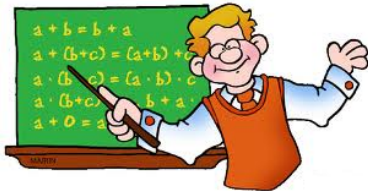


Properties of Integers

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Closure property



Closure property under addition

Integers are closed under addition, i.e. for any two [integers](#), a and b , $a+b$ is an integer.

Example: $3+4=7$, 3 and 4 are integers and when we add them the answer we get is 7 which is also an integer, hence the property.

Closure property under subtraction

Integers are closed under subtraction, i.e. for any two integers, a and b , $a-b$ is an integer.

Example: $-21 - (-9) = -12$, -21 and -9 are integers and when we subtract them the answer we get is -12 which is also an integer, hence the property.

Closure property under multiplication

Integers are closed under multiplication, i.e. for any two integers, a and b , ab is an integer.

Example: $5 \times 6 = 30$, 5 and 6 are integers and when we multiplied them the answer we get is 30 which is also an integer, hence the property.

Closure property under division

Integers are **NOT** closed under division, i.e. for any two integers, a and b , a/b may not be integer.

Commutative property

Commutative property under addition

Addition is commutative for integers. For any two integers, a and b , $a + b = b + a$

Example: $5 + (-6) = 5 - 6 = -1$

$(-6) + 5 = -6 + 5 = -1$

? $5 + (-6) = (-6) + 5$

Commutative property under subtraction

Subtraction is **NOT** commutative for integers. For any two integers, a and b, $a - b \neq b - a$

Example: $8 - (-6) = 8 + 6 = 14$

$$(-6) - 8 = -6 - 8 = -14$$

$$? 8 - (-6) ? -6 - 8$$

Commutative property under multiplication

Multiplication is commutative for integers. For any two integers, a and b, $ab = ba$

Example: $9 \times (-6) = -(9 \times 6) = -54$

$$(-6) \times 9 = -(6 \times 9) = -54$$

$$? 9 \times (-6) = (-6) \times 9$$

Commutative property under division

Division is **NOT** commutative for integers. For any two integers, a and b, $a/b \neq b/a$

Example: $3/6 = 1/2$

$$6/3 = 2$$

$$? 3/6 ? 6/3$$

Associative property

Associative property under addition

Addition is associative for integers. For any three integers, a, b and c, $a + (b + c) = (a + b) + c$

Example: $5 + (-6 + 4) = 5 - 2 = 3$

$$(5 - 6) + 4 = -1 + 4 = 3$$

$$? 5 + (-6 + 4) = (5 - 6) + 4$$

Associative property under subtraction

Subtraction is associative for integers. For any three integers, a, b and c

$$a - (b - c) ? (a - b) - c$$

Example: $5 - (6 - 4) = 5 - 2 = 3$;

$$(5 - 6) - 4 = -1 - 4 = -5$$

$$? 5 - (6 - 4) ? (5 - 6) - 4$$

Associative property under multiplication

Multiplication is associative for integers. For any three integers, a, b and c,

$$(a \times b) \times c = a \times (b \times c)$$

Example: $[(-3) \times (-2)) \times 4] = (6 \times 4) = 24$

$[(-3) \times (-2 \times 4)] = (-3 \times -8) = 24$

? $[(-3) \times (-2)) \times 4] = [(-3) \times (-2 \times 4)]$

Associative property under division

Division is **NOT** associative for integers.

Distributive property

Distributive property of multiplication over addition

For any three integers, a, b and c, $a \times (b + c) = a \times b + a \times c$

Example: $-2 (4 + 3) = -2 (7) = -14$

$-2(4+3) = (-2 \times 4) + (-2 \times 3)$

$= (-8) + (-6)$

$= -14$

Distributive property of multiplication over subtraction

For any three integers, a, b and c, $a \times (b - c) = a \times b - a \times c$

Example: $-2 (4 - 3) = -2 (1) = -2$

$-2(4-3) = (-2 \times 4) - (-2 \times 3)$

$= (-8) - (-6)$

$= -2$

The distributive property of multiplication over the operations of addition and subtraction is true in the case of integers.

Identity under addition

Integer 0 is the identity under addition. That is, for an integer a, $a + 0 = 0 + a = a$

Example: $4 + 0 = 0 + 4 = 4$

Identity under multiplication

The integer 1 is the identity under multiplication. That is, for an integer a, $1 \times a = a \times 1 = a$

Example: $(-4) \times 1 = 1 \times (-4) = -4$

Now try it yourself! Should you still need any help, [click here](#) to schedule live online session with e Tutor!

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Reference Links :

- <http://en.wikipedia.org/wiki/Integer>
- [http://en.wikipedia.org/wiki/Closure_\(mathematics\)](http://en.wikipedia.org/wiki/Closure_(mathematics))
- <http://en.wikipedia.org/wiki/Commutativity>
- <http://en.wikipedia.org/wiki/Associativity>
- <http://en.wikipedia.org/wiki/Distributivity>
- http://en.wikipedia.org/wiki/Identity_element

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