

עֵיבּוֹר הַשָּׁנָה  
קְבִיעַת הַמּוֹלָד  
וְאֲרַבַּע דְּחֵיזוֹת

A DISCUSSION CONCERNING  
THE LUNAR CALENDAR

THE INTENT OF WHICH IS TO SERVE AS A GENERAL INTRODUCTION TO  
SUBJECT MATTER THAT SHOULD BE PURSUED IN GREATER DEPTH .

IT CAN BE FOUND IN THE FOLLOWING SOURCES

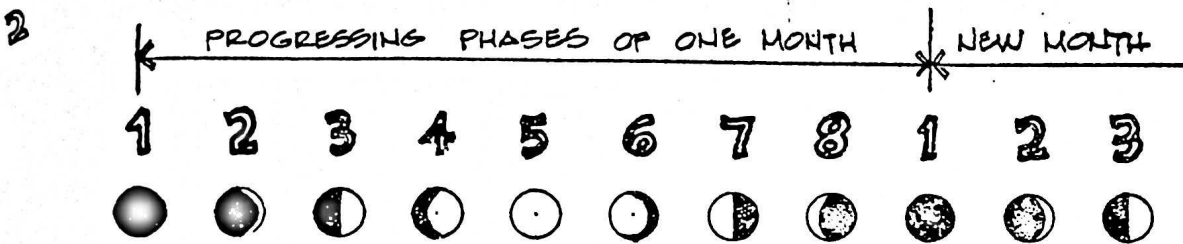
שבילי דדקיע משניות פי' תפארת ישראל, מועד חלק א'

לוח הקביעת קיצור ש"ע מבואר ומצויר, הרב דוד פעלדמאן

טור ושו"ע או"ח סי' תכח

JEWISH CHRONONOMY זמני היום בהלכה י. לוי

רמב"ם זמנים הל' קידוש החודש



THESE ARE THE DIFFERENT SIZES THE MOON APPEARS TO BE AS THE MONTH PROGRESSES, AND AS THE MOON SHIFTS FROM ONE POSITION TO THE NEXT.

POSITION #1, WHERE NO MOON IS VISIBLE, IS THE END OF A MONTH. THE FOLLOWING NIGHT, A SLIGHT SLIVER OF THE NEW MOON CAN BE SEEN, AND THIS IS THE BEGINNING OF A NEW MONTH. GENERALLY, THAT SAME EVENING WE CELEBRATE **וְחַדְשׁוֹ**. IT TAKES ONE MONTH FOR THE MOON TO RETURN TO POSITION #1, AT WHICH TIME WE WILL AGAIN CELEBRATE **וְחַדְשׁוֹ**. THE WORD "**חֹדֶשׁ**" MEANS "MONTH" — THE WORD "**חֲדָשׁ**" MEANS "NEW". BEING THAT THE MOON RENEWS ITSELF EACH MONTH, A SIMILARITY OF THE TWO WORDS SEEMS VERY LOGICAL.

שמות יב' - החודש הזה לכם ראש חדשים

THE **תורה** DIRECTS US TO CELEBRATE **יום טוב** ON SPECIFIC DAYS OF CERTAIN MONTHS. THE WORD **חֹדֶשׁ** OBVIOUSLY REFERS TO A LUNAR MONTH — A MOON MONTH — FOR ONLY AT THE BEGINNING OF A LUNAR MONTH IS THERE ANYTHING WHICH IS **חדש** - NEW.

THE WORD **חֹדֶשׁ** CANNOT BE APPLIED TO THE SOLAR MONTH — THE SUN'S MONTH — BECAUSE NOTHING NEW OCCURS AS DOES WITH THE MOON. THE APPARENT SIZE OF THE SUN ALWAYS REMAINS THE SAME.

AS WE SAID, IT TAKES ONE MONTH FOR THE MOON TO REVOLVE AROUND THE EARTH. THE PRECISE LENGTH OF TIME FOR ONE REVOLUTION IS:

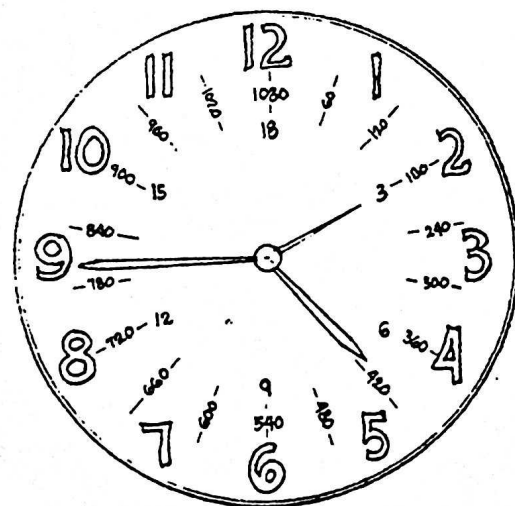
**29 DAYS 12 HOURS 44 MINUTES & 3 1/3 SECONDS**

IN ORDER TO SIMPLIFY THE MINUTE AND SECOND CALCULATION, OUR **תקנים** REFERRED TO A SIMPLER TIME ELEMENT CALLED A "**תלקה**".

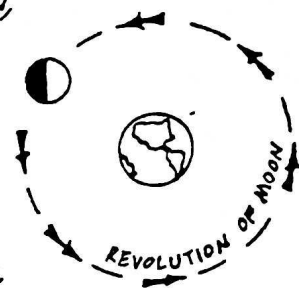
**תלקה** MEANS "PART OF" AND WE WILL USE THE TERM **תלקה** OR **תלקים** TO REFER TO A PART OF AN HOUR. WITH THIS NEW TERM WE SIMPLIFY THE FRACTIONS OF AN HOUR WHEN CALCULATING VARIOUS PROPERTIES OF THE MONTH.

WE DIVIDE A COMPLETE HOUR INTO **1080** EQUAL PARTS, AND CALL EACH OF THESE PARTS A **תלקה**. ONE **תלקה** IS EQUIVALENT IN TIME TO **3 1/3 SECONDS**.  $3600 \text{ SECONDS} \div 1080 = 3 \frac{1}{3} \text{ SECONDS} = \text{א תלקה}$ .

IF SECONDS AND MINUTES NUMBERS OF A CLOCK WOULD BE CONVERTED TO **תלקים** THE CLOCK WOULD LOOK THIS WAY.



THE WORD "LUNA" REFERS TO THE MOON, AND A LUNAR CALENDAR IS A CALENDAR BASED ON THE EARTH AND MOON RELATIONSHIP.



THE WORD "SOLAR" REFERS TO THE SUN, AND A SOLAR CALENDAR IS BASED ON THE EARTH AND SUN RELATIONSHIP. IT HAS A COMPLETE CYCLE OF **365 1/4 DAYS**, WHICH WE CALL A "YEAR".

THE SUN IS THE SOURCE OF LIGHT FOR BOTH THE EARTH AND THE MOON; AND AS THE EARTH SPINS AROUND ON ITS OWN AXIS EVERY 24 HOURS, ONE HALF FACES THE SUN AND EXPERIENCES DAYLIGHT, WHILE THE OTHER HALF FACES AWAY FROM THE SUN IN DARKNESS, WHICH WE EXPERIENCE AS NIGHT.

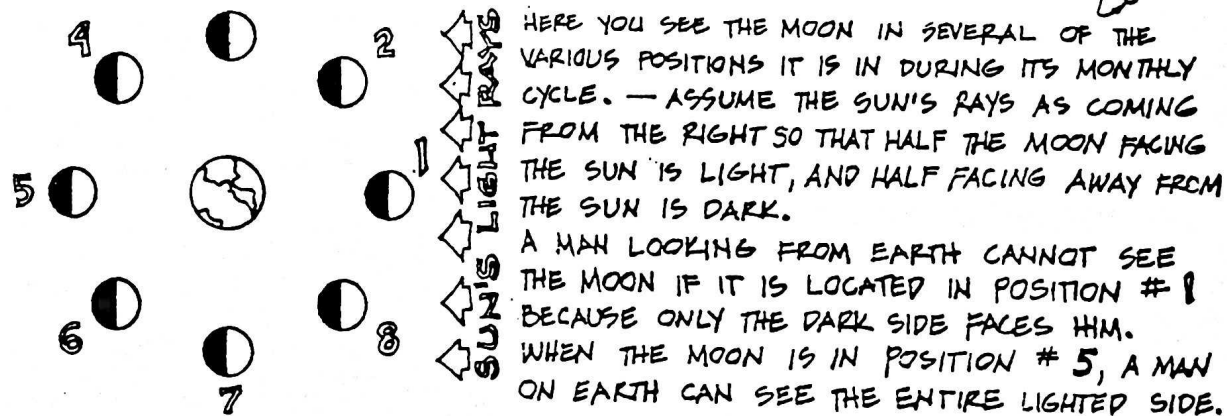
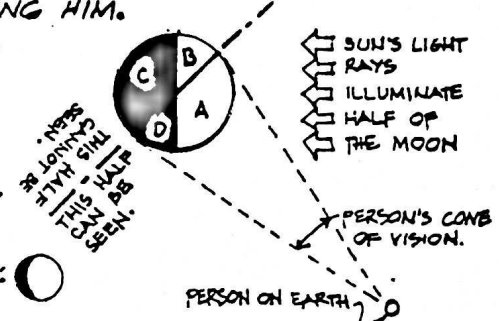
THE MOON ITSELF REVOLVES AROUND THE EARTH, USING ONE MONTH FOR A COMPLETE REVOLUTION; AND LIKE EARTH, HALF THE MOON FACING THE SUN IS IN LIGHT AND THE OTHER HALF FACING AWAY FROM THE SUN IS DARK.

MOST OF THE WORLD'S PEOPLE HAVE ALWAYS BEEN CONCERNED WITH THE SOLAR CALENDAR ALONE, BECAUSE THE YEARLY CYCLE HAVING 4 SEASONS IS RELATED ONLY TO THE SUN. SUMMER IN THE NORTHERN HEMISPHERE ALWAYS OCCURS DURING JULY AND AUGUST AND WINTER OCCURS DURING JANUARY AND FEBRUARY.

OUR DISCUSSION INVOLVES THE MONTHLY CYCLE OF THE MOON — THE WAY THE LUNAR CALENDAR IS ORGANIZED AND HOW IT DETERMINES **ד'יומיו**.

ALWAYS REMEMBER: HALF OF THE MOON FACES THE SUN AND IS LIGHT WHILE HALF OF IT FACES AWAY FROM THE SUN AND IS DARK. AS THE MONTH PROGRESSES, A PERSON HERE ON EARTH SEES THE MOON AS CHANGING IN SHAPE, DEPENDING ON WHAT PORTION OF THE LIGHTED HALF IS FACING HIM.

TO BETTER UNDERSTAND THIS, IMAGINE A PERSON ON EARTH STANDING AT POINT "O" AND LOOKING TOWARD THE MOON. SEGMENTS "A" AND "B" FACING THE SUN ARE IN LIGHT, WHILE SEGMENTS "C" AND "D" FACING AWAY FROM THE SUN ARE DARK. THE PERSON AT "O" CAN ONLY SEE ONE HALF THE MOON WHICH FACES HIM — AND THEREFORE SEES SEGMENTS "A" AND "D" ONLY. OUR DIAGRAM IS DRAWN AS A TWO DIMENSIONAL BIRD'S EYE VIEW, BUT IN ACTUALITY THE MOON APPEARS AS THIS:



HERE YOU SEE THE MOON IN SEVERAL OF THE VARIOUS POSITIONS IT IS IN DURING ITS MONTHLY CYCLE. — ASSUME THE SUN'S RAYS AS COMING FROM THE RIGHT SO THAT HALF THE MOON FACING THE SUN IS LIGHT, AND HALF FACING AWAY FROM THE SUN IS DARK. A MAN LOOKING FROM EARTH CANNOT SEE THE MOON IF IT IS LOCATED IN POSITION #1 BECAUSE ONLY THE DARK SIDE FACES HIM. WHEN THE MOON IS IN POSITION #5, A MAN ON EARTH CAN SEE THE ENTIRE LIGHTED SIDE. AS THE MONTH PROGRESSES, AND AS THE MOON CHANGES POSITIONS, THE MAN ON EARTH SEES THE MOON AS CHANGING IN SIZE FROM DAY TO DAY. AT FIRST HE SEES NO MOON AT ALL — THEN ITS REFLECTED LIGHT GRADUALLY INCREASES UNTIL HE SEES A FULL MOON — THEN IT GRADUALLY DECREASES UNTIL AGAIN HE SEES NO MOON — THE CYCLE REPEATING ITSELF OVER AND OVER AGAIN.

THE LENGTH OF TIME BETWEEN ONE **מוֹלַד** AND THE NEXT **מוֹלַד**, IS ALWAYS THE SAME, **29.5 12H 793A**. BUT WHEN A **מוֹלַד** OCCURS AT SOME MOMENT DURING THE DAY OR NIGHT, WE CANNOT SUDDENLY SPLIT THAT DAY INTO 2 PARTS; THE FIRST PART BELONGING TO ONE MONTH, AND THE SECOND PART BELONGING TO THE NEXT MONTH.

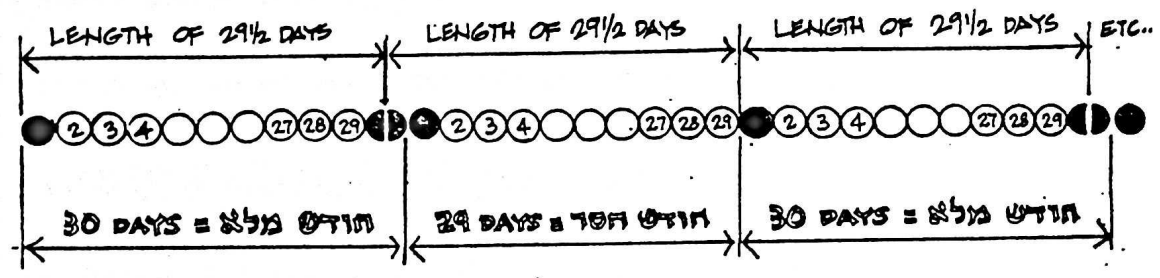
**... עַד הַיּוֹם הַזֶּה מֵאֵתָּה מִתְחַבֵּר לַחֲדָשִׁים, וְהָאֵתָּה מִתְחַבֵּר לַחֲדָשִׁים. מִסֵּף מִגִּדְלָה ה.**

THEREFORE, INSTEAD OF CONSIDERING THE LENGTH OF EACH MONTH AS BEING **29 1/2** DAYS, PLUS THE ADDED **חֲלָקִים**, — OUR **חֲזוֹן** CHOSE CERTAIN MONTHS TO BE **29** DAYS AND OTHERS TO BE **30** DAYS. THIS METHOD ENABLES US TO MAKE ONE FULL DAY OUT OF TWO **1/2** DAYS. JUST AS **29 1/2 + 29 1/2 = 59**, SO TOO, **29 + 30 = 59**.

WE SHALL SPEAK OF A MONTH AS HAVING **29** OR **30** DAYS (THE AVERAGE OF THEM BEING **29 1/2**) AND TEMPORARILY NEGLECT THE **793 חֲלָקִים**. LATER ON, WE WILL SEE THAT BY THE END OF THE YEAR, THE ACCUMULATED **חֲלָקִים** WILL BE ACCOUNTED FOR.

THE **חֲדָשִׁים** ASCRIBED **29** DAYS IS CALLED **חֶסֶד** — MISSING.  
THE **חֲדָשִׁים** ASCRIBED **30** DAYS IS CALLED **מִלּוּד** — COMPLETE.

IN THE DIAGRAM BELOW, EACH CIRCLE REPRESENTS 1 DAY. SHADED CIRCLES REPRESENT **חֲדָשִׁים חֶסֶד**. FOR LACK OF SPACE, ONLY THE BEGINNING AND END OF EACH MONTH ARE INDICATED.



THE DAY WHOSE TWO HALFS ACTUALLY BELONG TO TWO DIFFERENT MONTHS IS DESIGNATED AS THE **30TH** DAY OF THE MONTH. SINCE PART OF THAT **30TH** DAY IS ALSO THE BEGINNING OF A NEW MONTH, THE ENTIRE **30TH** DAY IS SAID TO BELONG TO **חֲדָשִׁים חֶסֶד**. — IN GENERAL, — A MONTH FOLLOWING A **30** DAY MONTH WILL HAVE **2** DAYS **חֲדָשִׁים חֶסֶד**; AND A MONTH FOLLOWING A **29** DAY MONTH WILL HAVE **1** DAY **חֲדָשִׁים חֶסֶד**.

THE MONTHS OF THE YEAR ARE EVENLY DISTRIBUTED BETWEEN **מִלּוּד** AND **חֶסֶד**. **חֶסֶד** AND **מִלּוּד** ARE THE TWO EXCEPTIONS. DEPENDING UPON THE YEAR — AND FOR REASONS WE WILL LATER DISCUSS — THE MONTHS OF **חֶסֶד** AND **מִלּוּד** ARE EITHER BOTH **מִלּוּד** OR BOTH **חֶסֶד** OR ONE **מִלּוּד** AND ONE **חֶסֶד**.

מלג	נִסָּן	חֶסֶד	מלג
חסד	אייר	מִלּוּד	מלג
מלג	סיון	חֶסֶד	מלג
חסד	תמוז	מִלּוּד	חסד
מלג	אב	חֶסֶד	מלג
חסד	אלול	מִלּוּד	חסד

BEING THAT EACH HOUR IS COMPRISED OF **1080 חֲלָקִים**, IT FOLLOWS THAT THE LENGTH OF **1** MINUTE = **1080 ÷ 60 = 18 חֲלָקִים**.

THE LUNAR CYCLE, AS WE SAID, IS **29** DAYS **12** HOURS **44** MINUTES & **3 1/3** SECONDS.

IF WE CONVERT THE MINUTES AND SECONDS TO THEIR EQUIVALENT **חֲלָקִים**, WE GET

**44** MINUTES X **18 חֲלָקִים** PER MINUTE = **792 חֲלָקִים**  
AND **3 1/3** SECONDS IS EQUAL IN TIME TO **1 חֲלָקָה**  
THEREFORE: **44** MINUTES & **3 1/3** SECONDS = **793 חֲלָקִים**  
WE CAN NOW SAY THAT:  
THE LUNAR CYCLE IS **29** DAYS **12** HOURS **793 חֲלָקִים**.

YOU WILL OFTEN SEE THIS NUMBER WRITTEN AS:

**כ"ט י"ב ט"ז ח' חל'ק'ים**

IT IS ALSO WRITTEN IN A SHORTER FORM AS: **כ"ט י"ב ט"ז ח'**

FROM THIS POINT ON, WE SHALL REFER TO THE LETTER **ד** FOR DAYS.  
THE LETTER **ה** FOR HOURS.  
AND THE LETTER **ח** FOR **חֲלָקִים**.

WE THEREFORE SAY THAT:

**1 LUNAR CYCLE = 29 ד 12 ה 793 ח**

**מוֹלַד**

THE INSTANT AT WHICH THE NEW MOON APPEARS IN **יְרוּשָׁלַיִם**, IS REFERRED TO AS THE **מוֹלַד** OF THAT MONTH; WHICH MEANS OF COURSE, THE BIRTH, OR THE BEGINNING OF THE NEW MOON CYCLE.

REGARDLESS OF WHICH COUNTRY ONE LIVES IN, NEVERTHELESS, WE STILL CONSIDER THE TIME OF THE **מוֹלַד** AS OCCURRING AT THE SAME TIME THAT IT OCCURS IN **יְרוּשָׁלַיִם**.

FOR EXAMPLE: IF THE **מוֹלַד** WAS CALCULATED TO OCCUR AT **8:00 P.M.** ON MONDAY, THIS WOULD MEAN **8:00 P.M.** IN **יְרוּשָׁלַיִם**. FOR THOSE LIVING IN NEW YORK CITY, THE ACTUAL **מוֹלַד** TIME WILL BE **7** HOURS EARLIER, OR **9:00 P.M.** MONDAY, EASTERN STANDARD TIME. FOR THOSE LIVING IN LOS ANGELES, THE ACTUAL **מוֹלַד** TIME WILL BE **10** HOURS EARLIER, OR **10:00 A.M.** MONDAY, PACIFIC STANDARD TIME.

ALL **מוֹלַד** CALCULATIONS ARE BASED ON **יְרוּשָׁלַיִם** TIME; AND THE MONTHLY **מוֹלַד**, LISTED ON CALENDARS, REFERS TO THE INSTANT AT WHICH THE **מוֹלַד** APPEARS IN **יְרוּשָׁלַיִם**.



IF WE WOULD ALLOW THE LUNAR YEAR TO FALL BEHIND THE SOLAR YEAR, ELEVEN DAYS EACH YEAR; THEN פסח WHICH IS CELEBRATED ON THE 15TH DAY OF ניסן, WOULD OCCUR DURING APRIL ONE YEAR AND DURING THE MONTH OF MARCH 3 YEARS LATER. SIX YEARS LATER, ניסן וטיבת WOULD OCCUR DURING THE MONTH OF JANUARY.

THE מורה DIRECTS US HOWEVER, TO CELEBRATE פסח DURING THE SPRING SEASON. ALL SEASONS ARE PHENOMENON OF THE SOLAR CALENDAR.

### שמור את חודש האביב ועשית פסח...

כפי-מקודם צונו שמור סיהח רחוי לחניב להקריב צו חת מנחת העמר ומס לחו עבר חת הסנה.

TO PREVENT פסח FROM FALLING BEHIND THE SPRING SEASON, WE MUST OCCASIONALLY ADD AN EXTRA MONTH OF אדר TO THE LUNAR YEAR, AND THUS POSTPONE פסח FOR ONE MONTH. THE ADDITIONAL 30 DAYS WOULD ALLOW ENOUGH TIME FOR THE SPRING SEASON TO BEGIN JUST BEFORE פסח, ENABLING US TO CELEBRATE פסח IN SPRING.

THE ADDITION OF AN EXTRA MONTH WOULD MAKE THIS PARTICULAR YEAR A 'LEAP YEAR', COMPRISED OF 13 MONTHS RATHER THAN THE USUAL 12. WHEREAS AN ORDINARY YEAR IS CALLED A שנה פשוטה - SIMPLE A 13 MONTH LEAP YEAR IS CALLED A שנה מעוברת - EXTENDED. UNLIKE THE SOLAR LEAP YEAR WHICH CONTAINS ONE EXTRA DAY ON EACH 4TH YEAR - FEBRUARY 29TH - THE LUNAR LEAP YEAR HAS 30 EXTRA DAYS - DESIGNATED AS אדר א' - ADAR THE 1ST. THE ORDINARY 29 DAYS OF אדר ב' IS THEN DESIGNATED AS אדר ב' - ADAR THE 2ND.

WE WILL EXAMINE HOW OUR משה WENT ABOUT CHOOSING CERTAIN YEARS AS שנים מעוברות AND OTHERS AS שנים פשוטות.

WE HAVE SEEN THAT ON EACH YEAR, THE LUNAR CYCLE IS SHORTER THAN THE SOLAR CYCLE BY AN AMOUNT OF: 10 D 21 H 204 M. THIS MEANS THAT AFTER THREE YEARS, THE שנת הלבנה WOULD FALL BEHIND THE שנת הקומה BY THREE TIMES THAT AMOUNT. ADDING THE DIFFERENCE FOR THREE YEARS, WOULD RESULT WITH:

$$\begin{array}{r}
 10 \text{ D } 21 \text{ H } 204 \text{ M} \cdot 1^{\text{st}} \text{ YEAR DIFFERENCE} \\
 + 10 \text{ D } 21 \text{ H } 204 \text{ M} \cdot 2^{\text{nd}} \text{ YEAR DIFFERENCE} \\
 + 10 \text{ D } 21 \text{ H } 204 \text{ M} \cdot 3^{\text{rd}} \text{ YEAR DIFFERENCE} \\
 \hline
 30 \text{ D } 63 \text{ H } 612 \text{ M} \cdot \text{TOTAL EXTRA DAYS IN 3 YEARS}
 \end{array}$$

↓

↪ CONVERT 63H

63H = 24H + 24H + 15H  
OR 63H = 2 DAYS AND 15H

$$30 \text{ D } 63 \text{ H } 612 \text{ M} = 32 \text{ D } 15 \text{ H } 612 \text{ M} \cdot \text{EXTRA}$$

## LEAP YEAR · שנה מעוברת

THE TOTAL AMOUNT OF DAYS PER LUNAR CYCLE IS 29 D 12 H 793 M. THIS IS THE LENGTH OF TIME BETWEEN ONE חנוכה AND THE NEXT חנוכה. MULTIPLYING THIS NUMBER BY 12 WOULD GIVE US THE TOTAL NUMBER OF DAYS IN ONE LUNAR YEAR. THEREFORE:

$$29 \text{ D } 12 \text{ H } 793 \text{ M} \times 12 = 354 \text{ D } 8 \text{ H } 876 \text{ M}$$

THE WAY IN WHICH WE ARRIVED AT THIS NUMBER IS SHOWN IN THIS BOX.

FIRST MULTIPLY EACH UNIT OF TIME

29 D	x 12	=	348 DAYS
12 H	x 12	=	144 HOURS
793 M	x 12	=	9516 מלקים

CONSOLIDATE THE TOTALS BY CONVERTING... מלקים INTO HOURS AND HOURS INTO DAYS.

EVERY 24 HOURS = 1 DAY  
EVERY 1080 מלקים = 1 HOUR.

9516 M ÷ 1080 M/H = 8 H + 876 M REMAINDER

144 H ÷ 24 H/D = 6 DAYS - AND BY ADDING THESE 6 DAYS TO THE PREVIOUS 348 D WE GET A NEW TOTAL OF 354 DAYS.

THE TIME LENGTH OF THE LUNAR YEAR IS THEREFORE:

**354 D 8 H 876 M**

KNOWING THE LENGTH OF A LUNAR YEAR, WE CAN CALCULATE THE PRECISE TIME DIFFERENCE BETWEEN THE SOLAR YEAR - שנת הקומה AND LUNAR YEAR - שנת הלבנה. WE HAVE JUST SEEN THAT THE LUNAR YEAR IS A BIT LESS THAN 354 1/2 DAYS AND THE LENGTH OF THE SOLAR YEAR IS 365 DAYS + 6 HOURS.

PROCEED TO SUBTRACT: 365 D 6 H

- 354 D 8 H 876 M

BUT IN ORDER TO DO SO, WE MUST CHANGE A DAY TO ITS EQUIVILANT IN HOURS.

1 DAY = 24 HOURS, AND 1 HOUR = 1080 מלקים

THEN: 365 D + 6 H IS ALSO 365 D + 5 H + 1080 מלקים

AND: 365 D + 6 H IS ALSO 364 D + 24 H + 5 H + 1080 מלקים

AND: 365 D + 6 H IS ALSO 364 D + 29 H + 1080 מלקים

NOW WE CAN SUBTRACT שנת הלבנה FROM שנת הקומה.

$$\begin{array}{r}
 364 \text{ D } 29 \text{ H } 1080 \text{ M} \text{ שנת הקומה} \\
 - 354 \text{ D } 8 \text{ H } 876 \text{ M} \text{ שנת הלבנה} \\
 \hline
 10 \text{ D } 21 \text{ H } 204 \text{ M} \text{ DIFFERENCE}
 \end{array}$$

IN OTHER WORDS, THE LUNAR YEAR IS ALMOST 11 DAYS SHORTER.



WE HAVE SHOWN THAT THE 3RD & 6TH YEARS MUST BE מעוברות שנים AND THEREBY ENABLE US TO CELEBRATE נוסח DURING THE SPRING.  
 FOLLOWING THROUGH WITH THIS SAME METHOD OF ADDING THE YEARLY DIFFERENCE BETWEEN שנת הקמה & שנת הלילה WILL RESULT IN THE 8TH - 11TH - 14TH - 17TH AND 19TH YEARS AS מעוברות שנים. A TOTAL OF 7 מעוברות שנים.  
 THE REMAINDER AFTER THE 19TH YEAR, AFTER THE 7TH מעוברות שנים, WILL THEN BE 1 HOUR 485 דקות; AND AT THAT POINT A NEW 19 YEAR CYCLE BEGINS.

THIS 19 YEAR CYCLE IS REFERRED TO AS **מחזור קטן** - THE SHORT CYCLE. THERE ALSO EXISTS A 78 YEAR SOLAR CYCLE **מחזור גדול** - THE LONG CYCLE, WHICH BEGINS AT A POINT WHERE THE SUN, WITH RESPECT TO EARTH, IS LOCATED IN EXACTLY THE SAME POSITION IT WAS IN - ON THE SAME WEEKDAY AND HOUR - DURING **משיבת כבוד**.  
 THE FAMOUS **מזמור** FOR THE מעוברות שנים AND SIMPLE TO REMEMBER IS: **גון אדם**

**ב** **ז** **ח** **ט** **י** **יא** **יב** **יג** **יד** **טו** **טז** **יז** **יח** **יט** **כ** **כא** **כב** **כג** **כד** **כה** **כו** **כז** **כח** **כט** **ל**  
**א** **ב** **ג** **ד** **ה** **ו** **ז** **ח** **ט** **י** **יא** **יב** **יג** **יד** **טו** **טז** **יז** **יח** **יט** **כ** **כא** **כב** **כג** **כד** **כה** **כו** **כז** **כח** **כט** **ל**

**א** **ב** **ג** **ד** **ה** **ו** **ז** **ח** **ט** **י** **יא** **יב** **יג** **יד** **טו** **טז** **יז** **יח** **יט** **כ** **כא** **כב** **כג** **כד** **כה** **כו** **כז** **כח** **כט** **ל**  
**א** **ב** **ג** **ד** **ה** **ו** **ז** **ח** **ט** **י** **יא** **יב** **יג** **יד** **טו** **טז** **יז** **יח** **יט** **כ** **כא** **כב** **כג** **כד** **כה** **כו** **כז** **כח** **כט** **ל**

HERE WE SEE THE **מחזור** IN WHICH WE CURRENTLY FIND OURSELVES. THE DARK LETTERS INDICATE THE YEARS WHICH ARE מעוברות שנים. WHEN THIS **מחזור** IS OVER, A NEW **מחזור** WILL BEGIN WITH YEAR **א**.

YOU CAN CALCULATE ANY YEAR'S POSITION IN ITS **מחזור** BY SIMPLY DIVIDING THAT YEAR BY 19. THE DIVISOR WILL TELL YOU THE AMOUNT OF **מחזור** SINCE **בניית העולם**; AND THE REMAINDER TELLS YOU THE FRACTION OF THE **מחזור** TO DATE.  
 AS FOR EXAMPLE:

301 → NUMBER OF **מחזור** SINCE **בניית העולם**

19 | 5734 → **משל**

57  
 ---  
 03  
 0  
 34  
 19  
 ---  
 15 → REMAINDER

TO DATE, 301 COMPLETE **מחזור** HAVE ALREADY PASSED THE CURRENT **מחזור** IS THE 302ND, AND **משל** IS THE 15TH YEAR OF THE CURRENT **מחזור**. THE NEXT מעוברות שנים WILL BE **משל**.

WE HAVE JUST FOUND THAT IN THREE YEARS, THE LUNAR CYCLE HAS ENDED MORE THAN ONE MONTH AHEAD OF THE SOLAR CYCLE. THIS ENABLES US TO ADD A 13TH MONTH - **אדר** - TO THE 3RD YEAR THUS MAKING THE 3RD YEAR A מעוברות שנים AND POSTPONE נוסח.

DEDUCTING ONE MONTH FROM OUR LAST TOTAL OF 32 D 15 H 612 M WOULD LEAVE US WITH A REMAINDER AS WELL. AS BEFORE, AND TO ENABLE US TO SUBTRACT, WE CONVERT ONE HOUR TO EQUIVALENT דקות.

$$32 \text{ D } 15 \text{ H } 612 \text{ M} = 32 \text{ D } 14 \text{ H } 1080 \text{ M} + 612 \text{ M}$$

$$= 32 \text{ D } 14 \text{ H } 1692 \text{ M}$$

NOW SUBTRACT !!

$$32 \text{ D } 14 \text{ H } 1692 \text{ M} \rightarrow \text{ACCUMULATED}$$

$$- 29 \text{ D } 12 \text{ H } 793 \text{ M} \rightarrow \text{ONE MONTH}$$


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$$3 \text{ D } 2 \text{ H } 899 \text{ M} \rightarrow \text{REMAINDER}$$

AS THE YEARS PROGRESS FURTHER WE WILL REPEAT ADDING THE AMOUNT OF DAYS THE שנת הלילה ENDS AHEAD OF THE שנת הקמה, UNTIL WE CAN AGAIN ACCUMULATE A SUFFICIENT AMOUNT OF DAYS FOR AN **אדר**. REMEMBER ONLY THAT WE MUST ALWAYS ATTACH THE OLD REMAINDER TO THE NEW TABULATION.

LET'S FIGURE OUT WHEN THE NEXT מעוברות שנים WOULD OCCUR.

	3 D	2 H	899 M	=	OLD REMAINDER
+	10 D	21 H	204 M	=	4TH YEAR DIFFERENCE
+	10 D	21 H	204 M	=	5TH YEAR DIFFERENCE
+	10 D	21 H	204 M	=	6TH YEAR DIFFERENCE

$$33 \text{ D } 65 \text{ H } 1511 \text{ M} = \text{TOTAL}$$

$$- 29 \text{ D } 12 \text{ H } 793 \text{ M} = \text{DEDUCT FOR } \text{אדר}$$


---

$$4 \text{ D } 53 \text{ H } 718 \text{ M} = \text{NEW REMAINDER}$$

↓  
 53 HOURS = 48 HOURS + 5 HOURS  
 = 2 DAYS + 5 HOURS

WE SIMPLIFY OUR REMAINDER TO READ:

$$6 \text{ D } 5 \text{ H } 718 \text{ M} = \text{REMAINDER AFTER 6 YEARS}$$

THIS REMAINDER WILL AGAIN BE PART OF A NEW TABULATION IN FIGURING OUT THE NEXT מעוברות שנים.

THE LENGTH OF THE SOLAR YEAR OF 4D 8H 876M HOLDS TRUE, OF COURSE, FOR THE NEXT YEAR ONLY, BECAUSE THE DISTANCE FROM ONE MOON TO THE NEXT MOON IS 29D 12H 793M. - FOR A YEAR, HOWEVER, WHOSE LENGTH IS LONGER BY ONE MONTH (29D 12H 793M), THE SOLAR YEAR WILL BE LONGER AS WELL. THE AMOUNT OF TIME REMAINING BEYOND THE YEAR'S COMPLETED WEEKS WILL BE THE REMAINING TIME FOR A YEAR.

BY FIRST FINDING THE LENGTH OF A YEAR WE CAN THEN DETERMINE ITS REMAINING TIME.

$$\begin{array}{r} 354 \text{ D } 8 \text{ H } 876 \text{ M} \text{ שנה פשוטה} \\ + 29 \text{ D } 12 \text{ H } 793 \text{ M} \text{ אדר א' סופר} \\ \hline 383 \text{ D } 20 \text{ H } 1669 \text{ M} \text{ שנה מעוברת} \end{array}$$

↓      ↗ CONVERT 1669 M  
1669 M = 1H + 589

$$383 \text{ D } 21 \text{ H } 589 \text{ M} = \text{שנה מעוברת}$$

DIVIDING THE FULL YEAR BY THE NUMBER '7' WILL TELL US THE AMOUNT OF COMPLETED WEEKS IN A YEAR, PLUS THE AMOUNT OF DAYS REMAINING BEYOND 54 COMPLETE WEEKS.

$$\begin{array}{r} 54 \text{ COMPLETE WEEKS} \\ 7 \overline{) 383} \\ \underline{378} \\ 5 \text{ DAYS REMAINING} \end{array}$$

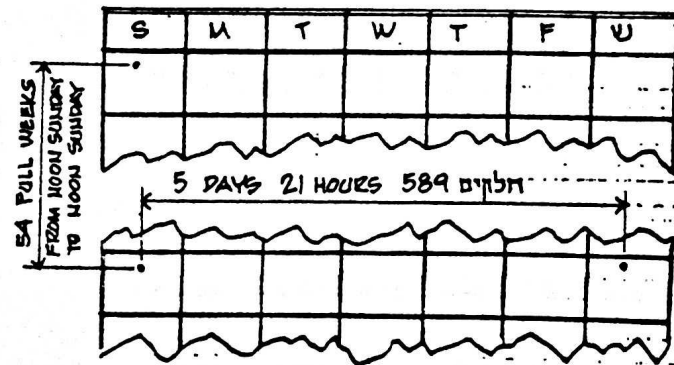
THE DIFFERENCE BETWEEN THE LENGTH OF THE YEAR AND 54 COMPLETE WEEKS.

$$\begin{array}{r} 383 \text{ D } 21 \text{ H } 589 \text{ M} \text{ שנה מעוברת} \\ - 378 \text{ D } \phantom{21 \text{ H } 589 \text{ M}} \text{ 54 FULL WEEKS} \\ \hline 5 \text{ D } 21 \text{ H } 589 \text{ M} \text{ שארית שנה מעוברת} \end{array}$$

THIS WOULD MEAN THAT IF THE MOON FOR A YEAR OCCURRED AT NOON TIME SUNDAY, THEN THE MOON FOR THE NEXT YEAR, 13 MONTHS LATER, WILL OCCUR 54 WEEKS LATER, PLUS 5D 21H 589M PAST NOON TIME SUNDAY. (THAT IS EARLY SUN MORNING)

BEGINNING OF שנה מעוברת

ONE YEAR LATER



# שארית השנה

THE LENGTH OF THE SOLAR YEAR IS 52 WEEKS + 1 DAY.

DIVIDING A FULL YEAR BY THE NUMBER 7 TELLS US THE AMOUNT OF FULL WEEKS IN A YEAR, PLUS THE AMOUNT OF DAYS REMAINING BEYOND 52 FULL WEEKS.

$$\begin{array}{r} 52 \text{ COMPLETE WEEKS} \\ 7 \overline{) 365} \\ \underline{364} \\ 1 \text{ DAY REMAINING} \end{array}$$

BECAUSE THE YEAR IS LONGER THAN 52 FULL WEEKS, JANUARY 1<sup>ST</sup> 1973 WAS ON MONDAY, JANUARY 1<sup>ST</sup> 1974 WAS ON TUESDAY, JANUARY 1<sup>ST</sup> 1975 WOULD BE WEDNESDAY.

IF THE SOLAR YEAR WAS EXACTLY 52 WEEKS LONG THEN OF COURSE JANUARY 1<sup>ST</sup> WOULD ALWAYS OCCUR ON THE SAME WEEKDAY. BUT, BECAUSE THE SOLAR YEAR IS 1 DAY LONGER THAN 52 WEEKS, THEN EACH JANUARY 1<sup>ST</sup> OCCURS ONE WEEKDAY BEYOND LAST YEAR'S.

THE ONE REMAINING DAY IS CALLED THE 'REMAINING' DAYS OF THE YEAR BEYOND THE YEAR'S COMPLETED WEEKS.

JUST AS THERE EXISTS A 'REMAINING' DAY FOR THE SOLAR YEAR SO TOO, THERE EXISTS A 'REMAINING' DAY FOR THE LUNAR YEAR.

THE LENGTH OF THE LUNAR YEAR CAN BE DEFINED AS: THE LENGTH OF TIME THAT A MOON FOR THE FIRST TIME OF A NEW YEAR IS EXTENDED, BEYOND THE WEEKDAY OF THE MOON FOR THE PREVIOUS YEAR.

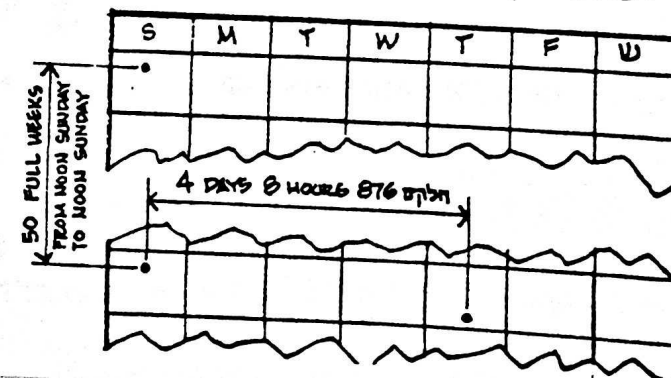
THE LENGTH OF A LUNAR YEAR, A 'REMAINING' DAY, IS 354D 8H 876M. THE YEAR CONTAINS 50 FULL WEEKS; AND 50 x 7 IS 350 DAYS. THE DIFFERENCE BETWEEN THESE 2 FIGURES IS THE 'REMAINING' DAY.

$$\begin{array}{r} 354 \text{ D } 8 \text{ H } 876 \text{ M} \text{ שנת הלונה} \\ - 350 \text{ D } \phantom{8 \text{ H } 876 \text{ M}} \text{ 50 FULL WEEKS} \\ \hline 4 \text{ D } 8 \text{ H } 876 \text{ M} \text{ שארית השנה} \end{array}$$

THIS MEANS THAT IF THE MOON OF THE PAST YEAR OCCURRED AT NOON TIME SUNDAY, THEN THE MOON OF THE NEW YEAR WILL OCCUR 50 WEEKS LATER AND AN ADDITIONAL 4D 8H 876M PAST NOON TIME SUNDAY, IN OTHER WORDS, THURSDAY EVENING.

BEGINNING OF שנה פשוטה

ONE YEAR LATER





# ארבע דהיות

היום הראשון IS ORDINARILY CELEBRATED ON THE SAME DAY IN WHICH THE מולד FOR טעדי OCCURS. UPON OCCASIONS, היום הראשון WILL BE POSTPONED FOR ONE OR TWO DAYS IN ORDER TO PREVENT CERTAIN COMPLICATIONS FROM ARISING. THE FAMOUS ד' דהיות - 4 POSTPONEMENTS - ARE 4 RULES, EACH OF WHICH WOULD BE A REASON TO POSTPONE היום הראשון FOR A DAY OR TWO AFTER THE מולד היום הראשון.

# 1

## לא יאיר ראש

THE FIRST RULE STATES THAT IN THE EVENT מולד טעדי OCCURS ON EITHER  $\text{שבת}$  - SUNDAY OR  $\text{ד'}$  - WEDNESDAY OR  $\text{ה'}$  - FRIDAY

THEN WE WOULD NOT CELEBRATE היום הראשון ON THE SAME DAY AS THE מולד טעדי, BUT RATHER THE NEXT DAY. CELEBRATING THE FIRST DAY OF היום הראשון ON SUN. WED. OR FRIDAY WOULD COMPLICATE FUTURE  $\text{ד' דהיות}$ , AS SHOWN HERE ON THESE CALENDAR SEGMENTS.

-S	M	T	W	T	F	ש
ראש השנה	ראש השנה					
		ד'				
המנוחה	המנוחה	המנוחה	המנוחה	המנוחה	המנוחה	המנוחה

IF SUNDAY WERE THE FIRST DAY OF טעדי, THEN היום הראשון - THE 21<sup>ST</sup> DAY OF טעדי WOULD OCCUR ON שבת, THUS PREVENTING US FROM PERFORMING מצות חילול ערב (BEATING THE ערב) ON שבת. WE THEREFORE POSTPONE היום הראשון ONE DAY AND היום הראשון WILL BE SUNDAY.

IF WEDNESDAY WERE THE FIRST OF טעדי, THEN היום הראשון, THE 10<sup>TH</sup> OF טעדי WOULD OCCUR ON FRIDAY. BUT  $\text{ד' דהיות}$  AND  $\text{ה' דהיות}$  MUST NEVER FOLLOW EACH OTHER. IF THEY FOLLOWED EACH OTHER, THEN A PERSON WHO PASSED AWAY ON FRIDAY COULD NOT BE BURIED UNTIL SUNDAY.

-S	M	T	W	T	F	ש
			ראש השנה	ראש השנה		
					יום כיפור	שבת

TO PREVENT THE LONG DELAY OF BURIAL, היום הראשון IS POSTPONED ONE DAY. BECAUSE OF THIS POSTPONEMENT, היום הראשון WILL OCCUR SIMULTANEOUSLY WITH  $\text{שבת}$ .

-S	M	T	W	T	F	ש
					ראש השנה	ראש השנה
יום כיפור						שבת

IF FRIDAY WERE THE FIRST OF טעדי, THEN היום הראשון WOULD OCCUR ON SUNDAY AND THIS FOLLOW  $\text{שבת}$ . POSTPONING היום הראשון ONE DAY WOULD POSTPONE היום הראשון TO MONDAY, ENABLING QUICKER BURIAL OF A נפטר.

# 2

## מולד זקן בל תדרוש

THE SECOND RULE STATES: THAT IF THE מולד טעדי OCCURS PAST THE 18<sup>TH</sup> HOUR OF A DAY, היום הראשון IS THEN POSTPONED TO THE FOLLOWING DAY.

BEAR IN MIND THAT IN ALL OUR DISCUSSIONS, THE DAY BEGINS AT SUNDOWN -  $\text{שקיעת היום}$  - AND ENDS AT THE NEXT SUNDOWN. THEREFORE: IF SUNDOWN IS 6:00 PM THEN THE 18<sup>TH</sup> HOUR IS 12:00 PM TOMORROW. THOUGH SUNDOWN FOR MOST DAYS IS BEFORE OR AFTER 6:00 P.M. - NEVERTHELESS, OUR  $\text{ד' דהיות}$  CHOOSE 6:00 P.M. - THE AVERAGE SUNSET - AS THE REFERENCE POINT IN מולד טעדי CALCULATIONS.

IT IS OBVIOUS THAT JUST AS THERE EXISTS A  $\text{הפרש}$  BETWEEN ONE YEAR AND THE NEXT, THERE ALSO EXISTS A  $\text{הפרש}$  BETWEEN ONE MONTH AND THE NEXT. THE  $\text{הפרש}$  IS, OF COURSE, THE AMOUNT OF TIME THAT A מולד EXTENDS BEYOND THE WEEKDAY OF THE PREVIOUS מולד.

THE LENGTH OF A LUNAR MONTH, A  $\text{חודש הלבנה}$ , IS:  $29 \text{ d } 12 \text{ h } 793 \text{ m}$ . THE MONTH CONTAINS 4 FULL WEEKS, AND  $7 \times 4 = 28$  DAYS. THE DIFFERENCE BETWEEN THESE 2 FIGURES, IS A  $\text{הפרש}$ .

$$29 \text{ d } 12 \text{ h } 793 \text{ m} \quad \text{חודש הלבנה}$$

$$- 28 \text{ d} \quad \text{4 FULL WEEKS}$$

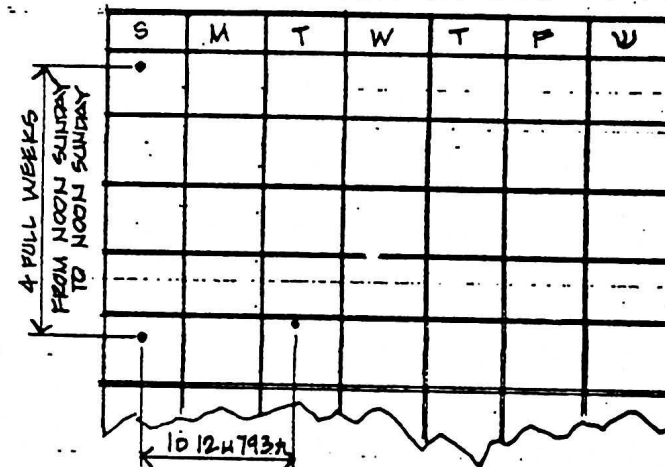

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$$1 \text{ d } 12 \text{ h } 793 \text{ m} \quad \text{שארית החודש}$$

THIS WOULD MEAN THAT IF THE מולד OF THE PAST MONTH OCCURED AT NOON TIME SUNDAY, THEN THE מולד OF THE NEW MONTH WILL OCCUR 4 WEEKS LATER, PLUS AN ADDITIONAL 1 d 12 h 793 m PAST THE NOON TIME SUNDAY, IN OTHER WORDS, EARLY TUESDAY MORNING.

BEGINNING OF  $\text{חודש}$  →

BEGINNING OF NEXT  $\text{חודש}$  →



ALWAYS REMEMBER THAT THE DISTANCE BETWEEN ONE מולד AND THE NEXT מולד IS ALWAYS  $29 \text{ d } 12 \text{ h } 793 \text{ m}$ ; AND IT DOES NOT MATTER WHETHER THE  $\text{חודש}$  IS A  $\text{מלא}$  OR A  $\text{חסר}$ .

TO SUMMARIZE: WE HAVE DISCUSSED 3 TYPES OF  $\text{שארית החודש}$ .

- 1 d 12 h 793 m  $\text{שארית החודש}$
- 4 d 8 h 876 m  $\text{שארית שנה פשוטה}$
- 5 d 21 h 589 m  $\text{שארית שנה מעוברת}$

NOTICE THAT BY ADDING THE  $\text{שארית החודש}$  TO THE  $\text{שנה פשוטה}$  THE RESULT IS THE  $\text{שנה מעוברת}$ . THE REASON OF COURSE IS THAT 1 MONTH + 12 MONTHS = 13 MONTHS.



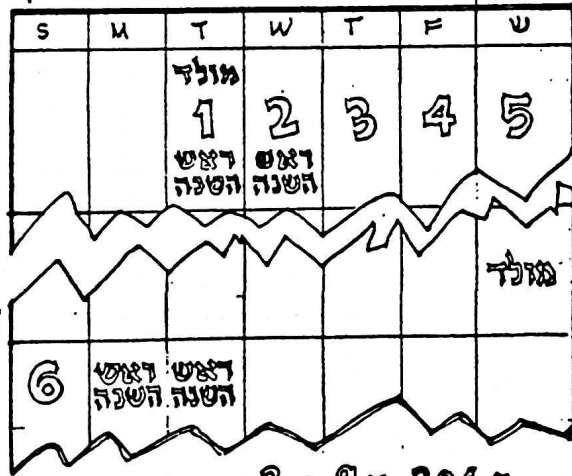
THE FIRST TWO OF THE **ארכי דחיות** ARE GENERAL RULES. THE THIRD AND FOURTH RULES ARE FOR 2 PARTICULAR HOURS OF A WEEK. A **מועד תשרי** OCCURRING PAST A CERTAIN HOUR ON TUESDAY OR PAST A CERTAIN HOUR ON MONDAY WOULD INDICATE THAT **ראש השנה** NOT BE CELEBRATED ON THE DAY OF THE **מועד**.

# 3 ג' ט' ד' ב'שנה פ'שנה ג'רוש

THE THIRD RULE STATES, THAT IF THE **מועד תשרי** OF A **שנה** OCCURS THE THIRD DAY OF THE WEEK, TUESDAY: **2 DAYS** NINE HOURS PAST 6:00 P.M. MONDAY EVENING: **9 HOURS** PLUS 204 **חלקים** PAST THAT HOUR: **ד', חלקים** (OR ANY TIME LATER THAT DAY) THEN **ראש השנה** IS POSTPONED TO THURSDAY.

WE CANNOT CELEBRATE **ראש השנה** ON THE SAME DAY AS THE **מועד ג' ט' ד'** (PRONOUNCED-ג' ט' ד') BECAUSE OF A COMPLICATION IT WOULD CREATE 12 MONTHS LATER. THIS CAN BE DEMONSTRATED BY ADDING THE **שארית השנה** TO THE **ג' ט' ד'** AND SHOW THAT THE NEXT **מועד תשרי** OCCURS ON **שבת**, BUT AFTER THE 18<sup>th</sup> HOUR. NEXT YEAR'S **מועד תשרי** WOULD NOT BE CELEBRATED ON **שבת** BECAUSE OF **זמן זקן**. NEITHER WOULD IT BE CELEBRATED ON SUNDAY BECAUSE OF **לא אדיו**.

POSTPONING THE NEXT **ראש השנה** TO MONDAY WOULD MAKE NEXT YEAR'S **ראש השנה** EXTEND 6 DAYS BEYOND THIS YEAR'S **ראש השנה**, IN OTHER WORDS, THIS YEAR WILL BE 50 WEEKS PLUS 6 DAYS, ALTOGETHER 356 DAYS; ONE DAY LONGER THAN A **שנה פשוטה** CAN ACCOMMODATE. THE CALENDAR SEGMENT SHOWN HERE, INDICATES THE SITUATION THAT WOULD EXIST FOR THIS AND NEXT YEAR, IF **ראש השנה** IS NOT POSTPONED.



THE **ג' ט' ד'** PROBLEM CAN ALSO BE ILLUSTRATED ARITHMETICALLY BY ASSIGNING NUMBERS TO DAYS OF THE WEEK. WE BEGIN A WEEK WITH SUNDAY AS DAY #1 AND END IT WITH **שבת** AS DAY #7.

ARITHMETICALLY **ג' ט' ד'** CAN NOW BE WRITTEN AS 3 D 9 H 204 H. THIS REPRESENTS TUESDAY, THE 3<sup>RD</sup> DAY OF THE WEEK, 9 HOURS AND 204 **חלקים** PAST 6:00 P.M. MONDAY EVENING. NOW WE ARE ABLE TO ADD THE **שארית השנה** TO **ג' ט' ד'** AND DETERMINE **מועד תשרי** FOR NEXT YEAR.

$$\begin{array}{r} 3 \text{ D } 9 \text{ H } 204 \text{ H} \\ + 4 \text{ D } 8 \text{ H } 876 \text{ H} \\ \hline 7 \text{ D } 17 \text{ H } 1080 \text{ H} \end{array}$$

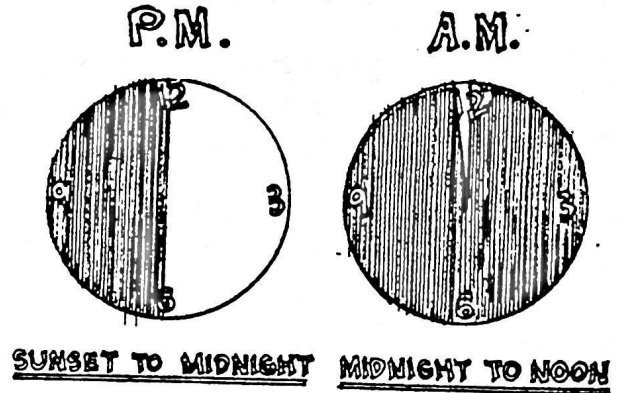
**ג' ט' ד' שנתית השנה**

↓ ↓ CONVERT 1080 H TO 1 HOUR AND ADD IT TO 17 H.

7 D 18 H = **מועד זקן** ON THE 7<sup>TH</sup> DAY OF THE WEEK, **שבת**.

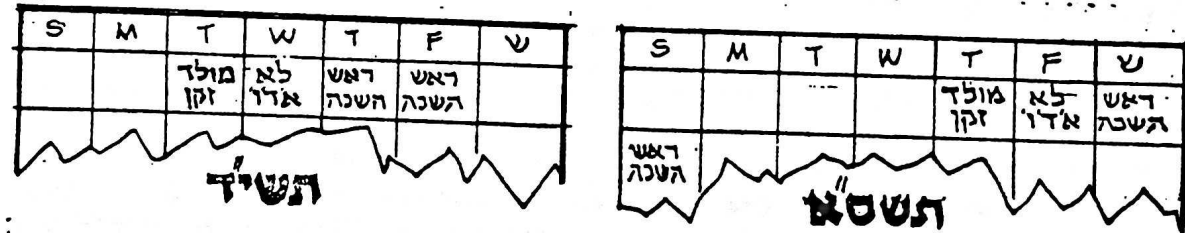
BECAUSE OF THE FACT, THAT THE SUN'S CYCLE HAS ACTUALLY NO RELATION TO THE MOON'S CYCLE, WE ARE THEREFORE NOT DEPENDANT ON THE EXACT TIME OF THE **מועד תשרי** FOR OUR **מועד** CALCULATIONS. SINCE WE ARE DEALING WITH NUMBERS OF DAYS & HOURS AND MUST BEGIN A DAY AT SOME POINT, WE REFER TO 6:00 P.M. AS OUR STARTING POINT.

THE DAY IS 24 HOURS LONG AND IS MEASURED FROM **שקיעת החמה** TO THE NEXT DAY'S **שקיעת החמה**. THIS DIAGRAM SHOWS THAT ON A DAY WHOSE **שקיעת החמה** IS AT 6:00 P.M., THEN BY THE TIME NOON APPEARS, 18 HOURS (OR 3/4) OF THE DAY HAVE ALREADY PASSED. A **מועד תשרי** WHICH OCCURS AFTER NOON TIME IS THEREFORE CALLED A **מועד זקן** - AN AGED **מועד**.



THE REASON FOR NOT CELEBRATING **ראש השנה** ON THE DAY OF A **מועד זקן** IS THAT, TILL THE END OF THE **תקופת הראשונים**, EACH MONTH **דין בית דין** WOULD PRONOUNCE THE DAY OF **ראש השנה** UPON HEARING THE TESTIMONY OF WITNESSES THAT HAD SEEN THE NEW MOON IN ITS EARLIEST PHASE. FOR THE FIRST 6 HOURS PAST A **מועד**, THE CRESCENT OF THE MOON IS TOO THIN FOR IT TO BE SEEN BY ANYONE. IF A **מועד** OCCURS PAST NOON TIME, THEN THE MOON CANNOT BE SEEN BEFORE 6:00 P.M., WHICH IS THE BEGINNING OF A NEW DAY THEREFORE **דין בית דין** COULD NOT PRONOUNCE **ראש השנה** ON THE DAY OF A **מועד זקן**. JUST AS **דין בית דין** DID NOT DESIGNATE THAT DAY AS **ראש השנה**, WE TOO DO NOT CELEBRATE **ראש השנה** ON THE SAME DAY AS A **מועד זקן**.

THOUGH, SINCE THE **תקופת הראשונים**, ALL OUR **דינים** AS WELL AS OUR **דיני מדינה** ARE BASED ON CALCULATIONS RATHER THAN ANY EYE WITNESS TESTIMONY, NEVERTHELESS, WE FOLLOW THE SAME PATTERN THAT **דין בית דין** WOULD HAVE FOLLOWED.



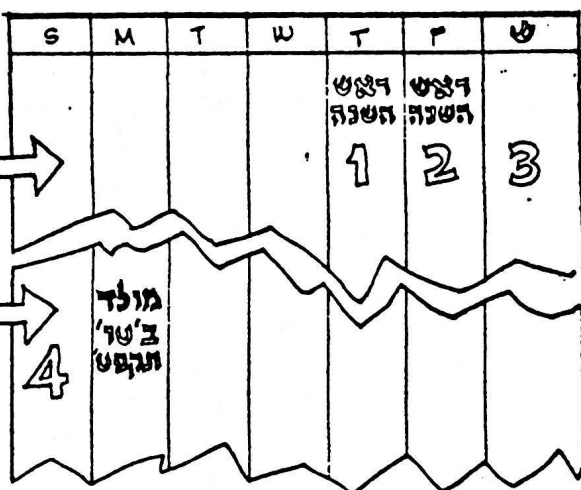
SUPPOSE **מועד תשרי** WOULD OCCUR ON TUESDAY AFTERNOON. **ראש השנה** CANNOT BE CELEBRATED ON TUESDAY BECAUSE OF **מועד זקן**. **ראש השנה** CANNOT BE CELEBRATED ON WEDNESDAY BECAUSE OF **לא אדיו** IS THEREFORE CELEBRATED ON THURSDAY.

THIS TYPE OF 2 DAY POSTPONEMENT HAS MOST RECENTLY OCCURRED IN THE YEAR **תשנ"ג**. THE **מועד תשרי** WAS TUESDAY SEPTEMBER 8<sup>TH</sup> AT 5:10 + 12 P.M. (3023H192M) BUT **ראש השנה** WAS NOT UNTIL THURSDAY SEPTEMBER 10<sup>TH</sup> 1953.

A SIMILAR SITUATION WILL OCCUR IN **תשס"ב** WHEN THE **מועד תשרי** WILL BE ON THURSDAY 1:00 + 310 P.M. (5D 19H 310M) BUT **ראש השנה** WILL BE ON **שבת** SEPTEMBER 30, 2000.

THE CALENDAR SEGMENTS SHOW THAT THE START OF THE YEAR THAT JUST PASSED WAS ACTUALLY ON THURSDAY.

START OF **שנה מעוברת** →



START OF **שנה פשוטה** →

IF THE NEW YEAR IS CELEBRATED ON THE SAME DAY AS ITS BIRTHDAY THEN THE NEW YEAR WOULD EXTEND BEYOND THE OLD ONE BY ONLY 4 DAYS.

BUT!! A YEAR WHICH OCCURS AFTER A **שנה מעוברת** MUST EXTEND AT LEAST 5 DAYS BEYOND THE **שנה מעוברת**.

THEREFORE, IN THIS SITUATION, THE START OF THE YEAR IS ACTUALLY CELEBRATED ON TUESDAY, ONE DAY AFTER THE BIRTHDAY.

IN ORDER TO ILLUSTRATE WHY WE SAID THAT THE START OF THE YEAR WAS ON THURSDAY, WE WILL CALCULATE BACKWARDS THROUGH SUBTRACTING THE BIRTHDAY FROM THE NEW BIRTHDAY. BUT FIRST, WE MUST MAKE THIS CALCULATION ARITHMETICALLY FEASIBLE.

LET US CONSIDER THE BIRTHDAY NOT AS OCCURRING ON THE 2<sup>ND</sup> DAY OF THE WEEK, BUT RATHER AS THE 9<sup>TH</sup> DAY OF THE PREVIOUS WEEK. THE 2<sup>ND</sup> DAY OF A WEEK IS ALWAYS THE 9<sup>TH</sup> DAY OF A PREVIOUS WEEK, BECAUSE  $2+7=9$ .

ORDINARILY, THE APPROPRIATE NUMBERS ASSIGNED TO BIRTHDAY WOULD BE 2 D 15 H 589 M, REPRESENTING 15 HOURS PLUS 589 MINUTES OF THE SECOND DAY. BY ADDING 7 DAYS TO THIS NUMBER, WE WILL GET A NUMBER HIGH ENOUGH TO ENABLE US TO DEDUCT A BIRTHDAY FROM IT.

$$\begin{array}{r} 2 \text{ D } 15 \text{ H } 589 \text{ M} \\ + 7 \text{ D} \\ \hline \end{array} \quad \begin{array}{l} \text{ב' טו' תקפ"ט} \\ \text{ADD ONE WEEK} \end{array}$$

$$9 \text{ D } 15 \text{ H } 589 \text{ M} \quad \text{SAME AS ב' טו' תקפ"ט}$$

↳ CONVERT 9 D  
 $9 \text{ D} = 8 \text{ D} + 24 \text{ H}$

$$9 \text{ D } 15 \text{ H } 589 \text{ M} = 8 \text{ D} + 24 \text{ H} + 15 \text{ H} + 589 \text{ M}$$

ADD HOURS TO HOURS

$$\text{ב' טו' תקפ"ט} = 8 \text{ D } 39 \text{ H } 589 \text{ M}$$

OUR FIGURES ARE NOW HIGH ENOUGH TO SUBTRACT FROM THEM.

WE SEE THAT BECAUSE OF **מולד קודם** AND **שנה מעוברת**, THE NEXT YEAR'S YEAR WOULD ABSOLUTELY NOT BE CELEBRATED BEFORE MONDAY.

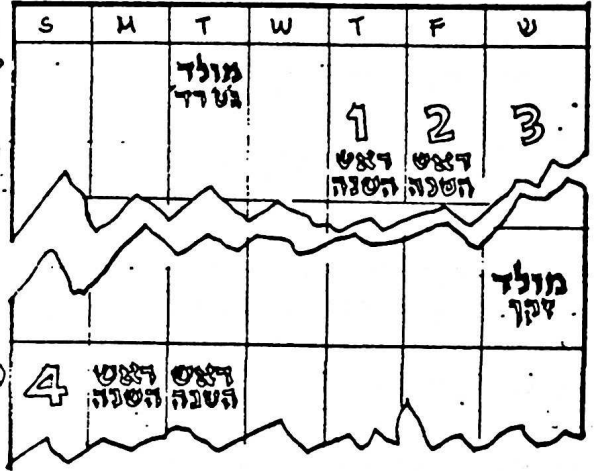
IF THINGS WERE LEFT ALONE AS IS, THE YEAR WOULD BE 356 DAYS WHICH IS TOO LONG FOR A YEAR.

THEREFORE, THIS THIRD RULE STATES THAT, IN ORDER TO SHORTEN THE LENGTH OF THE YEAR, POSTPONE YEAR FROM TUESDAY TO THURSDAY.

THIS POSTPONEMENT WOULD SHORTEN THE YEAR BY 2 DAYS AND MAKE IT A 354 DAY YEAR, WHICH OF COURSE IS THE AVERAGE LENGTH OF A YEAR.

THIS CALENDAR SEGMENT SHOWS THE DAYS ON WHICH BOTH YEAR AND BIRTHDAY ARE ACTUALLY CELEBRATED AS A RESULT OF A **מולד ב' טו' קד'**.

THIS MOST RECENTLY OCCURRED IN 1957 WHEN THE BIRTHDAY WAS TUESDAY 6:33 + 12 A.M. WHICH IS ALSO 30 D 12 H 14 M AND LATER THAN **ב' טו' קד'** - (30 D 9 H 20 M) BUT YEAR WAS NOT UNTIL THURSDAY, SEPT. 26, 1957.



THIS SITUATION WILL AGAIN OCCUR IN 1984 WHEN THE BIRTHDAY WILL BE TUESDAY 11:54 + 4 A.M. (30 D 11 H 976 M) BUT YEAR WILL NOT BE UNTIL THURSDAY, SEPT. 23, 1984.

# 4 ב' טו' תקפ"ט אחר עיבור עקור מלשרוש

THE FOURTH RULE STATES THAT IF AFTER A YEAR THE NEW BIRTHDAY OCCURS ON: THE SECOND DAY OF THE WEEK, MONDAY : 3 DAYS 15 HOURS PAST 6:00 P.M. SUNDAY EVENING : 10 HOURS PLUS 589 MINUTES PAST THE HOUR : חלקים, תקפ"ט (OR ANY TIME LATER THAT DAY) THEN YEAR IS POSTPONED TO TUESDAY.

WE SHALL PROCEED TO SHOW THAT CELEBRATING YEAR ON THE SAME DAY AS A BIRTHDAY WOULD MEAN THAT THE YEAR WHICH JUST PASSED WAS ONLY 382 DAYS LONG WHICH IS ONE DAY SHORTER THAN THE MINIMUM LENGTH OF A YEAR.

BY POSTPONING YEAR FOR ONE DAY, TO CELEBRATE IT ON THE DAY AFTER THE BIRTHDAY, WE THUS INCREASE THE LENGTH OF THE PASSING YEAR, BY ONE DAY. OF COURSE THE PASSING YEAR WOULD THEREFORE BE A 383 DAY YEAR, WHICH IS THE MINIMUM LENGTH OF A YEAR.



# השנה - כסלו

AS MENTIONED EARLIER, ALL THE MONTHS OF THE YEAR ALTERNATE BETWEEN  $\text{תשרי}$  AND  $\text{חשוון}$ , EXCEPT FOR THE MONTHS OF  $\text{אדר}$  AND  $\text{שבט}$ . IN ANY GIVEN YEAR,  $\text{אדר}$  AND  $\text{שבט}$  WILL HAVE ONE OF 3 POSSIBILITIES:

- THEY ARE EITHER — BOTH  $\text{אדר}$
- OR — BOTH  $\text{שבט}$
- OR — ONE  $\text{אדר}$  & ONE  $\text{שבט}$ .

WE SHALL DESCRIBE HOW THESE 2 MONTHS FUNCTION.

ORDINARILY, THE YEAR IS 354 DAYS LONG, WHICH IS THE RESULT OF 6 MONTHS OF  $\text{אדר}$  AND 6 MONTHS OF  $\text{שבט}$ .

$$\begin{aligned} 6 \text{ MONTHS} \times 29 \text{ DAYS EACH} &= 174 \text{ DAYS} \\ + 6 \text{ MONTHS} \times 30 \text{ DAYS EACH} &= 180 \text{ DAYS} \\ \hline 12 \text{ MONTHS TOTAL LENGTH} &= 354 \text{ DAYS} \end{aligned}$$

THE AVERAGE  $\text{אורכה}$  IS 354 DAYS LONG. THE AVERAGE  $\text{אורכה}$  IS 384 DAYS LONG, BECAUSE OF THE EXTRA 30 DAYS OF  $\text{אדר}$ ,  $354 + 30 = 384$ .

WE REFER TO 'AVERAGE' LENGTH, BECAUSE NOT EVERY YEAR IS 354 OR 384 DAYS LONG. OCCASIONALLY, THE YEAR IS ONE DAY LONGER, OR ONE DAY SHORTER. THERE ARE 2 BASIC REASONS FOR VARYING THE LENGTH OF A YEAR.

**1<sup>ST</sup> OF ALL:**  $\text{אדר}$  DOES NOT ALWAYS OCCUR ON THE SAME DAY AS THE  $\text{אדר}$ . IF  $\text{אדר}$  IS POSTPONED A DAY OR TWO, THEN THE PREVIOUS YEAR AUTOMATICALLY BECOMES LONGER; AND THE NEW YEAR, AUTOMATICALLY BECOMES SHORTER.

**2<sup>ND</sup> OF ALL:** IF THE  $\text{אדר}$  OF A  $\text{אדר}$  WOULD HAVE ONLY BEEN PRECISELY 4 DAYS, THEN ONE  $\text{אדר}$  WOULD EXTEND 4 DAYS BEYOND THE PREVIOUS ONE AND MOST YEARS WOULD BE 354 DAYS LONG. BUT BECAUSE THE  $\text{אדר}$  IS 4D 8H 876N THOSE EXTRA HOURS WILL OCCASIONALLY LEAD INTO THE 5<sup>TH</sup> DAY. FOR EXAMPLE: IF THE PREVIOUS  $\text{אדר}$  OCCURRED 11:00 A.M. MONDAY MORNING, THE NEXT  $\text{אדר}$  WOULD OCCUR 7:48 + 12 P.M. FRIDAY EVENING. THE PREVIOUS  $\text{אדר}$  WOULD HAVE BEEN CELEBRATED ON MONDAY, AND THE NEW  $\text{אדר}$  WOULD BE CELEBRATED ON  $\text{אדר}$ , ONE YEAR LATER. THE NEW  $\text{אדר}$  WOULD THEN EXTEND 5 DAYS BEYOND THE PREVIOUS ONE.

BECAUSE OF THESE 2 REASONS MENTIONED, THE LENGTH OF A YEAR VARIES:

$$\begin{aligned} \text{שנה מעוברת} &= 383, 384 \text{ OR } 385 \text{ DAYS} \\ \text{שנה פשוטה} &= 353, 354 \text{ OR } 355 \text{ DAYS} \end{aligned}$$

THE  $\text{אדר}$  FOR A  $\text{שנה מעוברת}$  IS 5D 21H 589N. THIS MEANS THAT AT THE COMPLETION OF 54 WHOLE WEEKS OF THE YEAR, THE NEW  $\text{אדר}$  WILL EXTEND BEYOND THE PREVIOUS  $\text{אדר}$  BY THE AMOUNT OF THE  $\text{אדר}$ . THEREFORE, BY SUBTRACTING THE  $\text{אדר}$  FROM  $\text{אדר}$  WE CAN DETERMINE WHEN THE  $\text{אדר}$  OF THE PREVIOUS YEAR OCCURED.

$$\begin{array}{r} 8 \text{ D } 39 \text{ H } 589 \text{ N } \quad \text{ב' טו' תקפ"ט} \\ - 5 \text{ D } 21 \text{ H } 589 \text{ N } \quad \text{שמינית שנה מעוברת} \\ \hline 3 \text{ D } 18 \text{ H } \quad \text{מועד תשרי קל"ג} \end{array}$$

HERE WE SEE THAT — THE PREVIOUS  $\text{אדר}$  OCCURED ON TUESDAY, THE 3<sup>RD</sup> DAY OF THE WEEK, AT 12:00 NOON TIME WHICH IS 18 HOURS PAST 6:00 P.M. MONDAY EVENING. IN OTHER WORDS, A  $\text{אדר}$ .

THE PREVIOUS  $\text{אדר}$  WAS NOT ON TUESDAY, BECAUSE OF  $\text{אדר}$ . THE PREVIOUS  $\text{אדר}$  WAS NOT ON WEDNESDAY, BECAUSE OF  $\text{אדר}$ . THE PREVIOUS  $\text{אדר}$  WAS, HOWEVER, THURSDAY.

TWO THINGS ARE NOW CLEAR TO US. FIRST OF ALL, THE PREVIOUS YEARS'  $\text{אדר}$  WAS ACTUALLY ON THURSDAY.

SECOND OF ALL, THE MINIMUM LENGTH OF A  $\text{שנה מעוברת}$  IS 54 WEEKS PLUS 5 DAYS — ALTOGETHER 383 DAYS.

THE LAST RULE OF THE  $\text{אדר}$  STATES, THAT WE POSTPONE THE  $\text{אדר}$  OF THE  $\text{אדר}$  SO THAT IT WILL EXTEND 5 DAYS BEYOND THE PREVIOUS  $\text{אדר}$ . THIS WILL MAKE THE  $\text{אדר}$  A 383 DAY YEAR.

S	M	T	W	T	F	S
				אדר	אדר	
				1	2	3
	אדר	אדר	אדר			
4	5					

THE  $\text{אדר}$  SITUATION HAS MOST RECENTLY OCCURED IN  $\text{אדר}$ , WHEN THE  $\text{אדר}$  WAS MONDAY 3:29 + 11 P.M. (20 21H 533N). THE PREVIOUS  $\text{אדר}$  WAS ON TUESDAY SEPTEMBER 28, 1954.

THE PREVIOUS YEAR WAS A  $\text{שנה מעוברת}$  WHOSE  $\text{אדר}$  WAS TUESDAY 5:06 + 16 P.M. AND ITS  $\text{אדר}$  OF THAT YEAR WAS THURSDAY SEPT. 10, 1953.

ANOTHER  $\text{אדר}$  SITUATION WILL AGAIN OCCUR IN  $\text{אדר}$ , WHEN THE  $\text{אדר}$  WILL BE MONDAY 10:48 + 12 P.M. (20 16H 876N) BUT  $\text{אדר}$  WILL BE TUESDAY, OCTOBER 4, 2005.

THE YEAR PRECEDING IT,  $\text{אדר}$ , WILL BE A  $\text{שנה מעוברת}$  WITH A  $\text{אדר}$  TUESDAY 1:15 + 17 P.M. AND ITS  $\text{אדר}$  WILL BE THURSDAY SEPT. 16, 2004.



THERE IS, OF COURSE, A TIME RELATIONSHIP BETWEEN THE LENGTH OF A YEAR AND THE YEAR'S **מספר ימים**. THERE ALSO EXISTS, A TIME RELATIONSHIP BETWEEN ONE **בית** AND ANOTHER.

OUR **לוח** HAVE CALCULATED THAT THERE ARE ONLY 7 TYPES OF **מספר ימים** AND ONLY 7 TYPES OF **מספר ימים**. SOME TYPES ARE RARE, SUCH AS THE FIRST DAY **א** OCCURRING ON SUNDAY, WHILE OTHER TYPES ARE MORE COMMON. TO EACH OF THESE TYPES, **לוח** HAVE GIVEN A **מספר**, UNIQUE TO THAT YEAR ONLY.

EACH **מספר** CONSISTS OF THREE LETTERS OF THE ALPHABET. THE FIRST LETTER REFERS TO THE WEEKDAY ON WHICH **החודש** WILL OCCUR. THE SECOND LETTER REFERS TO THE LENGTHS OF **חשוון** AND **כסלו**. THE THIRD LETTER REFERS TO THE WEEKDAY ON WHICH **אדר** WILL OCCUR.

EXAMPLE!

SUPPOSE THE FIRST DAY **החודש** OF A **שנה** OCCURRED ON **א**, AND THE MONTHS OF **כסלו** AND **חשוון** ARE BOTH **מלא**, 30 DAYS. WE CAN EASILY DETERMINE WHICH WEEKDAY **אדר** WILL OCCUR ON.

WE BEGIN BY ADDING ALL THE DAYS OF THE FIRST 6 MONTHS.

<b>חשוון</b>	30 DAYS
<b>כסלו</b>	30 DAYS
<b>טבת</b>	29 DAYS
<b>שבט</b>	30 DAYS
<b>אדר</b>	29 DAYS
<b>TOTAL</b>	178 DAYS

FROM THE FIRST OF THE YEAR, TO THE END OF **אדר**, IS 178 DAYS. **החודש** WILL BE THE 179<sup>TH</sup> DAY OF THE YEAR, AND **אדר** WILL OCCUR 15 DAYS LATER, **א**.  $178 + 15 = 193$ . AND **אדר** WILL THEREFORE OCCUR ON THE 193<sup>RD</sup> DAY OF THE YEAR. IF THE FIRST DAY OF THE YEAR WAS **א**, THE 193<sup>RD</sup> DAY IS TUESDAY.

THE **מספר** DESIGNATED BY **לוח** FOR THE TYPE OF YEAR IN OUR EXAMPLE IS: **אשג**.

- א** - THE FIRST DAY **החודש** OCCURS ON **א**, THE 7<sup>TH</sup> DAY OF THE WEEK.
- ש** - THE MONTHS OF **כסלו** AND **חשוון** ARE BOTH **מלא**, 30 DAYS.
- ג** - THE FIRST DAY **אדר** OCCURS ON TUESDAY, THE 3<sup>RD</sup> DAY OF THE WEEK.

THE **מספרים** FOR THE 14 TYPES OF YEARS ARE SHOWN HERE.

<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>
<b>אשג</b>	<b>אשג</b>	<b>אשג</b>

JUST AS THIS CALCULATION WAS MADE FOR **אדר**, SO TOO, OTHER SIMILAR CALCULATIONS CAN BE MADE FOR OTHER **מספרים**.

AS A MATTER OF FACT: THE AMOUNT OF DAYS FROM **החודש** TO **אדר** OF THE SAME YEAR DEPENDS ON THE LENGTH OF **כסלו** & **חשוון**. BUT THE DISTANCE FROM **אדר** TO THE NEW **החודש** IS ALWAYS THE SAME. **החודש** IS ALWAYS 168 DAYS AFTER **אדר**, 23 WEEKS + 2 DAYS. IF **אדר** OCCURS ON TUESDAY, THE NEXT **החודש** WILL BE THURSDAY. ALSO, JUST AS **החודש** WILL NOT OCCUR ON **א**,

TO ACCOMMODATE THE CHANGE OF ONE DAY MORE OR ONE DAY LESS, THE MONTHS OF **כסלו** AND **חשוון** CAN VARY TO BECOME EITHER **מלא** OR **חסר**.

THE FOLLOWING AMOUNTS ARE DESIGNATED FOR EACH OF THE 3 MONTHS.

ONE DAY LESS	→ <b>חשוון</b> 29	<b>כסלו</b> 29	<b>אדר</b> <b>אשג</b>
AVERAGE YEAR	→ <b>חשוון</b> 29	<b>כסלו</b> 30	<b>אדר</b> <b>אשג</b>
ONE DAY MORE	→ <b>חשוון</b> 30	<b>כסלו</b> 30	<b>אדר</b> <b>אשג</b>

DURING THE AVERAGE YEAR, THE MONTH OF **חשוון** IS **אשג** - 29 DAYS. AND THE MONTH OF **כסלו** IS **אשג** - 30 DAYS. WHERE THE YEAR IS A DAY SHORTER, - **כסלו** LOSES A DAY. WHERE THE YEAR IS A DAY LONGER, - **חשוון** GAINS A DAY.

WE WILL LATER SEE THAT **לוח** USE THE LETTERS **א**, **ב**, AND **ג** AS PART OF A THREE LETTER **מספר** FOR EVERY TYPE OF YEAR.

THE 3 VARIATIONS OF A **שנה**; AND 3 FOR **שנה** ARE SHOWN HERE.

<b>שנה מעוברת</b>	<b>שנה פשוטה</b>
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30	30	30	<b>אדר</b>	<b>אשג</b>	<b>אדר</b>	30	30	30
29	29	30	<b>חשוון</b>	<b>אשג</b>	<b>אדר</b>	29	29	30
29	30	30	<b>כסלו</b>	<b>אשג</b>	<b>אדר</b>	29	30	30
29	29	29	<b>טבת</b>	<b>חסר</b>	<b>אדר</b>	29	29	29
30	30	30	<b>שבט</b>	<b>מלא</b>	<b>אדר</b>	30	30	30
30	30	30	<b>אדר</b>	<b>מלא</b>	<b>אדר</b>	29	29	29
29	29	29	<b>אדר</b>	<b>חסר</b>	<b>אדר</b>	30	30	30
30	30	30	<b>ניסן</b>	<b>מלא</b>	<b>אדר</b>	29	29	29
29	29	29	<b>אייר</b>	<b>חסר</b>	<b>אדר</b>	30	30	30
30	30	30	<b>סיון</b>	<b>מלא</b>	<b>אדר</b>	29	29	29
29	29	29	<b>תמוז</b>	<b>חסר</b>	<b>אדר</b>	30	30	30
30	30	30	<b>אב</b>	<b>מלא</b>	<b>אדר</b>	29	29	29
29	29	29	<b>אלול</b>	<b>חסר</b>	<b>אדר</b>			

<b>353</b>	<b>354</b>	<b>355</b>	<b>TOTALS</b>	<b>TOTALS</b>	<b>353</b>	<b>354</b>	<b>355</b>
↑	↑	↑			↑	↑	↑
<b>DAY LESS</b>	<b>AVERAGE</b>	<b>DAY MORE</b>			<b>DAY LESS</b>	<b>AVERAGE</b>	<b>DAY MORE</b>

THERE IS, OF COURSE, A TIME RELATIONSHIP BETWEEN THE LENGTH OF A YEAR AND THE YEAR'S **מספרים**. THERE ALSO EXISTS, A TIME RELATIONSHIP BETWEEN ONE **ימי** AND ANOTHER.

OUR **לוח** HAVE CALCULATED THAT THERE ARE ONLY 7 TYPES OF **מספרים** AND ONLY 7 TYPES OF **מספרים**. SOME TYPES ARE RARE, SUCH AS THE FIRST DAY **א** OCCURRING ON SUNDAY, WHILE OTHER TYPES ARE MORE COMMON. TO EACH OF THESE TYPES, **לוח** HAVE GIVEN A **מספר**, UNIQUE TO THAT YEAR ONLY.

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EXAMPLE!

SUPPOSE THE FIRST DAY **החודש** OF A **שנה** OCCURRED ON **א**, AND THE MONTHS OF **כסלו** AND **חשוון** ARE BOTH **מלאים**, 30 DAYS. WE CAN EASILY DETERMINE WHICH WEEKDAY **אדר** WILL OCCUR ON.

WE BEGIN BY ADDING ALL THE DAYS OF THE FIRST 6 MONTHS.

<b>חשוון</b>	30 DAYS
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<b>טבת</b>	29 DAYS
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<b>אדר</b>	29 DAYS
<b>TOTAL</b>	<b>178 DAYS</b>

FROM THE FIRST OF THE YEAR, TO THE END OF **אדר**, IS 178 DAYS. **החודש** WILL BE THE 179<sup>th</sup> DAY OF THE YEAR, AND **אדר** WILL OCCUR 15 DAYS LATER, **א**.  $178 + 15 = 193$ . AND **אדר** WILL THEREFORE OCCUR ON THE 193<sup>rd</sup> DAY OF THE YEAR. IF THE FIRST DAY OF THE YEAR WAS **א**, THE 193<sup>rd</sup> DAY IS TUESDAY.

THE **מספר** DESIGNATED BY **לוח** FOR THE TYPE OF YEAR IN OUR EXAMPLE IS: **אטז**.

- א** - THE FIRST DAY **החודש** OCCURS ON **א**, THE 7<sup>th</sup> DAY OF THE WEEK.
- ט** - THE MONTHS OF **כסלו** AND **חשוון** ARE BOTH **מלאים**, 30 DAYS.
- ז** - THE FIRST DAY **אדר** OCCURS ON TUESDAY, THE 3<sup>rd</sup> DAY OF THE WEEK.

THE **מספרים** FOR THE 14 TYPES OF YEARS ARE SHOWN HERE.

<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>
<b>אטז</b>	<b>אטז</b>	<b>אטז</b>

JUST AS THIS CALCULATION WAS MADE FOR **אדר**, SO TOO, OTHER SIMILAR CALCULATIONS CAN BE MADE FOR OTHER **מספרים**.

AS A MATTER OF FACT: THE AMOUNT OF DAYS FROM **החודש** TO **אדר** OF THE SAME YEAR DEPENDS ON THE LENGTH OF **כסלו** & **חשוון**. BUT THE DISTANCE FROM **אדר** TO THE NEW **החודש** IS ALWAYS THE SAME. **החודש** IS ALWAYS 168 DAYS AFTER **אדר**, 23 WEEKS + 2 DAYS. IF **אדר** OCCURS ON TUESDAY, THE NEXT **החודש** WILL BE THURSDAY. ALSO, JUST AS **החודש** WILL NOT OCCUR ON **א**,

TO ACCOMMODATE THE CHANGE OF ONE DAY MORE OR ONE DAY LESS, THE MONTHS OF **כסלו** AND **חשוון** CAN VARY TO BECOME EITHER **מלאים** OR **מקוצרים**.

THE FOLLOWING AMOUNTS ARE DESIGNATED FOR EACH OF THE 2 MONTHS.

ONE DAY LESS	→ <b>חשוון</b> 29	<b>כסלו</b> 29	<b>מספרים</b>
AVERAGE YEAR	→ <b>חשוון</b> 29	<b>כסלו</b> 30	<b>מספרים</b>
ONE DAY MORE	→ <b>חשוון</b> 30	<b>כסלו</b> 30	<b>מספרים</b>

DURING THE AVERAGE YEAR, THE MONTH OF **חשוון** IS **מקוצר** - 29 DAYS. AND THE MONTH OF **כסלו** IS **מלא** - 30 DAYS. WHERE THE YEAR IS A DAY SHORTER, - **כסלו** LOSES A DAY. WHERE THE YEAR IS A DAY LONGER, - **חשוון** GAINS A DAY.

WE WILL LATER SEE THAT **לוח** USE THE LETTERS **א**, **ב**, AND **ג** AS PART OF A THREE LETTER **מספר** FOR EVERY TYPE OF YEAR.

THE 3 VARIATIONS OF A **שנה**; AND 3 FOR **שנה** ARE SHOWN HERE.

<b>שנה מעוברת</b>				<b>שנה פשוטה</b>			
30	30	30	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
29	29	30	<b>מקוצר</b>	<b>מקוצר</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
29	30	30	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
29	29	29	<b>מקוצר</b>	<b>מקוצר</b>	<b>מקוצר</b>	<b>מלא</b>	<b>מלא</b>
30	30	30	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
30	30	30	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
29	29	29	<b>מקוצר</b>	<b>מקוצר</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
30	30	30	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
29	29	29	<b>מקוצר</b>	<b>מקוצר</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
30	30	30	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
29	29	29	<b>מקוצר</b>	<b>מקוצר</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
30	30	30	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
29	29	29	<b>מקוצר</b>	<b>מקוצר</b>	<b>מלא</b>	<b>מלא</b>	<b>מלא</b>
<b>333</b>	<b>334</b>	<b>335</b>	<b>TOTALS</b>	<b>TOTALS</b>	<b>353</b>	<b>354</b>	<b>355</b>
↑	↑	↑	<b>DAY LESS</b>	↑	↑	↑	<b>DAY LESS</b>
			<b>AVERAGE</b>				<b>AVERAGE</b>
			<b>DAY MORE</b>				<b>DAY MORE</b>



# COMPUTING THE MOON OF ANY YEAR

WE HAVE DETERMINED THAT FOR MOON CALCULATIONS WE MUST CONSIDER AN INITIAL MOON AS IF HAVING OCCURRED PRIOR TO 205204H AND KNOWN AS MOON 1. THE PRECISE TIME FOR MOON 1 IS TAKEN TO BE 205204H, AND REFERRED TO AS 'MOON 1'. (PRONOUNCED MOON 1) IN VIEW OF THIS, AND SINCE EACH LUNAR CYCLE IS 29D 12H 793H, ONE CAN EASILY COMPUTE PRECISELY WHEN THE MOON OF ANY YEAR WILL OCCUR.

ADDING A YEAR TO THE DAY AND HOUR OF A MOON WILL INDICATE HOW FAR A NEW MOON EXTENDS BEYOND THE PREVIOUS ONE. THEREFORE, BY ADDING THE MOON (MOON 1) TO THE YEAR OF EVERY SINGLE MONTH SINCE MOON 1, WE WOULD THEN KNOW WHEN THE NEXT MOON WILL APPEAR.

TO ILLUSTRATE THIS, WE WILL PROCEED TO COMPUTE MOON 1.

FIRST WE COMPUTE THE AMOUNT OF DAYS SINCE MOON 1 AND MULTIPLY IT BY A YEAR FOR EACH ONE.

FOOT NOTE: THE AMOUNT OF WHOLE WEEKS WHICH HAVE ACCUMULATED IS NOT SIGNIFICANT TO US. WE ARE CONCERNED WITH THE MONTH ONLY, AND HOW MANY WEEKDAYS THE NEW MOON WILL EXTEND BEYOND THE MOON OF 'MOON 1'. THEREFORE: TO ELIMINATE WHOLE WEEKS WE DIVIDE THE TOTAL DAYS BY NUMBER '7'. WE DISCARD THE DIVISOR AND RETAIN THE REMAINDER.

AMOUNT OF DAYS SINCE MOON 1  
 5734 YEARS X 12 MONTHS EACH = 68808  
 30 MONTHS OF 7 MONTHS OF 'MOON 1' = 2107  
 MONTHS OF 'MOON 1' IN CURRENT YEAR = 5  
 TOTAL DAYS SINCE MOON 1 = 70,920

REMAINDER of  $1012H 793H \times 70,920 \div 7 =$  MOON 1  
 $+ 205H 204H$  (MOON 1) =

1 DAY X 70,920 = 70,920 DAYS  
 12 HOURS X 70,920 = 35,460 DAYS  
 793 HOURS X 70,920 = 56,239,560 HOURS

THESE HOURS ARE EQUAL TO 2169D 17H 720H.  
 THE REASONING FOR THIS IS BECAUSE EACH DAY IS 1080H X 24H = 25,920H.  
 THEREFORE DIVIDE:  
 $2169 \text{ DAYS} \rightarrow 2,169 \text{ DAYS}$

25,920 | 56,239,560  
 -56,220,480  
 REMAINDER = 19,080  
 CONVERT  
 $19,080 \div 1080 = 17H 720H$

TOTAL DAYS = 108549D.  
 DISCARD 15707 WEEKS  
 $7 | 108549$   
 -108549  
 REMAIN = 0 DAYS.  
 BY COINCIDENCE, THIS REMAINDER IS ZERO.

REMAINDER of  $1012H 793H \times 70,920 \div 7 = 0D 17H 720H$   
 $+ \text{'MOON 1' (MOON 1)} = +205H 204H$   
 MOON 1 = 205H 204H

THE LENGTH OF MONTH & YEAR, THE TYPE OF YEAR, THE LENGTH OF THE YEAR, AND THE MOON, ARE ALL INTER-RELATED, AND DEPENDENT ON ONE ANOTHER. TO ILLUSTRATE THIS POINT, YOU WILL FIND BELOW, A LISTING FOR SEVERAL YEARS AND THEIR RELATED NUMBERS. THIS WILL ALSO HELP YOU TO COMPREHEND HOW EACH YEAR IS CONSISTENT WITH ALL THE INFORMATION YOU HAVE LEARNED.

FOR EACH YEAR, YOU WILL FIND:

1. THE WEEKDAY AND HOUR OF THE MOON.
2. THE WEEKDAY ON WHICH THE FIRST DAY OCCURS.
3. THE NUMBER OF WEEKDAYS EXTENDS BEYOND THE PREVIOUS ONE.
4. THE MOON FOR THE YEAR.

MOON 1  
 5D 14H 48H = MON. 8:02 + 12 P.M.

S	M	T	W	T	F	S
				MOON 1	2	3
				1	2	3

MOON 2  
 2D 22H 924H = MON. 4:51 + 6 P.M.

	MOON 2	MOON 2				
4	5	1	2	3	4	

MOON 3  
 1D 7H 720H = SAT. 1:40 A.M.

						MOON 3
						1

MOON 4  
 6D 5H 229H = THU. 11:12 + 13 P.M.

					MOON 4	MOON 4
2	3	4	5	6	7	1

MOON 5  
 3D 14H 25H = TUE. 8:01 + 7 A.M.

		MOON 5				
2	3	1	2	3	4	5

MOON 6  
 2D 11H 614H = MON. 5:34 + 2 A.M.

	MOON 6					
6	1	2	3	4	5	

MOON 7  
 6D 20H 410H = FRI. 2:22 + 14 P.M.

					MOON 7	MOON 7
					1	1

MOON 8  
 4D 5H 206H = TUE. 11:11 + 8 P.M.

			MOON 8			
2	3	4	5	1	2	3

MOON 9  
 5D 2H 775H = MON. 8:44 + 3 P.M.

				MOON 9		
4	5					



# COMPUTING THE LENGTH OF ANY YEAR

AFTER HAVING COMPUTED THE **מוֹלַד תְּשׁוּבָה**, WE ARE NOW ABLE TO DETERMINE THE LENGTH OF **תְּשׁוּבָה** AND CONSEQUENTLY THE LENGTHS OF **כֶּסֶל** AND **חֶסֶן**.

**מוֹלַד תְּשׁוּבָה** WAS COMPUTED AS 20 22H 924A, WHICH IS LATE MONDAY AFTERNOON. SINCE THIS IS, OF COURSE, A **מוֹלַד זָקֵן** - PAST THE 18<sup>TH</sup> HOUR - **דַּעַשׁ הַשָּׁנָה תְּשׁוּבָה** IS THEREFORE POSTPONED TO TUESDAY.

TO DETERMINE THE PRECISE LENGTH OF **תְּשׁוּבָה**, WE MUST FIRST COMPUTE THE **מוֹלַד תְּשׁוּבָה תְּשׁוּבָה** FOR US TO SEE HOW MANY DAYS **דַּעַשׁ הַשָּׁנָה תְּשׁוּבָה** WILL EXTEND BEYOND **תְּשׁוּבָה תְּשׁוּבָה**. THIS WILL TELL US THE LENGTH OF THE YEAR **תְּשׁוּבָה**.

	20 22H 924A	מוֹלַד תְּשׁוּבָה תְּשׁוּבָה
+	40 8H 876A	שְׁעָרֵי שָׁנָה פְּטוּטָה
→	60 30H 1800A	מוֹלַד תְּשׁוּבָה תְּשׁוּבָה
SAME VALUE	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border-left: 1px solid black; border-bottom: 1px solid black; padding: 5px;">30H = 10 6H</div> <div style="border-left: 1px solid black; border-bottom: 1px solid black; padding: 5px;">1800A = 1H 720A</div> </div>	
→	70 7H 720A	מוֹלַד תְּשׁוּבָה תְּשׁוּבָה

THIS MEANS THAT **דַּעַשׁ הַשָּׁנָה תְּשׁוּבָה** WILL OCCUR ON **שְׁבִיעִי**, THE 7<sup>TH</sup> DAY.

תְּשׁוּבָה →

תְּשׁוּבָה →

S	M	T	W	T	F	S
		דַּעַשׁ הַשָּׁנָה מוֹלַד 1	דַּעַשׁ הַשָּׁנָה 2	3	4	
						מוֹלַד דַּעַשׁ הַשָּׁנָה

SINCE **דַּעַשׁ הַשָּׁנָה תְּשׁוּבָה** EXTENDS 4 DAYS BEYOND **תְּשׁוּבָה תְּשׁוּבָה**, THE LENGTH OF YEAR **תְּשׁוּבָה** IS THEREFORE:

50 FULL WEEKS + 4 DAYS = 354 DAYS.

AS DISCUSSED EARLIER: IN A 354 DAY שָׁנָה פְּטוּטָה THE MONTHS OF **כֶּסֶל** AND **חֶסֶן** ARE **פְּסוּדִים**, MEANING THAT - חֶסֶן IS חָסֵר - AND - כֶּסֶל IS מְלֵא. THE **מִצְוָה** FOR **תְּשׁוּבָה** IS THEREFORE **צָרָה**.

THE SAME METHOD IS USED TO COMPUTE THE LENGTH OF **תְּשׁוּבָה**; THE ONLY DIFFERENCE IS THAT, **תְּשׁוּבָה** IS A **שָׁנָה מְעוּבָדָה**.

**מוֹלַד תְּשׁוּבָה תְּשׁוּבָה**  
 + **שְׁעָרֵי שָׁנָה מְעוּבָדָה**  
 = **מוֹלַד תְּשׁוּבָה תְּשׁוּבָה**