

Integers

This sheet is designed as a review aid. If you have not previously studied this concept, or if after reviewing the contents you still don't pass, you should enroll in the appropriate math class.

Integers are positive and negative whole numbers. Applications with integers involve Order of Operations. Operations are ways to combine two numbers. The operations we use most often are addition, subtraction, multiplication and division.

Order of Operations

1. Do operations inside grouping symbols before the operations outside of the grouping symbols.

- a. Work grouping symbols from the inside to the outside.

$$\begin{aligned} &3(12 - 5) \\ &= 3(7) \\ &= 21 \end{aligned}$$

- b. Grouping symbols include (parentheses), [brackets], {braces}, as well as operations such as $\frac{\text{fractions}}{1}$, |absolute values|, and $\sqrt{\text{roots}}$.

$$\begin{aligned} &5 + \sqrt{(7 - 3)} \\ &= 5 + \sqrt{4} \\ &= 5 + 2 \\ &= 7 \end{aligned}$$

- c. Once an operation such as a root or an absolute value has been performed, it may help to replace it with parentheses to avoid mistakes.

$$\begin{aligned} &3|-6| \\ &= 3(6) \\ &= 18 \end{aligned}$$

2. Evaluate exponents and roots before other operations. Follow the appropriate rules of exponents.

$$\begin{aligned} &12 - 3^2 \\ &= 12 - 9 \\ &= 3 \end{aligned}$$

3. Perform multiplication and division before addition and subtraction. Work left to right, and work multiplication and division together. DO NOT perform all the multiplication and then all the division.

$$\begin{aligned}4 + 20 \div 2 * 5 \\&= 4 + 10 * 5 \\&= 4 + 50 \\&= 54\end{aligned}$$

4. Addition and subtraction is the last step in the order of operations. Remember that numbers can be added in any order.

- a. It is often helpful to change the order to make sums that are easy to work with, such as multiples of 10.

$$\begin{aligned}53 + 14 + 7 \\&= 53 + 7 + 4 \\&= 60 + 14 \\&= 74\end{aligned}$$

- b. To change the order for subtraction, keep the negative or the subtraction sign with the number that follows it.

$$\begin{aligned}10 - 15 + 12 \\&= 10 + 12 - 15 \\&= 22 - 15 \\&= 7\end{aligned}$$

5. Remember special properties, such as the Distributive Property. These allow you to work in a slightly different order without changing the answer.

$$\begin{aligned}4(25 - 3) + 12 \\&= 4(25) - 4(3) + 12 \\&= 100 - 12 + 12 \\&= 100\end{aligned}$$

Rules of Integers

1. When adding two integers, the larger sign wins:

- a. If the signs are the same, add and keep the sign.

$$+3 + +5 = +8$$

$$-3 + -5 = -8$$

- b. If the signs are different, subtract and keep the sign of the larger number.

$$+7 + -4 = +3$$

$$-7 + +4 = -3$$

2. When subtracting two integers, change subtraction to addition of the opposite.

$$13 - (-4)$$

$$= 13 + (+4)$$

$$= 17$$

3. When multiplying integers, two negatives make a positive:

- a. When multiplying two positives, the answer is positive.

$$(+3)(+8) = +24$$

- b. When multiplying two negatives, the answer is positive.

$$(-3)(-8) = +24$$

- c. When multiplying a positive and a negative, the answer is negative.

$$(-3)(+8) = -24$$

$$(+3)(-8) = -24$$

4. For more than two integers being multiplied together, count the signs:

- a. An even number of negative signs will multiply to a positive number.

$$(-2)(-5)(-4)(-1) = +40$$

- b. An odd number of negative signs will multiply to a negative number.

$$(-2)(-5)(-4) = -40$$

5. To divide two integers, the rules are the same as multiplication.

6. An absolute value is the distance a number is from zero. Distance is never negative, so absolute values will never be negative.

- a. $|5| = 5$

- b. $|-3| = 3$

- c. $|0| = 0$

Practice

1. $27 \div 3 * 2$

2. $17 - 15 + 13$

3. $3(10 - 2) + 7$

4. $-4(5 - 3)^2 - 12$

5. $5 + 4 * 3$

6. $(5 + 4) * 3$

7. $2|5 - 9|$

8. $\sqrt{9 + 16}$

9. $3 - 4 + (-5) + 6 - (-1)$

10. $10 - 15 + 6 + 7 - 8$

11. $4(-2)$

12. $(-15) \div (-5) * (3)$

Key

1. 18

2. 15

3. 31

4. -28

5. 17

6. 27

7. 8

8. 5

9. 1

10. 0

11. -8

12. 9