Properties of real numbers

Property	**Addition**	**Multiplication**
Commutative Property	You can add in any order $a+b=b+a$ $2+4=4+2=6$	You can multiply in any order $a\times b=b\times a$ $3\times 4=4\times 3=12$
Associative Property	When you add, you can group the numbers in any combination $a+(b+c)=(a+b)+c$ $1+(3+4)=(1+3)+4$	When you multiply, you can group the numbers in any combination $a\times(b\times c)=(a\times b)\times c$ $2\times(3\times 5)=(2\times 3)\times 5$
Identity Property	The sum of zero and any number is the number $a+0=a$ $4+0=4$	The product of 1 and any number is the number $a\times 1=a$ $3\times 1=3$

1) Rewrite using the associative property of addition: $(x + 2) + y$

2) Rewrite using the associative property of addition: $(y + 2) + x$

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3) Rewrite using the associative property of multiplication: $6(c \times d)$

4) Rewrite using the associative property of multiplication: $7(a \times b)$

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5) Rewrite using the commutative property of addition: $x + 5$

6) Rewrite using the commutative property of addition: $y + 9$

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7) Rewrite using the commutative property of multiplication: $x5$

8) Rewrite using the commutative property of multiplication: $y9$

Properties of real numbers

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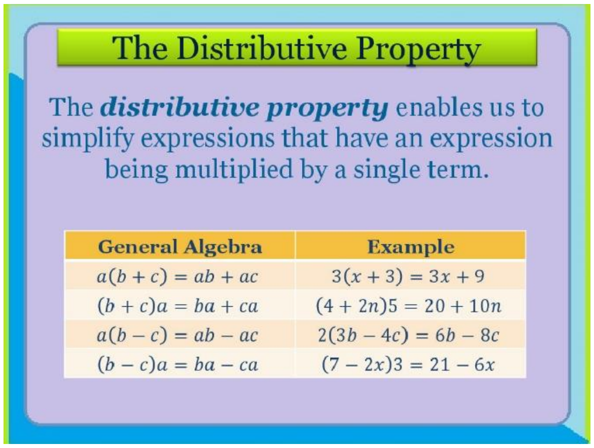
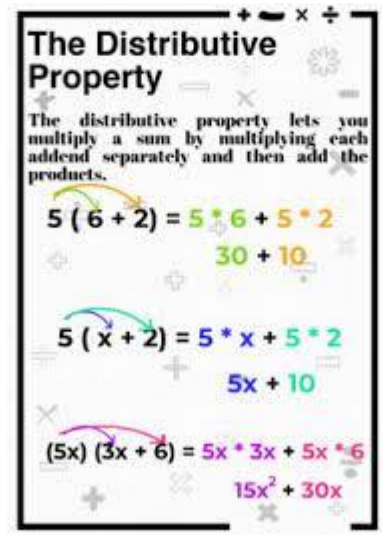
9) Rewrite using the commutative property of multiplication:
$(x - 3)7$

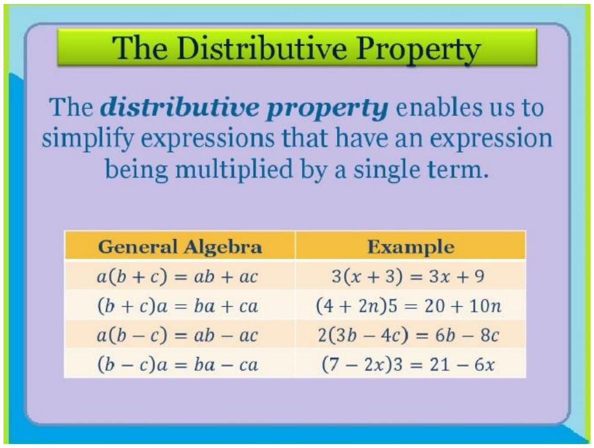
10) Rewrite using the commutative property of multiplication:
$(x - 2)5$

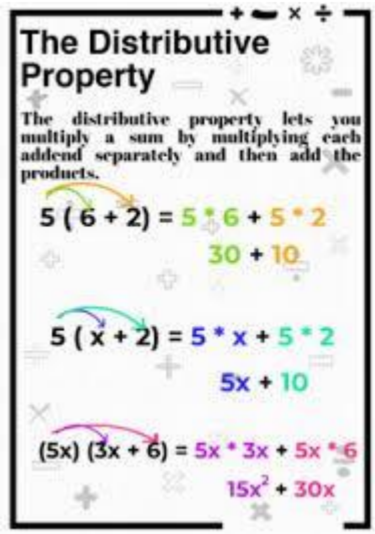




11) Rewrite using the distributive property, and simplify: $5(2 + 4)$

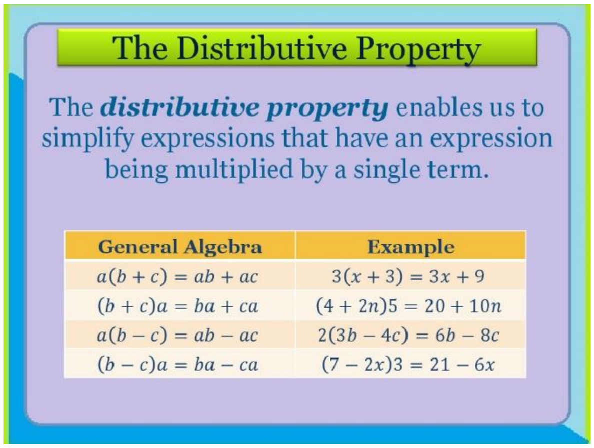
12) Rewrite using the distributive property, and simplify: $7(5 + 3)$

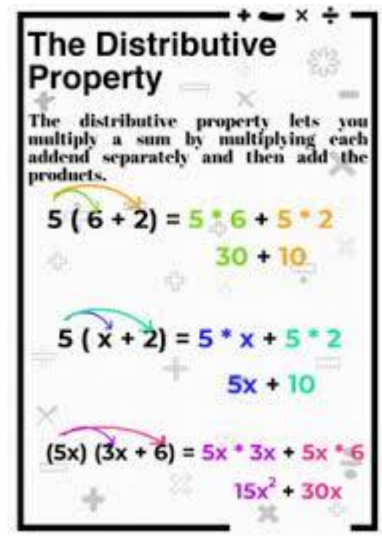




13) Rewrite using the distributive property, and simplify: $(7 + 3)8$

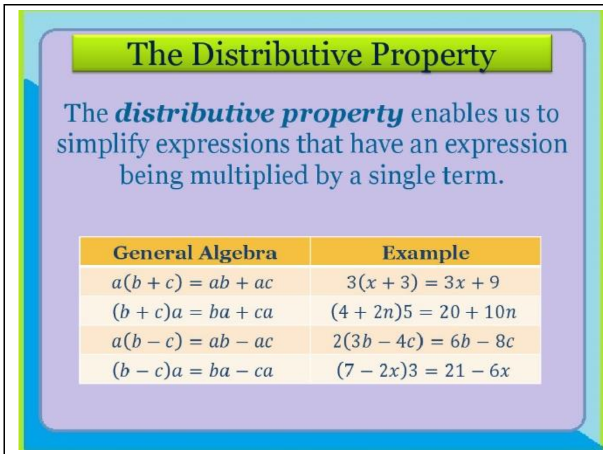
14) Rewrite using the distributive property, and simplify: $(5 + 2)9$

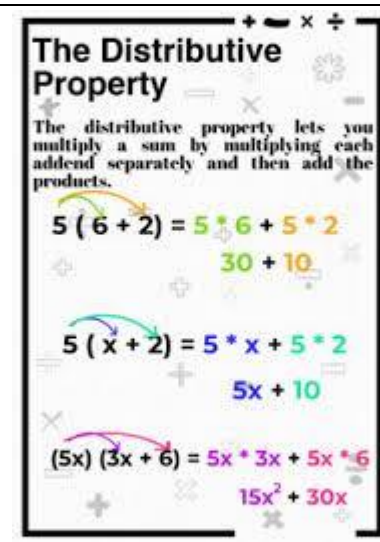




15) Rewrite using the distributive property, and simplify: $5(10\ -\ 4)$

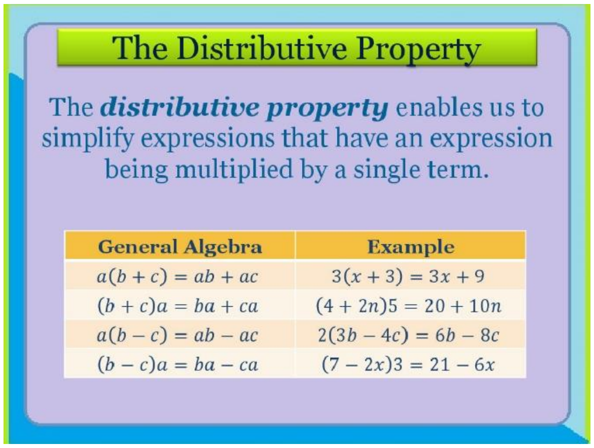
16) Rewrite using the distributive property, and simplify: $7(5\ -\ 3)$

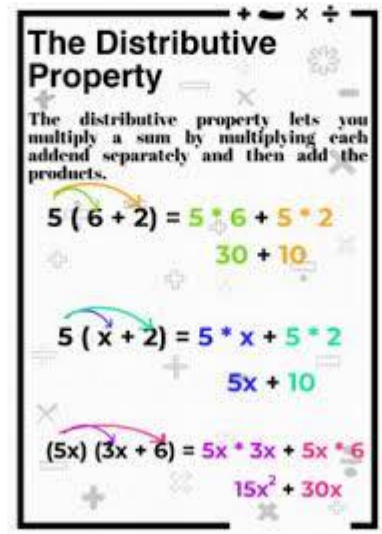




17) Rewrite using the distributive property, and simplify: $(2 - 3)8$

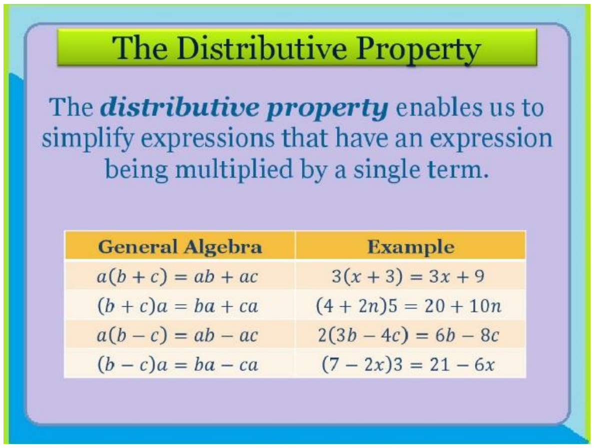
18) Rewrite using the distributive property, and simplify: $(1 - 2)9$

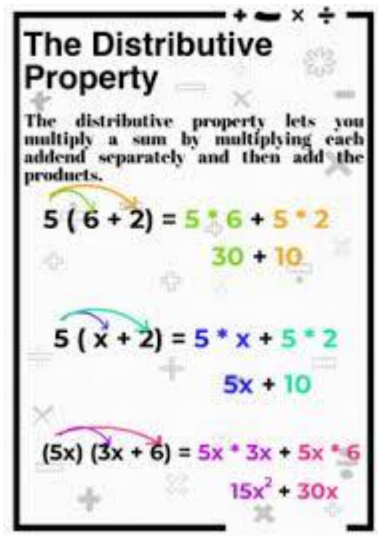




19) Rewrite using the distributive property: $5(x + y)$

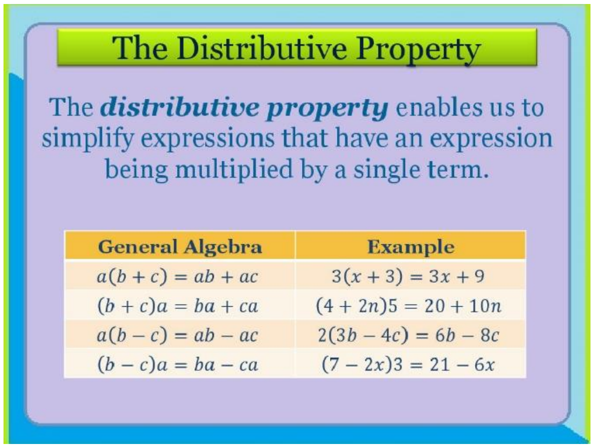
20) Rewrite using the distributive property: $7(a + b)$

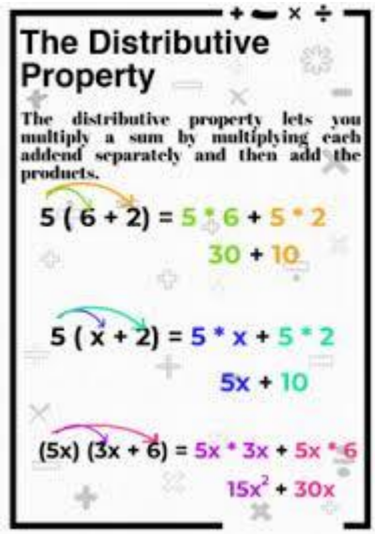




21) Rewrite using the distributive property: $(c + d)8$

22) Rewrite using the distributive property: $(x + y)9$





23) Rewrite using the distributive property, and simplify: $5(a - 4)$

24) Rewrite using the distributive property, and simplify: $7(c - 5)$

25) Rewrite using the distributive property, and simplify: $(x - 2)8$

26) Rewrite using the distributive property, and simplify: $(y - 2)9$

#27 – 38: Simplify

27) $-5(x - 2)$

28) $-3(y - 4)$

29) $-(3x - 2y)$

30) $-(5x - 4y)$

31) $8(3x^2 + 5x - 4)$

32) $6(2y^2 + 3y - 9)$

33) $-2(4x^2 + 6x - 3)$

34) $-3(5y^3 - 6y + 1)$

35) $\frac{1}{2}\left(\frac{4}{5}x + \frac{9}{2}\right)$

36) $\frac{2}{3}\left(\frac{6}{9}x + \frac{15}{8}\right)$

37) $\frac{3}{4}\left(\frac{4}{9}x - \frac{6}{5}\right)$

38) $\frac{3}{5}\left(\frac{15}{9}x - \frac{7}{6}\right)$

Fractions in the form $\frac{0}{x}$ and division problems of the form $0 \div x$

Every fraction obeys the following rules

- $\frac{\boldsymbol{numerator}}{\boldsymbol{denominator}} = \boldsymbol{answer}$
- $\boldsymbol{answer} \times \boldsymbol{denominator} = \boldsymbol{numerator}$

For example: $\frac{6}{2} = 3$ and $3 \times 2 = 6$

What does the fraction $\frac{0}{6}$ $reduce\ to$?
I know that the above rule must apply to the answer:

$\frac{0}{6} = answer$ and $answer \times 6 = 0$

I claim: $\frac{0}{6} = 0$
I will show you that it does.
$we\ know\ that\ \frac{0}{6} = answer \quad and\ \ answer \times 6 = 0$

- $change\ answer\ to\ 0$
- $\frac{0}{6} = 0$ Then: $0 \times 6 = 0$
- $since\ 0 \times 6\ does\ equal\ 0\ I\ know\ my\ answer\ is\ correct$

Thus $\frac{0}{6} = 0$

Rule for fractions with 0 in the numerator

$\frac{0}{x} = 0;\ provided\ x \neq 0$
and
$0 \div x = 0;\ provided\ x \neq 0$ (since $\frac{0}{x} = 0 \div x$)

Fractions in the form $\frac{x}{0}$, $(x \neq 0)$ and division problems in the form $x \div 0,\ x \neq 0$

What does the fraction $\frac{12}{0}$ $reduce\ to$?
I know that the above rule must apply to the answer:

$\frac{12}{0} = answer$ and $answer \times 0 = 12$

This is a problem when we try to figure out how to solve this:

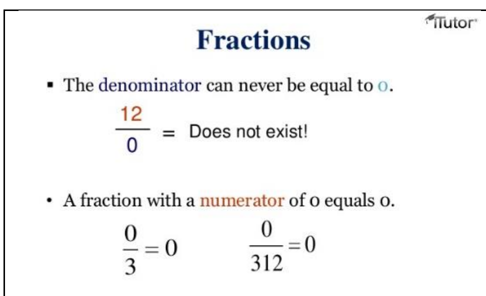
$$answer \times 0 = 12$$

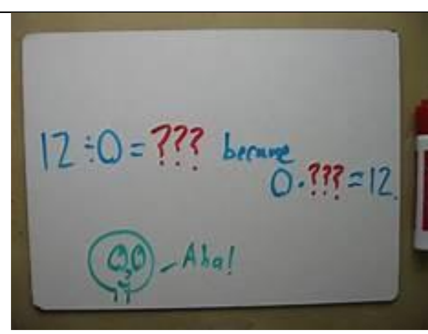
- The left side will always reduce to zero, no matter what number I replace with the word answer. The times 0 on the left side forces the left side to always equal 0.
- There is no number to change the word answer to so that the left side will equal 12
- There is no way to reduce the fraction $\frac{12}{0}$

Thus, we say $\frac{12}{0} = undefined$

Rule for fractions with 0 in the denominator:

$\frac{x}{0} = undefined;\ \ provided\ x \neq 0$ and
$x \div 0 = undefined;\ \ provided\ x \neq 0$ (since $\frac{x}{0} = x \div 0$)





#39 – 46: Simplify

39) $\frac{5}{0}$

40) $\frac{2}{0}$

41) $12 \div 0$

42) $8 \div 0$

43) $\frac{0}{7}$

44) $\frac{0}{6}$

45) $0 \div 3$

46) $0 \div 9$