

# NUMERACY:

## The Basics Workbook



### Set R: Metric & Imperial Conversions

Companion Workbook to Numeracy: The Basics Video Series

Workplace Education Manitoba would like to express appreciation to the following for supporting the development of this curriculum:

The Government of Canada  
Human Resource Skills Development Canada (HRSDC)

and

The Manitoba Government  
Industry Workforce Development (IWD), Entrepreneurship,  
Training and Trade (ETT)

Workplace Education Manitoba would also like to thank the individuals from across Manitoba who provided consultation, content, and feedback.

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# ACKNOWLEDGMENTS





## INTRODUCTION

### What is Numeracy: The Basics Workbook?

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This workbook is intended to accompany Workplace Education Manitoba's (WEM) Numeracy: The Basics Video Series, a set of 50 videos that explain essential numeracy concepts.

The refresher videos cover 25 critical numeracy topics, each broken into concept and practice.

The video series and accompanying downloadable workbooks can be found on the WEM website at [http://www.wem.mb.ca/learning\\_on\\_demand.aspx](http://www.wem.mb.ca/learning_on_demand.aspx)

These Numeracy: The Basics workbooks provide an opportunity for additional skill-building practice.

### Numeracy: The Basics topics are:

- Order of Operations 1
- Order of Operations 2
- Adding & Subtracting Fractions 1
- Adding & Subtracting Fractions 2
- Multiplying & Dividing Fractions
- Mixed & Improper Fractions
- Operations with Mixed Fractions 1
- Operations with Mixed Fractions 2
- Operations with Mixed Fractions 3
- Adding & Subtracting Decimals
- Multiplying Decimals
- Dividing Decimals
- Order of Operations & Decimals
- Decimals, Fractions & Percent 1
- Decimals, Fractions & Percent 2
- Imperial Conversions
- Metric Conversions
- Metric and Imperial Conversions
- Geometry 1 – Perimeter
- Geometry 2 – Area
- Geometry 3- Volume
- Solving Equations 1
- Solving Equations 2
- Ratio & Proportion
- Averages



## METRIC & IMPERIAL CONVERSIONS

This workbook contains five skill-building practice sections. Solutions can be found at the end of the workbook.

### Practice Section A

Convert each of the following between metric and Imperial measures. Round each answer to one decimal place, if rounding is necessary.

1.  $15\text{ cm} = \underline{\hspace{1cm}}\text{ in}$

2.  $1\text{ yd} = \underline{\hspace{1cm}}\text{ cm}$

3.  $16\text{ mm} = \underline{\hspace{1cm}}\text{ in}$

4.  $7\text{ ft} = \underline{\hspace{1cm}}\text{ m}$

5.  $1\text{ m} = \underline{\hspace{1cm}}\text{ yd}$

6.  $21\text{ cm} = \underline{\hspace{1cm}}\text{ ft}$

7.  $8\text{ ft} = \underline{\hspace{1cm}}\text{ m}$

8.  $23\text{ in} = \underline{\hspace{1cm}}\text{ cm}$

9.  $60\text{ m} = \underline{\hspace{1cm}}\text{ ft}$

10.  $9\text{ m} = \underline{\hspace{1cm}}\text{ ft}$

11.  $27\text{ cm} = \underline{\hspace{1cm}}\text{ in}$

12.  $7\text{ yd} = \underline{\hspace{1cm}}\text{ m}$

13.  $7\text{ mm} = \underline{\hspace{1cm}}\text{ in}$

14.  $25\text{ ft} = \underline{\hspace{1cm}}\text{ cm}$

15.  $19\text{ m} = \underline{\hspace{1cm}}\text{ yd}$

**Practice Section B**

Convert each of the following between metric and Imperial measures. Round each answer to one decimal place, if rounding is necessary.

1.  $300\text{ cm} = \underline{\hspace{1cm}}\text{ in}$
2.  $309\text{ in} = \underline{\hspace{1cm}}\text{ m}$
3.  $17\text{ mm} = \underline{\hspace{1cm}}\text{ in}$
4.  $6\text{ ft} = \underline{\hspace{1cm}}\text{ mm}$
5.  $230\text{ cm} = \underline{\hspace{1cm}}\text{ ft}$
6.  $31\text{ ft} = \underline{\hspace{1cm}}\text{ m}$
7.  $2000\text{ mm} = \underline{\hspace{1cm}}\text{ yd}$
8.  $22\text{ yd} = \underline{\hspace{1cm}}\text{ cm}$
9.  $105\text{ m} = \underline{\hspace{1cm}}\text{ yd}$
10.  $100\text{ in} = \underline{\hspace{1cm}}\text{ m}$
11.  $10050\text{ cm} = \underline{\hspace{1cm}}\text{ ft}$
12.  $10.25\text{ yd} = \underline{\hspace{1cm}}\text{ m}$
13.  $0.375\text{ m} = \underline{\hspace{1cm}}\text{ in}$
14.  $9.875\text{ in} = \underline{\hspace{1cm}}\text{ cm}$
15.  $9768.875\text{ m} = \underline{\hspace{1cm}}\text{ ft}$

**Practice Section C**

Convert each of the following between metric and Imperial measures and then calculate the answer to each of the following questions. Round each answer to one decimal place, if rounding is necessary.

- $(105\text{ in} = \text{ \_\_\_\_\_\_ } m) + (3.4\text{ ft} = \text{ \_\_\_\_\_\_ } m)$
- $(1.075\text{ m} = \text{ \_\_\_\_\_\_ } ft) \div (3.5\text{ cm} = \text{ \_\_\_\_\_\_ } ft)$
- $45\% \times (4700\text{ in} = \text{ \_\_\_\_\_\_ } cm) + \frac{1}{4} \times (3.4\text{ ft} = \text{ \_\_\_\_\_\_ } cm)$
- $(0.375\text{ yd} = \text{ \_\_\_\_\_\_ } mm) \times 1500\% + (3.4\text{ in} = \text{ \_\_\_\_\_\_ } mm)$
- $0.25 \times [(100\text{ in} = \text{ \_\_\_\_\_\_ } m) - (230\text{ cm} = \text{ \_\_\_\_\_\_ } ft)] \times [(25\text{ ft} = \text{ \_\_\_\_\_\_ } cm) - (7\text{ ft} = \text{ \_\_\_\_\_\_ } m)] \div 0.5$

**Practice Section D**

In this section, solutions for the practice questions contain commonly-made errors. For each question, circle the error(s) and give a correct solution.

- Convert:  $19\text{ m} = \text{ \_\_\_\_\_\_ } yd$

Solution:

$$19\text{ m} = \text{ \_\_\_\_\_\_ } yd$$

$$19\cancel{m} \times \frac{100\cancel{cm}}{1\cancel{m}} \times \frac{1\cancel{ft}}{2.54\cancel{cm}} \times \frac{1yd}{36\cancel{ft}} = 1.09361\text{ yd} = 1.1\text{ yd}$$

- Convert:  $100\text{ in} = \text{ \_\_\_\_\_\_ } m$

Solution:

$$100\text{ in} = \text{ \_\_\_\_\_\_ } m$$

$$100\cancel{in} \times \frac{1\cancel{cm}}{2.54\cancel{in}} \times \frac{1m}{100\cancel{cm}} = 0.3937\text{ m} = 0.4\text{ m}$$



### Practice Section E

Challenge Question. If you can do this one, then you get an A<sup>+</sup>. 😊

The sum of two numbers is 9 yd.  $\frac{1}{4}$  times one of the two numbers is 2.75 ft.

What is the product of the two numbers, measured in meters?



# SOLUTIONS

## Set R

### Metric & Imperial Conversions



**METRIC & IMPERIAL CONVERSIONS****Practice Section A**

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1. Solution:

$$15 \cancel{cm} \times \frac{1in}{2.54 \cancel{cm}} = \frac{15}{2.54} in = 5.9055 in = 5.9 in$$

2. Solution:

$$1 \cancel{yd} \times \frac{3 \cancel{ft}}{1 \cancel{yd}} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 cm}{1 \cancel{in}} = \frac{3 \times 12 \times 2.54}{1} cm = 91.44 cm = 91.4 cm$$

3. Solution:

$$16 \cancel{mm} \times \frac{1 \cancel{cm}}{10 \cancel{mm}} \times \frac{1in}{2.54 \cancel{cm}} = \frac{16}{10 \times 2.54} in = 0.62992 in = 0.6 in$$

4. Solution:

$$7 \cancel{ft} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1m}{100 \cancel{cm}} = \frac{7 \times 12 \times 2.54}{100} m = 2.1336 m = 2.1 m$$

5. Solution:

$$1 \cancel{in} \times \frac{100 \cancel{cm}}{1 \cancel{in}} \times \frac{1 \cancel{in}}{2.54 \cancel{cm}} \times \frac{1yd}{36 \cancel{in}} = \frac{100}{2.54 \times 36} yd = 1.0936 yd = 1.1 yd$$

6. Solution:

$$21 \cancel{cm} \times \frac{1 \cancel{in}}{2.54 \cancel{cm}} \times \frac{1ft}{12 \cancel{in}} = \frac{21}{2.54 \times 12} ft = 0.6889 ft = 0.7 ft$$

7. Solution:

$$8 \cancel{ft} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1m}{100 \cancel{cm}} = \frac{8 \times 12 \times 2.54}{100} m = 2.4384 m = 2.4 m$$



8. Solution:

$$23 \cancel{in} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} = \frac{23 \times 2.54}{1} \text{ cm} = 58.42 \text{ cm} = 58.4 \text{ cm}$$

9. Solution:

$$60 \cancel{in} \times \frac{100 \cancel{cm}}{1 \cancel{in}} \times \frac{1 \cancel{in}}{2.54 \cancel{cm}} \times \frac{1 \text{ ft}}{12 \cancel{in}} = \frac{60 \times 100}{2.54 \times 12} \text{ ft} = 196.8503 \text{ ft} = 196.9 \text{ ft}$$

10. Solution:

$$9 \cancel{in} \times \frac{100 \cancel{cm}}{1 \cancel{in}} \times \frac{1 \cancel{in}}{2.54 \cancel{cm}} \times \frac{1 \text{ ft}}{12 \cancel{in}} = \frac{9 \times 100}{2.54 \times 12} \text{ ft} = 29.5275 \text{ ft} = 29.5 \text{ ft}$$

11. Solution:

$$27 \cancel{cm} \times \frac{1 \text{ in}}{2.54 \cancel{cm}} = \frac{27}{2.54} \text{ in} = 10.6299 \text{ in} = 10.6 \text{ in}$$

12. Solution:

$$7 \cancel{yd} \times \frac{3 \cancel{ft}}{1 \cancel{yd}} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1 \text{ m}}{100 \cancel{cm}} = \frac{7 \times 3 \times 12 \times 2.54}{100} \text{ m} = 6.4008 \text{ m} = 6.4 \text{ m}$$

13. Solution:

$$7 \cancel{mm} \times \frac{1 \cancel{cm}}{10 \cancel{mm}} \times \frac{1 \text{ in}}{2.54 \cancel{cm}} = \frac{7}{10 \times 2.54} \text{ in} = 0.2755 \text{ in} = 0.3 \text{ in}$$

14. Solution:

$$25 \cancel{ft} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} = \frac{25 \times 12 \times 2.54}{1} \text{ cm} = 762 \text{ cm}$$

15. Solution:

$$19 \cancel{in} \times \frac{100 \cancel{cm}}{1 \cancel{in}} \times \frac{1 \cancel{in}}{2.54 \cancel{cm}} \times \frac{1 \text{ yd}}{36 \cancel{in}} = \frac{19 \times 100}{2.54 \times 36} \text{ yd} = 20.7786 \text{ yd} = 20.8 \text{ yd}$$

**Practice Section B**

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1. Solution:

$$300 \cancel{\text{cm}} \times \frac{1 \text{ in}}{2.54 \cancel{\text{cm}}} = \frac{300}{2.54} \text{ in} = 118.1102 \text{ in} = 118.1 \text{ in}$$

2. Solution:

$$309 \cancel{\text{in}} \times \frac{2.54 \cancel{\text{cm}}}{1 \cancel{\text{in}}} \times \frac{1 \text{ m}}{100 \cancel{\text{cm}}} = \frac{309 \times 2.54}{100} \text{ m} = 7.8486 \text{ m} = 7.8 \text{ m}$$

3. Solution:

$$17 \cancel{\text{mm}} \times \frac{1 \cancel{\text{cm}}}{10 \cancel{\text{mm}}} \times \frac{1 \text{ in}}{2.54 \cancel{\text{cm}}} = \frac{17}{10 \times 2.54} \text{ in} = 0.6692 \text{ in} = 0.7 \text{ in}$$

4. Solution:

$$6 \cancel{\text{ft}} \times \frac{12 \cancel{\text{in}}}{1 \cancel{\text{ft}}} \times \frac{2.54 \cancel{\text{cm}}}{1 \cancel{\text{in}}} \times \frac{10 \text{ mm}}{1 \cancel{\text{cm}}} = \frac{6 \times 12 \times 2.54 \times 10}{1} \text{ mm} = 1828.8 \text{ mm}$$

5. Solution:

$$230 \cancel{\text{cm}} \times \frac{1 \cancel{\text{in}}}{2.54 \cancel{\text{cm}}} \times \frac{1 \text{ ft}}{12 \cancel{\text{in}}} = \frac{230}{2.54 \times 12} \text{ ft} = 7.5459 \text{ ft} = 7.5 \text{ ft}$$

6. Solution:

$$31 \cancel{\text{ft}} \times \frac{12 \cancel{\text{in}}}{1 \cancel{\text{ft}}} \times \frac{2.54 \cancel{\text{cm}}}{1 \cancel{\text{in}}} \times \frac{1 \text{ m}}{100 \cancel{\text{cm}}} = \frac{31 \times 12 \times 2.54}{100} \text{ m} = 9.4488 \text{ m} = 9.4 \text{ m}$$

7. Solution:

$$2000 \cancel{\text{mm}} \times \frac{1 \cancel{\text{cm}}}{10 \cancel{\text{mm}}} \times \frac{1 \cancel{\text{in}}}{2.54 \cancel{\text{cm}}} \times \frac{1 \text{ yd}}{36 \cancel{\text{in}}} = \frac{2000}{10 \times 2.54 \times 36} \text{ yd} = 2.1872 \text{ yd} = 2.2 \text{ yd}$$

8. Solution:

$$22 \cancel{\text{yd}} \times \frac{3 \cancel{\text{ft}}}{1 \cancel{\text{yd}}} \times \frac{12 \cancel{\text{in}}}{1 \cancel{\text{ft}}} \times \frac{2.54 \text{ cm}}{1 \cancel{\text{in}}} = \frac{22 \times 3 \times 12 \times 2.54}{1} \text{ cm} = 2011.68 \text{ cm} = 2011.7 \text{ cm}$$

9. Solution:

$$105 \cancel{\text{in}} \times \frac{100 \cancel{\text{cm}}}{1 \cancel{\text{in}}} \times \frac{1 \cancel{\text{in}}}{2.54 \cancel{\text{cm}}} \times \frac{1 \text{ yd}}{36 \cancel{\text{in}}} = \frac{105 \times 100}{2.54 \times 36} \text{ yd} = 114.8293 \text{ yd} = 114.8 \text{ yd}$$



10. Solution:

$$100 \cancel{in} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1m}{100 \cancel{cm}} = \frac{100 \times 2.54}{100} m = 2.54 m = 2.5 m$$

11. Solution:

$$10050 \cancel{cm} \times \frac{1 \cancel{in}}{2.54 \cancel{cm}} \times \frac{1ft}{12 \cancel{in}} = \frac{10050}{2.54 \times 12} ft = 329.7244 ft = 329.7 ft$$

12. Solution:

$$10.25 \cancel{yd} \times \frac{3 \cancel{ft}}{1 \cancel{yd}} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1m}{100 \cancel{cm}} = \frac{10.25 \times 3 \times 12 \times 2.54}{100} m = 9.3726 m = 9.4 m$$

13. Solution:

$$0.375 \cancel{in} \times \frac{100 \cancel{cm}}{1 \cancel{in}} \times \frac{1in}{2.54 \cancel{cm}} = \frac{0.375 \times 100}{2.54} in = 14.7637 in = 14.8 in$$

14. Solution:

$$9.875 \cancel{in} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} = \frac{9.875 \times 2.54}{1} cm = 25.0825 cm = 25.1 cm$$

15. Solution:

$$9768.875 \cancel{in} \times \frac{100 \cancel{cm}}{1 \cancel{in}} \times \frac{1 \cancel{in}}{2.54 \cancel{cm}} = \frac{1ft}{12 \cancel{in}} = \frac{9768.875 \times 100}{2.54 \times 12} ft = 32050.1148 ft = 32050.1 ft$$

### Practice Section C

1. Solution:

$$\begin{aligned} & (105in = \underline{\hspace{1cm}} m) + (3.4 ft = \underline{\hspace{1cm}} m) \\ & = \left( 105 \cancel{in} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1m}{100 \cancel{cm}} = \underline{\hspace{1cm}} m \right) + \left( 3.4 \cancel{ft} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1 \cancel{in}}{100 \cancel{cm}} = \underline{\hspace{1cm}} m \right) \\ & = 2.667m + 1.03632m \\ & = 3.70332m \\ & = 3.7m \end{aligned}$$



2. Solution:

$$(1.075m = \text{ \_\_\_\_\_\_ } ft) \div (3.5cm = \text{ \_\_\_\_\_\_ } ft)$$

$$1.075 \cancel{m} \times \frac{100 \cancel{cm}}{1 \cancel{m}} \times \frac{1 \cancel{ft}}{2.54 \cancel{cm}} \times \frac{1 ft}{12 \cancel{in}} = 3.5269 ft$$

$$3.5 \cancel{cm} \times \frac{1 \cancel{ft}}{2.54 \cancel{cm}} \times \frac{1 ft}{12 \cancel{in}} = 0.1148 ft$$

$$3.5269 ft \div 0.1148 ft = 30.7221 ft = 30.7 ft$$

3. Solution:

$$45\% \times (4700in = \text{ \_\_\_\_\_\_ } cm) + \frac{1}{4} \times (3.4 ft = \text{ \_\_\_\_\_\_ } cm)$$

$$= 45\% \times \left( 4700 \cancel{in} \times \frac{2.54 cm}{1 \cancel{in}} = \text{ \_\_\_\_\_\_ } cm \right) + \frac{1}{4} \times \left( 3.4 \cancel{ft} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 cm}{1 \cancel{in}} = \text{ \_\_\_\_\_\_ } cm \right)$$

$$= 45\% \times (11938cm) + \frac{1}{4} \times (103.632cm)$$

$$= 5372.1 cm + 25.908 cm$$

$$= 5398.008 cm$$

$$= 5398.0 cm$$

4. Solution:

$$(0.375 yd = \text{ \_\_\_\_\_\_ } mm) \times 1500\% + (3.4in = \text{ \_\_\_\_\_\_ } mm)$$

$$= \left( 0.375 \cancel{yd} \times \frac{3 \cancel{ft}}{1 \cancel{yd}} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{10 mm}{1 \cancel{cm}} = \text{ \_\_\_\_\_\_ } mm \right) \times 1500\% + \left( 3.4 \cancel{in} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{10 mm}{1 \cancel{cm}} = \text{ \_\_\_\_\_\_ } mm \right)$$

$$= 342.9 mm \times 1500\% + 86.36 mm$$

$$= 342.9 mm \times 15 + 86.36 mm$$

$$= 5143.5 mm + 86.36 mm$$

$$= 5229.86 mm$$

$$= 5229.9 mm$$



5. Solution:

$$\begin{aligned}
 & 0.25 \times [(100in = \text{--- } m) - (230cm = \text{--- } ft)] \times [(25ft = \text{--- } cm) - (7ft = \text{--- } m)] \div 0.5 \\
 & = 0.25 \times \left[ \left( 100 \cancel{in} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1m}{100 \cancel{cm}} = \text{--- } m \right) - \left( 230 \cancel{cm} \times \frac{1 \cancel{in}}{2.54 \cancel{cm}} \times \frac{1ft}{12 \cancel{in}} = \text{--- } ft \right) \right] \\
 & \times \left[ \left( 25 \cancel{ft} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54cm}{1 \cancel{in}} = \text{--- } cm \right) - \left( 7 \cancel{ft} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1m}{100 \cancel{cm}} = \text{--- } m \right) \right] \div 0.5 \\
 & = 0.25 \times \left[ 2.54m - 7.5459 \cancel{ft} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1m}{100 \cancel{cm}} \right] \times \left[ 762 \cancel{cm} \times \frac{1m}{100 \cancel{cm}} - 2.1336m \right] \div 0.5 \\
 & = 0.25 \times [2.54m - 2.2999m] \times [7.62m - 2.1336m] \div 0.5 \\
 & = 0.25 \times 0.2401m \times 5.4864m \div 0.5 \\
 & = 0.060025m \times 10.9728m \\
 & = 0.6586m \\
 & = 0.7m
 \end{aligned}$$

### Practice Section D

1. Solution:

The only error in this question is the fact that the 19 m was left out of the mathematical calculation.

The correct solution is:

$$\begin{aligned}
 19m & = \text{--- } yd \\
 19 \cancel{m} \times \frac{100 \cancel{cm}}{1 \cancel{in}} \times \frac{1 \cancel{in}}{2.54 \cancel{cm}} \times \frac{1yd}{36 \cancel{in}} & = \frac{19 \times 100}{2.54 \times 36} yd = 20.7786yd = 20.8yd
 \end{aligned}$$

2. Solution:

The conversion of inches into cm should be  $\frac{2.54cm}{1in}$  instead of  $\frac{1cm}{2.54in}$ .

The correct solution is:

$$\begin{aligned}
 100in & = \text{--- } m \\
 100 \cancel{in} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1m}{100 \cancel{cm}} & = 2.54m = 2.5m
 \end{aligned}$$



## Practice Section E

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Solution:

$$9 \cancel{yd} \times \frac{3 \cancel{ft}}{1 \cancel{yd}} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1m}{100 \cancel{cm}} = 8.2296m$$

If the numbers add (sum) to 9 and the first is 'x', the second is '9-x'.

$$2.75 \cancel{ft} \times \frac{12 \cancel{in}}{1 \cancel{ft}} \times \frac{2.54 \cancel{cm}}{1 \cancel{in}} \times \frac{1m}{100 \cancel{cm}} = 0.8382m$$

Now we take  $\frac{1}{4} \times \text{number} = 0.8382m$  so one number is  $4 \times 0.8382 = 3.3528m$ .

The two numbers are  $3.3528m$  and  $8.2296 - 3.3528 = 4.8768m$ .

The product of  $(3.3528m)(4.8768m) = 16.3509m^2 = 16.4m^2$ .

Notice the units are 'squared' because when you multiply  $m \times m = m^2$ .