Units of Length and Their Conversion

Recap

The most commonly used **units of length** are **kilometre** (km), **metre** (m), **centimetre** (cm), and **millimetre** (mm).

The relation between these units is as follows:

1 km = 1,000 m	1 m = 100 cm	1 cm = 10 mm	1 m = 1,000 mm

Grasp

Study these examples.

1. Convert 6 m 75 cm to centimetres.

1 m = 100 cm

To convert metres and centimetres to centimetres, multiply metres by 100 and add centimetres to the product.

6 m 75 cm = (6 × 100) cm + 75 cm
= 600 cm + 75 cm
= 675 cm

Ans. 6 m 75 cm = 675 cm

2. Convert 240 cm to metres and centimetres.

100 cm = 1 m

To convert centimetres to metres and centimetres, divide centimetres by 100.

240 cm = (240 ÷ 100) m
= 2.40 m
= 2 m 40 cm (convert decimals to m and cm)

Ans. 240 cm = 2 m 40 cm

3. Convert 3 km 350 m to metres.

1 km = 1,000 metres

To convert kilometres and metres to metres, multiply kilometres by 1,000 and add metres to the product.

3 km 350 m = (3 × 1000) m + 350 m
= 3000 + 350
= 3350 m

Ans. 3 km 350 m = 3,350 m

4. Convert 1,240 m to kilometres and metres.

1,000 m = 1 km

To convert metres to kilometres and metres, divide metres by 1,000.

1240 m = (1240 ÷ 1000) km
= 1.240 km
= 1 km 240 m (convert decimals to km and m)

Ans. 1,240 m = 1 km 240 m

1m = 100cm
8(100) x 57

Work Out

1 Convert metres and centimetres to centimetres.

(a) 8 m 57 cm = 857 cm

(b) 17 m 15 cm = 1715 cm

(c) 25 m 25 cm = 2525 cm

(d) 30 m 8 cm = 308 cm

2 Convert centimetres to metres and centimetres.

(a) 325 cm = 3 m 25 cm

(b) 105 cm = 1 m 05 cm

(c) 910 cm = 9 m 10 cm

(d) 675 cm = 6 m 75 cm

3 Convert kilometres and metres to metres.

(a) 3 km 750 m = 3750 m

(b) 7 km 560 m = 7560 m

(c) 13 km 230 m = 13230 m

(d) 10 km 175 m = 10175 m

4 Convert metres to kilometres and metres.

(a) 2,475 m = 2 km 475 m

(b) 30,007 m = 30 km 7 m

(c) 9,999 m = 9 km 999 m

(d) 40,976 m = 40 km 976 m

5 Solve.

(a) Tanya ran 2 km and 750 m. How many metres did she run?

(b) Jessica bought two ribbons. The first ribbon is 50 cm long. The second ribbon is 200 cm long. What is the total length of the two ribbons in metres and centimetres?

(c) Niraj requires 1,450 cm cloth to stitch his shirt. What is the length of the cloth he should buy in metres and centiimetres?

(d) Disha bought a dress material of length 5 m 75 cm. How many centimetres of dress material did she buy?

(e) John rode 3 km on his bike. Sally rode 4,000 m on her bike. Who rode farther and how many kilometres more did he / she ride?

(f) Amin is measuring two line segments. The first line segment is 75 cm long. The second line segment is 500 mm long. How long are the two line segments together? (Answer in cm.)

Units of Weight and Their Conversion

Grasp

Weights of heavy objects such as a truck, a ship, or machinery are measured in **tons**. Weight of grain bags are measured in **quintals**. We buy groceries such as grains, wheat, rice, sugar, etc. for our personal consumption in **kilograms** (kg). We buy vegetables and fruits in **kilograms** or **grams** (g). **Milligram** (mg) is the smallest unit.

1 ton = 1,000 1 kg = $\frac{1}{1000}$

The relation between these units is as follows:

1 ton = 1,000 kg	**1 kilogram = 1,000 g**	**1 gram = 1,000 mg**
1 quintal = 100 kg	**1 ton = 10 quintals**	

Study these examples.

1. Convert 5 kg 250 g to grams.

1 kg = 1,000 g

To convert kilograms and grams to grams, multiply kilograms by 1,000 and add grams to the product.

5 kg 250 g = (5 × 1000) g + 250 g
= 5000 g + 250 g
= 5250 g

Ans. 5 kg 250 g = 5,250 g

2. Convert 3,450 grams to kilograms and grams.

1,000 g = 1 kg

To convert grams to kilograms and grams, divide grams by 1,000.

3450 g = (3450 ÷ 1000) kg
= 3.450 kg
= 3 kg 450 g (convert decimals to kg and g)

Ans. 3,450 g = 3 kg 450 g

Work Out

1 Convert larger units to smaller units.

Ton to Kilogram

E.g. 2 tons = 2 × 1000 = 2,000 kg

(a) 3 tons = 3X1000=3000kg kg

(b) 8 tons = 8x1000=8000kg kg

(c) 10 tons = 10x1000=10000kg kg

Ton to Quintal

2 tons = 2 × 10 = 20 quintals

(d) 3 tons = 3X10=30 quintals

(e) 8 tons = 8x10=80 quintals

(f) 10 tons = 10x10=100 quintals

Quintal to Kilogram

2 quintals = 2 × 100 = 200 kg

(g) 4 quintals = 4x100=400kg

(h) 9 quintals = 9x100=900kg

(i) 10 quintals = 10x100=1000 kg

2 Convert smaller units to larger units. Solve mentally.

Kilogram to Ton	Quintal to Ton	Kilogram to Quintal
Eg. 3,000 kg = 3000 ÷ 1000 = 3 tons	30 quintals = 30 ÷ 10 = 3 tons	300 kg = 300 ÷ 100 = 3 quintals
(a) 4,000 kg = 4000÷1000 4 tons	(d) 40 quintals = 40÷10 4 tons	(g) 400 kg = 400÷100 4 quintals
(b) 9,000 kg = 9000÷1000 9 tons	(e) 90 quintals = 90÷10 9 tons	(h) 900 kg = 900÷100 9 quintals
(c) 13,000 kg = 13000÷1000 13 tons	(f) 130 quintals = 130÷10 13 tons	(i) 1,300 kg = 1,300÷100 13 quintals

3 Convert kilogram and grams to grams.

(a) 5 kg 470 g = 5,470 g

(b) 9 kg 345 g = 9,345 g

(c) 14 kg 230 g = 14,230 g

(d) 22 kg 635 g = 22,635 g

4 Convert grams to kilograms and grams.

(a) 3,325 g = 3 kg 325 g

(b) 10,465 g = 10 kg 465 g

(c) 9,610 g = 9 kg 610 g

(d) 16,2275 g = 16 kg 275 g

5 Solve these problems.

(a) The weight of a car is 2 tons 600 kg. What is its weight in kilograms?

(b) A truck carries 50 quintals of goods. Convert this weight into tons.

(c) A tempo carries 20 sacks of wheat weighing half a ton in all. What is the weight of each sack in kilograms?

Math in Daily Life!

Collect grocery bills of the last month from your parents. Use the format given below and prepare a list of items purchased. Answer the questions.

Date of purchase	Item purchased	Weight (kg)	Amount paid (₹)

(a) Find out from your parents if they purchase these items every month in the same quantity. Also ask them why or why not.

(b) Which items on the list could have been avoided or purchased in lesser quantity? Ask them the reason for it.

(c) Name three things used in your house that are generally measured in milligrams.

Ans. _____

(d) Name any three ingredients used in preparing food at your home that are measured in grams.

Ans. _____

Do you know?

Preservation by drying!

Fruits, vegetables, and herbs are dried to remove extra moisture from them. It reduces the volume and weight of the food item. Dried things can be transported easily. They stay longer and can be used conveniently to enhance the taste and value of the dish.

Learn the process of drying vegetables and herbs from your elders.

Project

For My Portfolio!

Select three vegetables, herbs, and fruits that can be preserved by drying. Clean and weigh each one of them. Now, dry them in sunlight. Weigh the dried vegetables, herbs, and fruits. Prepare a chart. Compare the original weight and the weight of the dried items.

Add the chart to your portfolio.

Units of Volume (Capacity) and Their Conversion

Grasp

Small volumes of liquid are measured in **millilitres** (*ml*). We buy oil, petrol, and diesel in **litres** (*l*). Large quantities are expressed in **kilolitres** (*kl*).

The relation between these units is as follows:

1 litre = 1,000 millilitres	**1,000 litres = 1 kilolitre**

Study these examples.

1. **Convert 3 *l* 350 *ml* to millilitres.**

$1\ l = 1{,}000\ ml$

To convert litres and millilitres to millilitres, multiply litres by 1,000 and add millilitres to the product.

$3\ l\ 350\ ml = (3 \times 1000)\ ml + 350\ ml$

$= 3000\ ml + 350\ ml$

$= 3350\ ml$

Ans. $3\ l\ 350\ ml = 3{,}350\ ml$

2. **Convert 4,550 *ml* to litres and millilitres.**

$1{,}000\ ml = 1\ l$

To convert millilitres to litres and millilitres, divide millilitres by 1,000.

$4550\ ml = (4550 \div 1000)\ l$

$= 4.550\ l$

$= 4\ l\ 550\ ml$ (convert decimals to *l* and *ml*)

Ans. $4{,}550\ ml = 4\ l\ 550\ ml$

3. **Convert 3,000 *l* to kilolitres.**

$1000\ l = 1\ kl$

$1\ l = \frac{1}{1000}\ kl$

To convert litres to kilolitres, divide the litres by 1,000.

$3000\ l = (3000 \div 1000)\ kl$

$= 3\ kl$

Ans. $3{,}000\ l = 3\ kl$

Work Out

1 Convert smaller units to larger units.

a) 10,000 *ml* = 10 *l*

b) 6,000 *ml* = 6 *l*

c) 4,000 *l* = 4 *kl*

2 Convert larger units to smaller units.

a) 7 *kl* = 7000 *l*

b) 50 *kl* = 50,000 *l*

c) 6 *l* = 6000 *ml*

3 Convert litres and millilitres to millilitres.

a) 6 *l* 265 *ml* = 6265 *ml*

b) 9 *l* 400 *ml* = 9400 *ml*

c) 13 *l* 680 *ml* = 13680 *ml*

d) 20 *l* 60 *ml* = 2060 *ml*

4 Convert millilitres to litres and millilitres.

a) 2,556 *ml* = 2 *l* 556 *ml*

b) 12,785 *ml* = 12 *l* 785 *ml*

c) 8,843 *ml* = 8 *l* 843 *ml*

d) 42,272 *ml* = 42 *l* 272 *ml*

5 **Solve.**

(a) A tank contains 6,000 kilolitres of water. How many litres does that make? _____

(b) A red bottle contains 5,000 litres of water and a green bottle contains 30,000 millilitres water. The total amount of water in these two bottles is _____ *l*.

(c) Insert '>' or '<' or '='. i. 2 *l* ◯ 2,100 *ml* ii. 2,000 *l* ◯ 2,100 *kl* iii. 20 *l* ◯ 20,000 *ml*

Measurement and Fractions

Grasp

Study these examples.

1. Archana bought half a metre of cloth. How many centimetres of cloth did she buy?

Solution: 1 metre = 100 centimetres

If we divide 100 centimetres into 2 equal parts, we get (50 + 50) cm = 100 cm.

$\therefore \frac{1}{2}$ metre = 100 ÷ 2 = 50 cm

Hence, half a metre is 50 centimetres.

Ans. Archana bought 50 cm of cloth.

2. Tarun walked half a kilometre in 8 minutes. How many metres did he walk?

Solution: 1 kilometre = 1,000 metres

If we divide 1,000 metres into 2 equal parts, we get (500 + 500) m = 1,000 m.

$\therefore \frac{1}{2}$ kilometre = 1000 ÷ 2 = 500 m

Hence, half a kilometre is 500 metres.

Ans. Tarun walked 500 m.

3. Varun bought one-fourth litre of oil. How many millilitres of oil did he buy?

Solution: 1 litre = 1,000 millilitres

If we divide 1,000 millilitres into 4 equal parts, we get (250 + 250 + 250 + 250) *ml* = 1,000 *ml*.

$\therefore \frac{1}{4}$ litre = 1000 ÷ 4 = 250 *ml*

Hence, one-fourth litre is 250 millilitres.

Ans. Varun bought 250 *ml* of oil.

4. Reema used $\frac{3}{4}$ kilograms of flour to make a cake. How many grams of flour did she use?

Solution: $\frac{1}{4}$ kilogram = 1000 ÷ 4 = 250 g

$\therefore \frac{3}{4}$ kilogram = (250 + 250 + 250) g = 750 g

Ans. Reema used 750 g of flour.

Work Out

Solve.

(a) Half a litre = _____ = _____ *ml*

(b) Half a kilogram = _____ = _____ g

(c) $\frac{1}{4}$ of a kilometre = _____ = _____ m

(d) $\frac{1}{4}$ of a kilogram = _____ = _____ g

(e) $\frac{3}{4}$ of a litre = _____ = _____ *ml*

(f) $\frac{3}{4}$ of a metre = _____ = _____ cm

HOTS

Solve these problems.

(a) The volume of a bottle of milk is $\frac{1}{5}$ of a litre. What is its volume in millilitres?

(b) An apple weighs $\frac{1}{4}$ of a kilogram. What is its weight in milligrams?

(c) Yesterday Anjali drove 2 and a half kilometres to school. How many kilometres and metres did she drive?

(d) A big fish tank has a capacity of 900 litres. It is already half-filled. How many more litres of water need to be added to fill it up completely?

(e) If I ran $\frac{3}{4}$ of a kilometre, how many metres did I run?

(f) Mary buys a reel of thread for sewing. There is 10 m of thread on the reel. She uses one-tenth of the thread. How much of the thread in centimetres has she used?

Challenge

Solve.

(a) 1 and $\frac{1}{2}$ litre of oil = _____ *ml* of oil

(b) 3 and $\frac{1}{4}$ metre of cloth = _____ cm of cloth

(c) 5 and $\frac{3}{4}$ kilogram of sugar = _____ g of sugar

Addition / Subtraction of Metric Measurements (with Regrouping)

Grasp

Study these examples.

1. 30 kg 500 g + 15 kg 760 g

Step 1: Write kilograms and grams as kilograms in decimal form.

30 kg 500 g = 30.500 kg
15 kg 760 g = 15.760 kg

Step 2: Add the kilograms.

$$\begin{array}{r} \boxed{1} \\ 30.500 \\ +\ 15.760 \\ \hline 46.260 \end{array}$$

Step 3: Convert decimal to kg and g.

46.260 kg = 46 kg 260 g

Ans. 30 kg 500 g + 15 kg 760 g = 46 kg 260 g

2. 85 kg 350 g – 36 kg 870 g

Step 1: Write kilograms and grams as kilograms in decimal form.

85 kg 350 g = 85.350 kg
36 kg 870 g = 36.870 kg

Step 2: Subtract the kilograms.

$$\begin{array}{r} \boxed{14}\boxed{12} \\ \boxed{7}\boxed{\not{4}}\ \boxed{2}\boxed{15} \\ \not{8}\ \not{5}.\ \not{3}\ \not{5}0 \\ -\ 36.870 \\ \hline 48.480 \end{array}$$

Step 3: Convert decimal to kg and g.

48.480 kg = 48 kg 480 g

Ans. 85 kg 350 g – 36 kg 870 g = 48 kg 480 g

Similarly, we can add and subtract kilometres and metres or litres and millilitres.

Work Out

Solve in your notebook.

a) 38 kg 720 g + 14 kg 940 g

b) 72 km 520 m + 23 km 655 m

c) 87 kg 457 g – 31 kg 689 g

d) 67 km 380 m – 30 km 790 m

e) 500 *l* 600 *ml* – 387 *l* 984 *ml*

f) 136 *l* 75 *ml* + 82 *l* 990 *ml*

Multiplication / Division of Metric Measurements

Grasp

Study these examples.

1. 13 kg 350 g × 9

Write kilograms and grams as kilograms in decimal form and multiply.

13 kg 350 g = 13.350 kg

$$\begin{array}{r} \boxed{3}\boxed{3}\boxed{4} \\ 13.350 \\ \times \quad 9 \\ \hline 120.150 \end{array}$$

120.150 kg = 120 kg 150 g (convert decimal to kg and g)

Ans. 13 kg 350 g × 9 = 120 kg 150 g

2. 37 kg 255 g ÷ 5

Write kilograms and grams as kilograms in decimal form and divide.

37 kg 255 g = 37.255 kg

$$\begin{array}{r} 7.451 \\ 5\overline{)\,37.255} \\ -\,35\downarrow \\ \hline 22\downarrow \\ -\,20\downarrow \\ \hline 25\downarrow \\ -\,25 \\ \hline 05 \\ -\,5 \\ \hline 0 \end{array}$$

Q = 7.451 kg

= 7 kg 451 g

Ans. 37 kg 255 g ÷ 5 = 7 kg 451 g

We can use the same method for multiplication and division of kilometres and metres or litres and millilitres.

Work Out

Solve in your notebook.

a) 18 kg 5 g × 8

b) 84 m 79 cm × 6

c) 31 l 352 ml × 7

d) 25 kg 370 g ÷ 5

e) 39 l 423 ml ÷ 3

f) 64 m 252 cm ÷ 2

g) 78 kg 500 g × 4

h) 52 l 12 ml × 3

i) 99 km 999 m ÷ 9

j) 24 km 120 m ÷ 12

k) 57 km 319 m × 9

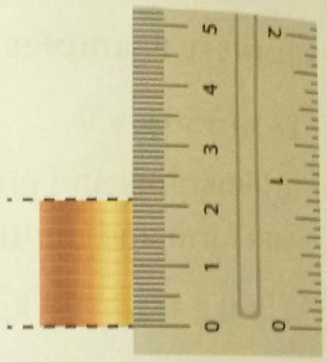
l) 101 l 22 ml ÷ 3

Math Lab

Measuring thickness of ₹10, ₹5, ₹2, ₹1, and 50 paise coins.

You will need: A ruler, coins of different denominations

Procedure: Work in a group of four students. On a flat surface, place ten 5-rupee coins of the same design one above the other to form a column. Measure the height of the column using a ruler. This will give you the thickness of ten coins together. Then, divide this reading by 10 to get the thickness of one coin.



Suppose your reading is 21 mm. Divide 21 by 10 → 21 ÷ 10 = 2.1 mm.

Use the above procedure and measure the thickness of ₹10, ₹2, ₹1, and 50 paise coins. Write the measurements in the following table.

Coin	₹10	₹5	₹2	₹1	50 paise
Thickness					

Answer the following questions.

a) Thickness of 1 coin of ₹5 is _____.

b) If you stack 20 coins of ₹5, what will be the height of the column so formed? _____

c) If you stack 100 coins of ₹5, will the height of the column so formed be more / less than $\frac{1}{4}$ of a metre? _____

Find out the actual height. _____

d) Arrange the coins according to their thickness in ascending order. _____

_____

Work Out

Solve these story problems.

(a) The weight of 6 bags of vegetables is 12 kg 870 g. If all bags carry the same weight, then find the weight of one bag.

(b) Bina bought two bags of rice. The weight of one bag is 30 kg 500 g and that of the other is 15 kg 750 g. What is the total weight of both the bags? What is the difference in the weights of these two bags?

(c) Nisha bought 2 kg 650 g tomatoes, 5 kg 375 g potatoes, and 1 kg 250 g cauliflower for making *pav bhaji*. What was the total weight of the vegetables?

(d) Sonia distributed 117 kg 650 g of rice equally among 13 people. How much rice did each person receive?

(e) Pinki had a 78 m long rope. She cut it into two pieces. The length of one piece is 32 m 85 cm. What is the length of the other piece?

(f) Saroj and her family went for a picnic. They travelled a distance of 50 km 475 m and 105 km 850 m in 2 days. How much distance in kilometres did they travel altogether?

(g) One bag of cement weighs 14 kg 750 g. What is the total weight of 5 such bags?

(h) The total capacity of 17 cans is 204 *l* 255 *ml*. What is the capacity of one can if all cans contain the same amount of liquid?

(i) Neha made 16 cakes of the same size from 17 kg 568 g flour. How much flour did she use for each cake? How much flour will be needed if she wants to make 12 such cakes?

Quick Calculation

Solve mentally and write the answers.

(a) 8 tanks of equal capacity can hold 160 *l* 800 *ml* water. Find the capacity of each tank.

Ans. _____ *l* _____ *ml*

(b) One bag of rice weighs 20 kg 100 g. Find the weight of 5 such bags.

Ans. _____ kg _____ g

(c) Anita used 2 m 50 cm cloth to stitch a shirt and 3 m 20 cm cloth to stitch a trouser. Find the total length of cloth she used.

Ans. _____ m _____ cm

(d) Mrinal purchased 15 *l* 500 *ml* oil. She used 10 *l* 200 *ml* oil. Find the amount of oil left.

Ans. _____ *l* _____ *ml*

Math in Daily Life!

Post Parcel

When you send a parcel through the post, it is first weighed and the postage charges are calculated based on the weight of the parcel and the distance over which it is sent.

The following table shows the postage charges based on the weight of the parcel.

Distance	Weight			
	Up to 50 g	51 to 200 g	201 to 500 g	Every additional 500 g
Local	₹15	₹25	₹30	₹10
Up to 200 km	₹25	₹35	₹50	₹15
201 to 1,000 km	₹35	₹40	₹60	₹30
1,001 to 2,000 km	₹45	₹60	₹80	₹40
More than 2,000 km	₹50	₹70	₹90	₹50

*[**Note:** This table is taken as an example and does not show actual charges and taxes.]*

Read the table and answer the following questions.

(a) What is the total cost of sending a 50 g parcel and a 100 g parcel to a place at a distance of 500 km?

(b) Anuradha sent two parcels of 500 g each. One was sent to her native place 300 km away. The second parcel was sent to her friend who lives 1200 km away. What is the total amount she paid as postal charges?

- Visit a post office with your parent and see how letters and parcels are weighed, sorted, and dispatched. Find out the other things available at the post office.

Estimation

Work Out

Write the appropriate units used to measure the following things.

Thickness of the cover page of your Math book: _____

Distance between the Earth and the Moon: _____

(c) A big tanker carrying diesel: _____

(d) Weight of heavy machinery: _____

(e) Amount of oil your mother uses for *dal tadka*: _____

(f) Quantity of raw rice required for 2,000 guests: _____

(g) Amount of diesel / petrol a car tank can contain: _____

2 Select the correct unit of weight from the words given below and fill in the blanks.

quintal, gram, kilogram, ton, milligram

				
A few grains of sugar weigh about a _____.	A paper clip weighs about a _____.	This packet of rice weighs about a _____.	This bag of rice weighs about a _____.	A car weighs about a _____.

Project

For My Portfolio!

Capacity in litres

Take the help of your parents and conduct a survey of at least 5 buildings in your locality. Collect information on the number of overhead water storage tanks, the capacity of the tanks, and the number of people staying in those buildings.

Prepare a chart of your observations as follows:

Name of the building / society	Capacity of the overhead tank in litres (*l*)	Number of people staying in the building	Source of the water	Is the amount of water received enough?

Add this chart to your portfolio.

Suggest some measures to save water.

APPLICATION BASED QUESTIONS

[1] John has a jug filled with orange juice. He filled 10 glasses with 150 *ml* of juice in each glass. He is still left with 500 *ml* juice in the jug. Was the capacity of the jug more than, less than, or equal to 2 litres?

[2] Workers in a godown transferred 50 bags of rice weighing 50 kg each into a truck. The capacity of the truck is two and a half tons. Did the workers overload the truck? Justify your answer. **[HOTS]**

[3] In a javelin throw competition, Rishabh from SMBH School threw the javelin up to a distance of 550 cm. The longest throw in the competition was 6 metres. What is the difference between Rishab's javelin throw and the longest javelin throw?

[4] Adrian is advised by the doctor to take 2 spoonfuls of multivitamin syrup every day. The capacity of the spoon is 15 *ml*. What quantity of syrup will be taken by him in 15 days? Is it more or less than half a litre?

[5] Richard's house is 3 km 750 m away from school. Alex's house is three and a half km away from the school. Whose house is far from the school? Explain.

[6] Neil bought a bag of pulses weighing 25 kg. While keeping it on the shelf, the bag tore and about 2,000 g of pulses fell on the floor. What quantity of pulses is still there in the bag?

[7] Tanya has stacked five books one above the other. The thickness of each book is 7 cm 5 mm. Will the total height so obtained be more or less than 40 cm? Explain, why or why not.

[8] Amar wants to distribute one-fourth kilogram of sweets to each of the 50 workers in his factory. How many kilograms of sweets should he order such that not more than 500 g of sweets are left with him?

9] $\frac{3}{4}$ portion of an overhead water storage tank of capacity 10 kilolitres is filled up. How many more litres of water can be added to fill it completely? **[HOTS]**

0] Samir packed 30 boxes with $\frac{1}{4}$ kg of vegetables in each. Then he packed all the boxes in one big container. Find out the weight of the vegetables in the container.