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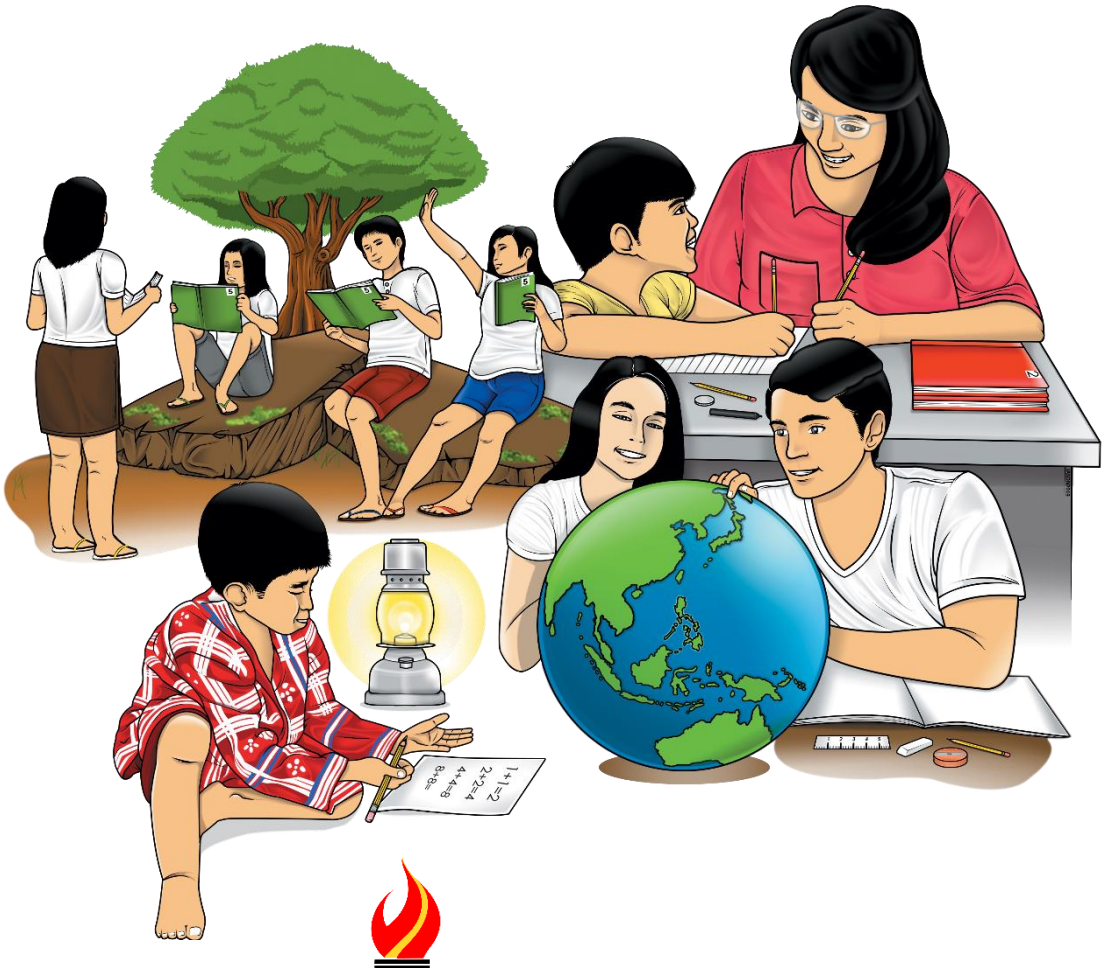
Mathematics

Quarter 3 – Module 11:
Conversion of Square Units



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5

Mathematics

Quarter 3 – Module 11:
Conversion of Square Units

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Good day!

In the previous module, you learned about the difference between perimeter and area. Now, you will learn about square units. Square units like cm2, dm2, m2, in2 and ft2, which are read as square centimeters or centimeter square, square decimeters or decimeter square, and so on, are units of areas. Some of these units may be smaller or bigger than the others. You use bigger units to measure big areas and smaller units for small areas.

This module will also help you understand how area measures may be converted from one unit to another, in particular, measures in square centimeters to square meters, and vice versa. We know that you will not only find the lesson in this module useful but fun as well.

Good luck!

After going through this module, you are expected to be able to convert square centimeters (cm2) to square meters (m2) and vice versa.

What I Know

EQUAL or NOT EQUAL

A. Write **=** if the conversion is correct and **≠** if it is not.

1. 20 000 sq. cm	☐	2 sq. m
2. 500 000 sq. cm	☐	500 sq. m
3. 41 sq. m	☐	410 000 sq. cm
4. 7 sq. m	☐	7 000 sq. cm
5. 34 000 sq. cm	☐	3.4 sq. m

B. Convert the following to square meters (m^2).

6. 28 000 sq. cm = _____ sq. m
7. 420 000 sq. cm = _____ sq. m

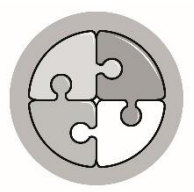
C. Convert the following to square centimeters (cm^2).

8. 17 sq. m = _____ sq. cm
9. 9 sq. m = _____ sq. cm

D. Solve the problem.

10. The standard outer area of a house in a village is 54 m^2. What is this in square centimeters (cm^2)?

To check, go to page 17 for the ***Answer Key***. If you got a score of 8 – 10, VERY GOOD! The lesson will be easy for you. If you got a score of 7 or below, study carefully the discussion and examples in this module.



What's In

Look at the example below and do as directed in the exercises that follow.

Example: $\frac{40\,000}{10\,000} = 4$

A. Simplify the following.

1. $\frac{70\,000}{10\,000}$ 2. $\frac{230\,000}{10\,000}$ 3. $\frac{100\,000}{10\,000}$ 4. $\frac{4\,550\,000}{10\,000}$

B. Find the product.

5. 12 x 10 000 6. 51 x 10 000 7. 721 x 10 000

C. Convert the following using the equivalence:

100 cm = 1 m

8. 800 cm = _____ m
9. 7 m = _____ cm
10. 45 m = _____ cm

While there are other units in the metric system of measurement, millimeters (mm), centimeters (cm), meters (m), and kilometers (km) are the more common ones used for measuring lengths or distances. The meaning of the prefixes is shown below:

milli – 1/1 000 centi – 1/100 kilo – 1 000

You therefore have,

$1\,mm = \frac{1\,m}{1\,000}$; $1\,cm = \frac{1\,m}{100}$; *and* $1\,km = 1\,000\,m$

Please check your answers with the ANSWER KEY on page 17.

What's New

How big is your classroom? How do you maintain the cleanliness of your classroom?

Read the problem below.

Gabriel and Joseph go to school early everyday. When they reach school, instead of playing, they sweep the floor of their classroom. One day, they measured the length and width of the floor and they found it to be 9 m long and 8 m wide. Using these, they computed for its area and got 72 sq. m. They wanted to find out the equivalent of 72 sq. m in sq. centimeters. Can you help them?

What Is It

How do you get the equivalent of 72 square meters in square centimeters?

Remember, **1 m = 100 cm**. Using this, you may now get the equivalent of 1 sq. m in sq. cm as follows,

$$1\ sq.m = 1\ m \times 1\ m = 100\ cm \times 100\ cm$$

You therefore have this equivalence:

$$\mathbf{1\ sq.m = 10\ 000\ sq.cm}$$

Since 1 sq. m is equal to 10 000 sq. cm, if you divide one by the other, you get 1 either way. And so, you have,

1. $\dfrac{\mathbf{1\ sq.m}}{\mathbf{10\ 000\ sq.cm}} = \mathbf{1}$ 2. $\dfrac{\mathbf{10\ 000\ sq.cm}}{\mathbf{1\ sq.m}} = \mathbf{1}$

Remember that 1 is the identity element for multiplication. Multiplying a number by 1 does not change its value even if there may be a change in its form.

You can now then get the two conversion factors below:

1. $\mathbf{sq.cm \rightarrow sq.m}$	2. $\mathbf{sq.m \rightarrow sq.cm}$
$\dfrac{\mathbf{1\ sq.m}}{\mathbf{10\ 000\ sq.cm}}$	$\dfrac{\mathbf{10\ 000\ sq.cm}}{\mathbf{1\ sq.m}}$

Going back to the question: How do you get the equivalent of 72 sq. m in sq. cm?

Using conversion factor number 2, you have,

$$72\ sq.m\ =\ 72\ sq.m\ \times\ \frac{10\ 000\ sq.cm}{1\ sq.m} = \frac{72\ sq.\ m\ \times\ 10\ 000\ sq.cm}{1\ sq.\ m}$$

$$72\ sq.m\ =\ \frac{72\ sq.\ m}{1\ sq.m} \times 10\ 000\ sq.cm = 72 \times 10\ 000\ sq.cm =\ 720\ 000\ sq.cm$$

You can get the same result using what is called **cancellation**. Using the same problem above, we have,

$$72\ sq.m\ \times\ \frac{10\ 000\ sq.\ cm}{1\ sq.\ m} = 72\ \cancel{sq.m}\ \times\ \frac{10\ 000\ sq.cm}{1\ \cancel{sq.m}} =\ 720\ 000\ sq.cm$$

Therefore, Joseph and Gabriel's classroom floor has an area of 720 000 sq. cm.

But let us look at why cancellation works. First, on why units get "cancelled". Examine the fraction: $\frac{2\ sq.\ m}{1\ sq.\ m}$.

You are dividing 2 sq. m by 1 sq. m. What do you understand by this?

When you are dividing, you are really asking yourself how many of the divisors there are in the dividend. For example, when you are dividing 10 by 2, you are really asking yourself how many 2s there are in 10. Your answer is of course 5 since there are five 2s in 10.

So, when you are dividing 2 sq. m by 1 sq. m, you really want to know how many 1 square meters there are in 2 square meters. Your answer is, of course, just 2, without units. Why?

It would be different if we were to divide, for example, 4 square meters by 2. Here, the answer would be 2 square meters, with units. Why?

Second, on why we can "cancel" the 0s.

Let us use the number 1.234 and see what happens when we multiply this by 10, 100, 1 000, 10 000, and so on.

$$1.234 \times 10 = 12.34$$
$$1.234 \times 100 = 123.4$$
$$1.234 \times 1\,000 = 1234$$
$$1.234 \times 10\,000 = 12340$$

You can see that when you multiply a number by 10, you can also get the product by just moving the decimal point of the other factor one place to the right, adding the 0 digit, when needed.

Multiplying by 100, 1 000, 10 000, and so on, is just like multiplying by 10 twice, three times, four times over, and so on. So, you just move the decimal point 2, 3, 4 and so on places to the right, again adding 0 digits when and as may be needed.

You just count the number of zeros to know how many places to move the decimal point to the right.

So, in converting square meters to square centimeters, instead of actually multiplying by the conversion factor $\frac{10\,000\ sq.\ cm}{1\ sq.\ m}$*, we may just* ***move the decimal point four places to the right, adding 0 digits when and as needed.***

Examples: 42 sq. m = 420 000 sq. cm = 420 000 sq. cm
56.1 sq. m = 561 000 sq. cm = 561 000 sq. cm

This time, let us use the number 432.1 and see what happens when you divide this by 10, 100, 1 000, 10 000, and so on.

$$432.1 \div 10 = 43.21 = 43.21$$
$$432.1 \div 100 = 4.321 = 4.321$$
$$432.1 \div 1\,000 = 0.4321 = 0.4321$$
$$432.1 \div 10\,000 = 0.04321 = 0.04321$$

You can see that when you divide a number by 10, you can get the quotient by just moving the decimal point of the dividend one place to the left, and again also adding a 0 digit, when and as needed. Dividing by 100, 1 000, 10 000, and so on, is just like dividing by 10 twice, three times, four times, and so on. So, you just move the decimal point 2, 3, and so on places to the left, also adding 0 digits when and as may be needed.

Again you just count the number of zeros in the divisor to know how many places to move the decimal point to the left.

Therefore, in converting square centimeters to square meters, *instead of using the conversion factor* $\frac{1\ sq.\ m}{10\ 000\ sq.\ cm}$, *you may just* ***move the decimal point four places to the left, adding 0 digits when and as needed.***

Examples: 32 000 sq m = 32 000 sq. cm = 3.2 sq. m
374.2 sq. cm = 0.03742 sq. m = 0.03742 sq. m

Now, read the problem below.

> Hannah and Jannah were cleaning their bathroom which had a rectangular floor. They measured the floor and found it to be 200 cm long and 150 cm wide. Using the formula for the area of a rectangle which is L x W, they got 30 000 sq. cm. What is the area of the bathroom floor in

Using conversion factor no. 1, we have,

$$30\ 000\ sq.cm\ = \ 30\ 000\ sq.cm\ \times \frac{1\ sq.\ m}{10\ 000\ sq.\ cm} = \frac{30\ 000\ sq.\ cm\ \times\ 1\ sq.\ m}{10\ 000\ sq.\ cm}$$
$$= \frac{30\ 000\ sq.\ cm}{10\ 000\ sq.\ cm} \times 1\ sq.m\ = 3 \times 1\ sq.m$$
$$= 3\ sq.m$$

If you use cancellation, you get the same result as you can see below,

$$30\ 000\ sq.cm\ = \ 3\cancel{0\ 000\ sq.cm}\ \times \frac{1\ sq.m}{\cancel{10\ 000\ sq.cm}} = 3\ sq.m$$

So, Hannah and Jannah's bathroom had a floor area of 3 sq. m.

NOTE: Area units may be written in different ways.

square centimeter → centimeter square → sq. cm → cm^2
square meter → meter square → sq. m → m^2

Study the following examples:

Converting sq. cm to sq. m

a. 60 000 square centimeters = 6 square meters
b. 580 000 cm^2 = 58 m^2
c. 47 000 sq. cm = 4.7 sq. m

Converting sq. m to sq. cm

a. 3 square meters = 30 000 square centimeters
b. 71 sq. m = 710 000 sq. cm
c. 4.2 m^2 = 42 000 cm^2

Now that you already know how to convert sq. m to sq. cm, and vice versa, you are now ready for some activities. LET'S GO!

What's More

Activity 1

A. Convert the following to square meters.

1. 590 000 sq. cm = _____ sq. m
2. 20 000 sq. cm = _____ sq. m
3. 850 000 sq. cm = _____ sq. m

B. Convert the following to square centimeters.

1. 48 sq. m = _____ sq. cm
2. 5 sq. m = _____ sq. cm
3. 70 sq. m = _____ sq. cm

Please check your answers for each activity with the ANSWER KEY on page 17. If you answered all of them correctly, Great job! Keep up the good work! If you have some mistakes, review the lesson and decide which of the two solutions presented is

Activity 2

Complete the table with the correct square units.

Area in cm^2	**Area in m^2**
320 000 cm^2	1.
2.	8 m^2
820 000 cm^2	3.
4.	12 m^2
60 000 cm^2	5.
6.	57 m^2
27 000 cm^2	7.
8.	2.4 m^2

Please check your answers with the ANSWER KEY on page 17. If you got 6-8, Excellent job! If you got below 6, it's okay. You can always review the lessons and examples given.

What I Have Learned

How do you convert square centimeters to square meters and vice versa?

Recall the equivalence,

10 000 sq. cm = 1 sq. m

A. To convert sq. cm to sq. m:

1. multiply by the conversion factor:

$$\frac{1\ sq.m}{10\ 000\ sq\ cm}$$

2. and, to simplify,
   a. move the decimal point 4 places to the left,
   b. cancel sq. cm, and
   c. express the result in sq. m.

B. To convert sq. m to sq. cm:

1. multiply by the conversion factor:

$$\frac{10\ 000\ sq.\ cm}{1\ sq.\ m}$$

2. and, to simplify,
   a. move the decimal point 4 places to the right,
   b. cancel sq. m, and
   c. express the result in sq. cm.

What I Can Do

Solve the following problems.

1. Mang Emong is painting his 420 000 sq. cm wall. What is its area in sq. m?

2. A bathroom floor has an area of 8 sq. m. What is the floor area in square centimeters?

3. An 81 sq. m floor of Dina's house is to be tiled. What is this in square centimeters?

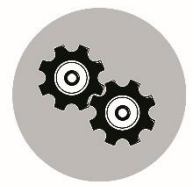
Please check your answers with the ANSWER KEY on page 17.

Assessment

Convert the following to sq. cm or to sq. m, as required.

1. 920 000 sq. cm = _____ sq. m
2. 15 sq. m = _____ sq. cm
3. 760 000 sq. cm = _____ sq. m
4. 100 000 sq. cm = _____ sq. m
5. 37 sq. m = _____ sq. cm

Please check your answers with the ANSWER KEY on page 17.



Additional Activities

Solve the following problems.

1. Rye has a broken 30 000 cm^2 - sliding door. He will temporarily replace it with plywood. How many m^2 of plywood does he need?

2. Miguelito volunteers to clean their two chalkboards. Both chalkboards are of the same size. The two chalkboards have a total area of 4 sq. m. What is the area of each chalkboard in sq. cm?

3. A 56 sq. m - wall is to be covered with wall paper. Would 570 000 sq. cm of wall paper be enough to completely cover it? Why?

4. If 1.5 m^2 = 15 000 cm^2, how many m^2 are there in 23 000 cm^2?

5. One sheet of *manila paper* is given to each group for a group activity in Mathematics. One sheet is 1.08 m^2. What is this in cm^2?

To check, turn to page 17 for the ***Answer Key***. Congratulations for reaching this part of the module.

You can always review the previous pages of this module if you need to.

Answer Key

What I Know

A.

1. =
2. ≠
3. =
4. ≠
5. =

B.

6. 2.8
7. 42

C.

8. 170 000
9. 90 000

D.

10. 540 000 sq. cm

What's In

1. 1. 7
2. 23
3. 10
4. 455
5. 120 000
6. 510 000
7. 7 210 000
8. 8
9. 700
10. 4 500

What's More

Activity 1:

A.	B.
1. 59	1. 480 000
2. 2	2. 50 000
3. 85	3. 700 000

Activity 2:

1. 32 m^2
2. 80 000 cm^2
3. 82 m^2
4. 120 000 cm^2
5. 6 m^2
6. 570 000 cm^2
7. 2.7 m^2
8. 24 000 cm^2

What I Can Do

1. 42 sq. m
2. 80 000
3. 810 000 sq. cm

Assessment

1. 92
2. 150 000
3. 76
4. 10
5. 370 000

Additional Activities

1. 3
2. Octagon - Irregular
3. Heptagon – Irregular sq. cm
4. 2.3
5. 10 800 cm^2

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