

# Leap year Functional Maths challenge



Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. How many days were there in 2019? \_\_\_\_\_
2. 2020 is a leap year. How many days are there in 2020? \_\_\_\_\_
3. What international sporting event takes place in a leap year? \_\_\_\_\_
4. In 2020, February 29<sup>th</sup> is on a Saturday.  
Use this information to complete the calendar for February 2020.  
TIP: plan carefully before you write any dates.

February 20__						
Saturday	Sunday	_____	_____	_____	_____	Friday

Use the completed calendar to answer questions 5-9.

5. How many Tuesdays were there in February 2020? \_\_\_\_\_
6. How many Saturdays were there? \_\_\_\_\_
7. On what day of the week is March 1<sup>st</sup>? \_\_\_\_\_
8. On what day of the week is March 5<sup>th</sup>? \_\_\_\_\_
9. a. Write the date of the day that comes before February 1<sup>st</sup>. \_\_\_\_\_  
b. On what day of the week was that? \_\_\_\_\_

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10.a. How many hours in a day? \_\_\_\_\_

b. How many days in February 2020? \_\_\_\_\_

11. a. Use the answers to Q10 to calculate the number of hours in February 2020.

b. Use estimation to check the magnitude (size) of your answer.

**Show your working out** and your answers in the box.



12. How many years in a decade? \_\_\_\_\_

13. How many years in a century? \_\_\_\_\_

14. What is a millennium? \_\_\_\_\_

15. How many centuries in a millennium? \_\_\_\_\_

16. a. What is the rule for this sequence of leap years from the 20<sup>th</sup> century?

1952      1956      1960      1964      1968

\_\_\_\_\_

b. Use your rule to complete this sequence of leap years from the 19<sup>th</sup> century.

1808      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_      1824

17. Write a sequence of five decades from the **18<sup>th</sup> century**. Explain the rule.

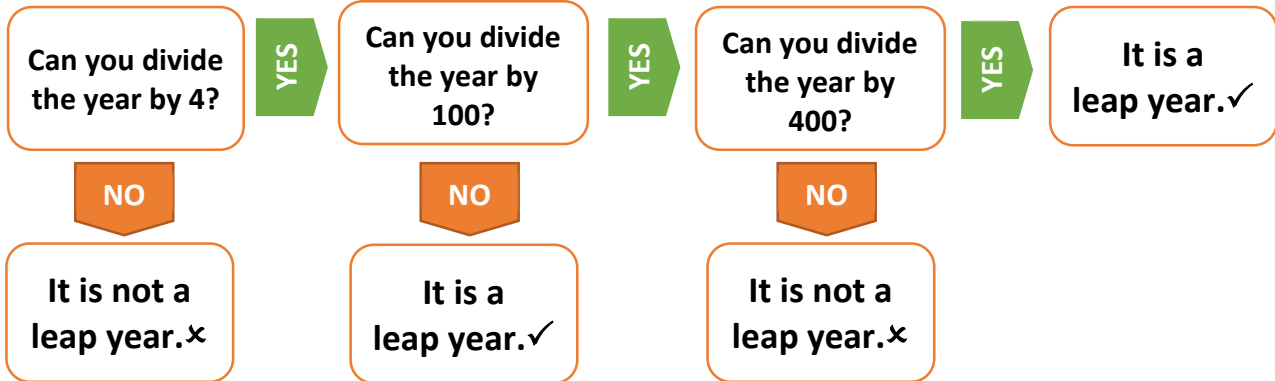
\_\_\_\_\_ Rule: \_\_\_\_\_

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With some exceptions, a leap year happens every 4 years. There are special rules for new centuries (e.g. 1600, 1800).

**Flow chart: rules for working out if a year is a leap year.**



**18.** Use the flow chart to work out if the following years are leap years.

Show step by step working out. Use short (bus stop) division when you need to.

a. 2026

b. 2400

c. 1900

d. 1932

e. Your birth year.

**19.** Use reverse calculations to show a check of your answers to **18b** and **18d**.

**20. a.** A leap year is always an even number. True or false? \_\_\_\_\_

b. Odd numbered years are never leap years. True or false? \_\_\_\_\_

# Leap year Functional Maths challenge **Notes, answers & curriculum mapping**

## Subject content – Reformed FUNCTIONAL SKILLS MATHEMATICS 2018 (takes effect from September 2019)

✓✓ = main **content** covered in this resource. ✓ = minor content. → or ← = not covered but included to show progression across levels (*content at each level subsumes and builds upon the content at lower levels*). Full content (inc. Handling Data) at: DfE <https://www.gov.uk/government/publications/functional-skills-subject-content-mathematics>

**Fundamental mathematical knowledge and skills** must be demonstrated in their own right, **with and without a calculator**, in addition to being used to solve problems.

**Entry Level 1    Entry Level 2    Entry Level 3    Level 1    Level 2**

### Using numbers and the number system (N)

<p>1. Read, write, order and compare numbers up to 20 2. Use whole numbers to count up to 20 items including zero 3. Add numbers which total up to 20, and subtract numbers from numbers up to 20 4. Recognise and interpret the symbols +, - and = appropriately</p>	<p>1. Count reliably up to 100 items 2. Read, write, order and compare numbers up to 200 3. Recognise and sequence odd and even numbers up to 100 → 4. Recognise and interpret the symbols +, -, x, ÷ and = appropriately 5. Add and subtract two-digit numbers 6. Multiply whole numbers in the range 0x0 to 12x12 (times tables) → 7. Know the number of hours in a day and weeks in a year. ✓ <b>Q10a</b> 8. Divide two-digit whole numbers by single-digit whole numbers and express remainders → 9. Approximate by rounding to the nearest 10, and use this rounded answer to check results → 10. Recognise simple fractions (halves, quarters and tenths) of whole numbers and shapes 11. Read, write and use decimals to one decimal place</p>	<p>1. Count, read, write, order and compare numbers up to 1000 2. Add and subtract using three-digit whole numbers 3. Divide three-digit whole numbers by single- and double-digit whole numbers and express remainders → 4. Multiply two-digit whole numbers by single- and double-digit whole numbers ✓ <b>Q11</b> 5. Approximate by rounding numbers less than 1000 to the nearest 10 or 100 and use this rounded answer to check results 6. Recognise and continue linear sequences of numbers up to 100 → 7. Read, write and understand thirds, quarters, fifths and tenths including equivalent forms 8. Read, write and use decimals up to two decimal places 9. Recognise and continue sequences that involve decimals</p>	<p>L1.1 Read, write, order and compare large numbers (up to one million) ✓ L1.2 Recognise and use positive and negative numbers L1.3 Multiply and divide whole numbers and decimals by 10, 100, 1000 L1.4 Use multiplication facts and make connections with division facts ✓✓ <b>Q11, Qs18-19</b> L1.5 Use simple formulae expressed in words for one or two-step operations L1.6 Calculate the squares of one-digit and two-digit numbers L1.7 Follow the order of precedence of operators L1.8 Read, write, order and compare common fractions and mixed numbers L1.9 Find fractions of whole number quantities or measurements L1.10 Read, write, order and compare decimals up to three decimal places L1.11 Add, subtract, multiply and divide decimals up to 2 decimal places L1.12 Approximate by rounding to a whole number or to one or two decimal places L1.13 Read, write, order and compare percentages in whole numbers L1.14 Calculate percentages of quantities, including simple percentage increases / decreases by 5% and multiples thereof L1.15 Estimate answers to calculations using fractions and decimals L1.16 Recognise and calculate equivalences between common fractions, percentages and decimals L1.17 Work with simple ratio and direct proportions</p>	<p>L2.1 Read, write, order and compare positive and negative numbers of any size L2.2 Carry out calculations with numbers up to one million including strategies to check answers including estimation and approximation ✓✓ <b>Q11, Qs18-19</b> L2.3 Evaluate expressions and make substitutions in given formulae in words and symbols L2.4 Identify and know the equivalence between fractions, decimals and percentages L2.5 Work out percentages of amounts and express one amount as a percentage of another L2.6 Calculate percentage change (any size increase and decrease), and original value after percentage change L2.7 Order, add, subtract and compare amounts or quantities using proper and improper fractions &amp; mixed numbers L2.8 Express one number as a fraction of another L2.9 Order, approximate and compare decimals L2.10 Add, subtract, multiply and divide decimals up to three decimal places L2.11 Understand and calculate using ratios, direct proportion and inverse proportion L2.12 Follow the order of precedence of operators, including indices</p>
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**Subject content – Reformed FUNCTIONAL SKILLS MATHEMATICS 2018** (takes effect from September 2019)

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**Fundamental mathematical knowledge and skills** must be demonstrated in their own right, **with and without a calculator**, in addition to being used to solve problems.

**Entry Level 1**

**Entry Level 2**

**Entry Level 3**

**Level 1**

**Level 2**

## Using common measures, shape and space (MSS)

5. Recognise coins and notes and write them in numbers with the correct symbols (£ & p), where these involve numbers up to 20  
 6. Read 12 hour digital and analogue clocks in hours →  
 7. Know the number of days in a week, months, and seasons in a year. Be able to name and sequence ✓ Q4  
 8. Describe and make comparisons in words between measures of items including size, length, width, height, weight and capacity  
 9. Identify & recognise common 2-D and 3-D shapes inc. circle, cube, rectangle (inc. square) and triangle  
 10. Use everyday positional vocabulary to describe position and direction including left, right, in front, behind, under and above

12. Calculate money with pence up to one pound and in whole pounds of multiple items and write with the correct symbols (£ or p)  
 13. Read and record time in common date formats Q4-10, and read time displayed on analogue clocks in hours, half hours and quarter hours, and understand hours from a 24-hour digital clock ✓✓  
 14. Use metric measures of length including millimetres, centimetres, metres and kilometres  
 15. Use measures of weight including grams and kilograms  
 16. Use measures of capacity including millilitres and litres  
 17. Read and compare positive temperatures  
 18. Read and use simple scales to the nearest labelled division  
 19. Recognise and name 2-D and 3-D shapes inc. pentagons, hexagons, cylinders, cuboids, pyramids, spheres  
 20. Describe properties of common 2-D & 3-D shapes inc. nos. of sides, corners, edges, faces, angles & base  
 21. Use appropriate positional vocabulary to describe position and direction including between, inside, outside, middle, below, on top, forwards and backwards

10. Calculate with money using decimal notation & express money correctly in writing in pounds and pence  
 11. Round amounts of money to the nearest £1 or 10p  
 12. Read, measure and record time using am and pm →  
 13. Read time from analogue and 24 hour digital clocks in hours and minutes →  
 14. Use and compare measures of length, capacity, weight and temperature using metric or imperial units to the nearest labelled or unlabelled division  
 15. Compare metric measures of length including millimetres, centimetres, metres and kilometres  
 16. Compare measures of weight including grams and kilograms  
 17. Compare measures of capacity including millilitres and litres  
 18. Use a suitable instrument to measure mass and length  
 19. Sort 2-D and 3-D shapes using properties including lines of symmetry, length, right angles, angles including in rectangles and triangles  
 E3.20 Use appropriate positional vocabulary to describe position and direction inc. eight compass points and including full/half/quarter turns

L1.18 Calculate simple interest in multiples of 5% on amounts of money  
 L1.19 Calculate discounts in multiples of 5% on amounts of money  
 L1.20 Convert between units of length, weight, capacity, money **and time**, in the same system ✓✓ Q11 12-15  
 L1.21 Recognise and make use of simple scales on maps and drawings  
 L1.22 Calculate area and perimeter of simple shapes including those that are made up of a combination of rectangles  
 L1.23 Calculate the volumes of cubes and cuboids  
 L1.24 Draw 2-D shapes and demonstrate an understanding of line symmetry & knowledge of the relative size of angles  
 L1.25 Interpret plans, elevations and nets of simple 3-D shapes  
 L1.26 Use angles when describing position and direction, and measure angles in degrees

L2.13 Calculate amounts of money, compound interest, percentage increases, decreases and discounts including tax and simple budgeting  
 L2.14 Convert between metric and imperial units of length, weight and capacity using a a) conversion factor and b) conversion graph  
 L2.15 Calculate using compound measures including speed, density and rates of pay ←  
 L2.16 Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles)  
 L2.17 Use formulae to find volumes and surface areas of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders)  
 L2.18 Calculate actual dimensions from scale drawings and create a scale diagram given actual measurements  
 L2.19 Use coordinates in 2-D, positive & negative, to specify the positions of points  
 L2.20 Understand and use common 2-D representations of 3-D objects  
 L2.21 Draw 3-D shapes to include plans and elevations  
 L2.22 Calculate values of angles and/or coordinates with 2-D and 3-D shapes

# Leap year Functional Maths challenge

## Notes, answers & curriculum mapping

### 2. Mathematical problem solving (at all levels of Functional Mathematics)

Although underpinning knowledge is tested in its own right, problem solving is a core element of Functional Skills mathematics yet should not obscure or add additional mathematical complexity beyond the level of the qualification. Defining problem solving is a challenge but the attributes below may help. Not all (often just one) of the listed attributes must be present in a single task for it to be considered to be problem solving. ✓ indicates why all or parts of this resource can be considered to be problem solving. **Source:** DfE (Feb 2018) <https://www.gov.uk/government/publications/functional-skills-subject-content-mathematics>.

#### One or more of the following attributes may be present in a single task for it to be considered problem solving:

<b>A</b> Tasks that have little or no scaffolding: there is little guidance given to the student beyond a start point and a finish point. Questions do not explicitly state the mathematical process(es) required for the solution.	
<b>B</b> Tasks that provide for multiple representations, such as use of a sketch or a diagram as well as calculations.	
<b>C</b> The information is not given in mathematical form or in mathematical language; or there is a need for the results to be interpreted or methods evaluated, for example, in a real-world context.	✓
<b>D</b> Tasks have a variety of techniques that could be used	✓
<b>E</b> The solution requires understanding of the processes involved rather than just application of the techniques.	✓

### Solving mathematical problems, carrying out tasks and decision making.

Entry 1 (E1)	Entry 2 (E2)	Entry 3 (E3)	Level 1 (L1)	Level 2 (L2)
<b>Students are expected to be able to use the content knowledge and skills to recognise and obtain a solution to:</b>				
<b><sup>1</sup>a simple problem</b> ✓		<b><sup>2</sup>a straightforward problem</b> ✓		<b><sup>3</sup>a complex problem</b>
E1a. Use given mathematical information and recognise and use simple mathematical terms appropriate to E1 ✓	E2a. E3a. Use given mathematical information including numbers, symbols, simple diagrams and charts ✓ E2b/3b. Recognise, understand and use simple mathematical terms appropriate to E2 / E3 ✓	L1a. L2a. Read, understand and use mathematical information and mathematical terms used at this level ✓ L1b. L2b. Address individual problems as described above ✓ L1c. L2c. Use knowledge and understanding to a required level of accuracy ✓ L1d. L2e. Analyse and interpret answers in the context of the original problem ✓		L2d. Identify suitable operations and calculations to generate results ✓
E1b. E2c. E3c. Use the methods given above to produce, check and present results that make sense [E3 only: to an appropriate level of accuracy]. ✓		L1e. L2f. Check the sense, and reasonableness, of answers ✓		
E1c. Provide a simple explanation for those results.	E[2d]/E3d. Present appropriate explanations using numbers, measures, simple diagrams, [simple] charts and symbols appropriate to Entry Level 2 / Entry Level 3 ✓	L1f. Present results with appropriate explanation and interpretation demonstrating simple reasoning to support the process & show consistency with the evidence presented ✓ L2g. Present results and explain results clearly and accurately demonstrating reasoning to support the process and show consistency with the evidence presented		

Problem type:	<sup>1</sup> Simple problem	<sup>2</sup> Straightforward	<sup>3</sup> Complex
<b>Level:</b>	All levels ✓	L1 and L2 ✓	Level 2 only
<b>Draws upon knowledge or skills from:</b>	One MCA only ✓	One MCA or a combination of any two MCA ✓	Up to a combination of any three MCA
<b>Number of steps or processes</b>	1 ✓	More than 1 ✓	At least 2
<b>Context</b>	Familiar to all and easily described ✓	Less familiar – requires some comprehension ✓	Less familiar – requires interpretation and analysis

Abbreviations: MCA = mathematical content area(s). NS = Using numbers and the number system. MS = Using common measures, shape and space. HD = Handling information and data.

# Leap year Functional Maths challenge

## Notes, answers & curriculum mapping

### Background

A hastily written resource (I didn't want to have to wait another 4 years!) that covers Functional Skills (Measures) content descriptors relating to using dates and units of time. Number topics such as estimation and checking, multiplication, division, odd and even numbers, and sequences are also included.

Some questions are general knowledge and do not map directly to Functional Maths. Levels are roughly: page 1 (E1-E3), page 2 (E3-L1), page 3 (L1-L2). As this is a graduated challenge, I suggest that all learners (including those at Level 1 or 2) start at page 1. It would also work well if tackled by pairs of disparate learners.

I wanted to interweave the resource with some questions on divisibility tests but ran out of time. However, divisibility would make an excellent precursor or extension topic. For example, a number is divisible by 4 if the number formed by the last two digits is divisible by 4 (e.g. 116, 256 and 12,380 are all divisible by 4).

Maggie Harnew, Feb 29<sup>th</sup> 2020.

### Answers

1. How many days were there in 2019? **365**
2. How many days are there in 2020? **366**
3. **Olympic Games**
- 4.

February 2020						
Sat	Sun	Mon	Tue	Wed	Thu	Fri
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29						

5. How many Tuesdays in February 2020? **4**
6. How many Saturdays are there? **5**
7. On what day of the week is March 1<sup>st</sup>? **Sunday**
8. On what day of the week is March 5<sup>th</sup>? **Thursday**
9. a. Write the date of the day that comes before February 1<sup>st</sup>. **31<sup>st</sup> Jan 2020, 31/01/2020, etc.**  
(Any acceptable format. Do not accept US style)
- b. On what day of the week was that? **Friday**
10. a. How many hours in a day? **24**  
b. How many days in February 2020? **29**
11. a. Calculate number of hours in February 2020.  
**29 x 24 = 696 hours. Accept any written method such as long multiplication, grid or lattice.**  
b. Estimation: **30 x 25 = 750 or 30 x 20 = 600**
12. How many years in a decade? **10**
13. How many years in a century? **100**
14. What is a millennium? **A period of 1000 years**
15. How many centuries in a millennium? **10**
16. a. What is the rule for this sequence of leap years from the 20<sup>th</sup> century? **Add 4**  
b. 1808 **1812 1816 1820** 1824
17. 5 decades from 18<sup>th</sup> C. **E.g. 1720, 1730, 1740, 1750, 1760 (or any consecutive 5). Rule: add 10**
18. a. 2026 **no**      b. 2400 **yes**      c. 1900 **no**  
d. 1932 **yes**      e. **Learner's own data.**
19. 18b. **E.g. 600 x 4 = 2400, 24 x 100 = 2400, 6 x 400 = 2400.** 18d. **483 x 4 = 1932.**
20. a. Odd number years are never leap years. **True**  
b. A leap year is always an even number. **True**

An **editable Word version** of this resource is available, on a one to one exchange basis for your own resource contribution. If you wish to become a registered contributor, please contact Maggie using the site contact link. Thank you 😊