

# Properties of Multiplication and Division

## Question 1 .

Simplify.

$$8 \times 12 \times -6$$

- A. -576
- B. -72
- C. 576
- D. 72

## Question 2 .

Indicate which property is illustrated in [Step 1](#).

Step 1	$-4 + 4 + 3(4 + 8) = -4 + 4 + (3 \cdot 4) + (3 \cdot 8)$
Step 2	$= -4 + 4 + (12) + (24)$
Step 3	$= -4 + 4 + 36$
Step 4	$= 0 + 36$
Step 5	$= 36$

- A. distributive property
- B. commutative property of division
- C. inverse property of addition
- D. identity property of addition

## Question 3 .

Indicate which property is illustrated in [Step 3](#).

Step 1	$12 \div 6 + 9 \div 1 = (12 \div 6) + (9 \div 1)$
Step 2	$= 2 + (9 \div 1)$
Step 3	$= 2 + 9$

- A. inverse property of multiplication
- B. distributive property
- C. identity property of addition
- D. identity property of division

**Question 4 .**

Use properties of operations to find the quotient.

$$-10 \div \frac{50}{63}$$

- A.  $-\frac{5}{63}$
- B.  $-\frac{63}{5}$
- C.  $-\frac{63}{500}$
- D.  $-\frac{500}{63}$

**Question 5 .**

Use properties of operations to find the quotient.

$$-18 \div (-11.52)$$

- A. 207.36
- B. 0.64
- C. -29.52
- D. 1.5625

**Question 6 .**

Use properties of operations to find the quotient.

$$-2\frac{1}{11} \div \left(-2\frac{1}{2}\right)$$

- A.  $1\frac{9}{46}$
- B.  $\frac{46}{55}$
- C.  $5\frac{5}{22}$
- D.  $-4\frac{13}{22}$

**Question 7 .**

Use properties of operations to find the quotient.

$$\frac{2}{3} \div \frac{3}{8}$$

- A.  $10\frac{2}{3}$
- B.  $1\frac{7}{9}$
- C.  $\frac{1}{3}$
- D.  $\frac{1}{4}$

**Question 8 .**

Simplify.

$$-336 \div (-28) \div 4$$

- A. -4
- B. 4
- C. -3
- D. 3

**Question 9 .**

Indicate which property is illustrated in [Step 3](#).

$$\text{Step 1} \quad 16 \div 8 + 3 \div 1 = (16 \div 8) + (3 \div 1)$$

$$\text{Step 2} \quad = 2 + (3 \div 1)$$

$$\text{Step 3} \quad = 2 + 3$$

- A. associative property of addition
- B. commutative property of division
- C. inverse property of multiplication
- D. identity property of division

**Question 10 .**

**Directions: Drag the tiles to the correct boxes to complete the pairs.**

Consider the expression below.

$$4 \cdot 5(-2 + 3) \div 4$$

Identify the properties used to simplify the expression, and match them with the corresponding calculation step.

Distributive Property

Commutative Property

Multiplicative Inverse Property

Multiplicative Identity Property

$$4 \cdot 5(-2 + 3) \div 4 = 4 \cdot (-10 + 15) \div 4 \longrightarrow$$

$$4 \cdot 5 \div 4 = 4 \cdot 5 \cdot \frac{1}{4} \longrightarrow$$

$$4 \cdot 5 \cdot \frac{1}{4} = 4 \cdot \frac{1}{4} \cdot 5 \longrightarrow$$

$$1 \cdot 5 = 5 \longrightarrow$$

**Question 11 .**

Simplify.

$$90 \times (-18) \div -54$$

- A. -18
- B. 30
- C. -30
- D. 18

**Question 12 .**

Simplify.

$$7 \times 11 \times -7$$

- A. 77
- B. -539
- C. 539
- D. -77

**Question 13 .**

Indicate which property is illustrated in [Step 4](#).

$$\text{Step 1} \quad 2 \cdot 6 \cdot 12 \cdot 1 = (2 \cdot 6) \cdot (12 \cdot 1)$$

$$\text{Step 2} \quad = (6 \cdot 2) \cdot (1 \cdot 12)$$

$$\text{Step 3} \quad = 12 \cdot (1 \cdot 12)$$

$$\text{Step 4} \quad = 12 \cdot 12$$

- A. commutative property of multiplication
- B. identity property of multiplication
- C. identity property of addition
- D. distributive property

**Question 14 .**

**Directions:** Drag each expression or property to the correct location on the table. Not all expressions or properties will be used.

$$3\frac{2}{5} + 1.5\left(-10.2 + \frac{1}{4}\right) - \left(-15.3 + 26\frac{1}{5}\right)$$

Complete the table using the given expressions and properties to show the evaluation process for the expression shown above.

Associative Property

Commutative Property

Distributive Property

$$3\frac{2}{5} + (-15.3) + 0.375 + 15.3 - 26\frac{1}{5}$$

$$3\frac{2}{5} + (-15.3) + 0.375 + 15.3 + 26\frac{1}{5}$$

$$3.4 - (0.375 - 26.2)$$

$$3.4 + (0.375 - 26.2)$$

**Question 15 .**

**Directions:** Drag each number to the correct location on the image. Each number can be used more than once, but not all numbers will be used.

Consider the expression below.

$$-\frac{8}{21} \times 1.75 \times \frac{42}{4} \div (-7)$$

Use properties of operations to complete the steps in simplifying the expression.

4    0.25    1.75     $\frac{42}{4}$     1    -4    -0.25    -1

# Answers

1. A
2. A
3. D
4. B
5. D
6. B
7. B
8. D
9. D
10. --
11. B
12. B
13. B
14. --
15. --

# Explanations

1. Multiply the terms from left to right. Start with the first two terms.

$$8 \times 12 = 96$$

Now, multiply the product by the third term.

A positive number multiplied by a negative number results in a negative number.

$$96 \times (-6) = -576$$

So, the answer is **-576**.

2. The property illustrated in Step 1 is the **distributive property**.

The **distributive property** states that every term inside grouping symbols, such as parentheses, may be multiplied by a term outside the grouping symbols to get an equivalent expression.

3. The property illustrated in Step 3 is the **identity property of division**.

The **identity property of division** states that a number remains unchanged after division by one.

4. To divide an integer by a fraction, first convert the integer to a fraction, and then multiply by the reciprocal of the second fraction.

$$\begin{aligned} -10 \div \frac{50}{63} &= -\frac{10}{1} \div \frac{50}{63} \\ &= -\frac{10}{1} \times \frac{63}{50} \\ &= -\frac{63}{5} \end{aligned}$$



5. To divide -18 by -11.52, first divide the decimals ignoring the negative signs.

For the divisor 11.52, move the decimal 2 places to the right to get rid of the decimal point. Do the same for the dividend.

- 11.52 becomes 1152
- 18 becomes 1800

Now do the division as you normally would.

$$\begin{array}{r}
 0001.5625 \\
 1152 \overline{)1800.0000} \\
 \underline{1152} \phantom{0000} \\
 06480 \phantom{00} \\
 \underline{05760} \phantom{00} \\
 007200 \phantom{00} \\
 \underline{006912} \phantom{00} \\
 0002880 \phantom{00} \\
 \underline{0002304} \phantom{00} \\
 00005760 \phantom{00} \\
 \underline{00005760} \phantom{00} \\
 00000000
 \end{array}$$

1. The decimal point in your answer will line up with the decimal point of the dividend. Fill in zeros as needed.
2. Divide 1800 by 1152 to get 1 plus a remainder. Place 1152 below 1800.
3. Subtract 1152 from 1800 to get 648. Bring the 0 down from 1800.0000.
4. Divide 6480 by 1152 to get 5 plus a remainder. Place 5760 below 6480.
5. Subtract 5760 from 6480 to get 720. Bring the 0 down from 1800.0000.
6. Divide 7200 by 1152 to get 6 plus a remainder. Place 6912 below 7200.
7. Subtract 6912 from 7200 to get 288. Bring the 0 down from 1800.0000.
8. Divide 2880 by 1152 to get 2 plus a remainder. Place 2304 below 2880.
9. Subtract 2304 from 2880 to get 576. Bring the 0 down from 1800.0000.
10. Divide 5760 by 1152 to get 5. Place 5760 below 5760.
11. Subtract 5760 from 5760 to get 0.

Since -18 is negative and -11.52 is negative, the quotient will be positive.

Therefore,  $-18 \div (-11.52) = \mathbf{1.5625}$ .

6. To divide a mixed number by a mixed number, first convert both mixed numbers to improper fractions, and then multiply by the reciprocal of the second fraction.

$$\begin{aligned}
 -2\frac{1}{11} \div \left(-2\frac{1}{2}\right) &= -\frac{23}{11} \div \left(-\frac{5}{2}\right) \\
 &= -\frac{23}{11} \times \left(-\frac{2}{5}\right) \\
 &= \frac{46}{55}
 \end{aligned}$$

7. To divide two fractions, multiply the first fraction by the reciprocal of the second fraction.

$$\begin{aligned}
 \frac{2}{3} \div \frac{3}{8} &= \frac{2}{3} \times \frac{8}{3} \\
 &= \frac{16}{9} \\
 &= 1\frac{7}{9}
 \end{aligned}$$

8. Divide the terms from left to right. Start with the first two terms.

A negative number divided by a negative number results in a positive number.

$$-336 \div (-28) = 12$$

Now, divide the quotient by the third term.

$$12 \div 4 = 3$$

So, the answer is **3**.

9. The property illustrated in Step 3 is the **identity property of division**.

The **identity property of division** states that a number remains unchanged after division by one.

10. Simplify the expression using the properties of operations.

$$\begin{aligned} 4 \cdot 5(-2 + 3) \div 4 &= 4 \cdot (-10 + 15) \div 4 \\ &= 4 \cdot 5 \div 4 \\ &= 4 \cdot 5 \cdot \frac{1}{4} \\ &= 4 \cdot \frac{1}{4} \cdot 5 \\ &= 1 \cdot 5 \\ &= 5 \end{aligned}$$

First, the **distributive property** was used to multiply 5 by both terms inside the parentheses, resulting in  $(-10 + 15) = 5$ .

Next, the **multiplicative inverse property** was used to change  $\div 4$  to  $\cdot \frac{1}{4}$ , as shown below.

$$4 \cdot 5 \div 4 = 4 \cdot 5 \cdot \frac{1}{4}$$

Then, the **commutative property** was used to pair the factor 4 with the factor  $\frac{1}{4}$ , as shown below.

$$4 \cdot 5 \cdot \frac{1}{4} = 5 \cdot \left(4 \cdot \frac{1}{4}\right) = 5 \cdot 1$$

Finally, the product of a number and 1 is equal to the number. So, the **multiplicative identity property** was used to get an answer of 5.

11. Multiply and divide the terms from left to right. Start with the first two terms.

A positive number multiplied by a negative number results in a negative number.

$$90 \times (-18) = -1620$$

Now, divide the product by the third term.

A negative number divided by a negative number results in a positive number.

$$-1620 \div (-54) = 30$$

So, the answer is **30**.

12. Multiply the terms from left to right. Start with the first two terms.

$$7 \times 11 = 77$$

Now, multiply the product by the third term.

A positive number multiplied by a negative number results in a negative number.

$$77 \times (-7) = -539$$

So, the answer is **-539**.

13. The property illustrated in Step 4 is the **identity property of multiplication**.

The **identity property of multiplication** states that a number remains unchanged after multiplication with one.

14. First, perform the distributive property on the given expression.

$$3\frac{2}{5} + 1.5\left(-10.2 + \frac{1}{4}\right) - \left(-15.3 + 26\frac{1}{5}\right)$$

$$3\frac{2}{5} + (1.5)(-10.2) + (1.5)\left(\frac{1}{4}\right) + (-1)(-15.3) + (-1)\left(26\frac{1}{5}\right)$$

$$3\frac{2}{5} + (-15.3) + 0.375 + 15.3 - 26\frac{1}{5}$$

Next, write the fractions as decimals, and then, switch the order of the third and fourth terms using the commutative property.

$$3.4 + (-15.3) + 0.375 + 15.3 - 26.2$$

$$3.4 + (-15.3) + 15.3 + 0.375 - 26.2$$

Now, use the associative property to group the second and third terms together, and group the fourth and fifth terms together.

$$3.4 + (-15.3 + 15.3) + (0.375 - 26.2)$$

Then, perform the calculation in the first set of parentheses. Since -15.3 and 15.3 are opposites, the additive inverse property is performed, which states that the sum of two opposites is equal to zero.

$$3.4 + (-15.3 + 15.3) + (0.375 - 26.2)$$

$$3.4 + (0) + (0.375 - 26.2)$$

$$3.4 + (0.375 - 26.2)$$

Last, simplify the above equation using operations with rational numbers.

$$3.4 + (0.375 - 26.2)$$

$$3.4 + (-25.825)$$

$$-22.425$$

The complete table is shown below.

	Expressions	Justification
1.	$3\frac{2}{5} + 1.5\left(-10.2 + \frac{1}{4}\right) - \left(-15.3 + 26\frac{1}{5}\right)$	Given
2.	$3\frac{2}{5} + (-15.3) + 0.375 + 15.3 - 26\frac{1}{5}$	Distributive Property
3.	$3.4 + (-15.3) + 0.375 + 15.3 - 26.2$	Write Fractions as Decimals
4.	$3.4 + (-15.3) + 15.3 + 0.375 - 26.2$	Commutative Property
5.	$3.4 + (-15.3 + 15.3) + (0.375 - 26.2)$	Associative Property
6.	$3.4 + (0.375 - 26.2)$	Additive Inverse Property
7.	-22.425	Operations with Rationals

**15.** Apply properties of operations to simplify the given expression.

The commutative property of multiplication states that order in which numbers are multiplied does not change the product. The associative property of multiplication states that the way numbers are grouped does not change the product.

First, apply the associative property to group the first three numbers together. Then, use the commutative property to move  $\frac{42}{4}$  next to  $-\frac{8}{21}$ .

$$\left(-\frac{8}{21} \times 1.75 \times \frac{42}{4}\right) \div (-7) = \left(-\frac{8}{21} \times \frac{42}{4} \times 1.75\right) \div (-7)$$

Next, the associative property can be used to group  $\frac{42}{4}$  with  $-\frac{8}{21}$  and 1.75 with -7. This property can be applied here since dividing by -7 is the same as multiplying by the reciprocal.

$$-\frac{8}{21} \times \frac{42}{4} \times 1.75 \div (-7) = \left(-\frac{8}{21} \times \frac{42}{4}\right) \times (1.75 \div (-7))$$

Then, simplify the expression.

$$\begin{aligned} \left(-\frac{8}{21} \times \frac{42}{4}\right) \times (1.75 \div (-7)) &= \left(-\frac{336}{84}\right) \times (-0.25) \\ &= (-4) \times (-0.25) \\ &= 1 \end{aligned}$$

The missing steps used to simplify the expression are shown below.

$$\begin{aligned} -\frac{8}{21} \times 1.75 \times \frac{42}{4} \div (-7) &= \left(-\frac{8}{21} \times \frac{42}{4} \times 1.75\right) \div (-7) \\ &= \left(-\frac{8}{21} \times \frac{42}{4}\right) \times (1.75 \div (-7)) \\ &= (-4) \times (-0.25) \\ &= 1 \end{aligned}$$