mustn't be in the four times table.

If the year can be divided by 100, but not by 400, then it is not a leap year.

An example of classroom practice

All the learners were quick to appreciate the purpose of the worksheet and it was soon established that the smiley face indicated leap years, while the gloomy face indicated years that were not leap years.

However, when it came to sorting the years into the two different categories, there was a considerable range of approaches.

Some learners used prior knowledge, explaining that they had placed 2004 and 2000 in the leap years category, before using these and the two given answers (1964 and 2007) as reference points for determining other answers, for example:

- '1964 is a leap year, so 1962 can't be one'
- 'If you count on or back in fours from 2000 you will always get even numbers, so the odd years are not leap years'.

Other learners recognised that, since leap years occurred at four-yearly intervals:

- 'All you have to do is count in fours', or
- 'They are in the four times table'.

Some learners were able to explain that they had used division by 4 (see illustration opposite), while one group suggested that they only needed to look at the last two digits:

- 'Because the four times table keeps repeating itself'.

When asked what they meant, it was explained that:

- 'It goes 4, 8, 12, 16, 20 up to 100, and then 104, 108, 112 up to 1000, and then 1004, 1008. It goes on forever!'.

Those groups of learners that finished the worksheet before the end of the session were asked to discuss Activity sheet 2. This prompted a great deal of interest, with most learners enjoying the challenge of using the flow chart to filter out the leap years. The learners (and the teacher) were also surprised to find that leap years do not necessarily occur every four years.

Is it a leap year?

Is it a leap year?	Smiley Face (Leap Year)	Frowny Face (Not Leap Year)
1964	1964	1565
2007	2000	1962
2004	2004	1801
1501	2000	1844
2000	1480	1744
1666	1744	1480
1923	1666	1360
1256	1256	1200

Explain how you found your answers.

- ② We used the four times table.
- ① Find out if it is even.
- ③ We looked at the tens and the digits.

Is it a leap year?

Is it a leap year?	Smiley Face (Leap Year)	Frowny Face (Not Leap Year)
1964	1964	1565
2007	2004	1962
2004	2000	1801
1501	1844	1844
2000	1744	1744
1666	1480	1480
1923	1360	1360
1256	1200	1200

Explain how you found your answers.

If 4 goes into the number it is a leap year and if it doesn't it is not a leap year.

Activity 1 | The year on Earth

What to look for

Measuring

When compiling their facts, responding to questions and/or reporting back, are learners able to:

- compare two or more of the units of time in everyday use, e.g. 'A day is longer than an hour', 'A week is shorter than a month', etc. (Cell 1)
- order and use common relationships between units, e.g. '60 minutes in an hour', '24 hours in a day', 'seven days in a week', etc. (Cell 2)
- deduce further relationships between these units by using one or more conversions, e.g. 'Find the number of hours in a week... the number of minutes in a day... the number of seconds in a week' (Cell 3)?

Talking about and explaining work

When discussing their work, recording their findings and/or reporting back, are learners able to:

- talk about what they have done, referring to some of the numbers they have encountered (Cell 1)
- make comparisons, talking about and recording number relationships using appropriate language and symbols (Cell 2)
- use language associated with the passage of time and its measurement (Cell 3)
- use correct mathematical language, symbols and notation, e.g. when carrying out, recording or checking calculations (Cell 4)?

Using a variety of methods

When compiling their facts, responding to questions and/or investigating leap years, are learners able to:

- count-on in steps of four, perhaps with the help of a number line (Cell 1)
- count-on or back mentally in steps of four (Cell 2)
- carry out appropriate calculations using a variety of mental, written and calculator methods (Cell 3)
- check the accuracy of results using mental estimation, approximation and inverse operations to decide whether or not the results make sense (Cell 4)?

It takes about $365\frac{1}{4}$ days for the planet Earth to orbit the Sun.
This is a year on Earth.



What else do you know about time and the way it is measured?

Some things to think about:

- The number of months, weeks and days in a year.
- The number of seasons in a year and the way the seasons are made up.
- The number of hours, minutes and seconds in a day.

Record your results.

You may be asked to share these with other groups.

Name(s):

Is it a leap year?



~~1964~~

1964

2007

1565

~~2007~~

1962

2004

1801

1501

1844

2000

1744

1666

1480

1923

1360

1256

1200

Explain how you found your answers.

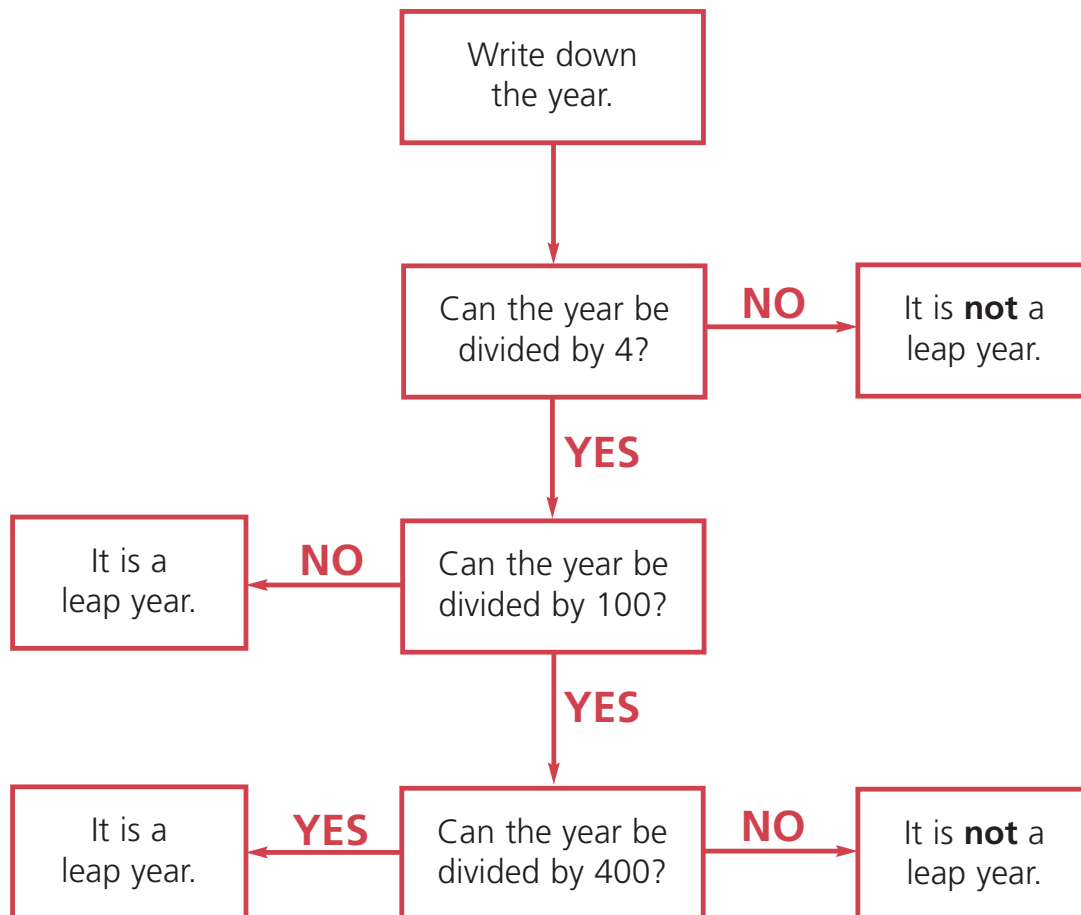
.....

.....

.....

Some years that can be divided by 4 are **not** leap years.

This chart can be used to identify leap years.



Use the chart to check whether the following years are leap years.

2000	2104	1700	2200	2400
1926	1748	1586	1242	
1500	1800	1600	2313	1910

Find other years that can be divided by 4, but are **not** leap years.

Activity 2: The changing year



Links to the skills framework

In order to make evidence gathering more manageable, it is suggested that you concentrate initially on each of the principles shown as a main focus in the table below.

Use mathematical information

- Using numbers
- Measuring
- Gathering information

Calculate

- Using the number system
- Using a variety of methods

Interpret and present findings

- Talking about and explaining work
- Comparing data
- Recording and interpreting data and presenting findings

Key

- Main focus ● Incidental focus
- No intentional focus

The **What to look for** section at the end of this activity provides an indication of some of the evidence that you might expect and the cells with which this evidence might be matched. However, it is important to appreciate that a range of other evidence may also be generated and that this may be more validly associated with other principles and/or cells.

Context

This activity is in two parts. Consequently, you may wish to spread it over two or more sessions.

In the first part of the activity, learners consider differences there might be in the way we would measure time if our year consisted of only 88 days. They then present their results in the form of a calendar. The intention is that learners should engage with number in a creative way, either by considering the implications of still having seven days in a week and four weeks in a month, or by considering some system to measure time, for example, one in which there are only four months of just 22 days in a year.

In the second part of the activity, learners are asked to carry out calculations, some of which are in unfamiliar contexts where there are no longer 365 days in a year.

Resources

For the first part of the activity, each group of learners will require a copy of the activity sheet provided. To help learners design their own calendar, you may wish to provide them with copies of a conventional calendar.

Each of the learners attempting the second part of the activity will require a copy of the worksheet provided.

When completing this worksheet, learners should have access to a calculator.

Activity 2 | The changing year

Developing the activity (part 1)

- Display the activity sheet on the whiteboard and/or distribute a copy to each group of learners.
- Stimulate whole-class discussion and thinking by asking questions such as:
 - How is this activity similar to Activity 1?
 - How is it different?
 - Why do you think it takes less time for Mercury to orbit the Sun?
 - What might happen with other planets?
- As learners provide feedback, encourage other learners to comment and/or ask further questions.
- After the general introduction, ask learners to work in groups to consider the differences there might be in the way we would measure time if our year consisted of only 88 days.
- This activity is intended to promote creative thinking and encourage learners to manipulate numbers in an imaginative way with the minimum input from you.
- However, if learners lack ideas or need to be challenged to develop ideas, make appropriate interventions, e.g. 'What if the 88 days were divided into five months?' or 'What if each week was only four days long?'.
- Encourage learners to present their ideas in the form of a calendar, inventing names for their months and days. To help with this aspect of the task (which may spread over more than one session), some conventional calendars should be available.

Time	Activity 2: The changing year	Activity sheet
It takes about 88 of our days for the planet Mercury to orbit the Sun. This is a year on Mercury.  Suppose there were only 88 days in our year. What differences might this make to the way we measure time? Some things to think about: • Would we need 12 months in our year? • How many days would we have in each month? • How many days would we have in a week? • What names would we give to each month? • What names would we give to each day? Design a calendar to show your ideas.		

- When you consider it appropriate, bring the groups together to share and compare their ideas.
- Selecting particular learners and asking appropriate questions, e.g. 'Why did you choose that number of days and months?' or 'What would happen if you altered the number of days in a week?', will allow you to gather further evidence.
- Following the reporting back session, you may wish to allow further time for learners to follow up the ideas discussed.

Mercury takes about 88 days to orbit the Sun and about 59 days to make a complete rotation on its axis. This means that there are about $1\frac{1}{2}$ Mercurian days in a Mercurian year! This is likely to prove an elusive notion for learners and it is not intended that they engage with it in this activity.

Some examples of classroom practice

The teacher provided a brief introduction in which learners were reminded of the number of days, weeks and months in a year on Earth. The activity sheet was then distributed and learners considered this in groups. Initially, the discussion centred around the relationship between the number of months in a year of 88 days and the number of days that should be allocated to each of these months. Eventually each group decided independently to have an equal number of days in their months, that is, 11 months of eight days, eight months of 11 days or four months of 22 days.

Discussion then turned to the number of days in a week. Some groups thought quite deeply about this and recognised that the number of days in a week did not have to divide exactly into the number of days in a month (see calendar produced by Group A), while other groups arrived at a more simplistic solution (see calendar produced by Group B).

Reflecting on the activity, the teacher reported that:

All the children enjoyed inventing names for their new months and days, although some got carried away and spent too long doing this! They were also excited at the prospect of making their own calendars on card – I promised them they could do this another time. Some even want to make a Mercurian calendar at the end of the year instead of the usual 'Earth' calendar we make!

- 8 months
- 11 days in a month
- Robin, Sparrow, Woodpecker, Bluejay, Dodo, Hawk, Seagull, Dove
- 5 days in a week
- Red, pink, blue, purple, orange

Group A

Calendar of the Year

	Robin	Sparrow	Woodpecker	Dove
Red	1 6 11	5 10	4 9	3 8
Pink	2 7	1 6 11	5 10	4 9
Blue	3 8	2 7	1 6 11	5 10
Purple	4 9	3 8	2 7	1 6 11
Orange	5 10	4 9	3 8	2 7

	BlueJay	Dodo	Hawk	Seagull
Red	2 7	1 6 11	5 10	4 9
Pink	3 8	2 7	1 6 11	5 10
Blue	4 9	3 8	2 7	1 6 11
Purple	5 10	4 9	3 8	2 7
Orange	1 6 11	5 10	4 9	3 8

Group B

1. Corlin			2. Ferry		
tach	1	12	tach	1	12
udors	2	13	udors	2	13
ism	3	14	ism	3	14
gering	4	15	gering	4	15
rono	5	16	rono	5	16
zabeth	6	17	zabeth	6	17
hem	7	18	hem	7	18
lucia	8	19	lucia	8	19
laves	9	20	laves	9	20
ative	10	21	ative	10	21
graphy	11	22	graphy	11	22

3. Stitch			4. Gold		
tach	1	12	tach	1	12
udors	2	13	udors	2	13
ism	3	14	ism	3	14
gering	4	15	gering	4	15
rono	5	16	rono	5	16
zabeth	6	17	zabeth	6	17
hem	7	18	hem	7	18
lucia	8	19	lucia	8	19
laves	9	20	laves	9	20
ative	10	21	ative	10	21
graphy	11	22	graphy	11	22

Activity 2 | The changing year

In another classroom, the teacher and learners began by considering a 2008 calendar, reviewing the number of months in a year, days in a month, etc. Attention was also given to the way in which the calendar was set out, in particular the way in which the days 'rolled over' at the end of each month.

The learners then worked in pairs, designing their own calendars based around a year of 88 days. Most pairs used numbers that divided exactly into 88, for example, four, 11 or 22 months in a year and 22, eight or four days in a month.

James and Rebecca decided upon a calendar of eight months, each containing 11 days. However, they ran into difficulties trying to over-lay this with a week of six days. Their solution was to label each of the dates within a particular month with the names of the days. Although not the neatest representation, this is practical and can be used to identify the day on any particular date.

Calendar

	Fayday	Arilsday	Fayday	Arilsday	Chocday	Fruitday	Arilsday	Fayday	Arilsday	Walday	Chocday
Mercury	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
Venus	Fruit	Fay	Arils	Fay	Wal	Choc	Fruit	Fay	Arils	Fay	Wal
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
Earth	Choc	Fruit	Fay	Arils	Fay	Wal	Choc	Fruit	Fay	Arils	Fay
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
Mars	Wal	Choc	Fruit	Fay	Arils	Fay	Wal	Choc	Fruit	Fay	Arils
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
Jupiter	Fay	Wal	Choc	Fruit	Fay	Arils	Fay	Wal	Choc	Fruit	Fay
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
Saturn	Arils	Fay	Wal	Choc	Fruit	Fay	Arils	Fay	Wal	Choc	Fruit
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
Uranus	Fay	Arils	Fay	Wal	Choc	Fruit	Fay	Arils	Fay	Wal	Choc
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
Neptune	Fruit	Fay	Arils	Fay	Wal	Choc	Fruit	Fay	Arils	Fay	Wal
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
Pluto	Fruit	Fay	Arils	Fay	Wal	Choc	Fruit	Fay	Arils	Fay	Wal
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th

Abby and Georgia decided that it was not necessary to work with factors of 88, and produced a calendar in which there were six months in the year and four days in a week.

Presenting each month as a two-way table overcomes the difficulties encountered by James and Rebecca. This is a strategy that interested all the learners in the reporting back session and one that James and Rebecca recognised they could use to improve their calendar.

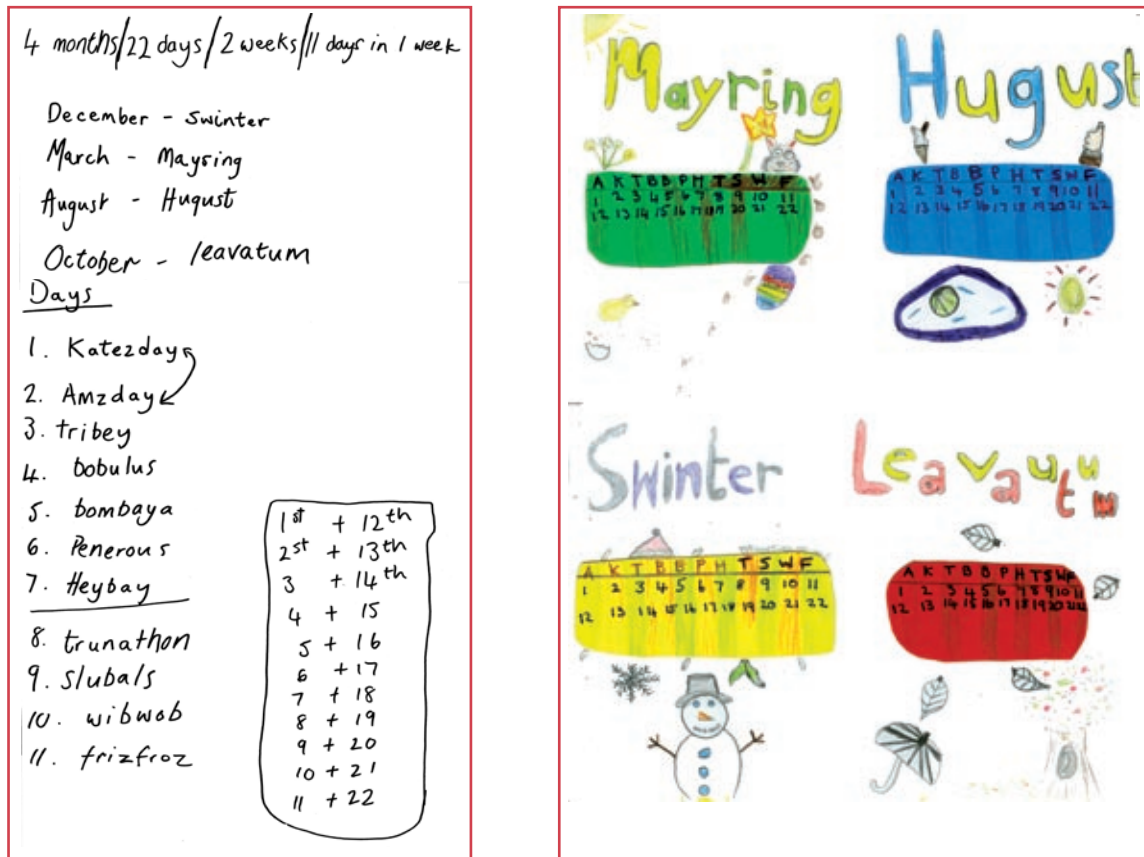
Reflecting on the activity, the teacher reported that:

The next time I use this activity I will challenge the children's thinking further by stipulating some features that they must include in their calendars, for example, the year must have 5 months.

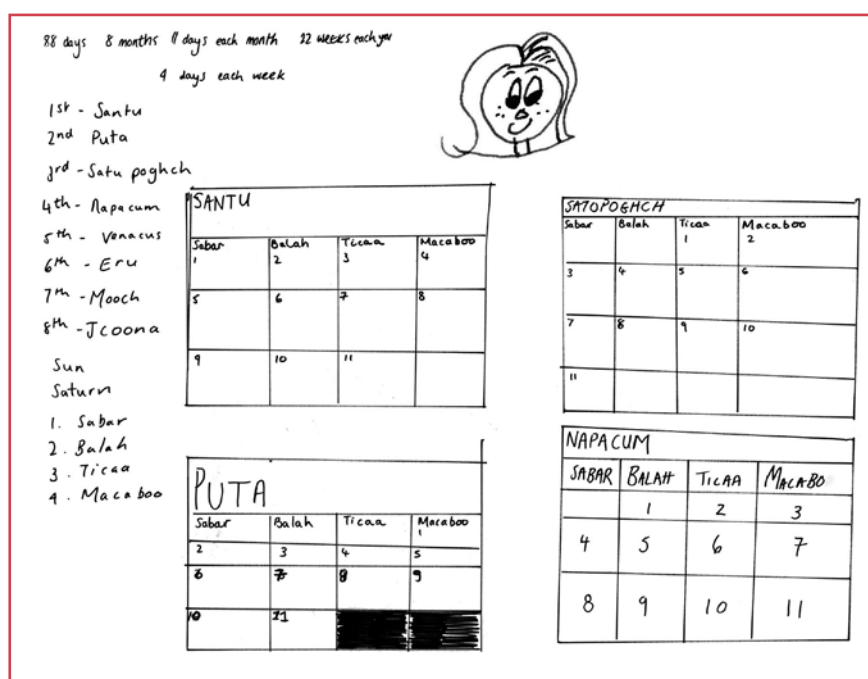
Georgia + Abby

1 <u>Aprich</u> ♥ blue 1 5 9 13 red 2 6 10 14 green 3 7 11 pink 4 8 12	2 <u>benig</u> ☼ blue 3 7 11 15 red 4 8 12 green 1 5 9 13 pink 2 6 10 14
3 <u>Carbis</u> ✱ blue 4 8 12 red 1 5 9 13 green 2 6 10 14 pink 3 7 11 15	4 <u>darbis</u> ✧ blue 1 5 9 13 red 2 6 10 14 green 3 7 11 15 pink 4 8 12
5 <u>enwy</u> ☹ blue 2 6 10 14 red 3 7 11 15 green 4 8 12 pink 1 5 9 13	6 <u>jindle</u> ☒ blue 3 7 11 red 4 8 12 green 1 5 9 13 pink 2 6 10 14

Another group of learners spent time discussing and planning their calendar, before producing this colourful representation.



This group also carefully planned their work, before producing their calendar on eight separate cards, four of which are shown.



Activity 2 | The changing year

Developing the activity (part 2)

- Distribute a copy of the worksheet to each of those learners for whom you consider it to be appropriate.
- Stimulate whole-class discussion and thinking by asking questions such as:
 - How old are you in years?
 - How old are you in years and months?
 - How could you work out your age in days?
 - How could you work out your age in years measured on Mercury?
- As learners provide feedback, encourage other learners to comment and/or ask further questions.
- After the general introduction, ask learners to complete the calculations. Although you may wish them to work in pairs or in groups, each learner should complete their own worksheet as it requires personal data.
- Some learners may be content to say that they are 10-years-old and work with a figure of 3650 days. Others may wish to work more accurately by including the months, weeks and even days since their date of birth.
- Similarly, when working out their age in Mercurian years, some learners may be content to divide 3650 by 88, while others will wish to work more accurately.
- Be flexible in what you accept, matching your expectations to the ability of the learner. You could challenge some learners even further by asking them if they can include extra days for any leap years that have occurred since their birth!
- Careful observation of learners as they work will provide opportunities for gathering evidence relating to thinking, communication and number skills.

Time	Activity 2: The changing year	Worksheet									
Name:											
You may use a calculator to answer the questions on this sheet.											
1. How old are you in Earth days?											
Show your working.											
2. On Mercury, there are 88 days in a year.											
Calculate your age in years measured on Mercury:											
Here are the times it takes some other planets to orbit the Sun. <table> <tr> <td>Venus</td> <td></td> <td>about 225 Earth days</td> </tr> <tr> <td>Mars</td> <td></td> <td>about 687 Earth days</td> </tr> <tr> <td>Jupiter</td> <td></td> <td>about 11 Earth years and 315 Earth days</td> </tr> </table>			Venus		about 225 Earth days	Mars		about 687 Earth days	Jupiter		about 11 Earth years and 315 Earth days
Venus		about 225 Earth days									
Mars		about 687 Earth days									
Jupiter		about 11 Earth years and 315 Earth days									
All images © NASA											
3. Calculate your age in years measured on:											
(a) Venus (b) Mars (c) Jupiter											

- When learners have had sufficient time to engage with the task, bring them back together to share and compare their results.
- Selecting particular learners and asking appropriate questions, e.g. 'How did you calculate your age in years measured on Mercury?' or 'What method did you use to divide by 88 and how can you check your answer?', will allow you to gather further evidence.
- Following the reporting back session, you may wish to allow further time for learners to follow up the ideas discussed.

An example of classroom practice

The teacher distributed a copy of the worksheet to each learner and asked how they might calculate their ages in Earth days. Jessie immediately responded, 'That's easy, I'm 10, so it's 365×10 days'. Luke commented that this was true 'Only if your birthday is today'. This promoted great interest, with all learners keen to work out their ages as accurately as possible. Consequently, the teacher suggested they spend some time doing this, working with a partner but using each of their own birth dates. Learners did this enthusiastically, before the teacher brought them back together to share and compare their results.

Jessica said her birthday was on the eleventh of October, so she was 10 years, six whole months and 27 days old. She explained her written calculations by saying the 20 days (which she had crossed out) were the 20 days until the end of October and, when this was added to the other seven days (it was now the seventh of May), it gave 27. Jessica had then worked out the total number of days (181) in November to April (inclusive) and combined this with the 27 days and the 10 years to find her answer.

Handwritten calculations for Jessica's age in Earth days:

10 years = 3650
 6 months 11 October
~~20 days~~
 27 days
 $30 + 31 + 31 + 28 + 30 = 181$
 $181 + 27 = 208$

$$\begin{array}{r} 3650 \\ 208 \\ \hline 3858 \end{array}$$

Month list (with days):
 30 September
 30 April
 30 June
 30 November
~~28 February~~
 31 January
 31 March
 31 July
 31 August
 31 October
 31 December
 31 May
 28 February

Rhys said his birthday was on the fourteenth of November, so there were 16 days he needed to count in that month, seven days in this month (May) and five other months to add to his 10 years.

Handwritten calculations for Rhys's age in Earth days:

10 years = 3650

$$\begin{array}{r} 31 \\ 31 \\ 28 \\ 31 \\ + 30 \\ \hline 151 \end{array}$$

$$\begin{array}{r} 151 \\ + 23 \\ \hline 174 \end{array}$$

$$\begin{array}{r} 3650 \\ + 174 \\ \hline 3824 \end{array}$$

Month list (with days):
 30 days Sep
 Apr
 June
 Nov
 31 almost
 28 Feb

Katie said it was easy for her, because she wouldn't be 10 until the sixteenth of May. This meant that all she had to do was, 'Take away 9 from 3650'.

Handwritten calculations for Katie's age in Earth days:

10 years = 3650 days
 $3650 - 9 = 3641$

Month list (with days):
 30 days Sep
 April
 June
 Nov
 31 all the rest
 28 Feb

Before moving on, Luke suggested that they put all their answers in order. He said that this would help them to check if they were correct because, 'We can see if they are in the same order as our birthdays'. The teacher said she thought this was a brilliant idea, so each learner proceeded to write his or her age on the whiteboard, checking that it was correctly positioned relative to the other learners. This also promoted a great deal of mental calculation as learners commented on how many days older or younger they were than their friends. Although none of the learners had attempted to take account of the number of leap years that had passed since their birth, the teacher thought that this didn't matter as everyone had done such a lot of excellent number work.

Activity 2 | The changing year

What to look for

Measuring

When discussing the activity sheet, designing their calendars and/or reporting back, are learners able to:

- identify the need to sub-divide the year into smaller units, e.g. 'You could still have weeks and months, but they would have fewer days' (Cell 1)
- suggest a way of defining a smaller unit, e.g. 'four months in a year' or '11 weeks in a year' or 'five days in a week' (Cell 2)
- establish relationships that could be used to measure the passage of time, e.g. 'eight months in a year, 11 days in a month, five days in a week' or 'nine months in a year, three weeks in a month, four days in a week' (Cell 3)?

Recording and interpreting data and presenting findings

When presenting their results, are learners able to:

- record the number of months in their year and the number of days in each of their months (Cell 1)
- itemise in a simple table or list, the number and names of the days they have identified (Cell 2)
- construct a calendar that incorporates, in a consistent manner, the days, weeks and months they have identified and the relationships they have used (Cell 3)?

Using a variety of methods

When calculating their age in days on Earth or in years measured on other planets, are learners able to:

- use a variety of mental strategies to add and subtract small numbers (Cell 2)
- use a variety of mental, written and calculator methods to obtain answers, interpreting these by referring to the size of numbers or the context, e.g. ' $3650 \div 225 = 16.22$, so I would be just over 16 years old' (Cell 3)
- check the accuracy of their results using mental estimation, approximation and inverse operations to decide whether or not the results make sense, e.g. ' $3650 \div 225$ is a bit less than $3600 \div 200 = 18$, so the answer seems about right' or ' 16.22×225 is about $16 \times 200 = 3200$ ' (Cell 4)?

It takes about 88 of our days for the planet Mercury to orbit the Sun.

This is a year on Mercury.



Suppose there were only 88 days in our year.

What differences might this make to the way we measure time?

Some things to think about:

- Would we need 12 months in our year?
- How many days would we have in each month?
- How many days would we have in a week?
- What names would we give to each month?
- What names would we give to each day?

Design a calendar to show your ideas.

Name:

You may use a calculator to answer the questions on this sheet.

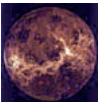
1. How old are you in Earth days?

Show your working.

2. On Mercury, there are 88 days in a year.

Calculate your age in years measured on Mercury.

Here are the times it takes some other planets to orbit the Sun.

Venus  about 225 Earth days

Mars  about 687 Earth days

Jupiter  about 11 Earth years and 315 Earth days

All images © NASA

3. Calculate your age in years measured on:

(a) Venus (b) Mars (c) Jupiter

Activity 3: Time zones



Links to the skills framework

In order to make evidence gathering more manageable, it is suggested that you concentrate initially on each of the principles shown as a main focus in the table below.

Use mathematical information

- Using numbers
- Measuring
- Gathering information

Calculate

- Using the number system
- Using a variety of methods

Interpret and present findings

- Talking about and explaining work
- Comparing data
- Recording and interpreting data and presenting findings

Key

- Main focus ● Incidental focus
- No intentional focus

The **What to look for** section at the end of this activity provides an indication of some of the evidence that you might expect and the cells with which this evidence might be matched. However, it is important to appreciate that a range of other evidence may also be generated and that this may be more validly associated with other principles and/or cells.

Context

This activity is in two parts. Consequently, you may wish to spread it over two or more sessions.

In the first part of this activity, learners investigate the different times that clocks are set to in various cities around the world and consider reasons for this.

In the second part of the activity, learners plan a world tour in which they visit four cities. Learners present reasons for their choice of city and investigate time differences and distances between each of their chosen cities.

Resources

Each group of learners will need a copy of the activity sheet provided. Learners also need access to the computer software **Time tracker** that is provided on the CD.

Depending on your organisational preference, each group, pair or individual learner will also require copies of the two worksheets provided.

When completing the second worksheet, learners should have access to a calculator and the internet. If the internet is not available, you will need to ensure that suitable reference material is to hand and allow additional time for research.

In addition, it is recommended that you provide globes, atlases and/or maps to help learners appreciate more fully the geographical relationships between the various cities and countries they consider.

Activity 3 | Time zones

Developing the activity (part 1)

- Display the activity sheet on the whiteboard and/or distribute a copy to each group of learners.
- Stimulate whole-class discussion and thinking by asking questions such as:
 - What does 'rotate' mean?
 - Why is it day-time in some places and night-time in others?
 - Why are clocks set to different times in some countries?
 - What would happen if all countries set their clock to the same time?
 - Does anyone have experience of time differences, e.g. by travelling abroad, phoning a relative in Canada or watching a sports event in Australia?
- As learners provide feedback, encourage other learners to comment and/or ask further questions.
- After the general introduction, distribute a copy of Worksheet 1 and ask learners to use the computer software **Time tracker** to investigate the time in the cities shown.
- Careful observation of learners as they work will provide opportunities for gathering evidence relating to thinking, communication and number skills.
- When you consider it appropriate, bring learners back together to share and compare their findings.
- Selecting particular learners and asking appropriate questions, e.g. 'How did you work out the time difference between Sydney and New York?' or 'How can you check your answer?', will allow you to gather further evidence.
- Following the reporting back session, you may wish to allow further time for learners to follow up the ideas discussed.

Time	Activity 3: Time zones	Activity sheet
	The Earth rotates on its axis as it orbits the Sun. At any time, some parts of the Earth face the Sun and others do not.  © NASA This means that when it is day-time in Britain it is night-time in other places. To allow for this, people in different places set their clocks to different times. Investigate the time in different cities around the world. Some things to think about: • What is the time now in... Paris... Athens... New York? • Why is time ahead of us in some countries and behind in others? • What are time zones?	



Some examples of classroom practice

For this session, learners worked in groups of three in the computer laboratory. Because of this, the teacher decided to dispense with the activity sheet and to begin by discussing learners' own experiences of time differences. These turned out to be considerable, since everyone had watched sporting events from other countries on television, while many learners had travelled to, or had relatives living in, countries situated in other time zones.

Learners were then asked to run the **Time tracker** software and to discuss what they thought it was all about. Learners were very motivated by the map of the world and soon discovered that they could identify cities and local times by clicking on the various locations. As learners discussed the cities, the teacher encouraged them to use directional language and compass bearings, for example, 'Brasilia is west of Kinshasa and south of New York'.

Once the initial excitement had died down, the teacher distributed Worksheet 1 and asked learners to consider this. Most learners were quick to complete the last two columns in the table, although some learners were unsure about the countries associated with some of the cities. As the learners worked, the teacher was able to gather further evidence by asking appropriate questions, for example, 'What is the time difference between Baghdad and Tokyo?... New York and Los Angeles?... Sydney and Brasilia?...', etc.

To conclude the session, the teacher brought the learners together to share and compare their answers and to discuss the methods used. Rachel explained that, since Wellington is twelve hours in front of us, 'It will be two o'clock tomorrow morning there', while Liam noted that it was midnight in Sydney.

Some learners reported finding the final question on the worksheet quite challenging. Problems were caused by learners trying to combine the

Time	Activity 3: Time zones	Worksheet 1	
Name(s): <u>Rachel + Rhys + Cari</u>			
Suppose the time in Wales is 2:00p.m.			
1. Complete this table.			
City	Country	Time difference (hours)	Time
Kinshasa	Congo	+1	3 p.m.
Baghdad	<u>Iraq</u>	+3	5 a.m.
Tokyo	<u>Japan</u>	+9	11 p.m.
New York	<u>U.S.A</u>	-5	9 a.m.
Sydney	<u>Australia</u>	+10	12 p.m.
Los Angeles	<u>U.S.A</u>	-8	6 a.m.
Brasilia	<u>Brazil</u>	-4	10 a.m.
Chicago	<u>U.S.A</u>	-6	8 a.m.
Wellington	<u>New Zealand</u>	+12	2 a.m.
2. Find the time difference between Sydney and:			
(a) Tokyo <u>1 hour</u> (b) New York <u>15 hours</u> (c) Chicago <u>16 hours</u>			
3. If it is 7:15am in Brasilia, write down the time in:			
(a) Cardiff <u>11:15am</u> (b) Baghdad <u>2:15pm</u> (c) Tokyo <u>8:15pm</u>			

time differences between Brasilia and Baghdad and/or Brasilia and Tokyo. Joshua explained that, 'It's easier if you work off Cardiff time'. When asked what he meant, Joshua said, 'Well, Brasilia is four hours behind Cardiff, so it's quarter past eleven in Cardiff. Baghdad is three hours in front of Cardiff. That makes it quarter past two. Tokyo is nine hours in front of Cardiff, so it's quarter past eight there'.

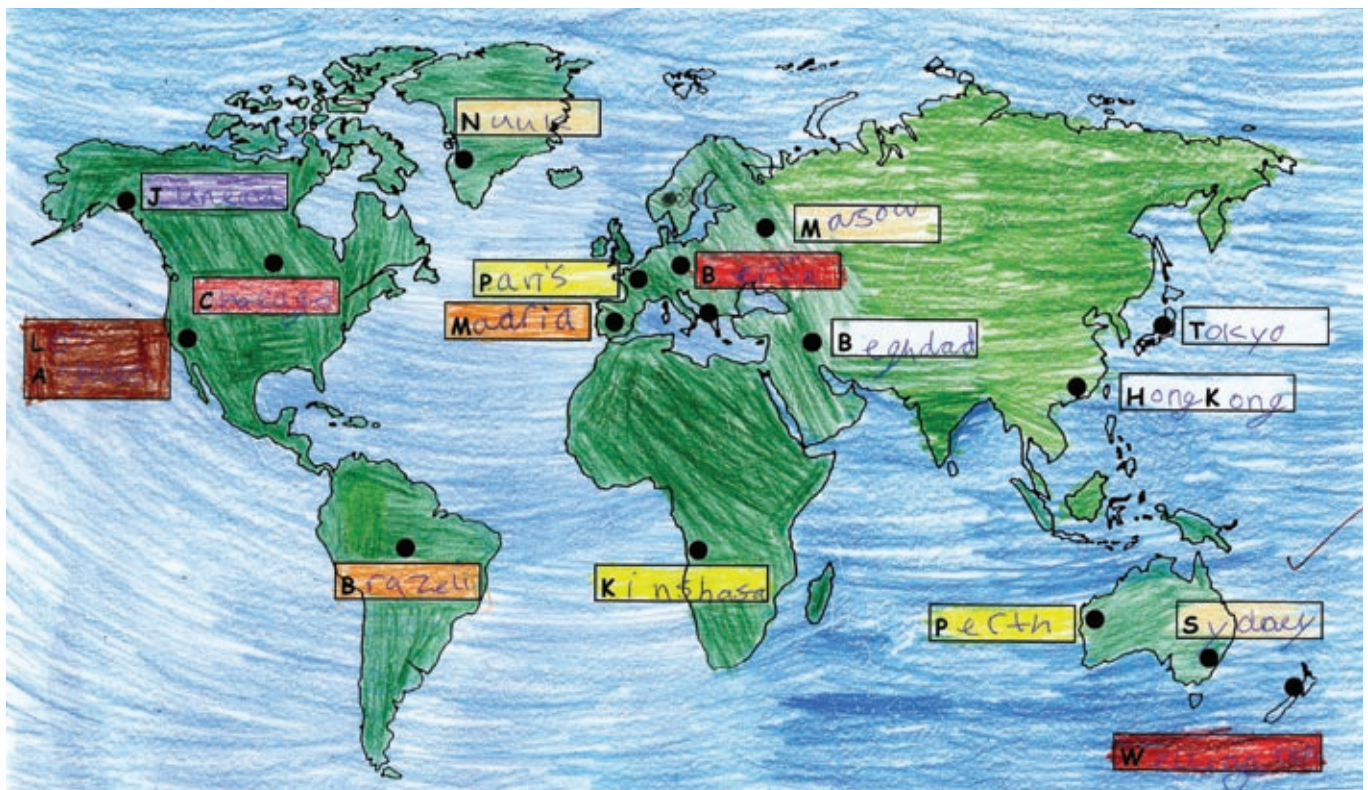
In a follow-up session, learners used globes and atlases to identify those countries they had not been sure about. They also spent some time using compass directions to discuss the positions of the cities relative to one another, the continents in which the cities are to be found, and the sights and features associated with each city.

Activity 3 | Time zones

A second teacher introduced the activity by displaying the activity sheet on the interactive whiteboard and discussing it. All of the learners were aware of the fact that clocks were set to different times in different parts of the world, and the teacher was able to elaborate on their comments by running and discussing **Time tracker**.

As a follow-up to this introduction, the teacher used two worksheets of her own. The first of these included an extended list of cities, with some information given regarding countries and time differences. The second showed a map of the world with a series of cities to be identified. These worksheets were designed to allow some learners to work with **Time tracker** on the small number of computers available in the classroom, while other learners used atlases and globes to complete their world maps or worked out time differences using the given information.

Name: Aleks		Date: 10.6.08	
The time in Britain is 10.00am. What time is it in cities around the world?			
City	Country	Time Difference (Hours)	Time
Juneau	USA	-9	1.00am
Tokyo	Japan	+9	7.00pm
Los Angeles	USA	-8	2.00am
Wellington	New Zealand	+12	10.00pm
Nuuk	Greenland	-3	7.00am
Baghdad	Iraq	+3	1.00pm
Kinshasa	Congo	+1	11.00am
Paris	France	+1	11.00am
Athens	Greece	+2	12.00am
Hong Kong	China	+8	6.00pm
Perth	Australia	+8	6.00pm
Berlin	Germany	+1	11.00am
Brasilia	Brazil	-4	6.00am
New York	USA	-5	5.00am
Oslo	Norway	+1	11.00am
Madrid	Spain	+1	11.00am
Moscow	Russia	+3	1.00pm
Chicago	USA	-6	4.00am
Sydney	Australia	+10	8.00pm



Developing the activity (part 2)

- For this part of the activity, learners will need access to the internet and/or suitable geographical reference material.
- Introduce the activity by telling learners that they are going to plan a world tour. Ask learners to suggest various cities they would like to visit, stimulating whole-class discussion and thinking by asking questions such as:
 - Why have you chosen these cities?
 - In what countries are the cities located?
 - What do you hope to see or do in these cities?
- As learners provide feedback, encourage other learners to comment and/or ask further questions.
- When learners are ready to begin planning their route, distribute a copy of Worksheet 2 to each group, pair or individual as you consider appropriate.
- Careful observation of learners as they work will provide opportunities for gathering evidence relating to thinking, communication and number skills.
- When you consider it appropriate, bring learners back together to share and compare their findings.
- Selecting particular learners and asking appropriate questions, e.g. 'How did you decide the order in which to visit your four cities?' or 'Could you visit the cities in a different order?... Which order do you think is best?... Why?', will allow you to gather further evidence.
- Following the reporting back session, you may wish to allow further time for learners to follow up the ideas discussed.



Activity 3 | Time zones

An example of classroom practice

The learners were extremely enthusiastic about the task and there was no shortage of suggestions for cities to visit.

The teacher distributed Worksheet 2 to each group of learners and asked them to work together to plan their tour. The internet and a collection of reference books, atlases and globes were available for learners to gather the information they needed.

When the learners had completed the worksheet, they were brought together to discuss the routes they had planned and the cities they intended to visit. During the reporting back session some interesting number questions were posed by learners, for example:

- will the distance travelled to visit the four cities be different for different routes?
- how many different routes are possible?
- which route is the shortest?

It was clear that further work was needed to answer these questions, so the teacher decided that learners should return to them in future lessons.

1. Choose 4 cities you would like to visit and complete this table.

Cities to visit	Time difference from London	Time difference from previous city
1. Paris	+ 1 hrs	
2. Athens	+ 2 hrs	+ 1 hrs
3. Tokyo	+ 9 hrs	+ 7 hrs
4. Los Angeles	- 7 hrs	- 16 hrs

2. Find the distances between the cities you have chosen.

Cities to visit	Distance from previous city (miles)	Total distance flown (miles)
London		
1. Paris	218	218
2. Athens	1284	1502
3. Tokyo	5919	7421
4. Los Angeles	5501	12 922
London	5451	18 373

What to look for

Gathering information

When investigating time differences and/or planning their world tour, are learners able to:

- read, understand and extract data presented in lists, tables, charts, simple graphs or diagrams, e.g. by extracting the necessary data from the completed table in order to calculate the required time differences (Cell 2)
- choose data from given information presented in a variety of numerical and graphical ways, e.g. using an atlas or globe to identify the countries in which the given cities are located (Cell 3)
- access information presented in a variety of ways and from different sources, e.g. choose and use an appropriate search engine to find relevant distances and time differences (Cell 4)?

Talking about and explaining work

When discussing their work, recording their findings and/or reporting back, are learners able to:

- talk about what they have done, referring to some of the numbers they have encountered (Cell 1)
- make comparisons using appropriate language and symbols (Cell 2)
- use the language of position (including co-ordinates and compass points) and movement, data and measures (Cell 3)
- use correct mathematical language, symbols and notation (Cell 4)?

Using a variety of methods

When investigating time differences and calculating distances travelled, are learners able to:

- use a variety of mental strategies to add and subtract small numbers (Cell 2)
- use a variety of methods of computation to solve numerical and practical problems, e.g. find the time difference between Sydney and New York or the total distance travelled on their world tour (Cell 3)?

The Earth rotates on its axis as it orbits the Sun.

At any time, some parts of the Earth face the Sun and others do not.



This means that when it is day-time in Britain it is night-time in other places.

To allow for this, people in different places set their clocks to different times.

Investigate the time in different cities around the world.

Some things to think about:

- What is the time now in... Paris... Athens... New York?
- Why is time ahead of us in some countries and behind in others?
- What are time zones?

Name(s):

Suppose the time in Wales is 2:00p.m.

1. Complete this table.

City	Country	Time difference (hours)	Time
Kinshasa	Congo	+1	
Baghdad			
Tokyo			
New York			
Sydney			
Los Angeles			
Brasilia			
Chicago			
Wellington			

2. Find the time difference between Sydney and:

(a) Tokyo (b) New York (c) Chicago

3. If it is 7:15a.m. in Brasilia, write down the time in:

(a) Cardiff (b) Baghdad (c) Tokyo

Name(s):

You are going to plan a world tour, flying from Heathrow Airport, London.

1. Choose 4 cities you would like to visit and complete this table.

Cities to visit	Time difference from London	Time difference from previous city
1.		
2.		
3.		
4.		

2. Find the distances between the cities you have chosen.

Cities to visit	Distance from previous city (miles)	Total distance flown (miles)
London		
1.		
2.		
3.		
4.		
London		

the 1990s, the incidence of *S. flexneri* infections has increased in the United Kingdom [10]. In the United States, the incidence of *S. flexneri* infections has increased in the 1990s, but the incidence of *S. flexneri* infections in children has decreased [11].

There is a need to identify the risk factors for *S. flexneri* infections in order to develop effective control measures. In the United Kingdom, the incidence of *S. flexneri* infections is highest in the south-east [12]. In the United States, the incidence of *S. flexneri* infections is highest in the south-east [13].

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