

Grade 9

NUMBER SENSE AND NUMERATION: INTEGERS

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Play **Order of Operations** at <http://www.learnalberta.ca/content/mec/html/index.html>
You may also go to www.wiredmath.ca for the link.

1. Write an integer to represent each statement.
 - a. Twelve units to the left of zero on a number line.
 - b. A reduction in pay of \$4000 for a year.
 - c. A profit of \$530 on an investment.
 - d. An altitude of 2100 metres.
 - e. A withdrawal of \$80 from a banking machine.
 - f. A loss of 300% on a risky investment.

2. Discuss each of the following statements with a partner.
 - a. $+52$ is the same as 52, but -52 is not.
 - b. When multiplying or dividing, the number of positives doesn't matter, but watch out for those negatives!
 - c. When multiplying count the number of negatives. If there are an even number of negatives, then the answer will be positive. If not, it'll be negative.
 - d. Integers are any one of $\dots, -3, -2, -1, 0, 1, 2, 3, \dots$

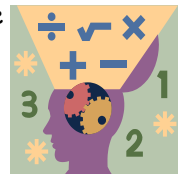
3. Arrange these integers from least to greatest.

<ol style="list-style-type: none"> a. $-77, -13, -73, 38, 82, -75$ <p>_____</p>	<ol style="list-style-type: none"> b. $23, -43, -51, 0, -42, 8$ <p>_____</p>
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Did You Know?

There are at least three different acronyms to help remember the order of operations.



BEDMAS


Brackets, Exponents, Division, Multiplication, Addition, Subtraction

PEMDAS

Parentheses, Exponents, Multiplication, Division, Addition, Subtraction

BODMAS

Brackets, raise to the power Of, Division, Multiplication, Addition, Subtraction

4.  Using integers, write a mathematical expression describing each of the following.
 - a. A gain of 8 yards followed by a loss of 3 yards.
 - b. Four weeks in a row the loss on a business deal has been \$450.
 - c. Eight identical pieces of pizza shared equally among 3 friends and their coach.

5.
 - a. Give 4 integers whose sum is -5 using 2 negative and 2 positive integers.
 - b. Give 5 integers such that 3 are negative and 2 are positive. The first and last integers are negative integers and the sum of the 5 integers is -7 .

A Convention for Positive Integers

It is more convenient to write 3 than +3.
It is customary to write numbers as natural numbers instead of the symbols for positive integers.

E.g. $(+3) + (+4) = (3) + (4) = (7)$

or $(+3) + (+4) = 3 + 4 = 7$

E.g. $(+4) \times (+5) = (4) \times (5) = (20)$

or $(+4) \times (+5) = 4 \times 5 = 20$

Subtracting Integers

To subtract an integer, add its opposite.

a. $(+3) - (+4)$
 $= 3 - 4$
 $= -1$

b. $(+3) - (-4)$
 $= 3 + 4$
 $= 7$

c. $(-3) - (+4)$
 $= -3 - 4$
 $= -7$

d. $(-3) - (-4)$
 $= -3 + 4$
 $= 1$

Multiplying Integers

The operation for multiplication can be represented using the cross (\times), the dot (\cdot), brackets $()()$, or the asterisk ($*$) or $(*)$.

E.g. a. 3×5
cross

b. $3 \cdot 5$
dot

c. $(3)(5)$
brackets

d. $3 * 5$ or $3*5$
asterisk

For each case above, the product is 15.

The dot is used infrequently because it is sometimes confused with a decimal point.

The asterisk is used in mathematics and computing.

6. Calculate.

a. $-2 - 4 - 6 + 8$

b. $-3 - 4 - (-5)$

c. $-6 - (-7) - (-2)$

d. $5 + (-3) - 7 + 2$

e. $-(-8) + (-3) - (-4)$

f. $-3 + (-6) - (-6) + (-2) - (-5)$

g. $-3(-5)$

h. $5(-4)(-2)$

i. $7(-8)(-3)$

j. $7(-3)(0)$

k. $(-1)(-1)(-1)(-1)(-1)$

l. $-3(-5)(-7)$

m. $(-42) \div 6$

n. $(-27) \div (-9)$

o. $\frac{-50}{-25}$

p. $\frac{144}{-12}$

q. $\frac{77}{-7}$

r. $-\frac{18}{-3}$

7. Using the order of operations, calculate each of the following.

a. $4(-7) + 2(-5)$

b. $-5(4) - 7(-10)$

c. $28 \div (-4) - 6$

d. $\frac{-45}{+5} + \frac{18}{-3}$

e. $\frac{-16}{-1} - \frac{12}{-3}$

f. $-7(-2)(-1) - 6(-2)$

g. $\frac{-4(-7)}{-7} - \frac{3(-2)}{-6}$

h. $\frac{8(-3)(4)}{2} - \frac{20(-2)}{-5}$

i. $-6[-2 + (-7)]$

j. $8[4 - (-3)]$

k. $-3 + 5[-8 + (-6)]$

l. $-6(-3 - 4) - 6(-9 + 7)$

m. $8[9 - (-2)] - 7[4 + (-1)]$	n. $-12 + 8[-4 - (-3)] - 12$	o. $[(-2)(-3) + (-4)(-6)] \div (-6)$
p. $24 \div (-4)(2) - 3(-4 - 1)$	q. $-10 + 4[1 - (7 - 9)]$	r. $\frac{-17 - 12 - 18 \div 6}{(3 - 5)(-6 + 10)}$
s. $\frac{16 + 4(3)}{10 - 4 + 1} + \frac{(16 + 4)(3)}{10 - (4 + 1)}$	t. $\frac{45 - (12 + 8) \div 2}{1 + 3(2 \times 8 - 7 \times 2)}$	u. $[(-10) + 2(-3)] \div (2 - 6) - (-4)$
v. $14 - 3(\{6 - 9\}(-4) + 12)(-2)$	w. $\frac{5(-4) - 3\{-9 + 6\} + (-3) - 4[2(-1) - 7]}{\{-6 - (3 - 8)(3) + [8 \div (-2)]\}}$	

8. Kayla performs an endothermic reaction in a flask in a science lab. At the beginning of the reaction the temperature in the flask is 23°C . The temperature decreases by 29 Celsius degrees. What is the new temperature?
9. Enzo caught three passes during a high school football game. One was for a touchdown and went for 38 yards. Another was for a first down and was for 16 yards. The last was on a screen pass that did not work so well and ended in a loss of 9 yards. What was the total yardage gained by Enzo on those three plays?
10. Five voltmeters were connected to a power line, and the readings were as follows: 234 volts, 232 volts, 235 volts, 234 volts, and 235 volts. What is the true (average) line voltage?
11. Calculate the mean of the following profits and losses $-\$110$, $\$238$, $-\$176$, $-\$132$, $\$68$, and $\$46$.
12. Eggs are sold by the score (20) or by the dozen (12). What is the smallest number of eggs that could be purchased either by the score or by the dozen, such that the same number of eggs was purchased either way?



Don't forget now! Go to www.wiredmath.ca for the link.



TRY THESE!

Adding 3 Integers

<http://www.berghuis.co.nz/abiator/maths/sa/saitegeradd3.html>

If you need to practice your multiplication tables, then try

<http://www.berghuis.co.nz/abiator/tables/frame1.html>

CHALLENGE YOURSELF!

13. You have a square yard for a flower garden with a side length of 15 metres.
 - a. What is the total area of the garden?
 - b. If you need a two-metre wide path though the centre parallel to a side, how much land is left for the flowers?
 - c. If you needed two, two- metre wide paths at right angles to each other through the centre and parallel to the sides, how much land is left for planting?



14. The rows, columns and diagonals of the following magic square add up to 10. Determine the missing numbers.

	- 8		14
- 2	10		
6			12
- 4	16		- 10



EXTENSIONS

15. A fourth order magic square uses the integers 1, 2, 3, ..., 16. The constant of the magic square is the number that each of the rows, columns and diagonals must add up to.
- Determine the constant of the following 4th order magic square.
 - Complete the magic square.



1			8
14		5	
			2
12			13

16. Absolute value is the size, or magnitude, of a number x with or without the negative sign. For example, the absolute value of 8 or of -8 is 8. We write absolute value using vertical lines so the “absolute value of x ” is denoted $|x|$.
- Determine each of the following.
 - $|-27|$
 - $|0|$
 - $|8|$
 - $|-32| - |-12|$
 - $\frac{5|-6| - 4|3| - 9| - 4|}{|2|(-3)}$
 - Determine the number of integral solutions of $|x| \times |y| \times |z| = 12$.