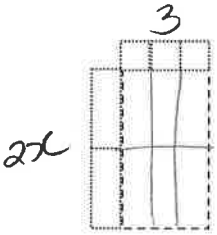
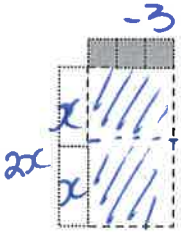
78. Write an equation represented by the diagram below and then multiply the two polynomials using the area model.



$(2x)(3)$

$= 6x$

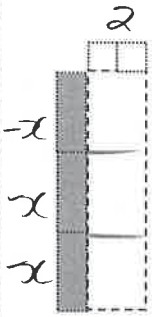
79. Write an equation represented by the diagram below and then multiply the two polynomials using the area model.



$(2x)(-3)$

$= -6x$

80. Write an equation represented by the diagram below and then multiply the two polynomials using the area model.

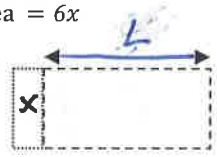


$(-3x)(2)$

$= -6x$

81. Write a quotient that can be represented by the diagram below and then find the missing side length using the area model.

Area $= 6x$



Length: 6

$A = L \cdot w$

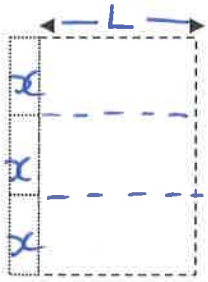
$\frac{6x}{x} = \frac{L \cdot x}{x}$

$\frac{6x}{x} = L$

$\therefore L = 6$

82. Write a quotient that can be represented by the diagram below and then find the missing side length using the area model.

Area $= 6x^2$



Length: $2x$

$A = L \cdot w$

$\frac{6x^2}{3x} = \frac{L \cdot 3x}{3x}$

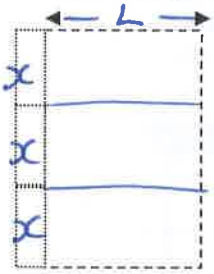
$\div 3 \quad \frac{6x^2}{3x} = L$

$\div 3$

$2x = L$

83. Write a quotient that can be represented by the diagram below and then find the missing side length using the area model.

Area $= -6x^2$



Length: $-2x$

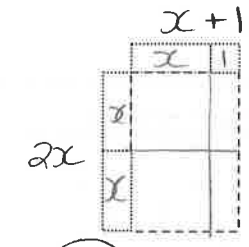
$A = L \cdot w$

$\frac{-6x^2}{3x} = \frac{L \cdot 3x}{3x}$

$-2x = L$

class example.

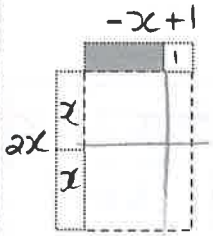
84. Write an equation represented by the diagram below and then multiply the two polynomials using the area model.



$2x(x+1)$

$2x^2 + 2x$

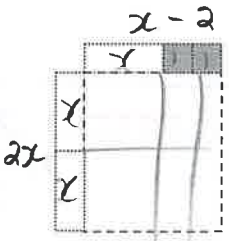
85. Write an equation represented by the diagram below and then multiply the two polynomials using the area model.



$2x(-x+1)$

$-2x^2 + 2x$

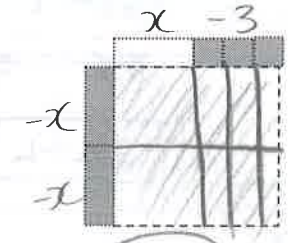
86. Write an equation represented by the diagram below and then multiply the two polynomials using the area model.



$2x(x-2)$

$2x^2 - 4x$

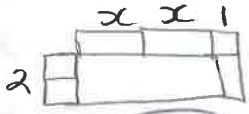
87. Write an equation represented by the diagram below and then multiply the two expressions using the area model.



$-2x(x-3)$

$-2x^2 + 6x$

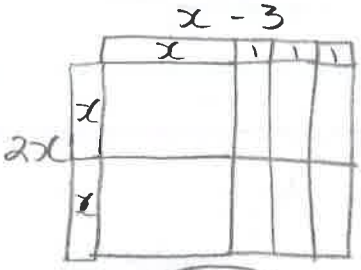
88. Draw and use an area model to find the product:
$(2)(2x+1)$



$(2)(2x+1)$

$4x + 4$

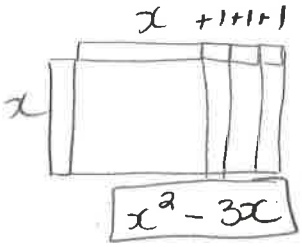
89. Draw and use an area model to find the product:
$(2x)(x-3)$



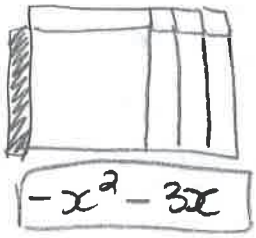
$(2x)(x-3)$

$2x^2 - 6x$

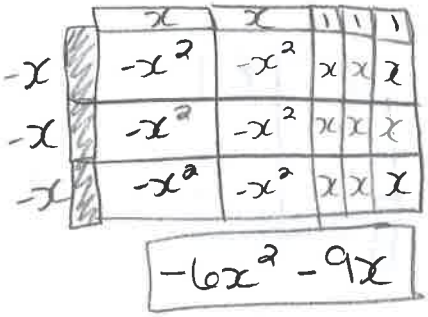
90. Draw and use an area model to find the product:
$(x)(x+3)$



91. Draw and use an area model to find the product:
$(-x)(x+3)$

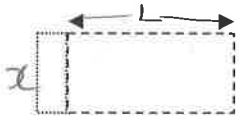


92. Draw and use an area model to find the product:
$(-3x)(2x+3)$



93. Write a quotient that can be represented by the diagram below and then find the missing side length using the area model.

Area $= x^2+3x$



$A = L \cdot w$

$\frac{x^2+3x}{x} = \frac{L \cdot x}{x}$

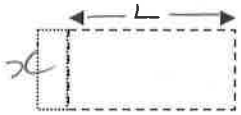
Length: $x+3$

$L = \frac{x^2+3x}{x}$

$L = x+3$

94. Write a quotient that can be represented by the diagram below and then find the missing side length using the area model.

Area $= -x^2-3x$



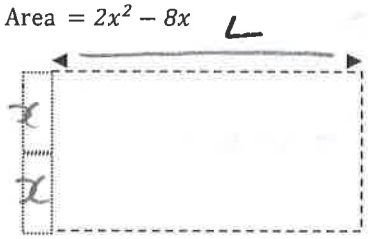
$A = L \cdot w$

$\frac{-x^2-3x}{x} = \frac{L \cdot x}{x}$

Length: $-x-3$

95. Write a quotient that can be represented by the diagram below and then find the missing side length using the area model.

Area $= 2x^2-8x$

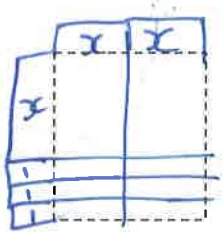


$A = L \cdot w$

$\frac{2x^2-8x}{2x} = \frac{L \cdot 2x}{2x}$

Length: x^2-4

96. Find the area, length and width that can be represented by the diagram.



Area: $2x^2+6x$

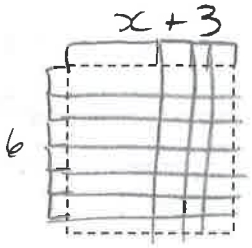
Length: $x+3$

Width: $2x$

$2x(x+3)$

$2x^2+6x$

97. Find the area, length and width that can be represented by the diagram.



Area: $6x+18$

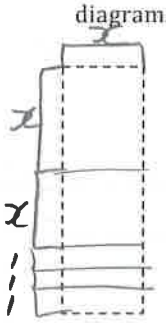
Length: 6

Width: $x+3$

$6(x+3)$

$6x+18$

98. Find the area, length and width that can be represented by the diagram.



Area: $2x^2+3x$

Length: $2x+3$

Width: x

$x(2x+3)$

$2x^2+3x$

Multiplying & Dividing Monomials without TILES

When multiplying expressions that have more than one variable or degrees higher than 2, algebra tiles are not as useful.

(monomial)(monomial)

Multiplying Monomials:

Eg.1.

$(2x^2)(7x)$

$= 2\times7\times x\times x^2$ Multiply numerical coefficients.

$= 14x^3$ Multiply variables using exponent laws.

Eg.2.

$(-4a^2b)(3ab^3)$

$= -4\times3\times a^2\times a\times b\times b^3$

$= -12a^3b^4$

① Multiply coefficients

② Exponent laws.

Dividing Monomials:

Eg.1.

$\frac{20x^3y^4}{-5x^2y^2}$

① Divide the numerical coefficients.

$= \frac{20}{-5}\frac{x^3}{x^2}\frac{y^4}{y^2}$

② Divide variables using exponent laws.

$= -4xy^2$

Eg.2.

$\frac{-36m^3n^4p^2}{-9m^3np}$

$= \frac{-36}{-9}\frac{m^3}{m^3}\frac{n^4}{n}\frac{p^2}{p}$

$= 4n^3p$

Revisit the exponent laws if ...needed

$a^m \cdot a^n = a^{m+n}$

$\frac{a^m}{a^n} = a^{m-n}$ | $(a^m)^n = a^{m\cdot n}$

Multiply or Divide the following.

99. $(-2ab^3)(-3ab^5)$

$-2\times-3\times a\times a\times b^3\times b^5$

$= 6a^2b^8$

100. $(5x^2y^3)(-2x^3y^5)$

$-10x^5y^8$

101. $4x(-3x^3)$

$-12x^4$

102. $\left(\frac{1}{2}ab^2\right)\left(\frac{3}{4}a^3b\right)$

$\frac{1}{2}\cdot\frac{3}{4}\cdot a\cdot a^3\cdot b^2\cdot b$

$\frac{3}{8}a^4b^3$

103. $\frac{-75t^5}{15t^2}$

$(-75\div15)t^{5-2}$

$-5t^3$

104. $\frac{-45x^3yz^2}{9x^2y}$

$5xz^2$

105. $\frac{24x^3y^2}{18xy^3}$ ÷6 ÷6

divide by HCF (6)

$\frac{4}{3}\cdot x^{3-1}\cdot y^{2-3}$

$\frac{4x^2}{3y}$

y^{-1} goes on bottom of fraction

106. $(2cd)(-2c^2d^3)(5c)$

$2\cdot-2\cdot5\cdot c\cdot d\cdot c^2\cdot d^3\cdot c$

$-20c^4d^4$

107. $\frac{(3xy)(4x^3y^2)}{2x^2y}$ *Top 1st

$\frac{12x^4y^3}{2x^2y}$

$6x^2y^2$

*FOIL → First outside, inside last
(binomial)(binomial)

Multiplying Binomials

Challenge:

108. Which of the following are equal to $x^2 + 9x + 18$? — multiplies to 18, adds to 9

a) $(x+3)(x+6)$
b) $(x+1)(x+18)$
c) $(x-3)(x-6)$
d) $(x+2)(x+9)$

Challenge:

109. Multiply $(2x+1)(x-5)$

$2x^2 - 10x + x - 5$

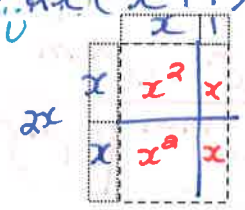
$2x^2 - 9x - 5$

① Expand
② Combine Like Terms

*Counting up the algebra tiles can help check your answer!! :)

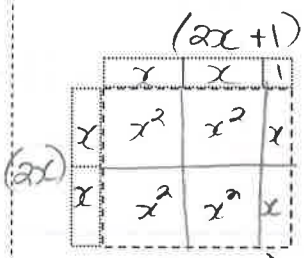
110. Write an equation represented by the diagram below and then multiply the two polynomials using the area model.

$2x(x+1)$



$2x^2 + 2x$

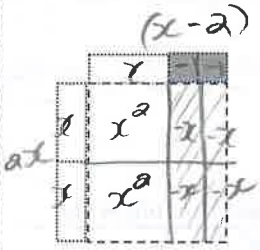
111. Write an equation represented by the diagram below and then multiply the two polynomials using the area model.



$2x(2x+1)$

$4x^2 + 2x$

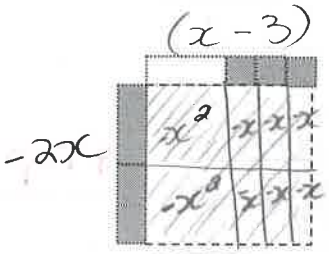
112. Write an equation represented by the diagram below and then multiply the two polynomials using the area model.



$2x(x-2)$

$2x^2 - 4x$

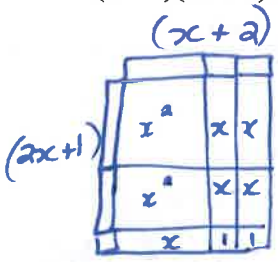
113. Write an equation represented by the diagram below and then multiply the two polynomials using the area model.



$-2x(x-3)$

$-2x^2 + 6x$

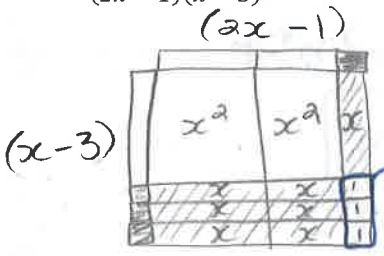
114. Draw and use an area model to find the product:
$(x+2)(2x+1)$



$(2x+1)(x+2)$

$2x^2 + 5x + 2$

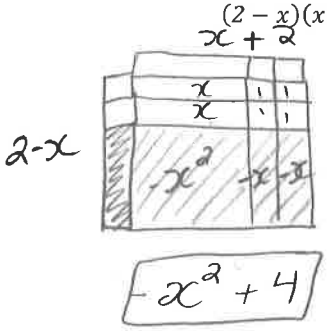
115. Draw and use an area model to find the product:
$(2x-1)(x-3)$



(-)(-) = (+)

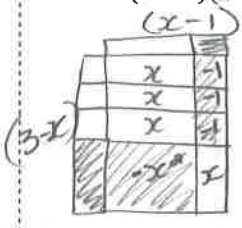
$2x^2 - 7x + 3$

116. Draw and use an area model to find the product:
$(2-x)(x+2)$



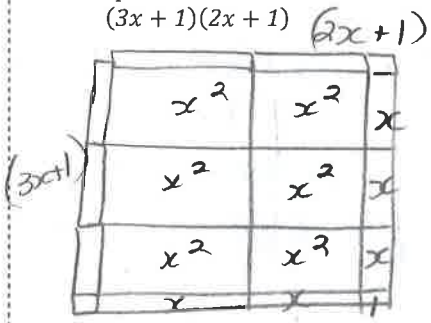
$-x^2+4$

117. Draw and use an area model to find the product:
$(3-x)(x-1)$



$-x^2+4x-3$

118. Draw and use an area model to find the product:
$(3x+1)(2x+1)$

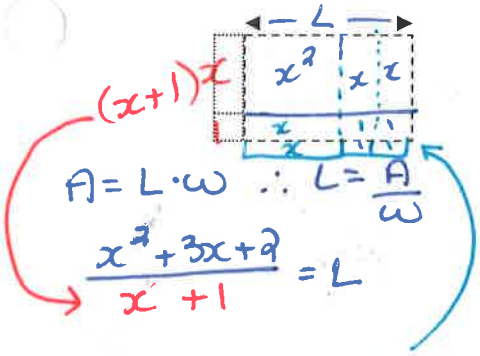


$6x^2+5x+1$

÷

119. Write a quotient that can be represented by the diagram below and then find the missing side length using the area model.

Area $= x^2+3x+2$



$A = L \cdot w \quad \therefore \quad L = \frac{A}{w}$

$\frac{x^2+3x+2}{x+1} = L$

Length: $x+2$

$(x+1)(x+2) = x^2+3x+2$

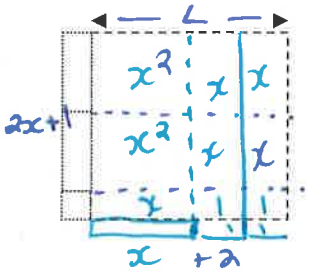
x^2

must add to 3x

must multiply to get 2

120. Write a quotient that can be represented by the diagram below and then find the missing side length using the area model.

Area $= 2x^2+5x+2$



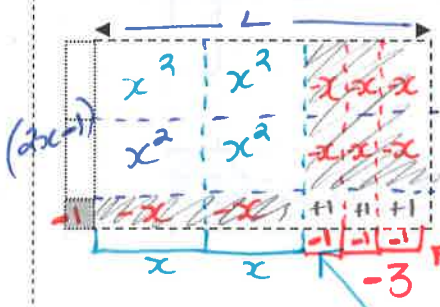
Length: $x+2$

$(2x+1)(x+2) = 2x^2+5x+2$

$2x^2$

121. Write a quotient that can be represented by the diagram below and then find the missing side length using the area model.

Area $= 4x^2-8x+3$



② fit in $-8x$.... also tells you that this must be -3

① write in $4x^2$ • tells you must be $x+x$ along side

Length: $2x-3$

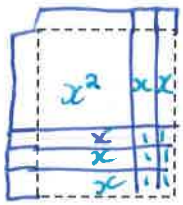
$(2x-1)(2x-3) = 4x^2-8x+3$

$4x^2-6x-2x+3$

✓ check.

Various → Answers.

122. Find the area, length and width that can be represented by the diagram.

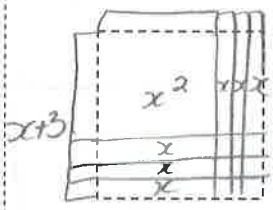


Area: x^2+5x+6

Length: $x+3$

Width: $x+2$

123. Find the area, length and width that can be represented by the diagram.

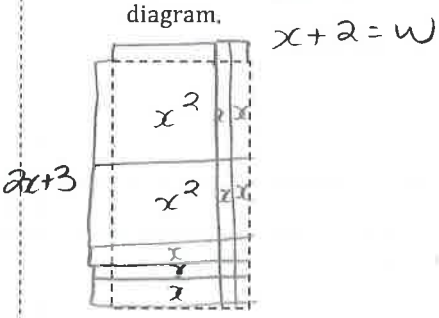


Area: x^2+6x+9

Length: $x+3$

Width: $x+3$

124. Find the area, length and width that can be represented by the diagram.

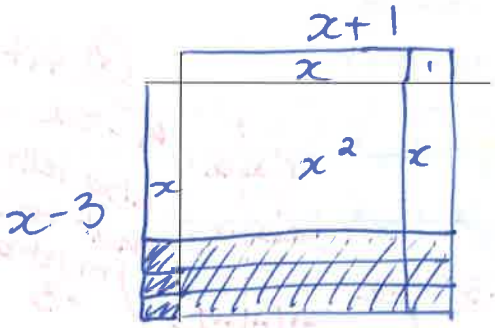


Area: $2x^2+7x+6$

Length: $2x+3$

Width: $x+2$

125. Draw tiles that represent the multiplication of $(x+1)(x-3)$.

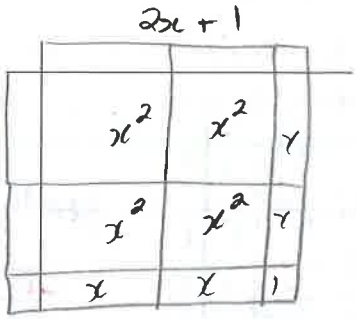


What is the product of $(x+1)(x-3)$?

$x^2-3x+x-3$

x^2-2x-3

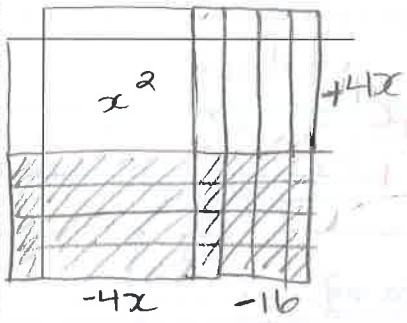
126. Draw tiles that represent the multiplication of $(2x+1)(2x+1)$.



What is the product of $(2x+1)(2x+1)$?

$4x^2+4x+1$

127. Draw tiles that represent the multiplication of $(x-4)(x+4)$.



What is the product of $(x-4)(x+4)$?

$x^2-4x+4x-16$

x^2-16