

Biblical and Talmudic units of Measurement

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Sources: The size of Talmudic units is a matter of controversy between: [A] R' Chaim Naeh. *Shi'urei Torah*. 1947, [B] the Hazon Ish (Rabbi Avraham Yeshayahu Karelitz 1878-1953) Moed 39: *Kuntres Hashiurim* and [C] R' Moshe Feinstein (*Iggerot Moshe OC* I:136, YD I:107, YD III:109, YD III:66:1). See also Adin Steinsaltz. *The Talmud, the Steinsaltz edition: a Reference Guide*. Israel V. Berman, translator & editor NY: Random House, 1989, pp.279-293.

Volume	Chomer ¹ (dry)= kor (dry,liq). Adriv = letech (dry). Ephah ² (dry)= Bat ³ (liq). Se'ah (dry)= ⁴ Kundess = Modeah ⁵ . Arbaim Se'ah (40 se'ah), the kor ⁶
min qty of water necessary for a <i>mikveh</i> (ritual bath), is the vol. of 1x1x3 amot ¹⁰ .	Tarkav ¹¹ = hin ¹² (liquid). Liquid measures include a hin , ½ hin , ¼ hin , ⅓ hin , ⅔ hin , a log (also a dry measure), ½ log , ¼ log , ⅓ log & an ⅔ of an ⅓ log which is a kortov ¹⁵ (liquid). Issaron ¹⁶ (dry measure of flour) ephah ⁵ 10 ¹⁷ letech ¹³ 2 ¹⁴
= Omer (dry) measure of grain ¹⁸ - ¹⁹ min. measure required for taking <i>Challah</i> . Kav (dry,liquid) is the basic unit from which others se'ah ³ 3 ²⁰ 15 ¹⁴ 30	
are derived. Kabayim ²¹ (dry)=2 kav. Kepiza ²² (dry). Kikar (loaf)=½ kav. P'ras ²³ (½ loaf ²⁴) or Perusah (broken loaf)=½ kav tarkav ²⁵ 6 ³⁰ 60	
= ²⁶ 4 beitzim . Seudah =½ kav ²⁷ . 2 Seudot ²⁸ =6-8 ²⁸ beitzim ²⁹ (dry)= ³⁰ 18 Grogeret - M'lō Hayad (a handful) of hops or issaron ¹ 3 ^{1/3} 10 ³⁰ 50 100	
M'lō Uzila D'Ikarei (full bundle) of green grain ³¹ or 2 Shargushei (spoonfuls) of Shesisa ³² . Log (dry,liquid)= kav ¹³ 1⅓ 3 ²⁵ ³⁴ 6 ²⁰ 18 90 180	
Rova (dry)= ³⁵ Old Tomnata = ³⁶ Tzipporean Kasta (dry)= ³⁷ Litra = Tarta ³⁸ . Revi'it (liq.) [not identical to kepiza ²] ³⁹ 2 ⁴⁰ 3 ^{1/3} 6 ²¹ 12 ⁴² 24 72 360 720	
rova (dry)] but also known as Anpak , Anbag and Antal ³⁹ =vol. of 2 x 2 x 2.7 etzba'ot ¹⁰ or 2 x 2 log ⁴⁰ 3 ⁴¹ 4 ²⁰ 7 ^{1/3} 24 48 96 288 1440 2880	
x 1% etzba'ot ⁴³ =½ Tiberian Sh'minit ³⁵ revi'it = ⁴⁴ 1½ beitzim . Teitaron ³⁵ was slightly tomen ² 6 ⁸ 14 ⁵ 24 288 1440 2880 less than a revi'it . Betzah (egg) ²³ , smallest dry measure regularly used=the revi'it ²³ 2 ⁴ 12 16 28 ⁵ 48 96 288 1440 2880	
vol. of 2 x 2 x 1% etzba'ot ⁴³ Tannita [Aramaic for Sh'miniti]= ³⁷ betzah ¹ 1½ ⁴⁸ - Rashi ³ 6 ²⁰ ⁴⁵ 18 24 43 ⁵ 72 144 ⁶⁷ 432 2160 4320	
Ukhlah ⁴⁶ (dry) (see Maim. <i>Erub.1:9-13</i>) Barzina (Shab.) shminit ¹ 1½ ⁴⁸ 2 ⁴ 8 ³ 24 32 ¹⁸ 57 ⁵ 96 192 576 2880 5760	
109b)=½ log . M'lō lugmav ²³ (cheeks full) kezayit ¹ 1½ ² 2 ³ 6 ¹² 36 48 86 ⁵ 144 288 864 4320 8640	
=42ml (A) is rov revi'it (just over mesurah ³ 4½ 6 ⁹ 9 18 36 ⁷ 108 144 259 ⁵ 432 864 2592 12,960 25,920	
½ revi'it = ⁴⁸ M'lō (or kortov ¹ 1½ ³ 8 10 ³ 16 32 64 192 256 460 ⁵ 768 1536 4608 23,040 46,080	
K'dei)	

Betzah												144 ⁶⁷														
Desert												A. Na'eh 5.4ml 9.6ml 17.3-28.8 ⁴⁹ 43.2ml 57.6ml 86.4ml 172.8 345.6 1.04L 1.38 2.49L 4.15L 8.29L 24.9L 124.4L 248.8														
B. Hazon Ish 9.33ml 16.6ml 33-50 ⁴⁹ 74.65ml 99.5ml 149.3ml 298.6 597.2 1.80L 2.39 4.30L 7.17L 14.3L 43.0L 215.0L 430.0												Betzah														
Jerusalem												A. Na'eh 6.5ml 11.5ml 34.6ml 51.8ml 69.1ml 103.7ml 207.3 414.6 1.24L 1.66 2.98L 5.0L 9.95L 29.9L 149.3L 298.5													172.8 ⁶⁷	
B. Hazon Ish 11.2ml 19.9ml 59.7ml 90.0ml 120ml 180ml 360.0 720.0 2.16L 2.88 5.184L 8.64L 17.28 51.8L 259.2L 518.4												Betzah												207.4 ⁶⁷		
Tzipori												A. Na'eh 7.8ml 13.8ml 41.5ml 62.2ml 82.9ml 124.4ml 248.7 497.4 1.49L 1.99 3.58L 6.0L 11.94 35.8L 179.1L 358.1													Betzah	
B. Hazon Ish 13.4ml 23.9ml 71.7ml 108.0ml 144ml 216ml 432.0 864.0 2.59L 3.46 16.221L 10.4L 20.74 62.2L 311.0L 622.1												Betzah												172.8 ⁶⁷		

gemi'ah^{35,50} (a swallow)⁴⁸ **Grogeret**, **Kezayit** (olive vol.) is somewhere between <½ **betzah**⁵¹ & ½ **betzah**⁵², ie 15-50 ml. **Kotevet**^{23,53} (large date)=² **zeittin**⁵⁴ or > **zayit** & < **beitzit**⁵⁵=30ml (A). **M'lō pi hatale** (lamb's mouthful, **Shab.76a**)=**Grogeret**²³ (dry fig)=²⁷ **betzah** (*Tos.Yom.80a*)=⁵⁶ ½ **seudah** or ½ kav. **K'adashah**⁵⁶ (lentil), **Se'orah**⁵⁷ (barley), **Pol Halavan** (white bean)⁵⁸, **m'lō egorf**⁴⁹ (fistful) & **Poteach Tefach**, **M'lō Tarvad**⁵⁰ (ladleful) is arguably equivalent to **M'lō Pisat Hayad**⁵¹ (palmyra) or **M'lō Chofnay**⁵² (2 handfuls), and is larger than **M'lō Kumtzo**⁶³ (**kometz**^{53,64}) is 3 fingers full⁶⁵. There were 3 separate systems, in order of date of origin & size: (1)desert (**midbar**), used in the years in the Sinai with Moses; (2)Jerusalem (**Yerushalmi**); & (3)Tzipori (**Tzippori**). **Yerushalmi** measures are ½ larger than **midbar**, and the **Tzippori** measures ½ larger than **Yeshulamit**^{66,67}. "If it was the desert se'ah it should have contained 144 eggs, and if it was the Jerusalem se'ah it should have contained 173 eggs, and if again it was the one of Tzippori it should have contained 207 eggs"⁶⁷. 1 **midbar seah**=5 **Yerushalmi kav**⁶⁸. 5 **Yerushalmi se'ah**=6 **midbar se'ah**=2 **midbar ephah**⁶⁹. 10 **Yerushalmi kav**=6½ **issaron**=½ of 10 **midbar issaron**⁷⁰. **Kista** (liquid) is volume of wine⁷¹.

Length	Mahalach (<i>Derech</i> ⁷²) Yom (a day's walk) from dawn until it is completely dark ⁷³ . Parsah ⁴ (Persian mile or parasang) yom
= ⁷⁵ Kimlo rizat hadag , Kimlo regel behemah ⁷⁶ 16 mil, parsah ¹⁰ ⁷⁷	
Mil (Talmudic mile), related but not identical mil ⁷⁸ 4 ⁷⁹ 40	
to Roman mile, is also known as Techum ris ⁷⁸ 30 300	
Shabbat Ris is the length of the Greek kaneh ⁴⁴ ⁸¹ 333½ 1333½ 13333½ stadium. M'lō ma'anah ⁸² 100 amah ⁶³ 266½ 2000 8000 80000	
amot , Iburah =70 ⁷³ zerez ⁸⁴ 2 ⁸⁵ 12 533½ 4000 16000 160000	
amot ⁸⁶ , Kaneh ⁸⁷ tefach ⁸⁸ 3 6 ⁸⁹ 36 1600 12000 48000 480000 etzba ⁹⁰ 10 ¹⁰⁸ 12 24 144 9600 48000 192000	
A. 2.0cm 8.0cm 24.0c ⁴⁸ 2.88m 128m 960m 3.84km 38.40km	
B. 2.4cm 9.6cm ⁴⁸ 28.8c ⁵⁷ 57.6c ³ 3.46m 154m 1152m 4608m 46.08km	
C. 2.25cm 9.0cm 28.0c 54c ⁴⁸ 3.24m 149m 1.09km 4.39km 43.68km	
(reed) is measure for buildings. M'lō einav ⁹¹ =as far as the eye can see. Chevel ⁹² (rope)= ⁹³ 50 amot , Amah ⁹⁴ (cubit), dist. from elbow to middle finger= Gomed ⁹⁵ = Garmida ⁹⁶ . Short amah = ⁹⁷ 5 tefachim , Pesiah beinonit (regular step)= ⁹⁸ anah , Pesiah gasah ^{98,99} >1 amah , Zeret (little finger span), dist. b/n thumb & end of little finger=2 or 3 tefachim , Kizba ¹⁰⁰ 2 tefachim , Tefach/Pushach ¹⁰¹ (handbreadth), the width of a clenched fist (otzey) ¹⁰² Sit (used for measuring pieces of fabric), dist. b/n index & middle finger ¹⁰² when held as far apart as possible=4 gudal (or agudal , thumb breadths)= k'dei anivah ¹⁰³ . Tefach sochek (loose)= ¹⁰⁴ 1½ tefachim , Etzba or M'lō Etzba ¹⁰⁵ (fingerbreadth) is the basic unit, typically the width of the middle of the thumb (guda ¹¹¹ or agudal), but can be the width of middle finger, tilta , ¼ tefach or small finger, ketanah , ¼ tefach ¹⁰⁶ . Kesher agudal ¹⁰⁷ (thumb-joint) is 3.5-4cm (A & B). Orech se'orah (barleycorn length)=1.0cm (A) or 1.07cm (B) is width of tefillin straps ¹⁰⁸ . M'lō charshinah ¹⁰⁹ (size of vetch)= ¹¹⁰ ½ orech se'orah . M'lō chut ha-sara'ah ¹¹¹ (nima ¹¹²) (hairbreadth) is smallest amount.	

[1]Lev.27:16,Isa.5:10,Ezek.45:11,13,14,Hos.3:2; [2]Rashi **Adriv L'areivah** (B.M.80b); [3]Ex.16:36,Lev.5:11,6:13,20,19:36,Num.5:15,28:5,Jud.6:19,I Sam.1:24;17,Isa.5:10,Ezek.45:10,11,13,24;46:5,7,11,14,Amos 8:5,Zach.5:6-10,Ruth 2:17,Ezra 7:22; [4]Ezek.45:11; [5]Kings 7:26,38,I Chr.2:9,10,4:5,Ezek.7:22,45:10,11,14,Isa.5:10; [6]Gen.18:6,J Sam.25:18,I Kings 18:32,II Kings 7:1,16,18; [7]Rashi Erub.83a; [8]Gitt.57a; [9]Kings 5:2,23,Ezek.45:14,II Chr.2:9,27:5; [10]Erub.14b,Pes.109b; [11]Nid.49b; [12]Ex.29:40,30:24,Lev.19:36,23:13,Num.15:4,5,6,7,9,10,28:5,7,14,Ezek.4:11,45:24,46:5,7,11,14; [13]Hos.3:2,Rashi B.M.80b; [14]Rashi Shab.127a; [15]R.sh.13a,Ket.104a,B.B.90a,Makk.4a,Hul.26a; [16]Ex.29:40,Lev.6:20,14:10,21,23:13,17,24:5,Num.15:4,6,9,28:9,12,13,20,21,28,29:3,4,9,10,14,15,Ezek.45:11; [17]Chomer=10 **Bat**=10 **Ephah** (Ezek.45:11,14); [18]Ex.16:18,22,32,33,36; [19]SA YD 324:1; [20]Rashi Ex.16:36,Erub.14b; [21]Shab.140a,156a,Yom.44b,B.K.20a,58b,B.M.21a,B.B.90a,Tam.30b; [22]Pes.48b; [23]Me'il.17b; [24]Bek.58a; [25]Rashi Arak.25a; [26]Rashi A.Z.67a; [27]Erub.82b & Rashi chetzyah l'vet hamenuga; [28]Rashi p'ras Pes.44a; [29]SA OC 368:3,MB there; [30]Omer-Ex.16:36; [31]Erub.28b; [32]Erub.29b; [33]II Kings 6:25; [34]RaSHBaM "vachatz se'ah" Shab.59a,Sot.8b,B.B.89b; [35]Sheb.8b; [36]Pes.109a; [37]Rashi uklhah (Erub.29a) weighs maneh (Rashi litrim Bek.50a); [38]Hul.124a; [39]B.B.58b; [40]Lev.14:10,12,15,21,24; [41]Rashi Shab.110b; [42]Hin=12 **Log** (Men.89a); [43]Shek.9a; [44]MB 271:68; [45] RaSHBaM "Tomen" (B.B.89b); [46]½ kav according to RaSHBaM & Rashi (Pes.109a); [47]Mesurah (liquid)=½ log (B.B.89b);

Time **Yovel** (Jubilee) is the 50th yr. **Shmittah** (Sabbatical year) is every 7th yr¹¹⁴. **Shanah** (yr) is typically 354 days (i.e. 12 lunar cycles of 29^{2/4}⁷⁹³¹⁰⁸⁰ days) but may have 353 or 355 days in a regular yr &, given that 7 yrs in 19 is a leap yr with an **tekufah*** of 1½¹⁵ days, refer to the vernal equinox, **yom**¹⁶ 29.531¹¹⁴ 91¹⁶ 365.247 2556.73 18262.3 the summer solstice, **onah**¹⁷ 2 14 59.0612 182.625 730.494 5113.46 36524.7 the fall equinox **sha'ah**¹⁸ 24 168 708.734 2191.5 8765.93 61361.5 43296 or winter **chelek**¹⁹ 1080 12960 25920 181440 765432²⁰ *defined in Rashi, Erub.56a et 0.533 576 6912 13824 96768 407780²¹ 'ein bein tekufah in relation to a rega²⁴ 12.8 13824 7 days solar year. Others are based on lunar year.

solstice. **Chodesh** (month) is approx. 29½ days, so months typically alternate b/n 29^{1/2} days, **Chodesh Chaser** & 30 **Chodesh Maleh** days. **Shavua** (wk) is also sometimes referred to as **Shabbat**¹¹⁷. **Yom** (mostly day but sometimes yr¹¹⁸) of 24-hr period or referring just to daylight. Days are measured from night-time to night-time. **Me'el et** (from 1 time to the next) is used to refer to a 24-hr period. **Onah** (period), often referring to a ½ day period either daytime or nighttime¹¹⁹, is also used to denote ¼ of an hr¹²⁰ (2½ min). **Shiur Ikul**¹²¹ time to walk 4 **mil** (72 min). **Sha'ah** (hr) is either **Sha'ah Regilah** (regular hr i.e. 60 min) or **Sha'ah Zemanit** (proportional hr) where the daylight period (sunrise to sunset) is equally divided by 12 & these units are sometimes less & sometimes>60 min. **Et** (time)=¹²⁰ ½ **onah** (in this sense, an hr) or 6¼ sec. **Rega** (moment)=¹²¹ 3848 hr or ¹²² 58888 hr¹²³, time to say 'rega'¹²³ or undefined, momentary period but mostly used to denote ¼ of an **et**. Other units include **Hiluch Mil** (the time taken to walk 2000 cubits)=18¹²⁴-24 min, **Kdei Achilat P'ras**¹²⁵ (time taken to eat ½ loaf of bread) varying between 2 and 9 min., and **Toch K'dei Dibur** (the time it takes to say *shalom aleichem rebi'*¹²⁶). **M'lō Nima**¹²⁷ (hairsbreadth) and **K'heref Ayin**¹²⁸ (blink of an eye) are the smallest amount of time. See *Pes.94a* for discussion on time taken to travel a specified distance (1 **mil** may be travelled in 18-24 min)

[48]Tosef Shab.76b; [49]The smaller measure used for Rabbinic obligations, larger measure for Biblical obligations; [50]Yom.8a; [51]OC 3

