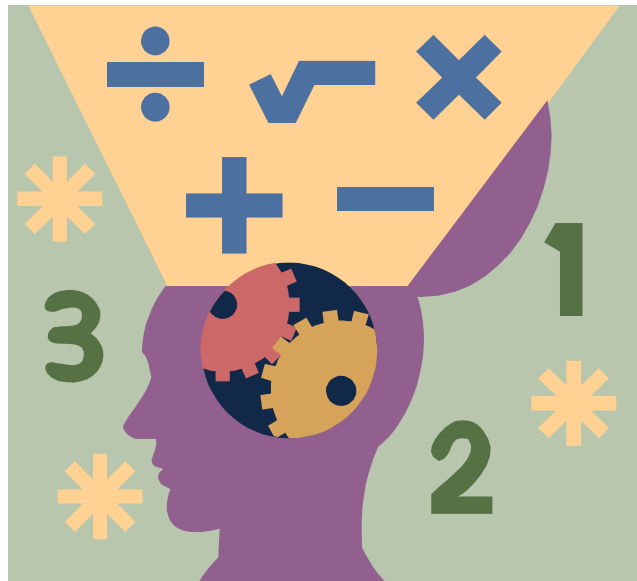


# Math Review – Part A

## Fundamental Level

(Up to the end of MAT 029)



***Calculators or the calculator function on another device SHOULD NOT BE USED as they will not be allowed on the actual test.***

*Updated May 2012*



## **Important information about the Math Review Book:**

This review booklet has been prepared so that you can refresh your math skills before writing the math assessment.

This review booklet is simply a refresher and is not meant to teach new material. Do what you can. If you get stumped and can't go any further, that's the time to stop and make an appointment at the college for your math assessment. Once you've completed the assessment, we will place you in the right course for your skill level.

Read all of the information in the sections you are working on. If we've included it, it's important! Do the exercises, and then check your answers.

**Answers for all of the exercises are at the back of the book.**

## TIMES TABLES

It is so very important to know your times tables. If you don't know all of them off by heart, now is the time to review and learn them!

Times Table Chart

×	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

Start with the ones you know and slowly add the more difficult ones. Practice daily and weekly. You need to practice them often in order to put this information into your long-term memory.

For extra practice materials with the times tables, you can try the website listed below. Just keep in mind that some websites do not stay up on the Internet forever.

<http://www.mathsisfun.com/numbers/math-trainer-multiply.html>

# Place Value

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Each part or place in a number has a value. These parts of each number are called **place value**. It is important to understand how numbers are made up.

**Numbers are made up of groups of ones, tens, hundreds, thousands, ten thousands, and so on.**

The number **9** is made up of **9 groups of one**.

The number **19** is made up of **one group of ten** and **nine groups of one**.

The number **349** is made up of **3 groups of a hundred**, **4 groups of ten**, and **9 groups of one**.

**Write the place value groups for the following numbers.**

1. 78 = \_\_\_\_ groups of ten and \_\_\_\_ groups of one

2. 465 = \_\_\_\_ groups of a hundred, \_\_\_\_ groups of ten and \_\_\_\_ groups of one

3. 2703 = \_\_\_\_ groups of a thousand, \_\_\_\_ groups of a hundred, \_\_\_\_ groups of ten,  
and \_\_\_\_ groups of one.

# Rounding Numbers

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It is easier to work with larger numbers if we can **round them** first. **The general rule for rounding is that if a number is at the halfway mark or above in one of the place value groups, then you round up to the next group of ten, hundred, thousand, etc.**

First example, 15 would be rounded up to 20 because 15 is exactly halfway between 10 and 20. 14 would be rounded down to 10 as it is closer to 10 than it is to 20.

If rounding to the nearest hundred, 247 would be rounded down to 200 as it is closer to 200 than it is to 300. 252 would be rounded up to 300 because 250 is the halfway mark between 200 and 300, and 252 is larger than 250.

**Round the following numbers to the nearest ten.**

4.    68    \_\_\_\_\_            581    \_\_\_\_\_            6    \_\_\_\_\_            2703    \_\_\_\_\_

**Now round to the nearest hundred.**

5.    178    \_\_\_\_\_            843    \_\_\_\_\_            4821    \_\_\_\_\_

We can use rounding to make numbers easier to work with. It is also a helpful skill to use when estimating answers.

# Estimation

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**Estimating answers is a skill that is very important in math.** You can use estimation to get a rough idea of what an answer will be. You don't always have to round off to the nearest ten or the nearest hundred. When estimating, you can also round off to numbers that end in 5 so that you can work with them more easily.

If you are shopping, you can use estimation to figure out roughly what you have spent on your items. **Just round off the numbers before you estimate, and then add them.**

Scarf	\$28	<b>estimate \$30</b>
Shoes	\$42	<b>estimate \$40</b>
Socks	\$14	<b>estimate \$15</b>
Actual	\$84	<b>estimated \$85</b>

When you are solving word problems or working with a calculator, you should **estimate your answer first** so you can tell if your answer is reasonable!

**Estimate the following answers by rounding them off first.**

6. 
$$\begin{array}{r} 11 \\ + 8 \\ \hline \end{array}$$

7. 
$$\begin{array}{r} 278 \\ - 160 \\ \hline \end{array}$$

8. 
$$\begin{array}{r} 5237 \\ + 3899 \\ \hline \end{array}$$

9.  $\$8.99 + \$24.99 + \$32.49 + 12.98 =$

## Greater than, less than, and equal to

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There are some symbols that we use in math when we want to say that some numbers might be bigger or smaller or exactly the same as other numbers.

**>** means **greater than**

For example, **65 > 49** (65 is greater than 49)

**<** means **less than**

For example, **12 < 19** (12 is less than 19)

**=** means **equal to**

For example, **858 = 858** (they are exactly the same numbers)

**State if the following are >, <, or =**

10. a) 12 \_\_\_ 9                      b) 47 \_\_\_ 62                      c) 27 \_\_\_ 49

d) 8401 \_\_\_ 7456                      e) 29 \_\_\_ 29                      f) 256 \_\_\_ 265

g) 583 \_\_\_ 583                      h) 7320 \_\_\_ 7230



# Whole Numbers

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## Add.

$$\begin{array}{r} 11. \quad 9 \\ + 6 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad 16 \\ + 24 \\ \hline \end{array}$$

$$\begin{array}{r} 13. \quad 183 \\ + 275 \\ \hline \end{array}$$

$$\begin{array}{r} 14. \quad 6\,230 \\ + 2\,148 \\ \hline \end{array}$$

15. a)  $4 + 3 + 2 + 8 =$

b)  $\begin{array}{r} 6 \text{ hours, } 24 \text{ minutes, } 12 \text{ seconds} \\ + 2 \text{ hours, } 52 \text{ minutes, } 30 \text{ seconds} \\ \hline \end{array}$

## Subtract.

$$\begin{array}{r} 16. \quad 9 \\ - 2 \\ \hline \end{array}$$

$$\begin{array}{r} 17. \quad 13 \\ - 7 \\ \hline \end{array}$$

$$\begin{array}{r} 18. \quad 54 \\ - 23 \\ \hline \end{array}$$

$$\begin{array}{r} 19. \quad 423 \\ - 187 \\ \hline \end{array}$$

20. a)  $\begin{array}{r} 5\,000 \\ - 1\,421 \\ \hline \end{array}$

b)  $\begin{array}{r} 10 \text{ hours, } 33 \text{ minutes, } 49 \text{ seconds} \\ - 2 \text{ hours, } 52 \text{ minutes, } 30 \text{ seconds} \\ \hline \end{array}$

## Multiply.

$$\begin{array}{r} 21. \quad 3 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} 22. \quad 9 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 23. \quad 42 \\ \times 12 \\ \hline \end{array}$$

$$\begin{array}{r} 24. \quad 18 \\ \times 20 \\ \hline \end{array}$$

$$\begin{array}{r} 25. \quad 316 \\ \times 104 \\ \hline \end{array}$$

$$\begin{array}{r} 26. \quad 8\,231 \\ \times 132 \\ \hline \end{array}$$

**Divide.**

27.  $3 \overline{)24}$

28.  $8 \overline{)584}$

29.  $9 \overline{)774}$

30.  $52 \overline{)4836}$

31.  $40 \div 8$

32.  $663 \div 3$

33.  $3960 \div 8$

34.  $7218 \div 9$

35.  $3612 \div 42$

**Word problems involving whole numbers.**

36. Mary earned \$212 one week, \$302 the next week, and \$178 the third week. What were her total earnings?
  
  
  
  
  
  
  
  
  
  
37. Jack downloaded 27 iTunes songs in November and 73 songs in December. How many more songs did he download in December?
  
  
  
  
  
  
  
  
  
  
38. Jane earned \$950 per month at her part time job. How much did she earn in 7 months?
  
  
  
  
  
  
  
  
  
  
39. How many 2 kg boxes can be filled from 178 kg of sugar?
  
  
  
  
  
  
  
  
  
  
40. Jim drives at an average speed of 75 km per hour. How long will it take him to drive 450 km at this speed?

# Fractions

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## REVIEW

A fraction is a number which consists of two parts, a numerator (top) over a denominator (bottom).

**Example:**  $\frac{2}{3}$   $\frac{\text{numerator}}{\text{denominator}}$

**Fractions must always be reduced to their lowest terms in final answers.** Lowest terms means the lowest numerator and denominator. Fractions are reduced to their lowest terms by dividing by a number that is in both the numerator and the denominator.

**Example:**  $\frac{12}{16}$  Both the 12 and the 16 can be divided by 4.

So  $\frac{12}{16} = \frac{3}{4}$  (lowest terms)

If the numerator is larger than the denominator, then the number is an **improper** fraction.

**Example:**  $\frac{6}{5}$

Improper fractions can be written as a **mixed number** which is part whole number, and part fraction.

**Example:**  $\frac{6}{5}$  (improper fraction) =  $1\frac{1}{5}$  (mixed number)

Mixed numbers can be written as **improper fractions**.

**Example:**  $4\frac{2}{3}$  (mixed number) =  $\frac{14}{3}$  (improper fraction)

**Simplify the following fractions (reduce to lowest terms).**

41.  $\frac{9}{12}$

42.  $\frac{8}{12}$

43.  $\frac{6}{8}$

44.  $\frac{15}{30}$

45.  $\frac{20}{25}$

46.  $\frac{14}{21}$

47.  $\frac{8}{18}$

48.  $\frac{24}{36}$

49.  $\frac{66}{99}$

50.  $\frac{18}{30}$

**Change the following to mixed numbers.**

51.  $\frac{7}{5}$

52.  $\frac{18}{11}$

53.  $\frac{70}{61}$

54.  $\frac{12}{5}$

55.  $\frac{100}{99}$

56.  $\frac{25}{2}$

**Change the following to improper fractions.**

57.  $2\frac{1}{5}$

58.  $6\frac{3}{8}$

59.  $8\frac{2}{3}$

60.  $11\frac{1}{5}$

61.  $9\frac{4}{5}$

62.  $4\frac{3}{4}$

**Simplify the following fractions (reduce to lowest terms).**

63.  $\frac{28}{40}$

64.  $\frac{80}{10}$

65.  $2\frac{12}{18}$

66.  $5\frac{27}{54}$

67.  $\frac{25}{15}$

68.  $\frac{90}{12}$

## ADDING OR SUBTRACTING WITH FRACTIONS

In order to add or subtract, fractions must have a common denominator. This is not required for multiplication or division of fractions.

### Examples of Adding

When you have the **same denominator**, you just add the numerators.

$$\frac{1}{4} + \frac{2}{4} = \frac{3}{4} \quad \text{or} \quad \begin{array}{r} \frac{1}{4} \\ + \frac{2}{4} \\ \hline \frac{3}{4} \end{array}$$

When you have **different denominators**, you have to make the denominators the same before you can add the numerators.

$$\frac{2}{4} + \frac{5}{8} = \frac{4}{8} + \frac{5}{8} = \frac{9}{8} = 1\frac{1}{8} \quad \text{or} \quad \begin{array}{r} \frac{2}{4} = \frac{4}{8} \\ + \frac{5}{8} = \frac{5}{8} \\ \hline \frac{9}{8} = 1\frac{1}{8} \end{array}$$

*Note that  $\frac{2}{4}$  was changed to  $\frac{4}{8}$  before the fractions could be added, by multiplying the numerator and denominator by the same number – in this case it was 2.*

With **mixed numbers** where denominators had to be changed.

$$2\frac{1}{2} + 3\frac{4}{5} = 2\frac{5}{10} + 3\frac{8}{10} = 5\frac{13}{10} = 6\frac{3}{10} \quad \text{or} \quad \begin{array}{r} 2\frac{1}{2} = 2\frac{5}{10} \\ + 3\frac{4}{5} = 3\frac{8}{10} \\ \hline 5\frac{13}{10} = 6\frac{3}{10} \end{array}$$

## Examples of Subtracting

When you have the **same denominator**, you just subtract the numerators.

$$\frac{4}{5} - \frac{1}{5} = \frac{3}{5} \quad \text{or} \quad \begin{array}{r} \frac{4}{5} \\ -\frac{1}{5} \\ \hline \frac{3}{5} \end{array}$$

When you have **different denominators**, you have to make the denominators the same before you subtract the numerators.

$$\frac{7}{8} - \frac{3}{4} = \frac{7}{8} - \frac{6}{8} = \frac{1}{8} \quad \text{or} \quad \begin{array}{r} \frac{7}{8} = \frac{7}{8} \\ -\frac{3}{4} = \frac{6}{8} \\ \hline \frac{1}{8} \end{array}$$

When you have **mixed numbers**, the denominators will need to be changed if they are not the same, and sometimes you have to borrow from the whole number before subtracting.

$$2\frac{2}{3} - 1\frac{1}{4} = 2\frac{8}{12} - 1\frac{3}{12} = 1\frac{5}{12} \quad \text{or} \quad \begin{array}{r} 2\frac{2}{3} = 2\frac{8}{12} \\ -1\frac{1}{4} = 1\frac{3}{12} \\ \hline 1\frac{5}{12} \end{array}$$

When you need to borrow, you **must borrow** from the whole number.

For example, in the fraction  $8\frac{2}{4}$ , 8 becomes  $7\frac{4}{4}$  then we add  $\frac{2}{4}$  to make  $7\frac{6}{4}$

$$8\frac{1}{2} - 2\frac{3}{4} = 8\frac{2}{4} - 2\frac{3}{4} = 7\frac{6}{4} - 2\frac{3}{4} = 5\frac{3}{4} \quad \text{or} \quad \begin{array}{r} 8\frac{1}{2} = 8\frac{2}{4} = 7\frac{6}{4} \\ -2\frac{3}{4} = 2\frac{3}{4} \\ \hline 5\frac{3}{4} \end{array}$$



## MULTIPLYING OR DIVIDING WITH FRACTIONS

You do not need to have a common denominator when multiplying or dividing fractions.

### Examples of Multiplying

$$\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$$

When multiplying **mixed numbers** you must change the fractions to improper fractions.

$$1\frac{1}{2} \times 2\frac{3}{4} = \frac{3}{2} \times \frac{11}{4} = \frac{33}{8} = 4\frac{1}{8}$$

*Note that when multiplying fractions, numbers can sometimes be cancelled or reduced first. This keeps the numbers small and easier to work with.*

$$\frac{\cancel{4}^2}{\cancel{8}^1} \times \frac{\cancel{10}^2}{\cancel{2}^1} = \frac{2 \times 2}{1 \times 1} = \frac{4}{1} = 4$$

### Examples of Dividing

*Note that when dividing fractions, invert (flip) the second fraction and then multiply.*

$$\frac{4}{7} \div \frac{2}{3} = \frac{4}{7} \times \frac{3}{2} = \frac{12}{14} = \frac{6}{7}$$

When dividing **mixed numbers**, change mixed numbers to improper fractions first. Then invert (flip) the second fraction and multiply.

$$4\frac{3}{5} \div 2\frac{1}{2} = \frac{23}{5} \div \frac{5}{2} = \frac{23}{5} \times \frac{2}{5} = \frac{46}{25} = 1\frac{21}{25}$$

**Add the following.**

69.  $\frac{1}{5} + \frac{2}{5}$

70.  $\frac{4}{5} + \frac{3}{5}$

71.  $\frac{2}{3} + \frac{1}{9}$

72.  $\frac{1}{2} + \frac{3}{8}$

73.  $3\frac{1}{2} + 4\frac{1}{4}$

74.  $9\frac{2}{3} + 3\frac{1}{6}$

**Subtract the following.**

75.  $\frac{9}{12} - \frac{1}{8}$

76.  $9\frac{2}{3} - 6\frac{1}{6}$

77.  $4\frac{1}{2} - 1\frac{1}{4}$

78.  $\frac{3}{4} - \frac{5}{8}$

79.  $6\frac{1}{3} - 2\frac{2}{3}$

80.  $16\frac{2}{3} - 5\frac{3}{4}$

**Multiply the following.**

81.  $\frac{2}{3} \times \frac{3}{4}$

82.  $\frac{5}{3} \times \frac{9}{15}$

83.  $2\frac{4}{5} \times 3\frac{4}{7}$

84.  $2\frac{5}{12} \times 6$

**Divide the following. (Don't forget to invert (flip) the second fraction.)**

85.  $\frac{3}{5} \div \frac{9}{15}$

86.  $\frac{3}{7} \div \frac{12}{5}$

87.  $\frac{27}{30} \div 8\frac{1}{3}$

88.  $4\frac{2}{3} \div 3\frac{1}{2}$

**Word problems involving fractions.**

89. Tom usually takes  $\frac{3}{4}$  of an hour to drive to work. One day, due to flooding of the road, it took him  $1\frac{1}{2}$  hours longer. How long did the journey take him that day?

90. Mary and John want to save \$7 000 for a down payment on a house. So far they have saved  $\frac{4}{5}$  of what they need. How much have they saved?

91. A recipe calls for  $\frac{2}{3}$  kg of sugar. How many times can Bill use the recipe before he uses 6 kg of sugar?

# Decimals

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## REVIEW

The decimal system is another way of expressing a part of a whole number. Decimals can be written as fractions with denominators of 10 or 100 or 1,000 etc. In a decimal, the number of decimal places refers to how many zeros will be in the denominator of the equivalent fraction.

The **first** decimal place refers to **tenths**.  $2.3 = 2\frac{3}{10}$

The **second** decimal place refers to **hundredths**.  $2.31 = 2\frac{31}{100}$

The **third** decimal place refers to **thousandths**.  $2.319 = 2\frac{319}{1000}$

*Note that the number 2.319 is read as “two and three hundred nineteen thousandths” or “two point three one nine”.*

The most common usage of decimals is in our monetary system where 100 cents (2 decimal places) make up one dollar.

For example, \$2.41 is really two dollars and forty-one hundredths  $\left(\frac{41}{100}\right)$  of a dollar.

## Examples:

Change 2.30 to a fraction.  $2.30 = 2\frac{30}{100} = 2\frac{3}{10}$

*Note that 2.30 is the same as 2.3  
In fact,  $2.3 = 2.300 = 2.3000$ , etc.*

Change 0.791 to a fraction.  $0.791 = \frac{791}{1000}$

*Note that  $0.791 = .791$ . The zero in front of the decimal place is not needed but is usually written with numbers of less than 1 to draw attention to the decimal point.*

Change 0.003 to a fraction.  $0.003 = \frac{3}{1000}$

*Notice that the zeros **after** the decimal point and **before** the number are important because they indicate whether a number is being expressed in hundredths or thousandths, or ten-thousandths, etc.*

Simplify 0.0024000  $0.0024\cancel{000} = 0.0024$

*Notice that the zeros at the end (to the right) are not needed.*

## USING DECIMALS

### Addition or Subtraction

Place numbers so that the decimal points line up vertically.

#### Examples:

$$21.43 + 8.1 + 120.235 \quad \text{is written as} \quad \begin{array}{r} 21.43 \\ 8.1 \\ +120.235 \\ \hline 149.765 \end{array}$$

$$234.06 - 128.7 \quad \text{is written as} \quad \begin{array}{r} 234.06 \\ -128.7 \\ \hline 105.36 \end{array}$$

## Multiplication

Ignore the decimals and multiply the numbers. Then count the decimal places in **both** numbers. That is the number of decimal places in your answer.

$$\begin{array}{r} 2.12 \quad (2 \text{ places}) \\ \times 4.2 \quad (1 \text{ place}) \\ \hline 424 \\ 8480 \\ \hline 8.904 \quad (3 \text{ places}) \end{array}$$

$2.12 \times 4.2$  is written as

## Division

The divisor must be a whole number or converted to a whole number.

If the divisor is a whole number:

$$232.2 \div 12 \quad \text{is written as} \quad 12 \overline{)232.2}$$

$$\begin{array}{r} 19.35 \\ 12 \overline{)232.20} \\ \underline{12} \phantom{0} \\ 112 \phantom{0} \\ \underline{108} \phantom{0} \\ 42 \phantom{0} \\ \underline{36} \phantom{0} \\ 60 \phantom{0} \\ \underline{60} \\ 0 \end{array}$$

*Add a zero to continue dividing.*

If the divisor is **not** a whole number:

$$51 \div 0.003 \quad \text{is written as} \quad 0.003 \overline{)51.000}$$

In order to make this divisor a whole number, move the decimal point 3 places to the right on **both** numbers.

$$\begin{array}{r} 17000. \\ 3 \overline{)51000.} \\ \underline{3} \phantom{000} \\ 21 \phantom{00} \\ \underline{21} \phantom{0} \\ 0 \end{array}$$

$0.003 \overline{)51.000.}$   
vvv      vvv

**Add.**

$$\begin{array}{r} 92. \quad 18.4 \\ \quad 13.7 \\ \quad + 16.3 \\ \hline \end{array}$$

$$\begin{array}{r} 93. \quad 21.45 \\ \quad \quad 8.2 \\ \quad + 9.214 \\ \hline \end{array}$$

$$\begin{array}{r} 94. \quad 145.8 \\ \quad \quad 27.21 \\ \quad + 16.4 \\ \hline \end{array}$$

95.  $18.2 + 137.81 + 23.45 =$

96.  $128.75 + 13 + 200.8 + 175.26 =$

**Subtract.**

$$\begin{array}{r} 97. \quad 15.85 \\ \quad - 12.37 \\ \hline \end{array}$$

$$\begin{array}{r} 98. \quad 814.14 \\ \quad - 25.85 \\ \hline \end{array}$$

$$\begin{array}{r} 99. \quad 2000 \\ \quad - 1428.7 \\ \hline \end{array}$$

100.  $250.8 - 12.74 =$

101.  $3500 - 497.18 =$

**Multiply.** (Remember to count the decimal points and move the decimal point from the end of the number to the left.)

102.  $41.2 \times 5 =$

103.  $394.12 \times 2.1 =$

104.  $512.1 \times 16.02 =$

105.  $81.75 \times 3.2 =$

**Divide.** (Remember the divisor must be a whole number, so if the divisor is a decimal, move the decimal point in both numbers.)

106.  $24.8 \div 8 =$

107.  $16.2 \div 0.02 =$

108.  $18.8 \div 0.8 =$

109.  $129.03 \div 2.3 =$



**Word problems involving decimals.**

110. The average life expectancy for men is 68.1 years and for women is 75.4 years. By how many years do women outlive men on average?
111. Mark drives 12 miles to work. One mile equals 1.6 kilometres. Find the distance Mark drives to work in kilometres.
112. A 3.75 kg bag of potatoes costs \$7.50 at the grocery store. What is the price per kg for the potatoes?

# Percentage

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## REVIEW

A percentage is another way of expressing a number as a fraction whose denominator is 100.

For example, 28% means  $\frac{28}{100}$

A percent means a part of 100. If you get 95% on a test, your mark was 95 out of 100.

*Fractions, decimals and percentages can be interchanged.*

## CHANGING PERCENTAGE TO FRACTIONS

Change a percentage to a fraction by simply dividing the percentage number by 100.

$$93\% = \frac{93}{100}$$

Put the % number over 100 and reduce if necessary.

$$50\% = \frac{50}{100} = \frac{1}{2}$$

$$24\% = \frac{24}{100} = \frac{6}{25}$$

If a decimal appears in the fraction, multiply the fraction by 10 or 100 or 1000, etc. to produce an equivalent fraction without decimals.

$$26.3\% = \frac{26.3 \times 10}{100 \times 10} = \frac{263}{1000}$$

$$5.55\% = \frac{5.55 \times 100}{100 \times 100} = \frac{555}{10000} = \frac{11}{2000}$$

## CHANGING PERCENTAGE TO DECIMALS

Change a percentage to a decimal by simply dividing the percentage number by 100. This is the same as moving the decimal point 2 places to the **left**.

$$50\% = .50 \text{ or } 0.5$$

$$9.23\% = 0.0923$$

$$4\% = 0.04$$

$$148\% = 1.48$$

## CHANGING FRACTIONS TO PERCENT

If you get 17 out of 20 for a test, it is convenient to change this mark to a percentage.

This means changing  $\frac{17}{20}$  to an equivalent fraction with 100 as the denominator.

That is,  $\frac{17}{20} = \frac{?}{100}$

To change fractions to % simply multiply the fraction by 100%.

$$\frac{17}{20} = \frac{17}{20} \times 100\% = \frac{1700}{20} = 85\%$$

$$\frac{1}{2} = \frac{1}{2} \times 100\% = \frac{100}{2} = 50\%$$

$$\frac{2}{3} = \frac{2}{3} \times 100\% = \frac{200}{3} = 66.6\% \text{ or } 66\frac{2}{3}\%$$

$$\frac{19}{40} = \frac{19}{40} \times 100\% = \frac{1900}{40} = 47.5\% \text{ or } 47\frac{1}{2}\%$$

The **mathematical wording** for changing the fraction  $\frac{17}{20}$  to a percent would normally be:

17 is what % of 20? **OR** What % is 17 of 20?

More examples:

19 is what % of 75?  $\frac{19}{75} = \frac{19}{75} \times 100\% = 25\frac{1}{3}\%$

What % is 7 of 5?  $\frac{7}{5} = \frac{7}{5} \times 100\% = 140\%$

## CHANGING DECIMALS TO PERCENTS

To change decimals to percents simply multiply by 100%. This is the same as moving the decimal point two places to the **right**.

$$0.29 = .29 \times 100\% = 29\%$$

$$0.156 = .156 \times 100\% = 15.6\%$$

$$1.3 = 1.3 \times 100\% = 130\%$$

Complete the table. The first row is done as an example.

	Percentage	Fraction	Decimal
113.	10%	$\frac{1}{10}$	0.1
114.		$\frac{1}{4}$	
115.			0.45
116.	0.25%		
117.	120%		
118.			0.14
119.		$\frac{7}{9}$	
120.	$5\frac{1}{2}\%$		
121.			2.5

## REVIEW

$$\frac{\%}{100} = \frac{\text{part}}{\text{whole}} \text{ or } \frac{\text{is}}{\text{of}}$$

We can work with percents in three different ways:

### 1) Finding the Percentage

What % of 40 is 20?  $\frac{n}{100} = \frac{20}{40} \quad n = 50\%$

or

What % is 20 of 40?  $\frac{n}{100} = \frac{20}{40} \quad n = 50\%$

### 2) Finding the Part

50% of 40 is what number?  $\frac{50}{100} = \frac{n}{40} \quad n = 20$

### 3) Finding the Total

50% of what number is 20?  $\frac{50}{100} = \frac{20}{n} \quad n = 40$

or

20 is 50% of what number?  $\frac{50}{100} = \frac{20}{n} \quad n = 40$

**Find the percentage.**

122. What % is 72 of 18?

123. 16 is what % of 80?

124. What % of 30 is 18.5?

**Find the part.**

125. 40% of 18 is what number?

126. What number is 16.5% of 30.2?

127. 65% of 15 is what?

**Find the total.**

128. 40% of what number is 12?

129. 18 is 55% of what number?

130. 120 is 150% of what number?

**Answer the following.**

131. What % of 25 is 5?
132. 70% of 15 is what number?
133. 85 is 20% of what number?
134. 90 is what % of 55?
135. 30% of what number is 80?
136. What number is 42% of 50?

**Word problems involving percentage.**

137. Betty bought a \$18.24 compact disk. If the provincial sales tax was 7%, how much did she pay for the disk?
138. The regular price for a watch on sale for \$52 was \$70. What is the percent savings?





## PROPORTION – REVIEW

A proportion is formed when two ratios are equal.

$\frac{2}{3} = \frac{8}{12}$  is a proportion because they are equal.

Missing quantities in a proportion can be calculated using cross multiplication.

$$\frac{n}{12} = \frac{3}{18} \quad \frac{n}{12} \begin{array}{l} \nearrow \\ \searrow \end{array} \begin{array}{l} 3 \\ 18 \end{array}$$

Cross multiply

$$18 \times n = 3 \times 12$$

$$n = \frac{36}{18}$$

$$n = 2$$

Find the missing quantity in each.

142.  $\frac{n}{10} = \frac{8}{15}$      $n =$

143.  $\frac{2}{3} = \frac{8}{n}$      $n =$

144.  $\frac{6}{n} = \frac{24}{18}$      $n =$

145. To get a specific shade of orange paint you need to mix 3 parts yellow paint to 2 parts red. How many litres of yellow would have to be mixed with 5.5 litres of red?

# The Metric System

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## REVIEW

Table 1. Chart of metric prefixes and place value.

	← Larger Units			Base Unit	Smaller Units →		
Metric Prefixes	kilo k	hector h	deca da	m (metre) g (gram) L (litre)	deci d	centi c	milli m
Place Value Decimal	1 000	100	10	1	0.1	0.01	0.001
Place Value Fraction	1 000	100	10		1/10	1/100	1/1 000

The metric prefixes may be used with any base unit – metres (m), grams (g), and litres (L), i.e. hectometre, hectogram, hectolitre.

## Converting within the Metric System using the Chart

**Example:** A cigar weighs 12 grams (g). Convert this amount to milligrams (mg).

1. If there is no decimal point in the known amount, place a “.” after the amount. 12 g = 12. g
2. Locate the prefix of the known amount. If no prefix is given, find the base unit (gram in the example) in the centre of the chart.
3. Find the prefix that you are changing to (milligram in this example). It is to the right of gram. Count the number of bars ( | ) between gram and milli. You cross three bars to move three places to the right.
4. Move the decimal point the same number of places in the same direction as you moved on the chart. Add zeros as needed. 12. g = 12000. mg, so the cigar is 12 000 mg in weight.

On the chart, every time you cross over a bar ( | ), the factor is 10.

If you cross a bar going from the left to the right (larger to smaller), multiply by 10. Crossing 3 bars is the same as multiplying by 1 000 ( $10 \times 10 \times 10$ ).

If you cross a bar going from the right to the left (smaller to larger), divide by 10. Crossing 3 bars is the same as dividing by 1 000 ( $10 \times 10 \times 10$ ).

Table 2. Common metric units.

Unit	Symbol	What is Measured
metre	m	length
litre	L	capacity (volume)
gram	g	mass (weight)
second	s	time
degree Celsius	°C	temperature

**Complete the following metric conversions.**

146. 42 cm to metres \_\_\_\_\_

147. 2.86 m to centimetres \_\_\_\_\_

148. 33 kg to centigrams \_\_\_\_\_

149. 8 L to millilitres \_\_\_\_\_

150. 78 mm to centimetres \_\_\_\_\_

**Write the metric prefix for.**

151. ten \_\_\_\_\_

152. one thousandth \_\_\_\_\_

153. one hundredth \_\_\_\_\_

**Measure the line segment below.**



154. to the nearest centimetre

\_\_\_\_\_

155. to the nearest millimetre

\_\_\_\_\_

**Complete these conversions.**

156. 2 metres to centimetres

\_\_\_\_\_

157. 2 metres to millimetres

\_\_\_\_\_

158. 400 mm to metres

\_\_\_\_\_

159. 2386 m to kilometres

\_\_\_\_\_

160. 5.4 cm to mm

\_\_\_\_\_

161. 0.6 km to m

\_\_\_\_\_

162. 3.21 m to cm

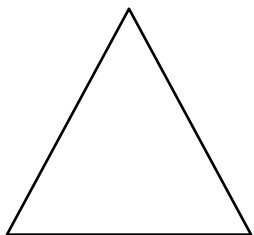
\_\_\_\_\_

# Fundamental Level Geometry

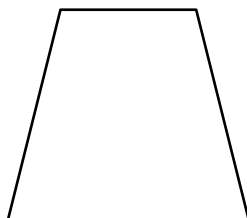
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## REVIEW

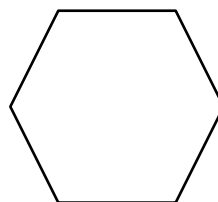
A **polygon** is a closed geometric figure with at least three sides, in which each side is a straight line segment. You should be familiar with the polygons below. They are named according to the number of sides and interior angles that they have.



Triangle (3)



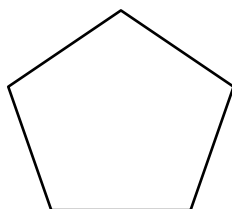
Quadrilateral (4)



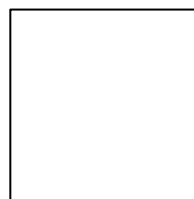
Hexagon (6)



Rectangle (4)



Pentagon (5)



Square (4 equal)

## FINDING THE PERIMETER OF A POLYGON

$P$  stands for **perimeter**, the sum of the lengths of the sides.

$l$  stands for *length*

$w$  stands for *width*

$s$  stands for *side*

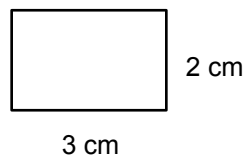
**Rectangle**     $P = 2l + 2w$     ( $2 \times$  the length plus  $2 \times$  the width) **OR**  
 $P = s + s + s + s$     (side plus side plus side plus side)

The perimeter of the rectangle shown is

$$P = 2 \times 2 + 2 \times 3 = 10 \text{ cm}$$

or

$$P = 3 + 3 + 2 + 2 = 10 \text{ cm}$$



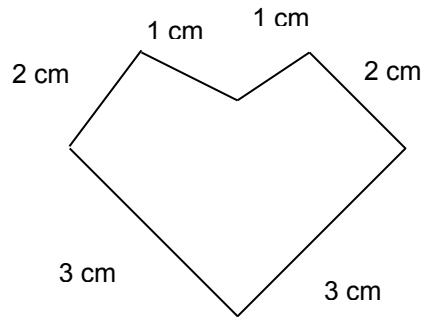
**Square**       $P = 2l + 2w$       ( $2 \times$  the length plus  $2 \times$  the width) OR  
 $P = 4s$  ( $4 \times$  one side)

**Triangle**       $P = s + s + s$       (side plus side plus side)

**Polygon**       $P = s + s + s + s \dots$       (side plus side plus side plus side... depending on the number of sides of the polygon)

The perimeter of the polygon shown is

$$P = 1 + 2 + 3 + 3 + 2 + 1 = 12 \text{ cm}$$



*The units for perimeter are just cm or m or whatever units were added together.*

## FINDING THE AREA OF A RECTANGLE

$A$  stands for **area**, the *space* that something takes up. It is always expressed in **square units** – e.g.  $\text{m}^2$ ,  $\text{cm}^2$ ,  $\text{km}^2$

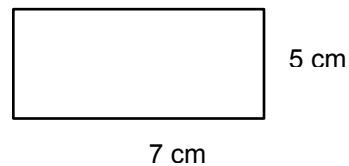
$l$  stands for *length*

$w$  stands for *width*

**Rectangle**       $A = lw$  (*length*  $\times$  *the width*)

The area of the rectangle shown is

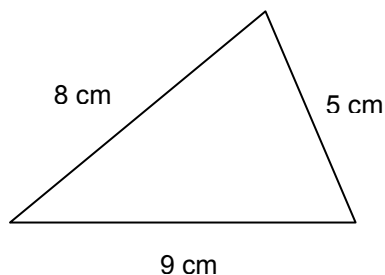
$$A = 5 \times 7 = 35 \text{ cm}^2$$



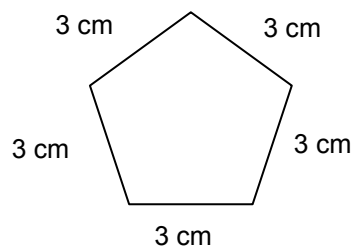
*The units for area are  $\text{cm}^2$  or  $\text{m}^2$  or whatever units were multiplied.*

**Find the perimeter of the following.**

163.



164.



**Word problems involving perimeter and area.**

165. You have decided to plant a garden 10 metres long by 3 metres wide. In order to know how much fertilizer to buy, you have to figure out the area of your garden or how many square metres ( $m^2$ ) it is. If one bag of fertilizer covers 5 square metres ( $m^2$ ), then how many bags of fertilizer will you need for your garden?

166. The deer have become a problem now that your garden is flourishing and you have decided to put up a fence. How many metres of fencing will you need to surround your garden?

# Graphs

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A graph is a way of presenting facts visually. There are many different kinds of graphs. Bar graphs, line graphs, circle (or pie) graphs are most common. Complete the following exercise on graphing.

Use the following graph to answer 167-169.



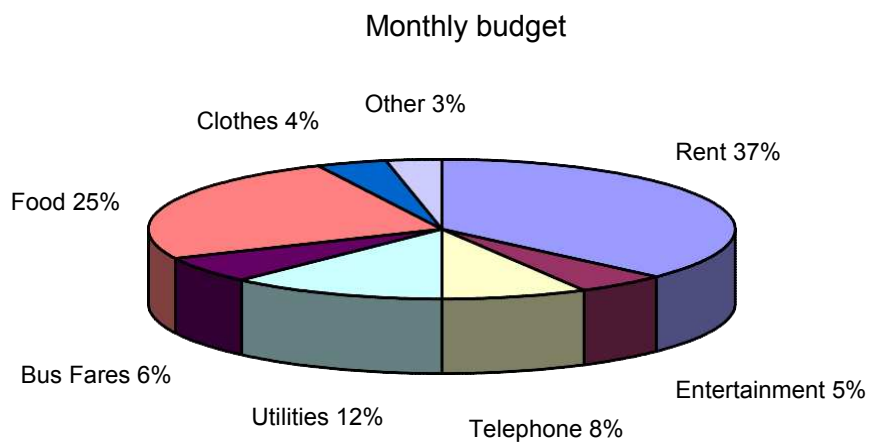
167. Which year showed the least loss of production days due to labour actions?
168. In which years were more than 5 production days lost as the result of labour action?
169. What is the average number of production days lost per year during the period 1988-1993?



170. Draw a line graph to show this set of data.

Season	Catch
1990	150 thousand kilograms
1991	140 thousand kilograms
1992	90 thousand kilograms
1993	125 thousand kilograms


171. What percentage of this budget is food and rent?



# Answers

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## Place Value, Rounding Numbers, Estimation, > < =

1. 7, 8                      2. 4, 6, 5                      3. 2, 7, 0, 3                      4. 70, 580, 10, 2700  
5. 200, 800, 4800                      6. 20                      7. 100                      8. 9000  
9. 80                      *(Note: Estimated answers may vary slightly for questions 6-9)*  
10. a) >    b) <    c) <    d) >    e) =    f) <    g) =    h) >

## Whole Numbers

11. 15                      12. 40                      13. 458                      14. 8378  
15. a) 17    b) 9 hours, 16 minutes, 42 seconds    16. 7                      17. 6  
18. 31                      19. 236                      20. a) 3579                      b) 7 hours, 41 minutes, 19 seconds  
21. 21                      22. 54                      23. 504                      24. 360  
25. 32,864                      26. 1,086,492                      27. 8                      28. 73  
29. 86                      30. 93                      31. 5                      32. 221  
33. 495                      34. 802                      35. 86                      36. \$692  
37. 46 songs                      38. \$6650                      39. 89 boxes                      40. 6 hours

## Fractions

41.  $\frac{3}{4}$                       42.  $\frac{2}{3}$                       43.  $\frac{3}{4}$                       44.  $\frac{1}{2}$   
45.  $\frac{4}{5}$                       46.  $\frac{2}{3}$                       47.  $\frac{4}{9}$                       48.  $\frac{2}{3}$   
49.  $\frac{2}{3}$                       50.  $\frac{3}{5}$                       51.  $1\frac{2}{5}$                       52.  $1\frac{7}{11}$   
53.  $1\frac{9}{61}$                       54.  $2\frac{2}{5}$                       55.  $1\frac{1}{99}$                       56.  $12\frac{1}{2}$   
57.  $\frac{11}{5}$                       58.  $\frac{51}{8}$                       59.  $\frac{26}{3}$                       60.  $\frac{56}{5}$   
61.  $\frac{49}{5}$                       62.  $\frac{19}{4}$                       63.  $\frac{7}{10}$                       64. 8  
65.  $2\frac{2}{3}$                       66.  $5\frac{1}{2}$                       67.  $1\frac{2}{3}$                       68.  $7\frac{1}{2}$   
69.  $\frac{3}{5}$                       70.  $1\frac{2}{5}$                       71.  $\frac{7}{9}$                       72.  $\frac{7}{8}$   
73.  $7\frac{3}{4}$                       74.  $12\frac{5}{6}$                       75.  $\frac{5}{8}$                       76.  $3\frac{1}{2}$   
77.  $3\frac{1}{4}$                       78.  $\frac{1}{8}$                       79.  $3\frac{2}{3}$                       80.  $10\frac{11}{12}$   
81.  $\frac{1}{2}$                       82. 1                      83. 10                      84.  $14\frac{1}{2}$   
85. 1                      86.  $\frac{5}{28}$                       87.  $\frac{27}{250}$                       88.  $1\frac{1}{3}$

89.  $2\frac{1}{4}$

90. \$5600

91. 9 times

**Decimals**

92. 48.4

93. 38.864

94. 189.41

95. 179.46

96. 517.81

97. 3.48

98. 788.29

99. 571.3

100. 238.06

101. 3002.82

102. 206

103. 827.652

104. 8203.842

105. 261.6

106. 3.1

107. 810

108. 23.5

109. 56.1

110. 7.3 years

111. 19.2 km

112. \$2.00

**Percentage**

	Percentage	Fraction	Decimal
113.	10%	$\frac{3}{4}$	0.1
114.	25%	$\frac{1}{4}$	0.25
115.	45%	$\frac{9}{20}$	0.45
116.	0.25%	$\frac{25}{10000}$	.0025
117.	120%	$1\frac{1}{5}$	1.2
118.	14%	$\frac{7}{50}$	0.14
119.	$77\frac{7}{9}\%$	$\frac{7}{9}$	$0.7\bar{7}$
120.	$5\frac{1}{2}\%$	$\frac{11}{200}$	0.055
121.	250%	$2\frac{1}{2}$	2.5

122. 400%

123. 20%

124.  $61\frac{2}{3}\%$  or  $61.\bar{6}\%$

125. 7.2

126. 4.983

127. 9.75

128. 30

129. 32.72 or  $32\frac{8}{11}$

130. 80

131. 20%

132. 10.5

133. 425

134. 163.63% or  $163\frac{7}{11}\%$

135.  $266\frac{2}{3}$  or  $266.\bar{6}$

136. 21

137. \$19.52

138. 25.71%

**Ratio and Proportion**

139. 40 plants:3 rows or  $\frac{40 \text{ plants}}{3 \text{ rows}}$

140. 1 centimetre:50 kilometres or  $\frac{1 \text{ centimetre}}{50 \text{ kilometres}}$

141. 1 cup flour:1 cup sugar or 1:1 or  $\frac{1}{1}$

142.  $5\frac{1}{3}$  or  $5.\bar{3}$

143. 12

144.  $4\frac{1}{2}$  or 4.5

145. 8.25 litres

**Metric**

- |             |                        |                   |               |
|-------------|------------------------|-------------------|---------------|
| 146. 0.42 m | 147. 286 cm            | 148. 3 300 000 cg | 149. 8 000 mL |
| 150. 7.8 cm | 151. deca              | 152. milli        | 153. centi    |
| 154. 9 cm   | 155. 92 mm ( $\pm 1$ ) | 156. 200 cm       | 157. 2000 mm  |
| 158. 0.4 m  | 159. 2.386 km          | 160. 54 mm        | 161. 600 m    |
| 162. 321 cm |                        |                   |               |

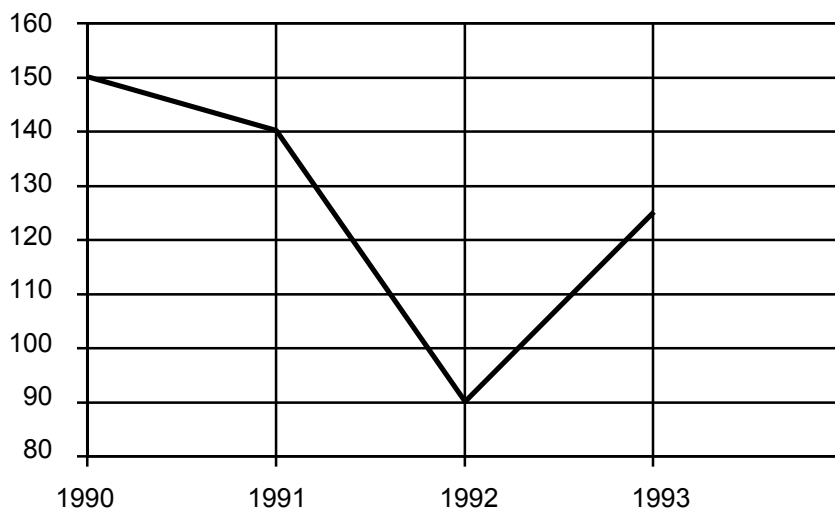
**Fundamental Level Geometry**

- |            |            |                               |           |
|------------|------------|-------------------------------|-----------|
| 163. 22 cm | 164. 15 cm | 165. 30 m <sup>2</sup> 6 bags | 166. 26 m |
|------------|------------|-------------------------------|-----------|

**Graphs**

- |           |                 |          |
|-----------|-----------------|----------|
| 167. 1992 | 168. 1990, 1993 | 169. 3.5 |
|-----------|-----------------|----------|

170. Gillnet Catch of Sockeye Salmon



171. 62%