

Bank Holiday  
Calculator  
(Oracle Package)

**Author:** G S Chapman  
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## DOCUMENT HISTORY

Version	Date	Changed By:	Remarks
1.2	08/07/11	G S Chapman	Added details for Northern Ireland and Scotland. Updated with announced bank holidays for 2012. Sorted output fro each year (except display_bankhol_names). Correct minor bug where the date of Xmas day bank holiday was after Boxing day when the dates fell on a weekend.

## DOCUMENT DISTRIBUTION

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**DOCUMENT REFERENCES**

Document Name	Originator	Part Number	Version	Date

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## **PURPOSE OF DOCUMENT**

This document describes the Macrotone Bank holiday package which is used to calculate the number of working days between any two given dates. In addition the package can list out the Bank Holidays for any given year or years. The determination works for all the countries comprising the United Kingdom, namely, England, Wales, Scotland and Northern Ireland, all of which have slightly different holidays.

# Overview

## 1 BANK HOLIDAYS

Bank holidays are holidays when banks and many other businesses are closed for the day. Public Holidays are holidays which have been observed through custom and practice, such as Christmas Day.

It is important to draw a distinction between bank holidays, and public or local holidays. As the dates for bank holidays are set out in statute or are the subject of proclamation, it follows that they are the same across the whole of the United Kingdom. On the other hand public or local holidays are determined by local authorities, based on local tradition (not statutory authority) and after consultation with local business interests. There is no legal or statutory definition of public holiday in the United Kingdom and it is questionable whether public holidays exist in Scotland. The term is often confused with bank holidays. In England and Wales a bank holiday tends automatically to be a public holiday, in that the majority of people have the day off and the day is generally observed as a holiday. In Scotland this is not always the case.

### 1.1 UK Bank Holidays

There are different bank and public holidays in different parts of the UK. There are currently six permanent bank holidays in England and Wales and an additional one in 2011 and 2012. Christmas Day and Good Friday are public holidays.

The expected bank and public holidays for England and Wales are listed in the table below.

- [Bank holidays in the UK](#)

#### 1.1.1 Bank and public holidays in England and Wales

<b>England and Wales</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
New Year's Day	3 January*	2 January*	1 January	1 January	1 January
Good Friday	22 April	6 April	29 March	18 April	3 April
Easter Monday	25 April	9 April	1 April	21 April	6 April
Royal wedding	29 April	-	-	-	-
Early May Bank Holiday	2 May	7 May	6 May	5 May	4 May
Spring Bank Holiday	30 May	4 June*	27 May	26 May	25 May
Queen's Diamond Jubilee	-	5 June	-	-	-
Summer Bank Holiday	29 August	27 August	26 August	25 August	31 August
Christmas Day	26 December*	25 December	25 December	25 December	25 December
Boxing Day	27 December*	26 December	26 December	26 December	28 December*

\* substitute day

**Table 1 - Bank and public holidays in England and Wales**

### 1.1.2 Special bank holidays

There are laws that allow the dates of bank holidays to be changed, or other holidays to be declared, for example to celebrate special occasions.

It has been announced that there will be a special bank holiday in 2012 to celebrate the Queen's Diamond Jubilee. The 2012 late May bank holiday will be moved to Monday 4 June 2012 and an additional Jubilee bank holiday will be on Tuesday 5 June 2012.

There was also a special bank holiday on 29 April 2011 to celebrate the royal wedding.

### 1.1.3 Substitute days

When the usual date of a bank or public holiday falls on a Saturday or Sunday, a 'substitute day' is given, normally the following Monday. For example in 2009, Boxing Day was on Saturday, 26 December, so there was a substitute bank holiday on Monday, 28 December.

## 1.2 Bank and public holidays in Scotland

Scotland	2011	2012	2013	2014	2015
New Year's Day	3 January*	2 January*	1 January	1 January	1 January
2nd January	4 January*	3 January	2 January	2 January	2 January
Good Friday	22 April	6 April	29 April	18 April	3 April
Royal wedding	29 April	-	-	-	-
Early May Bank Holiday	2 May	7 May	6 May	5 May	4 May
Spring Bank Holiday	30 May	4 June*	27 May	26 May	25 May
Queen's Diamond Jubilee	-	5 June	-	-	-
Summer Bank Holiday	1 August	6 August	5 August	4 August	3 August
St Andrew's Day	30 November	30 November	2 December*	1 December*	30 November
Christmas Day	26 December*	25 December	25 December	25 December	25 December
Boxing Day	27 December*	26 December	26 December	26 December	28 December*

\* substitute day

**Table 2 - Bank and public holidays in Scotland**

There are seven permanent bank holidays across the whole of Scotland. Christmas Day and Good Friday are public holidays. There are also other public or local holidays which can be determined by local authorities, based on local tradition. Since 2007, St Andrews Day has also been a permanent bank holiday.

There was an additional bank holiday on 29 April 2011 for the royal wedding.

Businesses and schools are not necessarily closed on Scottish bank holidays, and the Scottish banks follow the English and Welsh bank holidays for business reasons.

- [Bank holidays in Scotland](#)

## 1.3 Bank and public holidays in Northern Ireland

In Northern Ireland, there are eight permanent bank holidays - the same six as in England and Wales, plus St Patrick's Day and the Anniversary of the Battle of the Boyne in 1690 making a total of ten. Christmas Day and Good Friday are public holidays.

- [Bank and public holiday dates in Northern Ireland](#)

The expected dates of bank and public holidays in Northern Ireland for the next three years are listed below.

\*When the usual date falls on a Saturday or Sunday, the 'substitute day' is normally the following Monday. For example in 2011, Christmas Day is on Sunday 25 December, so the substitute bank holiday is Monday, 26 December.

<b>Northern Ireland</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
New Year's Day	3 January*	2 January*	1 January
St Patrick's Day	17 March	19 March*	18 March*
Good Friday	22 April	6 April	29 March
Easter Monday	25 April	9 April	1 April
Royal Wedding	29 April		
Early May Bank Holiday	2 May	7 May	6 May
Spring Bank Holiday	30 May	4 June	27 May
Queen's Diamond Jubilee		5 June	
Battle of the Boyne (Orangemen's Day)	12 July	12 July	12 July
Summer Bank Holiday	29 August	27 August	26 August
Christmas Day	26 December*	25 December	25 December
Boxing Day	27 December*	26 December	26 December

**Table 3 - Bank and public holidays in Northern Ireland**

### 1.3.1 Special bank holidays

There are laws that allow the dates of bank holidays to be changed, or other holidays to be declared, for example to celebrate special occasions.

It has been announced that there will be a special bank holiday in 2012 to celebrate the Queen's Diamond Jubilee.

The 2012 late May bank holiday will be moved to Monday 4 June 2012 and an additional Jubilee bank holiday will be on Tuesday 5 June 2012.



## **2 DATE DETERMINATION**

Whilst most of the public holidays fall upon a specific date, which may be moved to the nearest Monday, the date of Easter can be seen from the above tables to be variable, which makes its calculation more complex.

### **2.1 Computus - Calculation of Easter**

Computus (Latin for computation) is the calculation of the date of Easter in the Christian calendar. The name has been used for this procedure since the early Middle Ages, as it was one of the most important computations of the age.

Easter is a moveable feast, which means that it does not occur on the same date every year.

The Council of Nicaea (A.D. 325) set the date of Easter as the Sunday following the paschal full moon, which is the full moon that falls on or after the vernal (spring) equinox.

The canonical rule is that Easter day is the first Sunday after the 14th day of the lunar month (the nominal full moon) that falls on or after 21 March (nominally the day of the vernal equinox). For determining the feast, Christian churches settled on a method to define a reckoned "ecclesiastical" full moon, rather than actual observations of the Moon (which is subject to weather, etc.). Eastern Orthodox Christians calculate the fixed date of 21 March according to the Julian Calendar rather than the modern Gregorian Calendar, and use an ecclesiastical full moon that occurs four to five days later than the western ecclesiastical full moon.

In modern language, this definition is best described as: Easter is the Sunday following the Paschal Full Moon date. The Paschal Full Moon date is the Ecclesiastical Full Moon date following 20 March and, for the years 1900 to 2199, can be found in Tabular methods.

We know that Easter must always occur on a Sunday, because Sunday was the day of Christ's Resurrection. The paschal full moon is used because that was the date of Passover in the Jewish calendar, and the Last Supper (Holy Thursday) occurred on the Passover. Therefore, Easter was the Sunday after Passover.

The Church does not use the exact date of the paschal full moon but an approximation, because the paschal full moon can fall on different days in different time zones, which would mean that the date of Easter would be different depending on which time zone you live in. For calculation purposes, the full moon is always set at the 14th day of the lunar month (the lunar month begins with the new moon). Likewise, the Church sets the date of the vernal equinox at March 21, even though it can occur on March 20. Both approximations allow the Church to set a universal date for Easter.

Still, Easter isn't celebrated universally on that date. While Western Christians use the Gregorian calendar (the calendar that's used throughout the West today, in both the secular and religious worlds) to calculate the date of Easter, the Eastern Orthodox continue to use the older, astronomically inaccurate Julian calendar. Currently, March 21 on the Julian calendar falls on April 3 in the Gregorian

calendar. Therefore, for the Orthodox, the Sunday following the 14th day of the paschal full moon has to fall after April 3, hence the discrepancy in the date of Easter.

## 2.2 Calculation used in the package

The `easter_sunday` function returns the Easter Sunday day and month for a specified year and method.

Inputs:

`y` is the specified year

`method` is 1, 2 or 3 as detailed below

Outputs

Integer value in form YYYYMMDD

The Gregorian calendar has gradually been adopted world wide over from October 1582. The last known use of the Julian calendar by the author was in Greece in 1922. Either at the time of the calendar change or at a later date, some (but not all) regions have used a revised Easter date calculation based on the Gregorian calendar.

The Gregorian calendar is valid until 4099.

As a result, the 3 possible methods are:

- 1 The original calculation based on the Julian calendar
- 2 The original calculation, with the Julian date converted to the equivalent Gregorian date
- 3 The revised calculation based on the Gregorian calendar

Most Western churches moved from method 1 to method 3 at the adoption of the Gregorian calendar, while most Orthodox churches moved from method 1 to method 2.

What follows is a short guide on which method to use. It is important to check the history of the region in question to find the correct date of their change from Julian to Gregorian calendars, and if applicable, their change from the original to the revised Easter Sunday date calculation.

**AUSTRALIA** Has used the Gregorian calendar since settlement hence can be considered as Western churches and holidays use method 3, Orthodox churches use method 2.

**EUROPE** For years 326 to 1582, use method 1.

What was then Italy changed calendar AND calculation method in October 1582, so for years 1583 to 4099, use method 3. Most mainland European regions had converted to the Gregorian calendar by 1700

**ENGLAND** For years 326 to 1752, use method 1. England adopted the Gregorian calendar in September 1752. Use method 3 for Western churches for years 1753 to 4099. Use method 2 for Orthodox churches for years 1753 to 4099.

AMERICA Use method 1 from 326 AD until changes as follows: Regions of America under French influence adopted the Gregorian calendar in October 1582, while regions under British influence adopted both the new calendar and calculation from September 1752. Use method 2 for Orthodox churches after the adoption of the Gregorian calendar. Use method 3 for Western churches after the adoption of the Gregorian calendar.

### **2.2.1 Method 1: ORIGINAL CALCULATION**

From 326 AD, Easter Sunday was determined as the Sunday following the Paschal Full Moon (PFM) date for the year based on the Julian Calendar. PFM dates were made up of a simple cycle of 19 Julian calendar dates. This method returns a Julian calendar date, and applies for all years from 326. (The last known use of the Julian calendar was in Greece in 1922).

### **2.2.2 Method 2: ORIGINAL CALCULATION converted to GREGORIAN CALENDAR**

Same (original) calculation, also converts the Julian calendar date to the equivalent Gregorian calendar date. It applies for years 1583 to 4099. This method is currently used by Orthodox Churches.

### **2.2.3 Method 3: REVISED CALCULATION**

This method calculates Easter Sunday as the Sunday following the Paschal Full Moon (PFM) date for the year based on the Gregorian Calendar. PFM dates are calculated from the relationship between the sun, moon (as understood in 1582) using many 19 Gregorian calendar date cycles. This method was adopted from 1583 in Europe, 1753 in England and is currently used by Western churches.

### 3 PACKAGE DESCRIPTIONS

This section describes the calling parameters for every procedure and function used within the package. The external procedures are the ones that will be used in most usual day to day activities. The internal procedures are provided for completeness but are not callable except from within the package itself.

#### 3.1 HOLIDAYS Package

##### 3.1.1 External procedures and functions

Procedure Name	Parameters	Param Type	Default value	Description
General procedures				
PROCEDURE set_region	area	IN VARCHAR2		Set the region within the UK that determines which Bank Holidays apply.  One of 'ENGLAND;', 'SCOTLAND' or 'NIRELAND'.  [Wales has the same holidays as England.]
PROCEDURE display_bankhol_names	year_in	IN INTEGER	-	Year for which to display the names of the Bank holidays. NOTE: This is an unsorted output for the specified yar.
PROCEDURE display_bankhol_dates	year_in	IN INTEGER	-	Year for which to display the dates of the Bank holidays. These are a sorted output for each year.
PROCEDURE display_bankhols	year_in	IN INTEGER	-	Year for which to display the Bank holidays. These are sported for each specified year.
FUNCTION num_business_days	start_date	IN DATE		RETURN NUMBER  Returns the number of business days between the two specified dates.
	end_date	IN DATE		
	incBK	IN BOOLEAN	FALSE	Include the Bank Holidays as valid days in the calculation.

**Table 4 - Holidays External procedures/functions**

All of the above routines may be invoked separately, although it is usual to use the set\_region procedure first before the other routines are invoked.

##### 3.1.2 Internal procedures and functions

Procedure Name	Parameters	Param Type	Default value	Description
General procedures				
FUNCTION start_day_in_year	year_in	IN INTEGER		RETURN INTEGER  Returns the day of the week for the start of the year.
FUNCTION start_day_in_month	year_in	IN INTEGER		RETURN INTEGER  Returns the day of the week for the specified month of the year.
	month_in	IN INTEGER		

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Procedure Name	Parameters	Param Type	Default value	Description
FUNCTION day_number_week	date_in	IN INTEGER		RETURN INTEGER Returns the day number of the week for the given daye.
FUNCTION day_suffix	day_num	IN INTEGER		RETURN VARCHAR2 Returns the suffix for the day number. i.e. 'st', 'nd', 'th' etc.
FUNCTION newyear_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the day number for the start of the specified year.
FUNCTION newyear_day	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the start of the year as YYYYMMDD.
FUNCTION second_jan_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION second_jan_day	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION easter_sunday	y	IN INTEGER		RETURN INTEGER
	method	IN INTEGER	3	
FUNCTION good_friday	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION easter_monday	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION may_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION spring_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION august_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION battle_boyne_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION stpatrick_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION jubilee_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION christmas_day	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION christmas_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION boxing_day	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.

<b>Procedure Name</b>	<b>Parameters</b>	<b>Param Type</b>	<b>Default value</b>	<b>Description</b>
FUNCTION boxing_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION battle_boyne_day	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION stpatrick_day	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION standrews_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION diajubilee_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
FUNCTION williamwedding_bankhol	year_in	IN INTEGER		RETURN INTEGER Returns the integer for the second January of the year as YYYYMMDD.
PROCEDURE display_bankhol_dates	year_in	IN INTEGER		
PROCEDURE display_bankhol_names	year_in	IN INTEGER		
PROCEDURE display_bankhols	year_in	IN INTEGER		
PROCEDURE setup_BH_dates	year_in	IN INTEGER		
PROCEDURE array_setup	N/A			Sets up all internal arrays for routines
FUNCTION num_business_days	start_date	IN DATE		RETURN NUMBER Returns the number of business days between the two specified dates.
	end_date	IN DATE		
	incBK	IN BOOLEAN	FALSE	Include the Bank Holidays as valid days in the calculation.

**Table 5 - Holidays Internal procedures/functions**

All of the internal functions are hidden from external calling and are documented for completeness.