

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 II:190, YD III:46:2, 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 Chomer¹ (dry)=**kor** (dry, liq). **Adriv**=**letech** (dry). **Ephah**² (dry)=**bat**³ (liq). **Se'ah** (dry)⁴=⁶⁵**Kundess**. **Arbaim Se'ah** (40 se'ah), the min qty of **kor**⁵ water necessary for a **mikveh** (ritual bath), is the vol. of **1x1x3 amot**⁶. **Tarkav**⁷=**hin**⁸ (liquid). Liquid measures include a **hin**, ^{1/2}**hin**, ^{1/3}**hin**, ^{1/4}**hin**, ^{1/5}**hin**, ^{1/6}**hin**, ^{1/7}**hin**, ^{1/8}**hin**, ^{1/9}**hin**, ^{1/10}**hin**, ^{1/11}**hin**, ^{1/12}**hin**, ^{1/13}**hin**, ^{1/14}**hin**, ^{1/15}**hin**, ^{1/16}**hin**, ^{1/17}**hin**, ^{1/18}**hin**, ^{1/19}**hin**, ^{1/20}**hin**, ^{1/21}**hin**, ^{1/22}**hin**, ^{1/23}**hin**, ^{1/24}**hin**, ^{1/25}**hin**, ^{1/26}**hin**, ^{1/27}**hin**, ^{1/28}**hin**, ^{1/29}**hin**, ^{1/30}**hin**, ^{1/31}**hin**, ^{1/32}**hin**, ^{1/33}**hin**, ^{1/34}**hin**, ^{1/35}**hin**, ^{1/36}**hin**, ^{1/37}**hin**, ^{1/38}**hin**, ^{1/39}**hin**, ^{1/40}**hin**, ^{1/41}**hin**, ^{1/42}**hin**, ^{1/43}**hin**, ^{1/44}**hin**, ^{1/45}**hin**, ^{1/46}**hin**, ^{1/47}**hin**, ^{1/48}**hin**, ^{1/49}**hin**, ^{1/50}**hin**, ^{1/51}**hin**, ^{1/52}**hin**, ^{1/53}**hin**, ^{1/54}**hin**, ^{1/55}**hin**, ^{1/56}**hin**, ^{1/57}**hin**, ^{1/58}**hin**, ^{1/59}**hin**, ^{1/60}**hin**, ^{1/61}**hin**, 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Area <i>Bet Kor</i> is the min. space necessary to sow one <i>kor</i> (see Vol.) <i>bet kor</i> of produce. <i>Bet Se'ah</i> is the min. space necessary to sow one <i>bet seah</i> 30 <i>se'ah</i> (see Vol.) of produce. <i>Bet Satayim</i> is twice this <i>bet kav</i> 6 180 amount & there is an argument if this is 50x <i>bet rova</i> 4 24 720 <i>amot</i> or a square of 70% <i>amot</i> ¹²⁵ . <i>Amah m.</i> 104 $\frac{1}{2}$ 416 $\frac{1}{2}$ 2500 ¹²⁴ 750000
<i>M'lo Ma'anah</i> (100 <i>amot</i>) <i>tefach m.</i> 36 3750 15000 90000 (see Length) sq'd <i>etzba m.</i> 16 576 60000 = ¹²⁷ 4 or 5 <i>bet gris</i> 1 $\frac{1}{6}$ 19 $\frac{1}{2}$ 711 $\frac{1}{2}$ 74062 $\frac{1}{2}$
<i>seah</i> <i>adasha</i> 9 ¹²⁴ 11 $\frac{1}{2}$ 177 $\frac{1}{2}$ 6400 666562 $\frac{1}{2}$
A 0.361 3.25 4cm 64cm 2304cm ² 24m 96m 576m ² 17280
B 0.526 4.73 5.8cm 92.2cm 3318cm ² 34.56m 138m 829m ² 24883
C 0.468 4.21 5.2cm 83cm 2981cm ² 31.1m 124m 745m ² 22358

Bet Kav is min. space required to sow one *kav* (see Vol.) of produce. *Bet Rova* is min. space req'd to sow 1/4 *kav* (see Vol.) of produce. *Amah Meruba'at* (sq.cubit). *Tefach Meruba* (sq.handbreadth). *Etzba Meruba'at* (sq.fingerbreadth) used primarily for measuring small pieces of fabric (in order to decide whether they are susceptible to ritual impurity). *Tzemed*¹²⁸ (yoke), an ancient Hebrew unit of land area (0.2 hectare or around 1/2 acre), is also translated "acre" or 1/2 acre¹²⁹. *Chomer*¹³⁰, a unit of land area about 2.4 hectares (6 acres), was the amount of land that could be planted with 1 *chomer* (see Vol.) of seed. It is also a unit of dry capacity, about 230 litres (6.5 bushels)¹³¹. Many common objects became the source of a measurement of area. So, *M'lo egrof*^{132,135} (size of a fist), *k'rimon*¹³³, *M'lo makde'akh gado*¹³⁴ (size of the large Temple auger)=¹³⁵ size of *Pundyon coin* (Italian dupondium)=¹³⁵ size of a *Neronian Sela*¹³⁵ size of the hole of a yolk. Size of a *Sela*¹³⁶⁻¹³⁷ size of *grogeret* but smaller than an ordinary *M'lo Makdeakh*¹³⁸. *K'turmus* (lupine bean) was larger than a *Gris*^{139,141} (split bean's area), which could grow 36 hairs on it¹⁴⁰. *Adashah*¹⁴¹ (a lentil's area)=¹⁴⁰ area of 2 *Sa'arot* (hair-breadths – the space between 2 adjacent hairs) x 2 *Sa'arot*. *M'lo pi hazug* (scissors tipful)=2 hairs¹⁴¹. *K'chardal*¹⁴² (size of a mustard seed).

Weight These are very closely related to the coins. The different units of weight varied from place to place; thus the Judean <i>maneh</i> 60 <i>Sela</i> weighed twice as much as the Galilean <i>tartimar</i> 2 ¹⁴³ 120 <i>Sela</i> ¹⁴⁴ . A <i>Kikar shel kodesh</i> =2 com- <i>unkeya</i> 6 $\frac{1}{4}$ 12 $\frac{1}{2}$ 750 mon <i>Kikar</i> ¹⁴⁶ . <i>Kikar the</i> <i>B.shekel</i> 2 ¹⁴⁵ 12 $\frac{1}{2}$ 25 1500 weight of a silver <i>T.shekel</i> 2 ¹⁴⁶ 4 25 50 3000 <i>kikar</i> known <i>pim</i> ¹⁴⁷ 1 $\frac{1}{2}$ 3 6 37 $\frac{1}{2}$ 75 4500 as <i>dinar</i> 1 $\frac{1}{2}$ 2 4 ¹⁴⁵ 8 50 100 6000 <i>charuv</i> 24 32 48 96 192 1200 2400 144000 <i>se'orah</i> 96 128 192 384 768 4800 9600 5760000 480mg 6.4g 9.6g 19.2g 38.4g 240g 480g 28.8kg

"talent"¹⁴⁸. A *Maneh shel kodesh*¹⁴⁶=2 common *Maneh*. *Maneh*¹⁴⁹=*Maneh Italki*=*Litra*¹⁵⁰=60 *Shekel*¹⁵¹. *Biblical Shekel*¹⁵²=*Sela* (as in the Mishnah), the weight of the strip of red wool of the he-goat. That of the *parah adumah* weighed 2 or 2 $\frac{1}{2}$ *Selaim*¹⁵³. $\frac{1}{2}$ *Biblical Shekel*=*Beka*¹⁵⁴ was the weight of the strip of red wool of the *metzora*¹⁵⁵. Weights representing > 1 *Shekel* tend to occur in multiples of 4, i.e. 4, 8, 12, 16, 24 & 40 *Shekels*. The explanation¹⁵⁵ appears to be that 4 *Shekels* were very close in value to 5 Egyptian qdt, so a balance weight of, say, 12 *shekels* could be understood by Egyptian trader as 15 qdt, and by Judean as 12 shekels. *Pim* is ancient Heb. unit of weight. A *Dinar* or *Zuz*^{153,156} ≈ 5.7g (88.1 grains)= $\frac{1}{2}$ *Shekel*^{154,157}. *Gomed*, in the Assyrian "light" system of units of mass, was about 502g ($\frac{1}{2}$ as much in the heavy system). *Zipporean Meluzma* is slightly>¹⁵⁷ *Tiberian Meluzma*. Names of coins were used as weights. The lowest was *Perutah*=0.022g & a *Se'orah* (grain) weighed twice as much.

Area: 1 cm²=0.15500031000062 in² or 0.001076391041671 ft²; 1 m²=10.76391041670972 ft² or 1.19599004630108 yd²
Length: 1cm=0.39370087402 in; 1m=39.37007874in=3.2808398950 ft; 1km=3280.839895013 ft or 1093.613298338 yd or 0.6213711922373 mi.
Volume: 1 mL=0.033814023fl oz; 1L=33.8140227 fl oz, 0.26417205 gal
Weight: 1 g=0.0352739619495804 oz; 1 kg=2.204622621848776 lb

Red denotes measurements of one parameter which relate to another.

10b; [97]Rashi Men.69b; [98]Sukk.5b.B.B.3a.14b; [99]Rashi Shab.79a, 105b.Tem.34a; [100]SA OC 12.1; [101]Sukk.30b; [102]Bek.39b; [103]Men.41b; [104]Men.42a; [105]SA OC 27.11; [106]Bek.37a; [107]Rosh borech (Oha.17.1); [108]Men.30a; [109]Eruv.76b.Ta'an.9b.Hag.15a; [110]Lev. 25:10-12; [111]see A.Z.9b when counting starts; [112]see Arak.31b; [113]Lev.23:16; [114]Gen.21:34,37:34,Deut.1:46; [115]Nid.65a; [116]Tosefta Ber.1:3; [117]Ber.53b; [118]A.Z.4a; [119]Ber.7a; [120]OC 459:2.MB 459:15; [121]Ber.37b.41a.Eruv.4a.Pes.44a.Yom.80b.Sukk.6a.42b. Nez.36b-37a.Zeb.70a.Men.75b.Hul.35a.71b.Ker.12b-13b.Neg.13:9-10; [122]Sheb.32a; [123]Ber.48b,Shab.30a.Yom.38b,Ta'an.5b.M.K.28a; [124]Ber. 2b,Shab.34b; [125]Eruv.23a; [126]Eruv.23b; [127]Nid.57a; [128]Isa.5:10; [129]J Sam.14:14; [130]Lev.27:16; [131]Ezek.45:14 defines the unit. Num. 11:32.Isa.5:10.Ezek.45:11,13,14.Hos.3:2. "measure" (I Kings 18:32); [132] Oha.13:1.Sukk.21a.Nid.43b; [133]Ber.41b; [134]Kel.17:12,Oha.13:1-3,14:2, Eruv.7a.Hul.45a; [135]Bek.37b; [136]Nid.58b; [137]Shab.78b; [138] Bek.38a; [139]Bek.34b.Nid.14b.52b; [140]Neg.6:1; [141]Makk.20b; [142]Ber.31a.Nid.66a; [143]Sanh.70a; [144]Rashi Ket.59a; [145]Rashi Ex.21:32; [146]Men.77a.Bek.5a; [147]J Sam.13:21; [148]Jl Kings 18:14; [149]Jl Kings 10:17; [150]Bek.31a; [151]Ezek.45:12; [152]J Sam.17:5;7; [153]Shek.10a; [154]Gen.24:22; [155]Raz Kletter, "Economic Keystones. The Weight System of the Kingdom of Judah" in *Journal for the Study of the Old Testament*, Supplement Ser.#276,Sheffield,England:Sheffield Academic Press,1998; [156]Yom.34b; [157]Ex.38: 24-26,Rashi 38:26; [158]Pes.11b; [159]Kidd.11a.Bek.50b; [160]Bek.11a; [161]Rashi Bek.48b; [162]J.B.M.44a,45b; [163]BB.105b; [164]J.B.M.52a; [165]Bek.50a.Arak.24b; [166]J.B.M.44b; [167]Kidd.12a; [168]Ezra 2:69,Nehem.7:70-72; [169] Arak.7b; [170]Num.18:16; [171]Ex.30:13,Lev.27:25,Num.3:47,18:16,Ezek. 45:12; [172]Ex.38:26; [173]Shek.6a,Bek.51a; [174]Shek.5a; [175]Eruv.19a,

Coinage R' Steinsaltz writes that the currency systems in the Talmudic period were the most complicated elements of weights and measures mentioned in the Talmud. All those factors that produced differing standards of length, area and volume were combined in the area of coinage. In the nature of things, legal tender passes from one country to another, so that there has to be some correlation between the monetary systems of different countries. Moreover, <i>Eretz Yisrael</i> , which was an international crossroads, and to which contributions from Jews all over the world were sent, was full of extreme diverse types of currency. Two different age systems were used by the Jews: (1) "Tyrian money" (largely equivalent to the mentioned in the Torah), and according to which those values mentioned in the Torah were calculated, & (2) "monetary system of the state" which had units <i>mesimas</i> and <i>kontrank</i> .	<i>kikar</i> 2 <i>shel</i> 60 <i>kodesh</i> 120 <i>kikar</i> 2 <i>shel</i> 60 <i>kodesh</i> 120 <i>maneh</i> 2 120 240 <i>dinar</i> 4 8 480 960 <i>zahav</i> 4 8 480 960 <i>sela</i> 6 $\frac{1}{4}$ 25 50 3000 6000 <i>rigva</i> 3 $\frac{1}{4}$ 4 $\frac{1}{2}$ 18 $\frac{1}{2}$ 37 $\frac{1}{2}$ 2250 4500 <i>shekel</i> 1 $\frac{1}{2}$ 2 12 $\frac{1}{2}$ 25 50 3000 6000 <i>dinar</i> 2 $\frac{1}{2}$ 4 6 8 50 100 ¹⁶³ 200 <i>istera</i> 2 $\frac{1}{2}$ 4 6 8 50 100 ¹⁶³ 200 <i>ma'ah</i> 3 6 12 18 24 150 300 600 <i>pundyon</i> 2 ¹⁶⁰ 4 8 12 24 48 96 1200 <i>issar</i> 2 ¹⁶¹ 4 8 12 24 48 96 1200 2400 <i>mesimas</i> 2 ¹⁶² 4 8 16 24 48 96 1200 2400 4800 <i>kontrank</i> 2 ¹⁶¹ 4 8 16 24 48 96 1200 2400 4800 9600 <i>peru</i> 768 <i>perutah</i> =1 <i>Biblical Shekel</i> ¹⁶⁷ or <i>Sela</i> . <i>Perutah</i> =19g (Na'eh) or 11.3g (Hazontah) silver <i>tah</i> 2 ¹⁶⁹ 4 8 16 32 96 192 384 576 768 4800 9600 19200
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with the same names as those in Tyrian money, but whose value=¹⁵⁹ of corresponding Tyrian coins. Most payments specified by the Mishnah & Talmud are according to the "sela of the state"¹⁵⁹, reflecting the latter system. As with other measures, there was a systematic change of 20% in the larger coins during the 2nd Temple period. *Maneh*¹⁶⁸ (also see *Chelkat Mech.E.H.66:21-24*). *Sela*=2 *Talmudic Shekel*=¹⁶⁹1 *Shekel Hakodesh* (so called because it was used for payments made to the Sanctuary)=¹⁷⁰20 *Gerah* (71). *Beka*¹⁷²= $\frac{1}{2}$ *Shekel*. During 2nd Temple period, *Shekel Hakodesh* was revalued to 24 *Gerah* & all coins larger than 1 *Gerah* were revalued accordingly. All Torah-obligated payments made in units of *Shekel Hakodesh* were thenceforth to be made in units of *Sela*, thus increasing the amounts involved by $\frac{1}{5}$. *Garmesin*= $\frac{1}{12}$ *Shekel Hakodesh*¹⁷³ *Darkon*¹⁷³=*Dinar*. *Gold Darkon*¹⁷⁴=*Darkamon*¹⁶⁸=2 *Selaim*. *Dinar Zahav*¹⁷⁵ (of gold) resembled the silver *Dinar*. *Taba'ah* (*Teva'in*)¹⁷³= $\frac{1}{2}$ *Sela*. *Dinar* (*Kesef* in Tyrian currency)¹⁷⁷=*Zuz*=*Luma*¹⁷⁸=*Zin*=*Keratin*¹⁷³= $\frac{1}{4}$ *Sela*. *Tarpe'ik*¹⁷⁹=*Istera*. *Ma'ah*, a silver coin=*Gerah*¹⁸¹=*Kesitah*¹⁸²=*Danka*^{160,183} with a weight of 16 barleycorns of silver (384mg). *Kalbon*¹⁸⁴=1 *ma'ah* or $\frac{1}{2}$ *ma'ah*. *Treisit*=3 *Issar*¹⁸⁵. *Perutah*, (weighing $\frac{1}{2}$ barleycorn)=¹⁶⁷ $\frac{1}{16}$ *Italian Issar*¹⁸⁶=*Kurdikinian gold dinar*¹⁸⁷. *Sha'veh Perutah* (or $\frac{1}{5}$ of a *Perutah*) is either the current price of silver (see red writing above) or $\frac{1}{8400}$ of the min. required to live for a yr (i.e. 768 x 200 *zuz*)¹⁸⁸. *Agorah*¹⁸⁹ was a small coin. *Adarkon*¹⁹⁰ was a Persian gold coin.

Pes.57a,Hag.27a,Naz.31a-b,B.K.36a-b,62a,B.M.48a,49a; [176]Gen.37:28; [177]Rashi Shab.19a,Istera= $\frac{1}{2}$ *Zuz* (*Kidd.11b*); [178]Rashi A.Z.34b; [179]Yom.35b, *Ket.64a*; [180]Gitt.45b; [181]Ex.30:13; [182]Gen.33:19,Josh.24:32,Job 42:11; [183]R.Sh.26a,Ker.22b; [184]Shek.4a; [185]J.B.M.46a,Sheb.40a; [186]Kidd.21a; [187]Hul.54b; [188]Peah 8:8; [189]J Sam.2:36; [190]J Chr.29:7,Ezra 8:27

<i>achilat p'ras</i> time <i>dinar</i> zahav c <i>k'heref ayin</i> t <i>mesurah</i> v <i>shavua</i> t
<i>acre</i> <i>area</i> <i>dupondium</i> c <i>kikar</i> c,w,v <i>metzora</i> w <i>step</i> t
<i>adarkon</i> <i>coin</i> v <i>shel kodesh</i> c,w <i>middle finger</i> l <i>shekel (im)</i> c,w
<i>adashah</i> a <i>ephah</i> v <i>kista</i> v <i>mil</i> l <i>Biblical</i> c,w
<i>adriv</i> <i>volume</i> <i>equinox</i> t <i>kizba</i> l <i>mile, persian</i> l <i>hakodesh</i> c
<i>agorah</i> c <i>et (itim)</i> t <i>kometz (im)</i> v <i>roman</i> l <i>Talmudic</i> w
<i>agudal</i> <i>length</i> <i>etzba (ot)</i> l,v <i>kontrank</i> c <i>talmudic</i> l <i>shuir ikul</i> t
<i>amah (amot)</i> l,v <i>meruba'at</i> a <i>kor</i> a,v <i>moment</i> t <i>sh'minit</i> v
<i>meruba'at</i> a <i>fig</i> v <i>kortov</i> v <i>month</i> t <i>shmittah</i> t
<i>anbag</i> v <i>fingerbrdths a,l,v</i> <i>kotevet</i> v <i>mustard seed</i> a <i>sit</i> l
<i>anpak</i> v <i>fist</i> l <i>k'rimon</i> a <i>neronian sela</i> a <i>solstice</i> t
<i>antal</i> v <i>garmesin</i> c <i>k'turmus</i> a <i>olive</i> v <i>spoonful</i> v
<i>arbaum se'ah</i> v <i>garmida</i> l <i>kundess</i> v <i>omer</i> v <i>sunrise</i> t
<i>barley</i> v <i>gerah</i> w <i>kurdikinian</i> c <i>onah</i> t <i>sunset</i> t
<i>barleycorns</i> c <i>gomed</i> l,w <i>lentil</i> a,v <i>orech se'orah</i> l <i>tabaah (tevain)</i> c
<i>barzina</i> v <i>gris</i> a <i>letech</i> v <i>parasang</i> l <i>talent</i> w
<i>bat</i> v <i>grogeret</i> v <i>litra</i> v,w <i>parash</i> l <i>tammita</i> v
<i>bean, lupine</i> a <i>gudal</i> l <i>log</i> v <i>period</i> t <i>tarkav</i> v
<i>split</i> a <i>handbreadth</i> a,l <i>luma</i> c <i>perusah</i> v <i>taria</i> v
<i>white</i> v <i>handful</i> v <i>ma'ah</i> c <i>perutah</i> c,w <i>tarpe'ik</i> c
<i>beka</i> c,weight <i>hairbreadth</i> a,l,t <i>mahalach yom</i> l <i>pesiah</i> l <i>tartimar</i> w
<i>bet kav</i> a <i>hectare</i> a <i>maneh</i> c,w <i>pim</i> w <i>techum shabbat</i> l
<i>kor</i> a <i>hiluch mil</i> t <i>italki</i> w <i>pol halavan</i> v <i>tefach(im)</i> l
<i>rova</i> a <i>hin</i> v <i>shel kodesh</i> c,w <i>poteach tefach</i> v <i>meruba</i> a
<i>satayim</i> a <i>hour</i> t <i>me'et l'et</i> t <i>p'ras</i> t,v <i>poteach</i> v
<i>seah</i> a <i>iburah</i> l <i>m'lo charshina</i> l <i>pundyon</i> a,c <i>sochek</i> l
<i>betzah</i> v <i>issar</i> c <i>chofnav</i> v <i>pushach</i> l <i>teitarton</i> v
<i>bread</i> t <i>issaron</i> v <i>chut hasa'ara</i> l <i>reed</i> l <i>tekufah</i> t
<i>bushels</i> a <i>istera</i> a,v <i>rega</i> t <i>thumb breadths</i> l
<i>carob</i> w <i>jubilee</i> t <i>einav</i> l <i>revi'it</i> v <i>tilta</i> t
<i>charuv</i> w <i>kabayim</i> v <i>gemiah</i> v <i>rigva</i> c <i>toch k'dei dibur</i> t
<i>cheeks</i> v <i>k'adashah</i> v <i>hayad</i> v <i>ris</i> l <i>tomem</i> v
<i>chelek</i> t <i>kalbon</i> c <i>kumtzo</i> v <i>rope</i> l <i>tomata</i> v
<i>chevel</i> l <i>kaneh</i> l <i>lugmav</i> v <i>rova</i> v <i>treisit</i> c
<i>chodesh</i> v <i>kasitah</i> c <i>makde'akh</i> a <i>sa'arot</i> a <i>tyrian</i> c
<i>chomer</i> a,v <i>kasta</i> v <i>ma'anah</i> l,v <i>sabbatical</i> t <i>tzemed</i> a
<i>circuit</i> t <i>kav</i> a,v <i>nima</i> l,t <i>se'ah</i> a,v <i>ukhlah</i> v
<i>cubit</i> a,l,t,w <i>k'chardal</i> a <i>pi hataleh</i> v <i>sela(im)</i> c,w <i>unkeya</i> w
<i>danka'ei</i> c <i>kedei anivah</i> l <i>pi hazug</i> a <i>se'orah</i> v,w <i>week</i> t
<i>darkamon</i> c <i>kepiza</i> v <i>pisat hayad</i> v <i>seudah (ot)</i> t <i>year</i> t
<i>darkon</i> c <i>keratin</i> c <i>regel behemah</i> l <i>sha'ah</i> t <i>yom</i> t
<i>date</i> v <i>kesef</i> c <i>tarvad</i> v <i>shabbat</i> t <i>yovel</i> t
<i>day</i> t <i>kesita</i> c <i>uzilta d'ikarei</i> v <i>shanan</i> t <i>tzeret</i> l
<i>desert</i> v <i>ketanah</i> l <i>meluzma</i> w <i>shargushei</i> v <i>zin</i> c
<i>dinar</i> c,w <i>kezayit</i> v <i>mesimas</i> c <i>sha've perutah</i> c <i>zuz</i> c,w