Math 303

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1. (a) $3 \cdot \boxed{5} = 15$ (b) $18 = 6 + 3 \cdot \boxed{4}$ (c) $\square \cdot (5+6) = \square \cdot 5 + \square \cdot 6$

Any whole number will work. This is the Distributi
Property of Multiplication over Addit

2. The sets must be equal.

3. (a) Yes, since $0 \cdot 0 = 0$, $0 \cdot 1 = 0$, $1 \cdot 1 = 1$

(b) Yes, $(2n)(2m) = 2(2nm)$ where n and m are whole numbers.

(c) Yes, $(3n-2)(3m-2) = 9mn - 6n - 6m + 4$

$= 9mn - 6n - 6m + 6 - 2$

$= 3(3mn - 2n - 2m + 2) - 2$

where n and m are whole numbers.

4. (a) No, $2 + 3 = 5$.

(b) Yes, since 5 is a prime the only factors of 5 are $1 + 5$.

(c) Not closed for addition since $2 + 4 = 6$.

Not closed for multiplication since $2 \cdot 3 = 6$.

5. (a) $(a+b)(c+d) = (a+b) \cdot c + (a+b) \cdot d$

$= ac + bc + ad + bd$

(b) $\square(\Delta + O) = \square \cdot \Delta + \square \cdot O$

(c) $a(b+c) - ab = ab + ac - ab$

$= ac$

7. (a) $xy + y^2 = xy + y \cdot y$

$= yx + y \cdot y$

$= y(x+y)$

(b) $xy + x = xy + x \cdot 1$

$= x(y+1)$

(c) $a^2b + ab^2 = a \cdot ab + ab \cdot b$

$= ab \cdot a + ab \cdot b$

$= ab(a+b)$

9. Model with a tree diagram

$6 \cdot 4 \cdot 3 = 72$

There are 72 different shirt-pant-vest outfits possible.

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#10. (a) Associative Property of Multiplication of Whole Numbers
(b) Commutative Property of Multiplication of Whole Numbers
(c) Commutative Property of Multiplication of Whole Numbers.
(d) Identity Property of Multiplication of Whole Numbers
(e) Zero Multiplication Property for Whole Numbers.
(f) Distributive Property of Multiplication over Addition of Whole Numbers.

11. (a) The closure property for multiplication of whole numbers says that the solution for $9 \cdot 7$ must be unique.
(b) Zero property for multiplication of whole numbers
(c) Identity property of multiplication of whole numbers

12. (a) $6 \cdot 14 = 6(10+4)$ Place-value expanded form
$= (6 \cdot 10) + (6 \cdot 4)$ Distributive Property of Multi. over Add of Whole Nos.
$= 60 + 24$ Basic facts for multiplication
$= 84$ Basic facts for addition

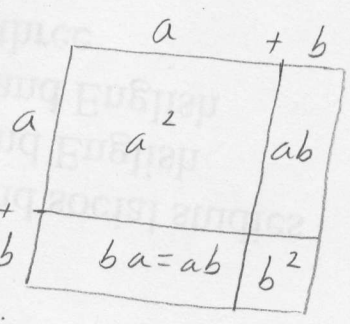
(b) $32 \cdot 12 = 32(10+2) = 320 + 64 = 384$
Think the above steps mentally.

13. (a) $9(10-2) = 9 \cdot 10 - 9 \cdot 2$
$= 90 - 18$
$= 72$

(b) $20(8-3) = 20 \cdot 8 - 20 \cdot 3$
$= 160 - 60$
$= 100$

14. (a) $(a+b)^2 = (a+b) \cdot (a+b)$
$= a \cdot (a+b) + b \cdot (a+b)$
$= a \cdot a + a \cdot b + b \cdot a + b \cdot b$
$= a^2 + ab + ab + b^2$
$= a^2 + 2ab + b^2$

(b)



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#16. (a) $(ab)c = a(bc)$ Associative Prop. of Multiplication
$= a(cb)$ Commutative Prop. of Multiplication
$= (ac)b$ Associative Prop. of Multiplication
$= (ca)b$ Commutative Prop. of Multiplication

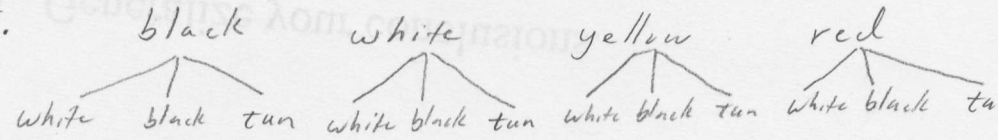
(b) $(a+b)c = c(a+b)$ Commutative Prop. of Multiplication
$= c(b+a)$ Commutative Prop. of Addition.

#17. (a) $xy - y^2 = yx - y \cdot y$
$= y(x-y)$

(b) $47 \cdot 101 - 47 = 47 \cdot 101 - 47 \cdot 1$
$= 47(101-1)$

(c) $ab^2 - ba^2 = ab \cdot b - b \cdot a \cdot a$
$= ab \cdot b - ab \cdot a$
$= ab(b-a)$

#25.



$4 \cdot 3 = 12$

There are 12 exterior-interior color schemes possible.

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#9. (a) $4 \cdot 3 = 12$ (b) $3 \cdot 7 = 21$

#10. (a) Zero Multiplication Property for Whole Numbers
(b) Commutative Property of Multiplication of Whole Numbers
(c) Commutative Property of Multiplication of Whole Numbers
(d) Identity Property of Multiplication of Whole Numbers
(e) Distributive Property of Multiplication over Addition of Whole Numbers
(f) Distributive Property of Multiplication over Addition of Whole Numbers.

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#5. Yes, for $x=1$ we have $1 \cdot 1 = 1$
and for $x=0$ we have $0 \cdot 0 = 0$.