ReviewsThis product has not yet been rated. Mathworksheetsgo.com is now a part of Mathwarehouse.com. All of your worksheets are now here on Mathwarehouse.com. Please update your bookmarks! Students will practice applying the distributive property of multiplication over addition. This worksheet has 23 problems. This is a 4 part worksheet Part I. Model Problems Part II. Practice Part III. Challenge Problems Part IV. Answer Key Directions: Simplify by applying the distributive property. Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution — You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. 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Home » Arithmetic » Distributive Property Worksheets Property involving two mathematical operations "Distributivity" redirects here and is not to be confused with Distributivism. Distributive propertyVisualization of distributive law for positive numbersTypeLaw, rule of replacementField Elementary algebra Boolean algebra Abstract algebra Set theory Propositional calculus Symbolic statement Elementary algebra x ⋅ (y + z) = x ⋅ y + x ⋅ z {\displaystyle x\cdot (y+z)=x\cdot y+x\cdot z} Propositional calculus: (P ∧ (Q ∨ R)) ⇔ ((P ∧ Q) ∨ (P ∧ R)) {\displaystyle (P\land (Q\lor R))\Leftrightarrow ((P\land Q)\lor (P\land R))} (P ∨ (Q ∧ R)) ⇔ ((P ∨ Q) ∧ (P ∨ R)) {\displaystyle (P\lor (Q\land R))\Leftrightarrow ((P\lor Q)\land (P\lor R))} In mathematics, the distributive property of binary operations is a generalization of the distributive law, which asserts that the equality x ⋅ (y + z) = x ⋅ y + x ⋅ z {\displaystyle x\cdot (y+z)=x\cdot y+x\cdot z} is always true in elementary algebra. For example, in elementary arithmetic, one has 2 ⋅ (1 + 3) = (2 ⋅ 1) + (2 ⋅ 3) . {\displaystyle 2\cdot (1+3)=(2\cdot 1)+(2\cdot 3).} Therefore, one would say that multiplication distributes over addition. This basic property of numbers is part of the definition of most algebraic structures that have two operations called addition and multiplication, such as complex numbers, polynomials, matrices, rings, and fields. It is also encountered in Boolean algebra and mathematical logic, where each of the logical and (denoted ∧ {\displaystyle \,\land \,}) and the logical or (denoted ∨ {\displaystyle \,\lor \,}) distributes over the other. Given a set S {\displaystyle S} and two binary operators ∗ {\displaystyle \,*\,} and + {\displaystyle \,+\,} on S , {\displaystyle S,} the operation ∗ {\displaystyle \,*\,} is left-distributive over (or with respect to) + {\displaystyle \,+\,} if, given any elements x , y , and z {\displaystyle x,y,{\text{ and }}z} of S , {\displaystyle S,} x ∗ (y + z) = (x ∗ y) + (x ∗ z) ; {\displaystyle x*(y+z)=(x*y)+(x*z);} the operation ∗ {\displaystyle \,*\,} is right-distributive over + {\displaystyle \,+\,} if, given any elements x , y , and z {\displaystyle x,y,{\text{ and }}z} of S , {\displaystyle S,} (y + z) ∗ x = (y ∗ x) + (z ∗ x) ; {\displaystyle (y+z)*x=(y*x)+(z*x);} and the operation ∗ {\displaystyle \,*\,} is distributive over + {\displaystyle \,+\,} if it is left- and right-distributive.[1] When ∗ {\displaystyle \,*\,} is commutative, the three conditions above are logically equivalent. The operators used for examples in this section are those of the usual addition + {\displaystyle \,+\,} and multiplication ⋅ . {\displaystyle \,\cdot .\,} If the operation denoted ⋅ {\displaystyle \cdot } is not commutative, there is a distinction between left-distributivity and right-distributivity: a ⋅ (b ± c) = a ⋅ b ± a ⋅ c (left-distributive) {\displaystyle a\cdot \left(b\pm c\right)=a\cdot b\pm a\cdot c\qquad {\text{ (left-distributive) }}} (a ± b) ⋅ c = a ⋅ c ± b ⋅ c (right-distributive) . {\displaystyle (a\pm b)\cdot c=a\cdot c\pm b\cdot c\qquad {\text{ (right-distributive) }}.} In either case, the distributive property can be described in words as: To multiply a sum (or difference) by a factor, each summand (or minuend and subtrahend) is multiplied by this factor and the resulting products are added (or subtracted). If the operation outside the parentheses (in this case, the multiplication) is commutative, then left-distributivity implies right-distributivity and vice versa, and one talks simply of distributivity. One example of an operation that is "only" right-distributive is division, which is not commutative: (a ± b) ÷ c = a ÷ c ± b ÷ c . {\displaystyle (a\pm b)\div c=a\div c\pm b\div c.} In this case, left-distributivity does not apply: a ÷ (b ± c) ≠ a ÷ b ± a ÷ c {\displaystyle a\div (b\pm c)\neq a\div b\pm a\div c} The distributive laws are among the axioms for rings (like the ring of integers) and fields (like the field of rational numbers). Here multiplication is distributive over addition, but addition is not distributive over multiplication. Examples of structures with two operations that are each distributive over the other are Boolean algebras such as the algebra of sets or the switching algebra. Multiplying sums can be put into words as follows: When a sum is multiplied by a sum, multiply each summand of a sum with each summand of the other sum (keeping track of signs) then add up all of the resulting products. In the following examples, the use of the distributive law on the set of real numbers R {\displaystyle \mathbb {R} } is illustrated. When multiplication is mentioned in elementary mathematics, it usually refers to this kind of multiplication. From the point of view of algebra, the real numbers form a field, which ensures the validity of the distributive law. First example (mental and written multiplication)During mental arithmetic, distributivity is often used unconsciously: 6 ⋅ 16 = 6 ⋅ (10 + 6) = 6 ⋅ 10 + 6 ⋅ 6 = 60 + 36 = 96 {\displaystyle 6\cdot 16=6\cdot (10+6)=6\cdot 10+6\cdot 6=60+36=96} Thus, to calculate 6 ⋅ 16 {\displaystyle 6\cdot 16} in one's head, one first multiplies 6 ⋅ 10 {\displaystyle 6\cdot 10} and 6 ⋅ 6 {\displaystyle 6\cdot 6} and add the intermediate results. Written multiplication is also based on the distributive law. Second example (with variables) 3 a 2 b ⋅ (4 a − 5 b) = 3 a 2 b ⋅ 4 a − 3 a 2 b ⋅ 5 b = 12 a 3 b − 15 a 2 b 2 {\displaystyle 3a^{2}b\cdot (4a-5b)=3a^{2}b\cdot 4a-3a^{2}b\cdot 5b=12a^{3}b-15a^{2}b^{2}} Third example (with two sums) (a + b) ⋅ (a − b) = a ⋅ (a − b) + b ⋅ (a − b) = a 2 − a b + b a − b 2 = a 2 − b 2 = (a + b) ⋅ a − (a + b) ⋅ b = a 2 + b a − a b − b 2 = a 2 − b 2 {\displaystyle {\begin{aligned}(a+b)\cdot (a-b)&=a\cdot (a-b)+b\cdot (a-b)=a^{2}-ab+ba-b^{2}=a^{2}-b^{2}\\&=(a+b)\cdot a-(a+b)\cdot b=a^{2}+ba-ab-b^{2}=a^{2}-b^{2}\\\end{aligned}}} Here the distributive law was applied twice, and it does not matter which bracket is first multiplied out. Fourth exampleHere the distributive law is applied the other way around compared to the previous examples. Consider 12 a 3 b 2 − 30 a 4 b c + 18 a 2 b 3 c 2 . {\displaystyle 12a^{3}b^{2}-30a^{4}bc+18a^{2}b^{3}c^{2}\,.} Since the factor 6 a 2 b {\displaystyle 6a^{2}b} occurs in all summands, it can be factored out. That is, due to the distributive law one obtains 12 a 3 b 2 − 30 a 4 b c + 18 a 2 b 3 c 2 = 6 a 2 b (2 a b − 5 a 2 c + 3 b 2 c 2) . {\displaystyle 12a^{3}b^{2}-30a^{4}bc+18a^{2}b^{3}c^{2}=6a^{2}b\left(2ab-5a^{2}c+3b^{2}c^{2}\right).} The distributive law is valid for matrix multiplication. More precisely, (A + B) ⋅ C = A ⋅ C + B ⋅ C {\displaystyle (A+B)\cdot C=A\cdot C+B\cdot C} for all l × m {\displaystyle l\times m} -matrices A , B {\displaystyle A,B} and m × n {\displaystyle m\times n} -matrices C , {\displaystyle C,} as well as A ⋅ (B + C) = A ⋅ B + A ⋅ C {\displaystyle A\cdot (B+C)=A\cdot B+A\cdot C} for all l × m {\displaystyle l\times m} -matrices A {\displaystyle A} and m × n {\displaystyle m\times n} -matrices B , C . {\displaystyle B,C.} Because the commutative property does not hold for matrix multiplication, the second law does not follow from the first law. In this case, they are two different laws. Multiplication of ordinal numbers, in contrast, is only left-distributive, not right-distributive. The cross product is left- and right-distributive over vector addition, though not commutative. The union of sets is distributive over intersection, and intersection is distributive over union. Logical disjunction ("or") is distributive over logical conjunction ("and"), and vice versa. For real numbers (and for any totally ordered set), the maximum operation is distributive over the minimum operation, and vice versa: max (a , min (b , c)) = min (max (a , b) , max (a , c)) and min (a , max (b , c)) = max (min (a , b) , min (a , c)) . {\displaystyle \max(a,\min(b,c))=\min(\max(a,b),\max(a,c))\quad {\text{ and }}\quad \min(a,\max(b,c))=\max(\min(a,b),\min(a,c)).} For integers, the greatest common divisor is distributive over the least common multiple, and vice versa: gcd (a , lcm (b , c)) = lcm (gcd (a , b) , gcd (a , c)) and lcm (a , gcd (b , c)) = gcd (lcm (a , b) , lcm (a , c)) . {\displaystyle \gcd(a,\operatorname {lcm} (b,c))=\operatorname {lcm} (\gcd(a,b),\gcd(a,c))\quad {\text{ and }}\quad \operatorname {lcm} (a,\gcd(b,c))=\gcd(\operatorname {lcm} (a,b),\operatorname {lcm} (a,c)).} For real numbers, addition distributes over the maximum operation, and also over the minimum operation: a + max (b , c) = max (a + b , a + c) and a + min (b , c) = min (a + b , a + c) . {\displaystyle a+\max(b,c)=\max(a+b,a+c)\quad {\text{ and }}\quad a+\min(b,c)=\min(a+b,a+c).} For binomial multiplication, distribution is sometimes referred to as the FOIL Method[2] (First terms a c , {\displaystyle ac,} Outer a d , {\displaystyle ad,} Inner b c , {\displaystyle bc,} and Last b d {\displaystyle bd}) such as: (a + b) ⋅ (c + d) = a c + a d + b c + b d . {\displaystyle (a+b)\cdot (c+d)=ac+ad+bc+bd.} In all semirings, including the complex numbers, the quaternions, polynomials, and matrices, multiplication distributes over addition: u (v + w) = u v + u w , (u + v) w = u w + v w . {\displaystyle u(v+w)=uv+uw,(u+v)w=uw+vw.} In all algebras over a field, including the octonions and other non-associative algebras, multiplication distributes over addition. Transformation rules Propositional calculus Rules of inference (List) Implication introduction / elimination (modus ponens) Biconditional introduction / elimination Conjunction introduction / elimination Disjunction introduction / elimination Disjunctive / hypothetical syllogism Constructive / destructive dilemma Absorption / modus tollens / modus ponendo tollens Modus non excipiens Negation introduction Rules of replacement Associativity Commutativity Distributivity Double negation De Morgan's laws Transposition Material implication Exportation Tautology Predicate logic Rules of inference Universal generalization / instantiation Existential generalization / instantiation vte In standard truth-functional propositional logic, distribution[3][4] in logical proofs uses two valid rules of replacement to expand individual occurrences of certain logical connectives, within some formula, into separate applications of those connectives across subformulas of the given formula. The rules are (P ∧ (Q ∨ R)) ⇔ ((P ∧ Q) ∨ (P ∧ R)) and (P ∨ (Q ∧ R)) ⇔ ((P ∨ Q) ∧ (P ∨ R)) {\displaystyle (P\land (Q\lor R))\Leftrightarrow ((P\land Q)\lor (P\land R))\qquad {\text{ and }}\qquad (P\lor (Q\land R))\Leftrightarrow ((P\lor Q)\land (P\lor R))} where " ⇔ {\displaystyle \Leftrightarrow } ", also written ≡ , {\displaystyle \,\equiv ,\,} is a metalogical symbol representing "can be replaced in a proof with" or "is logically equivalent to". Distributivity is a property of some logical connectives of truth-functional propositional logic. The following logical equivalences demonstrate that distributivity is a property of particular connectives. The following are truth-functional tautologies. (P ∧ (Q ∨ R)) ⇔ ((P ∧ Q) ∨ (P ∧ R)) Distribution of conjunction over disjunction (P ∨ (Q ∧ R)) ⇔ ((P ∨ Q) ∧ (P ∨ R)) Distribution of disjunction over conjunction (P ∧ (Q ∧ R)) ⇔ ((P ∧ Q) ∧ (P ∧ R)) Distribution of conjunction over conjunction (P ∨ (Q ∨ R)) ⇔ ((P ∨ Q) ∨ (P ∨ R)) Distribution of disjunction over disjunction (P → (Q → R)) ⇔ ((P → Q) → (P → R)) Distribution of implication (P → (Q ↔ R)) ⇔ ((P → Q) ↔ (P → R)) Distribution of implication over equivalence (P → (Q ∧ R)) ⇔ ((P → Q) ∧ (P → R)) Distribution of implication over conjunction (P ∨ (Q ↔ R)) ⇔ ((P ∨ Q) ↔ (P ∨ R)) Distribution of disjunction over equivalence {\displaystyle {\begin{alignedat}{13}&(P&&\;\land &&(Q\lor R))&&\;\Leftrightarrow \;&&((P\land Q)&&\;\lor (P\land R))&&\quad {\text{ Distribution of }}&&{\text{ conjunction }}&&{\text{ over }}&&{\text{ disjunction }}\\&(P&&\;\lor &&(Q\land R))&&\;\Leftrightarrow \;&&((P\lor Q)&&\;\land (P\lor R))&&\quad {\text{ Distribution of }}&&{\text{ disjunction }}&&{\text{ over }}&&{\text{ conjunction }}\\&(P&&\;\land &&(Q\land R))&&\;\Leftrightarrow \;&&((P\land Q)&&\;\land (P\land R))&&\quad {\text{ Distribution of }}&&{\text{ conjunction }}&&{\text{ over }}&&{\text{ conjunction }}\\&(P&&\;\lor &&(Q\lor R))&&\;\Leftrightarrow \;&&((P\lor Q)&&\;\lor (P\lor R))&&\quad {\text{ Distribution of }}&&{\text{ disjunction }}&&{\text{ over }}&&{\text{ disjunction }}\\&(P&&\to &&(Q\to R))&&\;\Leftrightarrow \;&&((P\to Q)&&\to (P\to R))&&\quad {\text{ Distribution of }}&&{\text{ implication }}&&{\text{ }}&&{\text{ }}\\&(P&&\to &&(Q\leftrightarrow R))&&\;\Leftrightarrow \;&&((P\to Q)&&\leftrightarrow (P\to R))&&\quad {\text{ Distribution of }}&&{\text{ implication }}&&{\text{ over }}&&{\text{ equivalence }}\\&(P&&\to &&(Q\land R))&&\;\Leftrightarrow \;&&((P\to Q)&&\;\land (P\to R))&&\quad {\text{ Distribution of }}&&{\text{ implication }}&&{\text{ over }}&&{\text{ conjunction }}\\&(P&&\;\lor &&(Q\leftrightarrow R))&&\;\Leftrightarrow \;&&((P\lor Q)&&\leftrightarrow (P\lor R))&&\quad {\text{ Distribution of }}&&{\text{ disjunction }}&&{\text{ over }}&&{\text{ equivalence }}\\\end{alignedat}}} Double distribution ((P ∧ Q) ∨ (R ∧ S)) ⇔ (((P ∨ R) ∧ (P ∨ S)) ∧ ((Q ∨ R) ∧ (Q ∨ S))) ((P ∨ Q) ∧ (R ∨ S)) ⇔ (((P ∧ R) ∨ (P ∧ S)) ∨ ((Q ∧ R) ∨ (Q ∧ S))) {\displaystyle {\begin{alignedat}{13}&((P\land Q)&&\;\lor (R\land S))&&\;\Leftrightarrow \;&&(((P\lor R)\land (P\lor S))&&\;\land ((Q\lor R)\land (Q\lor S)))&&\\&((P\lor Q)&&\;\land (R\lor S))&&\;\Leftrightarrow \;&&(((P\land R)\lor (P\land S))&&\;\lor ((Q\land R)\lor (Q\land S)))&&\\\end{alignedat}}} In approximate arithmetic, such as floating-point arithmetic, the distributive property of multiplication (and division) over addition may fail because of the limitations of arithmetic precision. For example, the identity 1 / 3 + 1 / 3 + 1 / 3 = (1 + 1 + 1) / 3 {\displaystyle 1/3+1/3+1/3=(1+1+1)/3} fails in decimal arithmetic, regardless of the number of significant digits. Methods such as banker's rounding may help in some cases, as may increasing the precision used, but ultimately some calculation errors are inevitable. Distributivity is most commonly found in semirings, notably the particular cases of rings and distributive lattices. A semiring has two binary operations, commonly denoted + {\displaystyle \,+\,} and ∗ , {\displaystyle \,*,\,} and requires that ∗ {\displaystyle \,*\,} must distribute over + . {\displaystyle \,+.\,} A ring is a semiring with additive inverses. A lattice is another kind of algebraic structure with two binary operations, ∧ and ∨ . {\displaystyle \,\land {\text{ and }}\lor .\,} If either of these operations distributes over the other (say ∧ {\displaystyle \,\land \,} distributes over ∨ {\displaystyle \,\lor \,}), then the reverse also holds (∨ {\displaystyle \,\lor \,} distributes over ∧ {\displaystyle \,\land \,}), and the lattice is called distributive. See also Distributivity (order theory). A Boolean algebra can be interpreted either as a special kind of ring (a Boolean ring) or a special kind of distributive lattice (a Boolean lattice). Each interpretation is responsible for different distributive laws in the Boolean algebra. Similar structures without distributive laws are near-rings and near-fields instead of rings and division rings. The operations are usually defined to be distributive on the right but not on the left. In several mathematical areas, generalized distributivity laws are considered. This may involve the weakening of the above conditions or the extension to infinitary operations. Especially in order theory one finds numerous important variants of distributivity, some of which include infinitary operations, such as the infinite distributive law; others being defined in the presence of only one binary operation, such as the according definitions and their relations are given in the article distributivity (order theory). This also includes the notion of a completely distributive lattice. In the presence of an ordering relation, one can also weaken the above equalities by replacing = {\displaystyle \,=\,} by either ≤ {\displaystyle \,\leq \,} or ≥ . {\displaystyle \,\geq .\,} Naturally, this will lead to meaningful concepts only in some situations. An application of this principle is the notion of sub-distributivity as explained in the article on interval arithmetic. In category theory, if (S , μ , ν) {\displaystyle (S,\mu ,\nu)} and (S ′ , μ ′ , ν ′) {\displaystyle \left(S^{\prime },\mu ^{\prime },\nu ^{\prime }\right)} are monads on a category C , {\displaystyle C,} a distributive law S . S ′ → S ′ . S {\displaystyle S.S^{\prime }\to S^{\prime }.S} is a natural transformation λ : S . S ′ → S ′ . S {\displaystyle \lambda :S.S^{\prime }\to S^{\prime }.S} such that (S ′ , λ) {\displaystyle \left(S^{\prime },\lambda \right)} is a lax map of monads S → S {\displaystyle S\to S} and (S , λ) {\displaystyle (S,\lambda)} is a colax map of monads S ′ → S ′ . {\displaystyle S^{\prime }\to S^{\prime }.} This is exactly the data needed to define a monad structure on S ′ . S {\displaystyle S^{\prime }.S} : the multiplication map is S ′ μ . μ ′ S 2 . S ′ λ S {\displaystyle S^{\prime }\mu .\mu ^{\prime }S^{2}.S^{\prime }\lambda S} and the unit map is η ′ S . η . {\displaystyle \eta ^{\prime }S.\eta .} See: distributive law between monads. A generalized distributive law has also been proposed in the area of information theory. The ubiquitous identity that relates inverses to the binary operation in any group, namely (x y) − 1 = y − 1 x − 1 , {\displaystyle (xy)^{-1}=y^{-1}x^{-1},} which is taken as an axiom in the more general context of a semigroup with involution, has sometimes been called an antidistributive property (of inversion as a unary operation).[5] In the context of a near-ring, which removes the commutativity of the additively written group and assumes only one-sided distributivity, one can speak of (two-sided) distributive elements but also of antidistributive elements. The latter reverse the order of (the non-commutative) addition; assuming a left-nearring (i.e. one which all elements distribute when multiplied on the left), then an antidistributive element a {\displaystyle a} reverses the order of addition when multiplied to the right: (x + y) a = y a + x a . {\displaystyle (x+y)a=ya+xa.} [6] In the study of propositional logic and Boolean algebra, the term antidistributive law is sometimes used to denote the interchange between conjunction and disjunction when implication factors over them:[7] (a ∨ b) ⇒ c ≡ (a ⇒ c) ∧ (b ⇒ c) {\displaystyle (a\lor b)\Rightarrow c\equiv (a\Rightarrow c)\land (b\Rightarrow c)} (a ∧ b) ⇒ c ≡ (a ⇒ c) ∨ (b ⇒ c) . {\displaystyle (a\land b)\Rightarrow c\equiv (a\Rightarrow c)\lor (b\Rightarrow c).} These two tautologies are a direct consequence of the duality in De Morgan's laws. ^ Distributivity of Binary Operations from Mathonline ^ Kim Steward (2011) Multiplying Polynomials from Virtual Math Lab at West Texas A&M University ^ Elliott Mendelson (1964) Introduction to Mathematical Logic, page 21, D. Van Nostrand Company ^ Alfred Tarski (1941) Introduction to Logic, page 52, Oxford University Press ^ Chris Brink; Wolfram Kahl; Gunther Schmidt (1997). Relational Methods in Computer Science. Springer. p. 4. ISBN 978-3-211-82971-4. ^ Celestina Cotti Ferrero; Giovanni Ferrero (2002). Nearrings: Some Developments Linked to Semigroups and Groups. Kluwer Academic Publishers. pp. 62 and 67. ISBN 978-1-4613-0267-4. ^ Eric C.R. Hehner (1993). A Practical Theory of Programming. Springer Science & Business Media. p. 230. ISBN 978-1-4419-8596-5. Look up distributivity in Wiktionary, the free dictionary. A demonstration of the Distributive Law for integer arithmetic (from cut-the-knot) Retrieved from " You are here: Home → Worksheets → Simplify expressions With this worksheet generator, you can make printable worksheets for simplifying variable expressions for pre-algebra and algebra 1 courses. The worksheets can be made either as PDF or html files (the latter are editable in a word processor). 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(Good reads include Students' Awareness of Distributive Property, Exploring Distributive Property, and Distributive Property Template) The distributive property of multiplication can come in two different methods, which are called the distributive property of multiplication over subtraction or the distributive property of multiplication over addition. The difference between both types of distributive properties is the operation of the numbers in the brackets. You can easily visualize both types by using this example, x(y+z) = xy + xz (Distributive property of multiplication over addition) and x(y-z) = xy – xz. (the distributive property of multiplication over subtraction) You can use any of the Distributive property worksheets, distributive lesson plans, and distributive property lesson reviews on the links above to practice this property. Begin by writing the whole equation on a piece of paper or digital note-taking software. This will help you create a visual representation of the whole equation and will help you distribute the number. You must distribute the number from the outside of the brackets to the numbers inside the bracket. For example, if the equation is 0 = 8(2x + 9) then the resulting equation should look like 0 = (8(2x) + 8(9)). To distribute the outside number inside the bracketed numbers, you must multiply the said outside number with all the numbers inside the brackets. Using the same example, it would result in the equation of 0 = 16x + 72. After you have finished all the steps above in the equation, you must simplify and solve the new equation. Using the example above, we can solve it by moving 16x to the other side of the equation resulting in -16x = 72. By isolating the unknown number, we can obtain its value by dividing both sides of the equation by -16, resulting in x = 72/-16. Afterward, all that is left is to simplify the equation, which gives us x = (-4.5). FAQs The distributive property of integers has a lot of real-life applications. This is possible because the distributive property of integers presents itself as a shortcut in mental mathematics. One can use the distributive property of multiplication to help create an easy summation of the income obtained from rent. Another practical use of the distributive property is via the summation of the costs incurred by the creation of the pilot's uniform. There are four properties of integers, and these are commutative, associative, identity, and distributive properties of the integer. People can apply the four properties of integers to the mathematical operations of addition and multiplication. The distributive property of an integer is the property that denotes the ability of a specific number to be distributed to a mathematical equation or expression in a closed bracket. The associative property of the integer, on the other hand, expresses that the position of the number in the equation is unimportant and will not affect the final answer. The distributive property of integers is a subtype of the properties of integers. This property helps us understand the number's ability to be distributed amongst other equations or numbers in a bracket. The Distributive Property is a great tool to help students simplify expressions and equations. The Distributive Property, while a simple concept for students to understand, often causes many simple mistakes when used in equations. Students frequently forget to distribute to all of the terms in an expression, or the presence of negative signs and subtraction signs confuse them. These free algebra worksheets are designed to alleviate these issues. At first students will practice using the distributive property with simple equations that contain addition and positive integers. As they work their way through the Solving Equations with The Distributive Property Worksheets set, students will become more confident working with subtraction and negative numbers. Like all of our worksheets at www.imathworksheets.com, these problems include answers keys, step-by-step examples, and plenty of space for students to show their work. Enjoy! Solving Equations with the Distributive Property 1– This 12 problem worksheet is designed to introduce you to solving equations that have contain the Distributive Property. Only positive whole numbers are featured in the equations and all of the answers are positive as well. A few of the equations are two-step equations, but most are three-step equations similar to "4(3x + 2) = 68″ Solving Equations with the Distributive Property 1 RTF Solving Equations with the Distributive Property 1 PDF Preview Solving Equations with the Distributive Property 1 in Your Browser View Answers Solving Equations with the Distributive Property 2– This 12 problem worksheet is designed to introduce you to solving equations that contain the Distributive Property. All of these problems include subtraction in the equation, but students will only deal with positive numbers and positive answers. No fractions or decimals yet. The typical problem looks like this: "5(2x – 10) = 30″. Solving Equations with the Distributive Property 2 RTF Solving Equations with the Distributive Property 2 PDF Preview Solving Equations with the Distributive Property 2 in Your Browser View Answers Solving Equations with the Distributive Property 3– This 12 problem worksheet features some challenging equations. Some of the answers will be decimals, some will be negative, and some answers will be negative decimals. The examples should help guide you through the process of solving equations like "3(4x + 3) + 4 = 31″. Solving Equations with the Distributive Property 3 RTF Solving Equations with the Distributive Property 3 PDF Preview Solving Equations with the Distributive Property 3 in Your Browser View Answers One stop for learning fun!Games, activities, lessons - it's all here!Explore All According to the distributive property, multiplying the sum of two or more addends by a number will give the same result as multiplying each addend individually by the number and then adding the products together. To "distribute" means to divide something or give a share or part of something. So what does distributive property mean in math? The distributive property describes how we can distribute multiplication over addition and subtraction. Distributive Property Formula (Bold) According to the distributive property, an expression of the form $A (B + C)$ can be solved as $A (B + C) = AB + AC$. 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Consider these distributive property examples below. We can verify the distributive property by solving both LHS and RHS. Example: Solve the expression $2 (4 \;-\; 3)$. Using the distributive law of multiplication over subtraction, we have $2 \times (4 \;-\; 3) = (2 \times 4) \;-\; 2 \times 3 = 8 \;-\; 6 = 2$ Again, if we try to solve the expression with the order of operations or PEMDAS, we'll have to subtract the numbers in parentheses, then multiply the difference with the number outside the parentheses, which implies: $2 \times (4 \;-\; 3)=2 \times 1 = 2$ The distributive property of subtraction is verified since both techniques give the same result. There are three simple steps to use the distributive property. Step 1: Distribute the multiplier (the number outside the parentheses). Step 2: Find the individual products. Step 3: Add or subtract. Let's understand how to use the distributive property with the help of examples. Examples of distributive property of multiplication over addition and subtraction: Example 1: Solve the expression: $6 \times (20 + 5)$ using the distributive property of multiplication over addition. Let's use the property to calculate the expression $6 \times (20 + 5)$, the number 6 is spread across the two addends. To put it simply, we multiply each addend by 6 and then the products can be added. $6 \times 20 + 6 \times 5 = 120 + 30 = 150$ Example 2: Solve the expression $2 \times (2 + 4)$ using the distributive law of multiplication over addition. $2 \times (2 + 4) = 2 \times 2 + 2 \times 4 = 4 + 8 = 12$ If we try to solve this expression using the PEMDAS rule, we'll have to add the numbers in parentheses and then multiply the total by the number outside the parentheses. This implies: $2 (2 + 4) = 2 \times 6 = 12$ Thus, we get the same result irrespective of the method used. 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Solution: Using the distributive property, $A (B \;–\; C) = AB \;–\; AC$ $\;–\;2 (\;–\;x \;–\; 7) = (\;–\;2)(\;–\;x) \;–\; (\;–\;2)(7)$ $= 2x \;–\; (\;–\;14)$ $= 2x + 14$ Example 3: Which property does the equation $3 (4 \;–\; 9) = (3 \times 4) \;–\; (3 \times 9)$ show? Solution: Given equation: $3 (4 \;–\; 9) = (3 \times 4) \;–\; (3 \times 9)$ Comparing it with the distributive property formula for multiplication over subtraction $A (B \;–\; C) = AB \;–\; AC$, we get that the above equation shows the distributive property of multiplication over subtraction. 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Does distributive property apply to division too? The distributive property applies to division in the same way that it applies to multiplication. However, the concept of "breaking apart" or "distributing" can be applied with division only by dividing the numerator into smaller amounts that are exactly divisible by the divisor. For example, to solve $\frac{125}{5}$, we can divide the numerator(125) as: (50 + 50 + 25) therefore:$\frac{125}{5}$ = $\frac{50}{5}$ + $\frac{50}{5}$ + $\frac{25}{5}$ = 10 + 10 + 5 = 25. What is the rule for the distributive property? According to the distributive property, multiplying the sum of two or more addends by a number produces the same result as when each addend is multiplied individually by the number and the products are added together. How can distributive property help in solving complex questions? The distributive property distributes complex expressions into simpler terms and thus makes problems, especially with multiple factors, easier to solve. Can parentheses be removed after distributing? Yes, when applying the distributive property, the outside factor is multiplied by each term inside the parentheses. This gets rid of parentheses. How do we use the distributive property with equations? We can use the distributive property either to expand terms in a given expression or equation or to simplify it based on the requirement. There are five sets of simplifying expressions worksheets: Examples, solutions, videos, and worksheets to help Grade 6 and Grade 7 students learn how to simplify an expression by using the distributive property. How to use the distributive property to simplify an expression? There are three sets of using distributive property to simplify an expression worksheets. Simplify Expressions using Distributive Property (One Variable) Simplify Expressions using Distributive Property (Two Variables) Simplify Expressions using Distributive Property (Include Combine Like Terms) The distributive property is a mathematical rule that states that when a number is multiplied by a sum, the product is the same as multiplying each of the addends by the number and then adding the products together. Steps on how to use the distributive property to simplify an expression: Identify the value outside the parentheses. This is the value to be distributed to the other terms in the expression. Multiply the value outside the parentheses by each of the terms inside the parentheses. Combine the terms that were created by the multiplication. Simplify the expression if necessary. Example: Expression: 5(x + 2) Distribute the 5: 5 × x = 5x 5 × 2 = 10 Combine the terms: 5x + 10 Example: Expression: -3(2x - 5y) Distribute the -3: -3 × 2x = -6x -3 × -5y = 15y Combine the terms: -6x + 15y Example: Expression: -3(2x - 5y) + 3x Distribute the -3: -3 × 2x = -6x -3 × -5y = 15y Combine the terms: -6x + 15y + 3x Simplify the expression: -3x + 15y Have a look at this video if you need to review how to use the distributive property to simplify an expression. Simplifying expressions using the distributive property Click on the following worksheet to get a printable pdf document. Scroll down the page for more Distributive Property Worksheets. More Distributive Property Worksheets Printable (Answers on the second page.) Distributive Property Worksheet #1 (one variable) Distributive Property Worksheet #2 (two variables) Distributive Property Worksheet #3 (include combine like terms) Online or Generated Evaluate Expressions by Substitution Simplify Expressions by Combining Like Terms Simplify Expressions using Distributive Property Use Distributive Property & Combine Like Terms Solving Equations using Distributive Property Solving Equations by Combining like terms More Printable Worksheets Try out our new and fun Fraction Concoction Game. Add and subtract fractions to make exciting fraction concoctions following a recipe. There are four levels of difficulty: Easy, medium, hard and insane. Practice the basics of fraction addition and subtraction or challenge yourself with the insane level. We welcome your feedback, comments and questions about this site or page. Please submit your feedback or enquiries via our Feedback page. 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