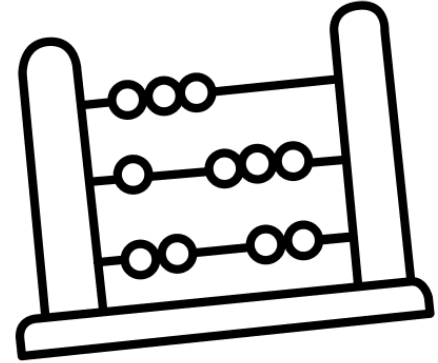


Wax soo saarka laba binomial (binomials)



Maths

Cutub: Tibaaxaha iyo Qaaciddada (Expressions and Formulae)

Natiijo

Waxaan isticmaali karaa sharciga qaybinta (distributive law) si aan u helo wax soo saarka laba binomial (binomials).

Erayada muhiimka ah

Sharciga qaybinta (distributive law) wuxuu sheegayaa in ku dhufashada wadar (sum) ay la mid tahay ku dhufashada mid kasta oo ka mid ah addends-ka (addends) iyo isku darka natiijada.

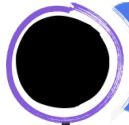
Erayo isku mid ah (Like terms) waa erayo leh isku variables (variables) iyo jibbaarada (exponents) u dhigma.

Wax soo saar qayb ah (partial product) waxaa loola jeedaa mid ka mid ah natiijooyinka ku dhufashada ee horseedaya natiijada guud ee ku dhufashada.

Binomial (binomial) waa tibaax aljabra (algebraic expression) oo matalaysa wadar (sum) ama kala-goyn (difference) laba eray oo aan isku mid ahayn.

Tusaalooyin ayaa lagu bixiyay darsiga.

Wax soo saarka laba binomial (binomials)



Sahminta wax soo saarka laba binomial (binomials)



Ku dhufashada binomials (binomials) si hufan

Binomial (binomial) waa tibaax aljabra (algebraic expression) oo matalaysa wadar (sum) laba eray oo aan isku mid ahayn.

Tusaalooyin

$$x + 2 \qquad 5x + 10y$$

$$5 - 6x \qquad xy + 150$$

$$x^2 - x \qquad a - 3b^3c$$

Tusaale ma aha (Non-examples)

$$x^2 + 3x + 2 \qquad 5x + 10y - 1$$

$$5xy \qquad 7x - 5x$$

$$\frac{1}{x + 2}$$

Waxaan isticmaali karnaa qaabka bedka (area model) si aan u sahamno waxa dhacaya marka aan ku dhufano laba binomial (binomials) wada jir.

Marka aan ku dhufano laba tiro oo 2-godoodle ah, waxaan u qori karnaa tiro kasta wadar (sum) qiimaha goobta (place value) ee godkeeda.

Tusaale ahaan: 12 waxaa loo qori karaa $10 + 2$

Xisaabta 12×13 waxaa loo qori karaa $(10 + 2) \times (10 + 3)$



Yacquub

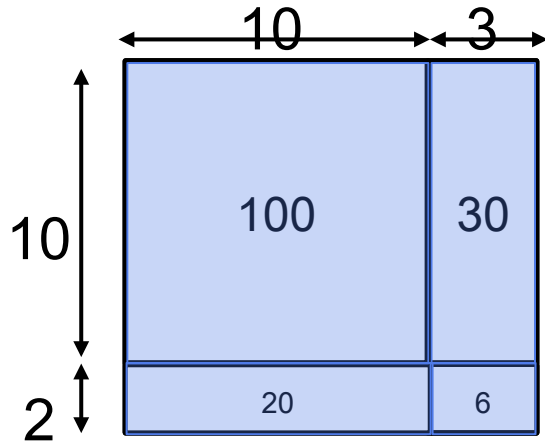
Taasi waa fududahay, jawaabtu waa
 $100 + 6 = 106$

Yacquub ma sax baa?

Maya, isku dhufashada tobannada (tens) iyo kowdaha (ones) ma helin natiijada (product) labada tiro.

Qawsyada (brackets) halkan waa muhiim, haddii kale isku dhufashadu (multiplication) waxay leedahay mudnaanta hawlgallada (priority of operations).

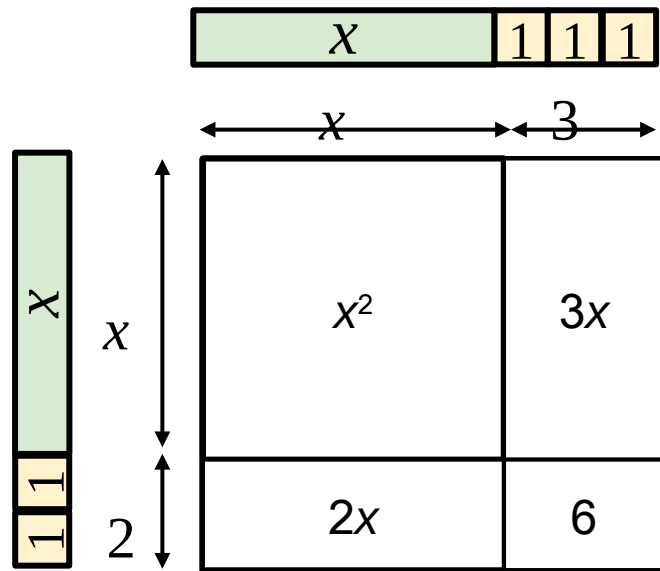
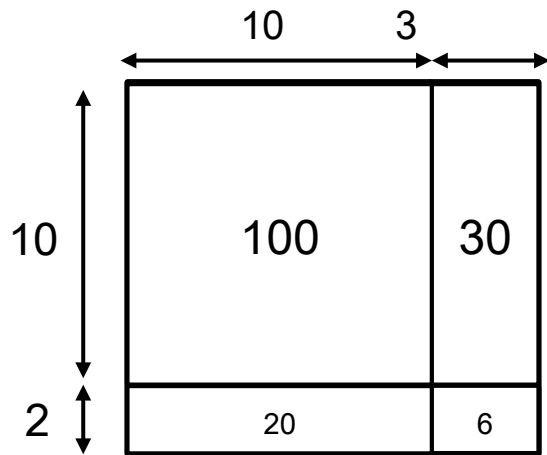
Qaabka bedka (area model) wuxuu naga caawin karaa inaan aragno halka Yacquub ku qaldamay.



$$\begin{aligned}12 \times 13 &= (10 + 2) \times (10 + 3) \\&= 10 \times 10 + 10 \times 3 + 2 \times 10 + 2 \times 3 \\&= 156\end{aligned}$$

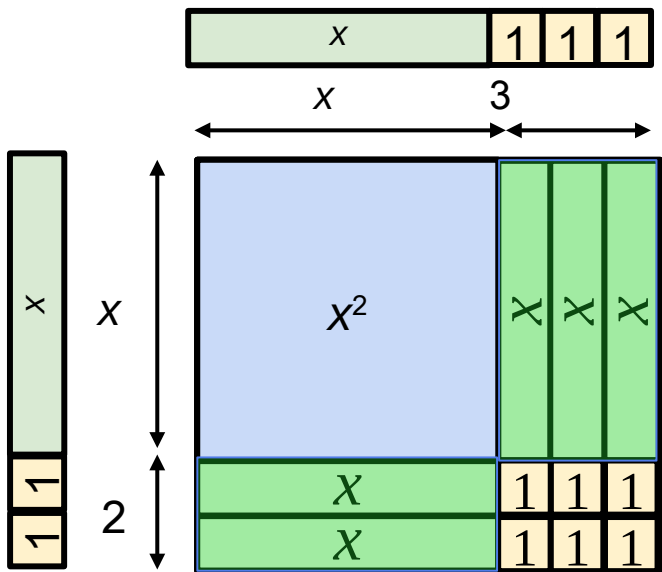
Qaababka bedka (area models) waa faa'iido markaan rabno inaan helno natijada (product) laba binomial sidoo kale:

Tusaale: $(x + 2) \times (x + 3)$



Qaababka bedka (area models) waa faa'iido markaan rabno inaan helno natiijada (product) laba binomial sidoo kale:

Tusaale: $(x + 2) \times (x + 3)$



Sideen u qori karnaa jawaabteena kama dambaysta ah?

$$(x + 2) \times (x + 3) \equiv x^2 + 3x + 2x + 6$$

Mararka qaarkood waxaan fududayn karnaa iyagoo soo ururinaya ereyada la midka ah (like terms). Ma jiraan ereyo la mid ah (like terms) qaabkayaga (model) ku jira?

$$x^2 + 3x + 2x + 6 \equiv x^2 + 5x + 6$$

Markaan qorno natijada (product) laba binomial, sida caadiga ah kuma qorno calaamadda isku dhufashada (multiplication sign) inta u dhaxaysa qawasyada (brackets)

$$(x + 3) \times (x + 1) \equiv (x + 3)(x + 1)$$

Isku dhufashada binomials-ka waxaan ku qoraynaa tibaaxaha (expression) qaab kale.

Qaabka cusub wuxuu muujinayaa tibaaxaha (expression) sida wadar (sum) ah oo ah ereyo (terms), halkii uu ahaan lahaa natijjo (product).

Qaabkan waxaan ugu yeeri karnaa qaabka la ballaariyay (expanded form).

Habka isku dhufashada binomials-ka mararka qaarkood waxaa loo yaqaan ballaarinta qawasyada (expanding the brackets).

Aan isku dayno qorista $(x + 3)(x + 1)$ qaab ballaaran.



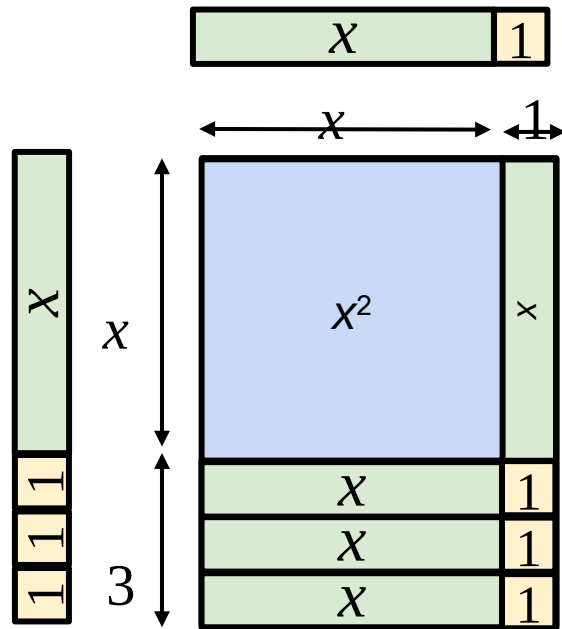
Yacquub

$$(x + 3)(x + 1) \equiv x^2 + 4x + 3$$

Waa fiicanyahay. Maxaa ka dhacaya haddii aan wax soo saarka u qorno si kale $(x + 1)(x + 3)$?

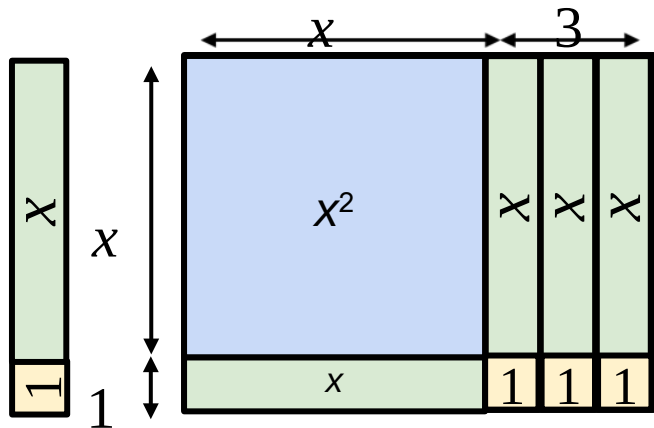


Layla



Sahminta wax soo saarka laba binomials

$$(x + 3)(x + 1) \equiv x^2 + 4x + 3$$



$$(x + 1)(x + 3) \equiv x^2 + 4x + 3$$

Waa isku mid!

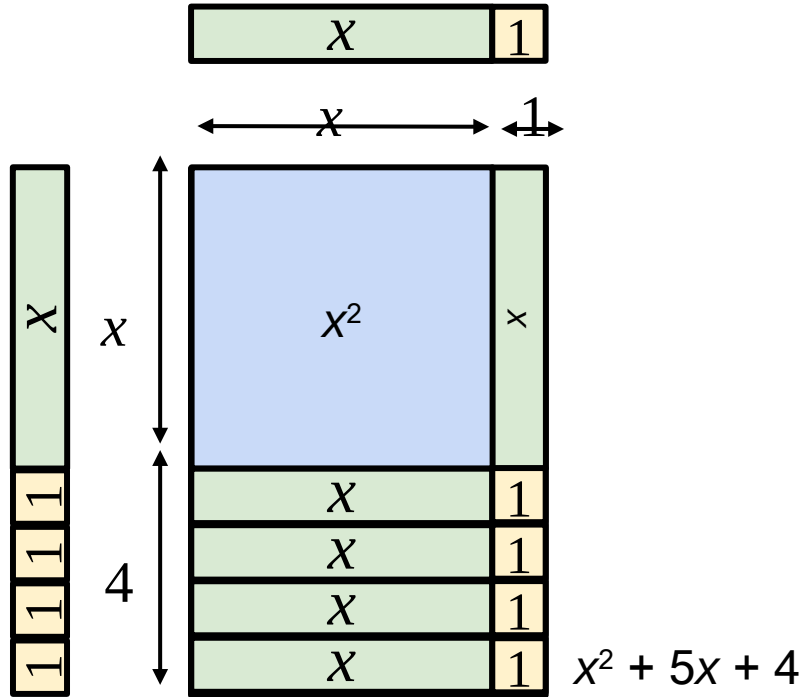


Layla

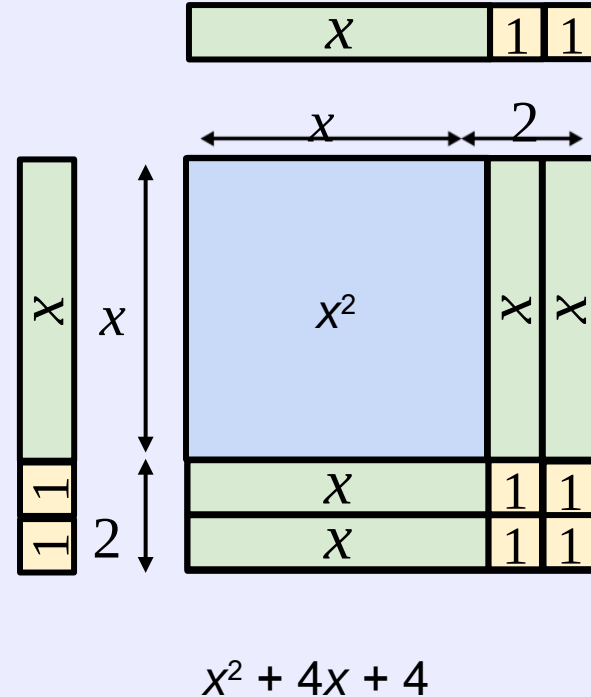
Isku dhufashadu waa commutative (commutative) marka ma aha mid muhiim ah sida binomials loo isku dhufo.

Sahminta wax soo saarka laba binomials

Ballaari oo fududee $(x + 4)(x + 1)$

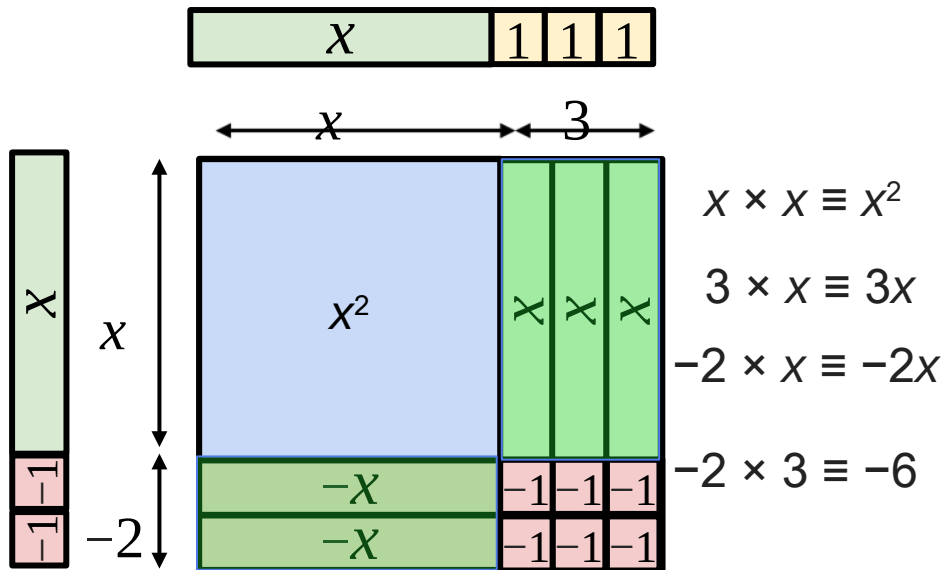


Ballaari oo fududee $(x + 2)(x + 2)$



Waxaan kaloo isku dhufan karnaa binomials leh erayo taban (negative).

Tusaale ahaan $(x - 2)(x + 3)$



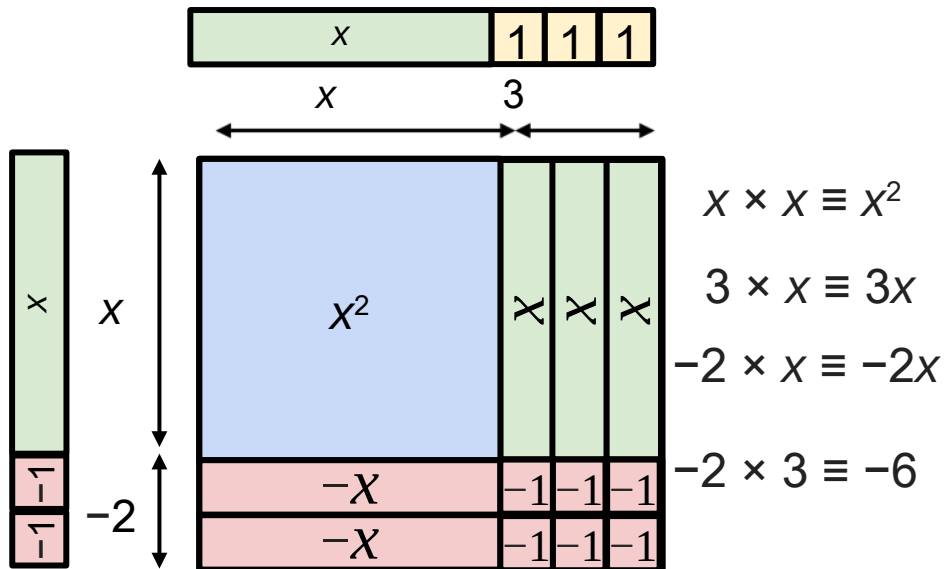
x	$-x$
x	$-x$
x	

Ka digtoonow markaad ururinayso erayada la midka ah (like terms).

$$3x + -2x \equiv x$$

$$x^2 + x - 6$$

$$(x - 2)(x + 3)$$



Waxaan u malaynayaa in $(x + 2)(x - 3)$ ay noqon doonto isku mid?



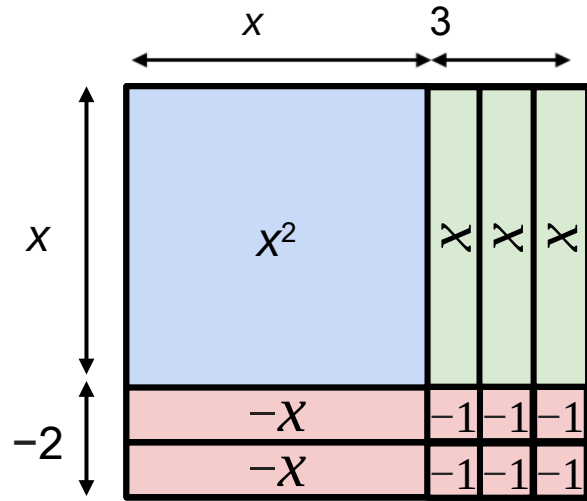
Layla

Maxaad u malaynaysaa?

$$x^2 + x - 6$$

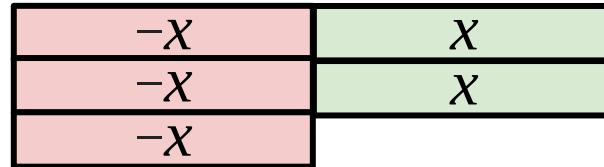
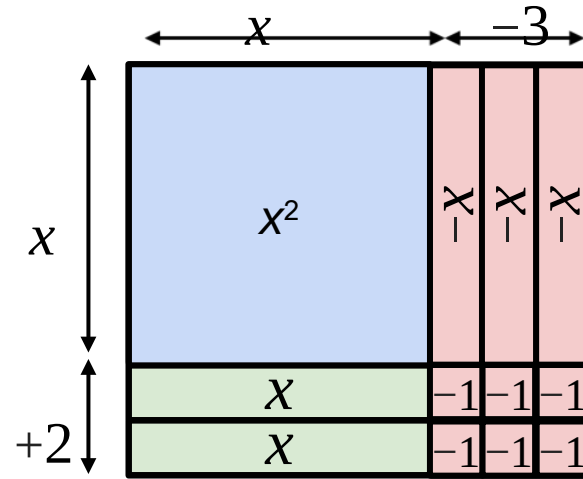
Sahminta wax soo saarka laba binomials

$$(x - 2)(x + 3)$$



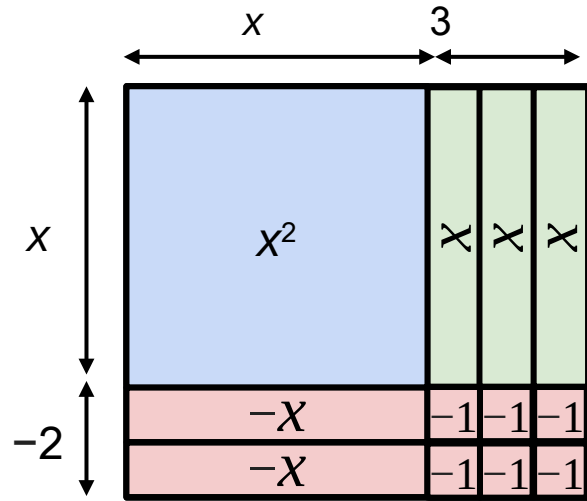
$$x^2 + x - 6$$

$$(x + 2)(x - 3)$$



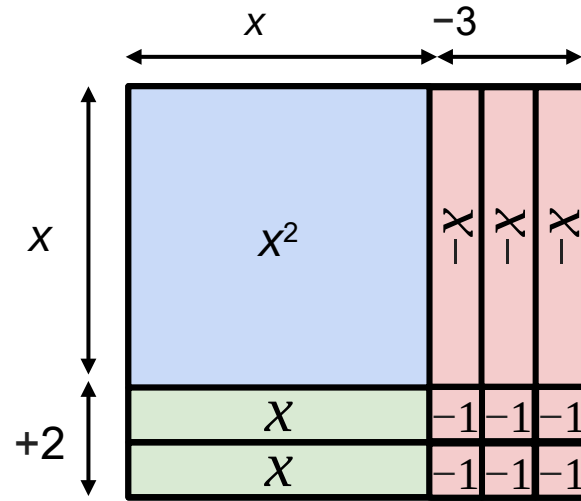
Sahminta wax soo saarka laba binomials

$$(x - 2)(x + 3)$$



$$x^2 + x - 6$$

$$(x + 2)(x - 3)$$



$$x^2 - x - 6$$

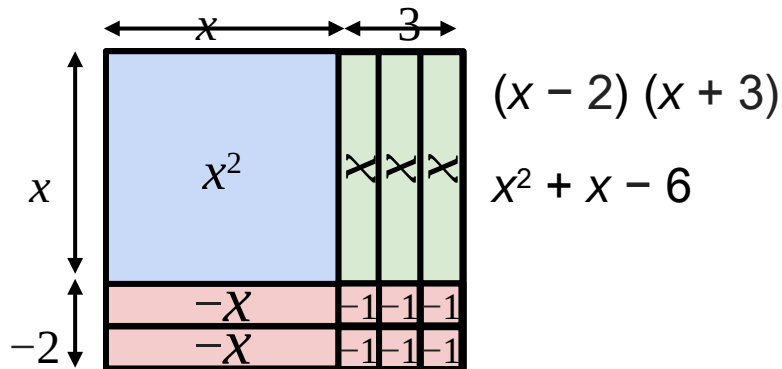
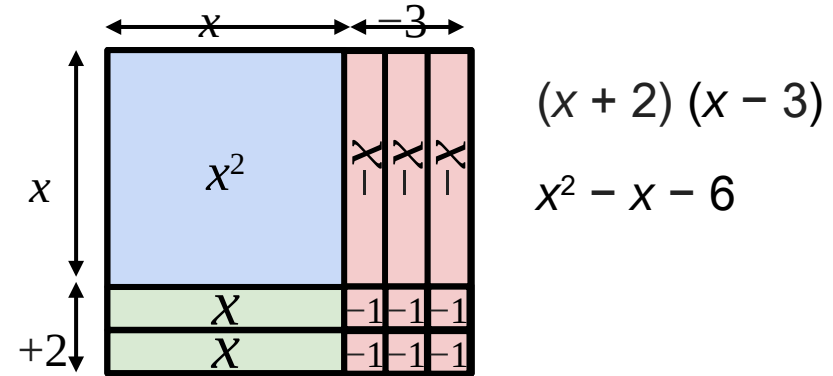
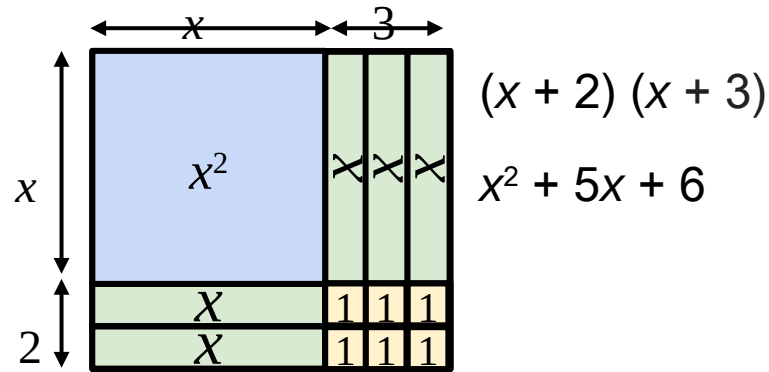
Isku mid ma aha!



Layla

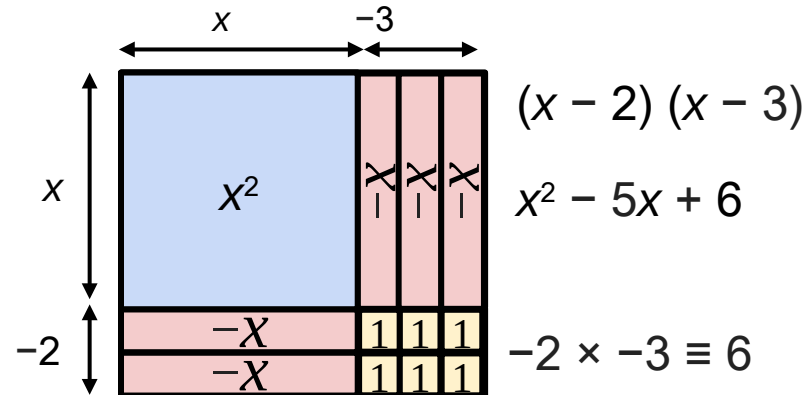
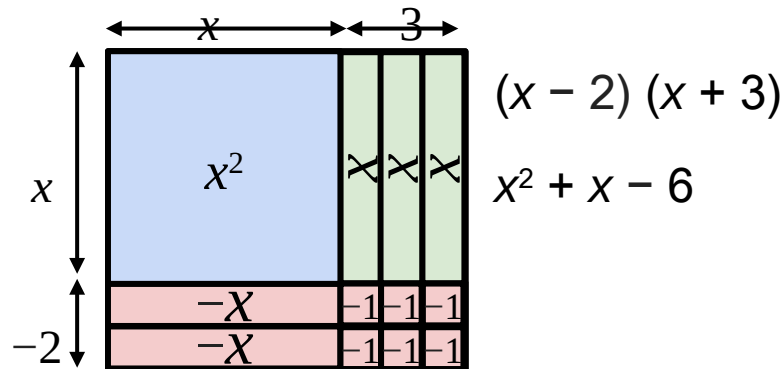
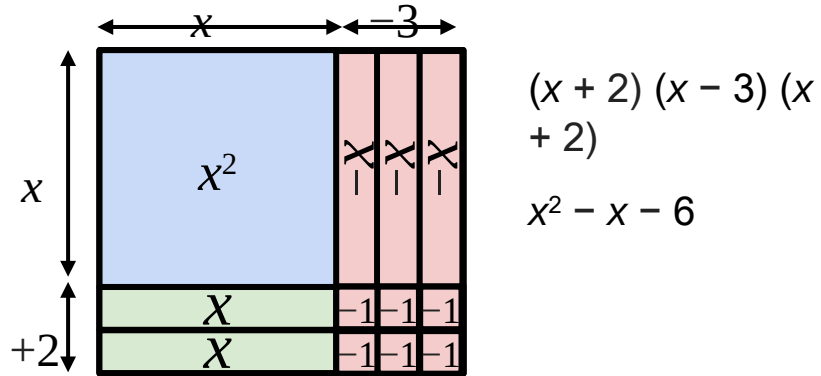
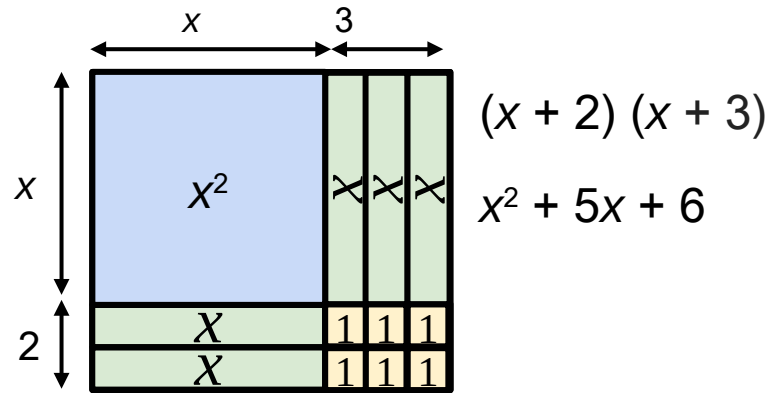
$$-3x + 2x \equiv -x$$

Sahaminta taranta (product) laba binomial (binomials)



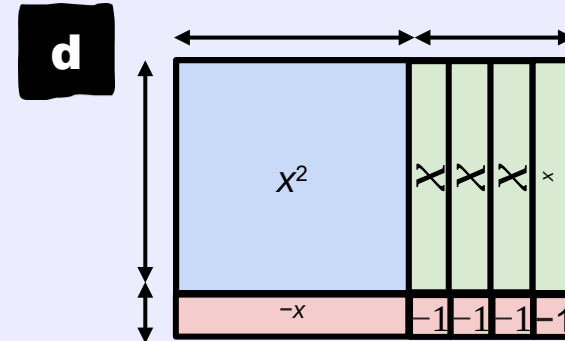
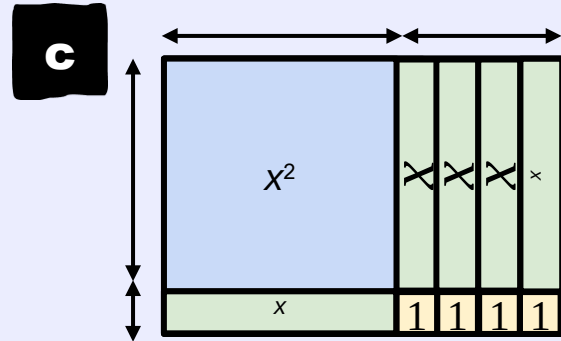
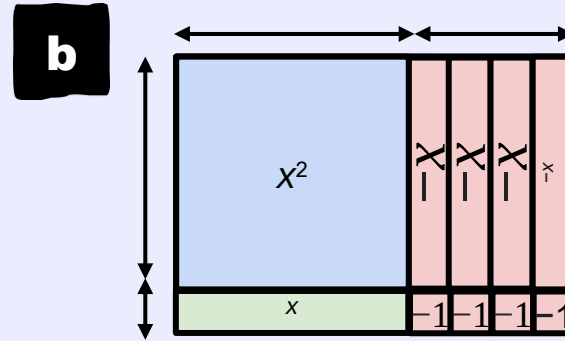
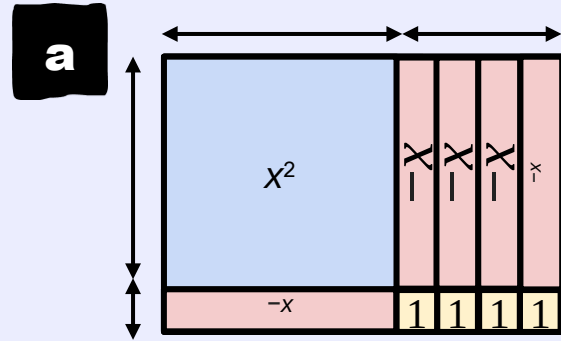
Sidee buu u ekaan lahaa $(x - 2)(x - 3)$ qaabka la ballaariyey (expanded form)?

Sahaminta taranta (product) laba binomial (binomials)



Sahaminta taranta (product) laba binomial (binomials)

U dhig (Match) tibaaxaha (expression) qaabka bedka (area model) saxda ah.



e $(x + 1) (x + 4)$

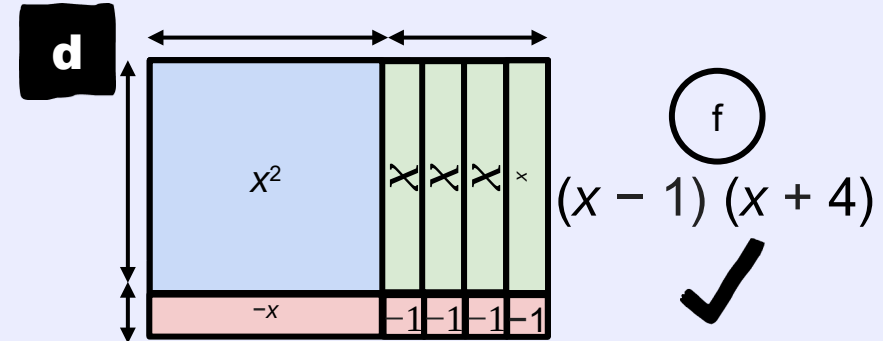
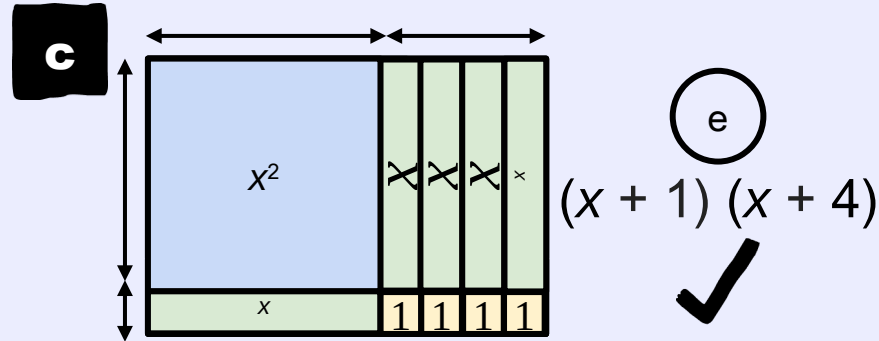
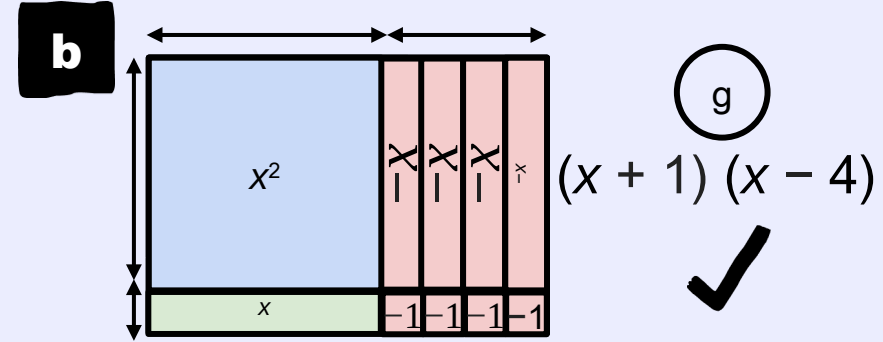
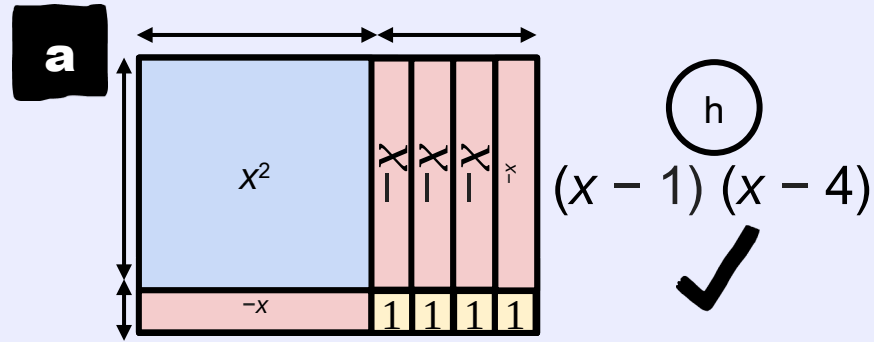
f $(x - 1) (x + 4)$

g $(x + 1) (x - 4)$

h $(x - 1) (x - 4)$

Sahaminta taranta (product) laba binomial (binomials)

U dhig (Match) tibaaxaha (expression) qaabka bedka (area model) saxda ah.



Sahaminta taranta (product) laba binomial (binomials)

Isticmaal qaababka bedka (area models) si aad u ballaarisoo (expand) oo u fududayso (simplify) tibaax kasta

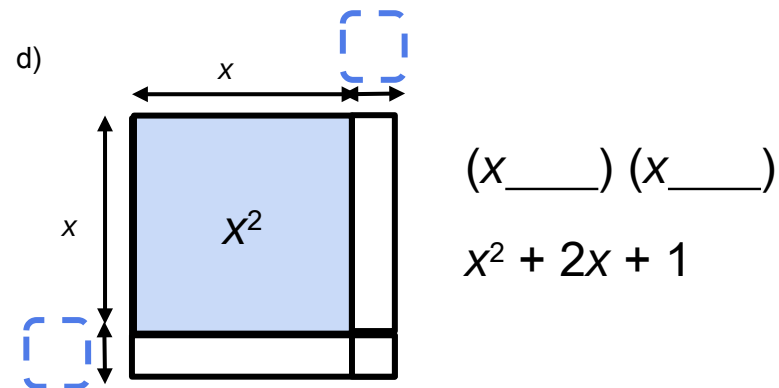
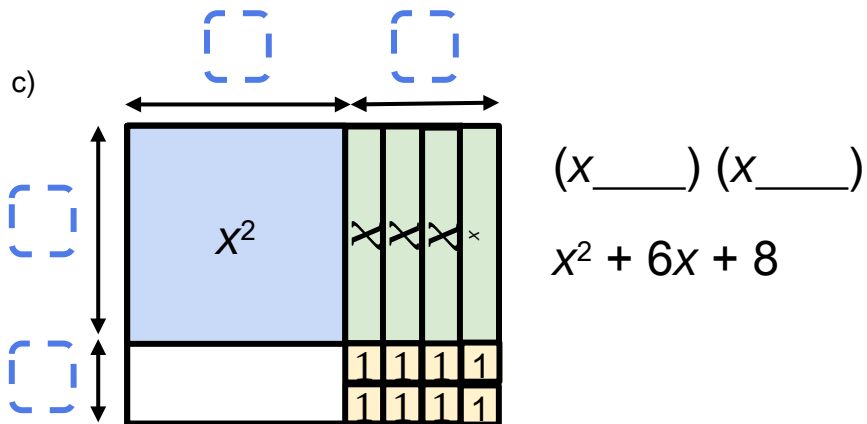
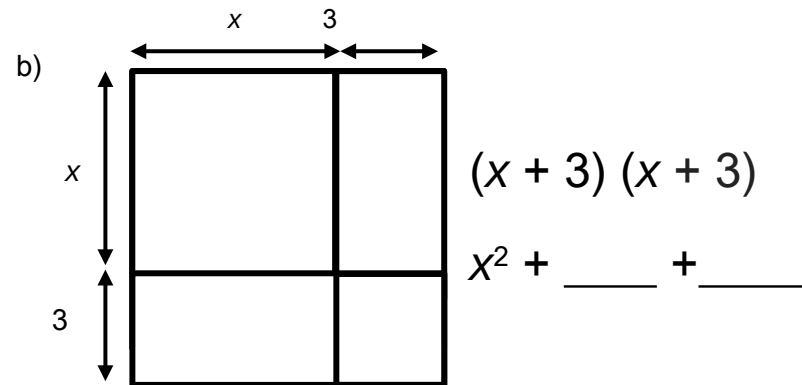
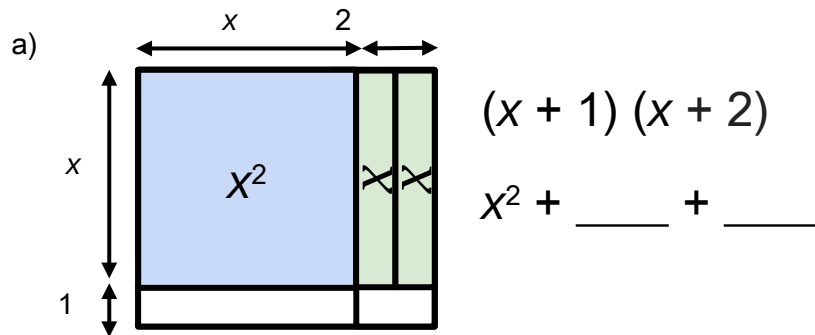
Diagram illustrating the area model for the product $(x - 1)(x - 4)$. The rectangle is divided into four regions: a large blue square labeled x^2 , a red rectangle labeled $-x$ below it, and four small yellow squares labeled 1 to the right of the $-x$ region. The width is labeled $(x - 1)$ and the height is labeled $(x - 4)$. The resulting expression is $x^2 - 5x + 4$.

Diagram illustrating the area model for the product $(x + 1)(x - 4)$. The rectangle is divided into four regions: a large blue square labeled x^2 , a green rectangle labeled x below it, and four small red squares labeled -1 to the right of the x region. The width is labeled $(x + 1)$ and the height is labeled $(x - 4)$. The resulting expression is $x^2 - 3x - 4$.

Diagram illustrating the area model for the product $(x + 1)(x + 4)$. The rectangle is divided into four regions: a large blue square labeled x^2 , a green rectangle labeled x below it, and four small yellow squares labeled 1 to the right of the x region. The width is labeled $(x + 1)$ and the height is labeled $(x + 4)$. The resulting expression is $x^2 + 5x + 4$.

Diagram illustrating the area model for the product $(x - 1)(x + 4)$. The rectangle is divided into four regions: a large blue square labeled x^2 , a red rectangle labeled $-x$ below it, and four small green squares labeled 1 to the right of the $-x$ region. The width is labeled $(x - 1)$ and the height is labeled $(x + 4)$. The resulting expression is $x^2 + 3x - 4$.

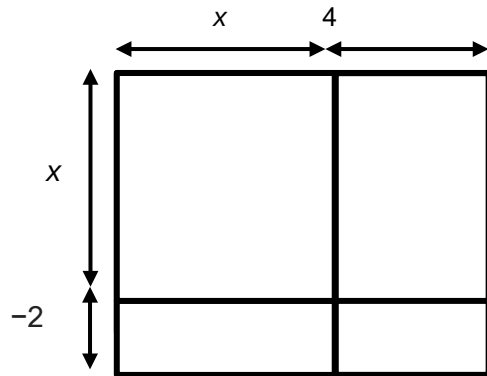
- 1) Isticmaal macluumaadka la siiyey si aad u buuxiso qaababkan bedka (area models) iyo erayada maqan.



2) Isticmaal qaabka bedka (area model) si aad u ballaarisoo (expand) oo u fududayso (simplify) tarannada (products) labadan binomial (binomials).

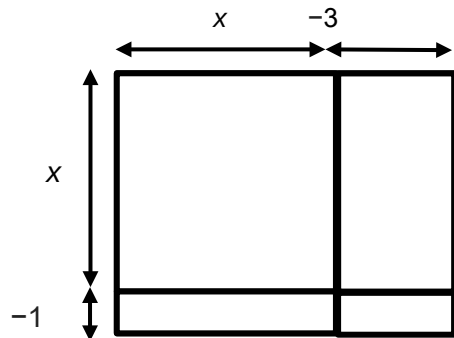
a) $(x - 2)(x + 4)$

≡ _____



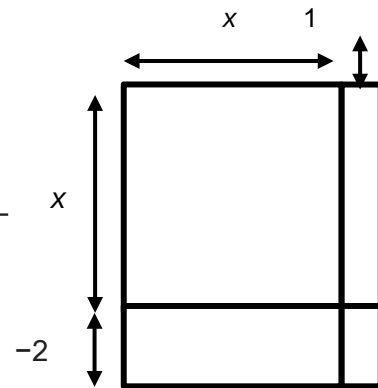
b) $(x - 1)(x - 3)$

≡ _____



c) $(x - 2)(x + 1)$

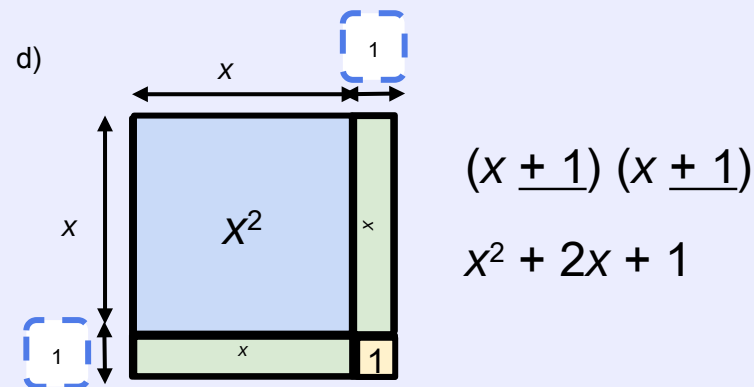
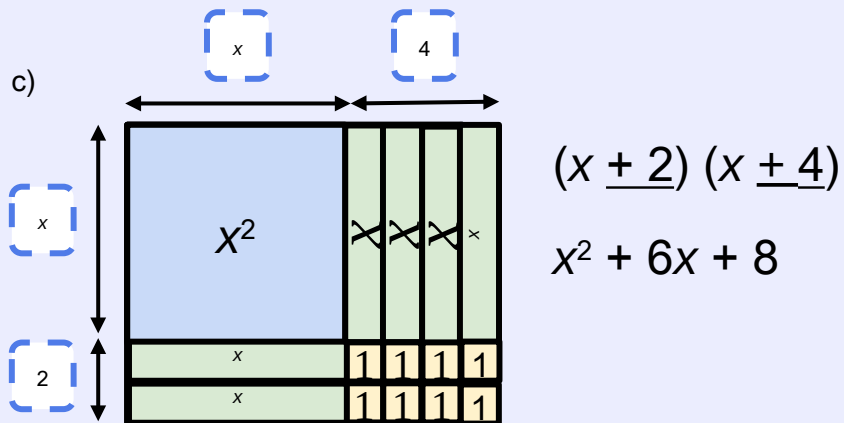
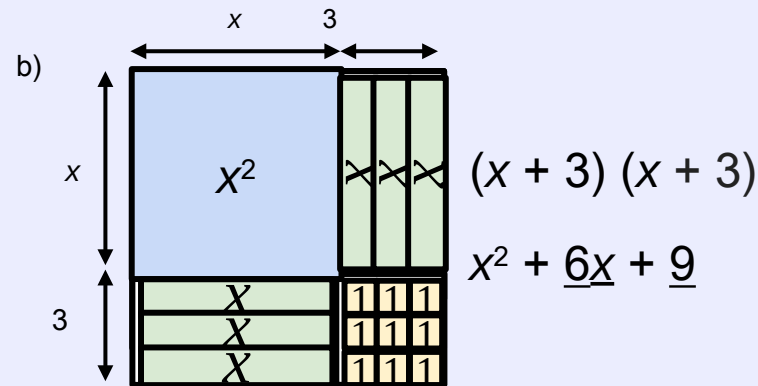
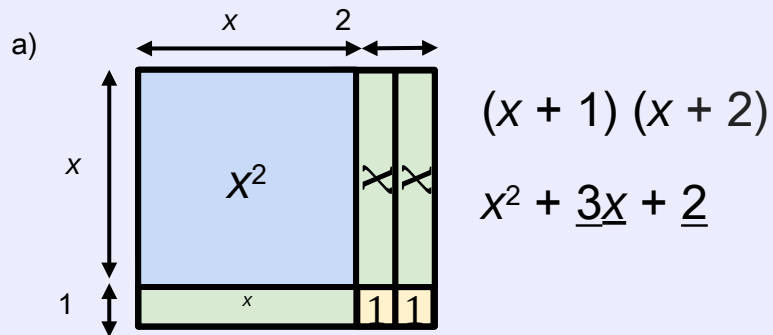
≡ _____



d) $(x - 2)(x - 2)$

≡ _____

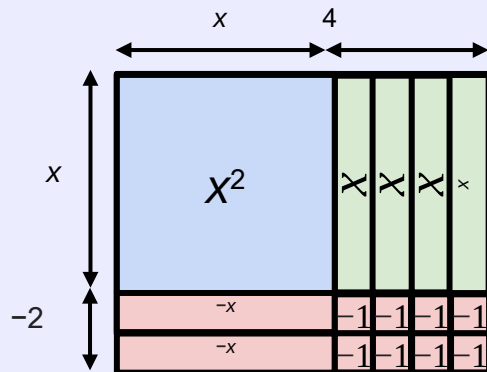
- 1) Isticmaal macluumaadka la siiyey si aad u buuxiso qaababkan bedka (area models) iyo erayada maqan.



2) Isticmaal qaabka bedka (area model) si aad u ballaarisoo (expand) oo u fududayso (simplify) tarannada (products) labadan binomial (binomials).

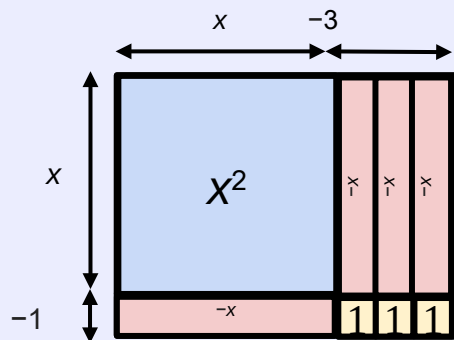
a) $(x - 2)(x + 4)$

$$\equiv x^2 + 2x - 8$$



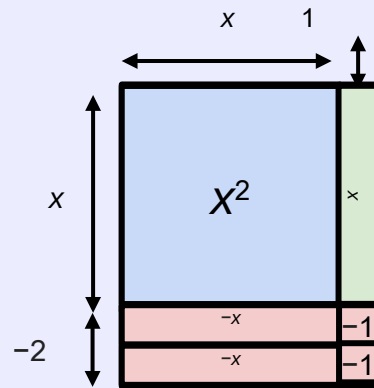
b) $(x - 1)(x - 3)$

$$\equiv x^2 - 4x + 3$$



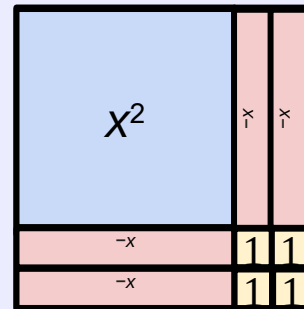
c) $(x - 2)(x + 1)$

$$\equiv x^2 - x - 2$$



d) $(x - 2)(x - 2)$

$$\equiv x^2 - 4x + 4$$



Taranta (product) laba binomial (binomials)



Sahaminta taranta (product) laba binomial (binomials)



Isku dhufashada (multiplying) binomials (binomials) si hufan (efficiently)

Ma aha had iyo jeer suurtagal in la sawiro moodellada aagga (area models) si isku mid ah.

Weli waxaan u isticmaali karnaa moodelka sida matalaad (representation).

Tusaale ahaan: $(x + 8)(x + 12)$

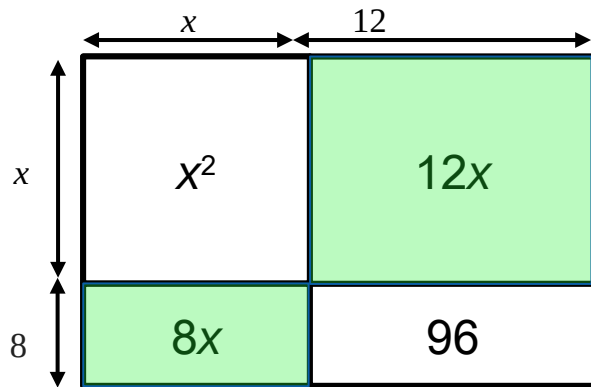
Waxaan xisaabin karnaa afarta shey qayb (partial products) oo aan isku darkaa si aan u helno sheyga guud (overall product).

$$x \times x \equiv x^2$$

$$x \times 12 \equiv 12x$$

$$8 \times x \equiv 8x$$

$$8 \times 12 \equiv 96$$



Xaggee ayay ku yaalliin ereyada isku midka ah (like terms)?

$$(x + 8)(x + 12) \equiv x^2 + 20x + 96$$

$$(x + 10)(x - 15) \equiv x^2 - 150$$

Maxaa khalad ku yimid Andeep?

Wuxuu xisaabiyay kaliya laba ka mid ah sheyga qayb (partial products). Wuxuu seegay labada kale.

Uma baahni moodel aag (area model) si aan u balaadhiyo $(x + 10)(x - 15)$ waa fududahay.

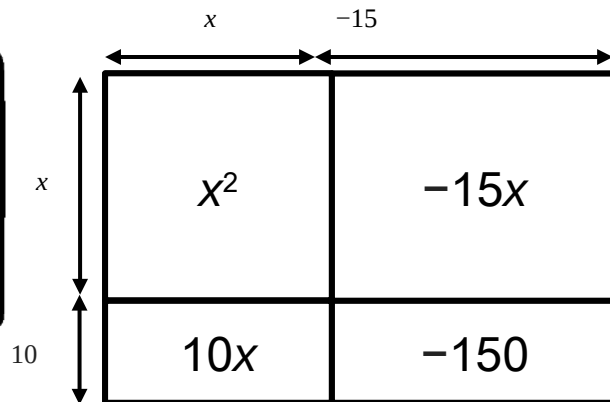


Andeep

Moodelka aagga (area model) wuxuu i caawiyaa inaan xusuusto inaan xisaabiyo dhammaan sheyga qayb (partial products) ka hor intaan ururin ereyada isku midka ah (like terms).



Jacob

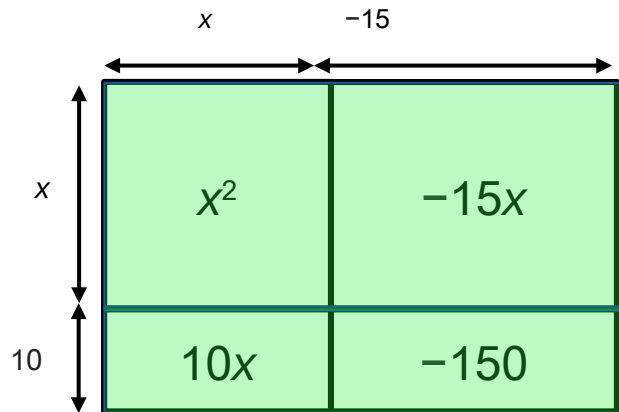


$$(x + 10)(x - 15)$$

$$\equiv x(x - 15) + 10(x - 15)$$

$$\equiv x^2 - 15x + 10x - 150$$

$$\equiv x^2 - 5x - 150$$



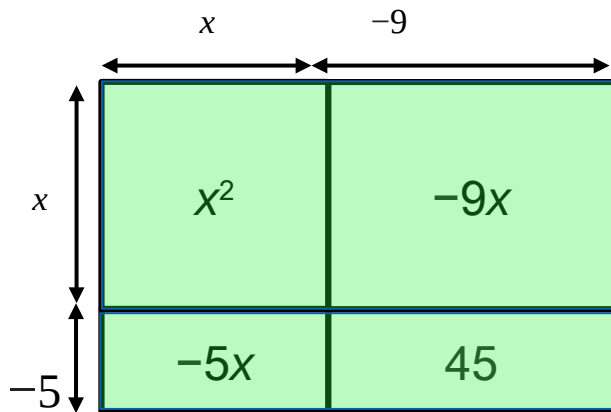
Haddaba haddii aan rabo inaan balaadhiyo $(x - 5)(x - 9)$ waxaan samayn karaa

$$x(x - 9) + -5(x - 9)$$

Waxaan tusi karnaa in tani ay shaqeyn doonto iyadoo la isticmaalayo model aag (area model).



Andeep



$$\equiv x^2 - 9x + -5x + 45$$

$$\equiv x^2 - 14x + 45$$

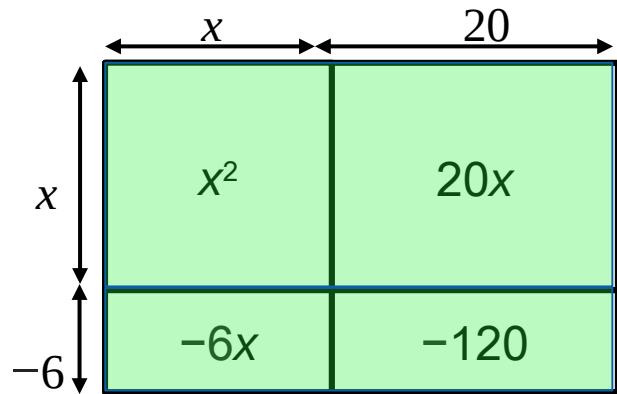
Si hufan u dhufashada binomials (Multiplying binomials efficiently)

Balaadhi oo fududee $(x - 6)(x + 20)$

$$\equiv x(x + 20) + -6(x + 20)$$

$$\equiv x^2 + 20x + -6x - 120$$

$$\equiv x^2 + 14x - 120$$

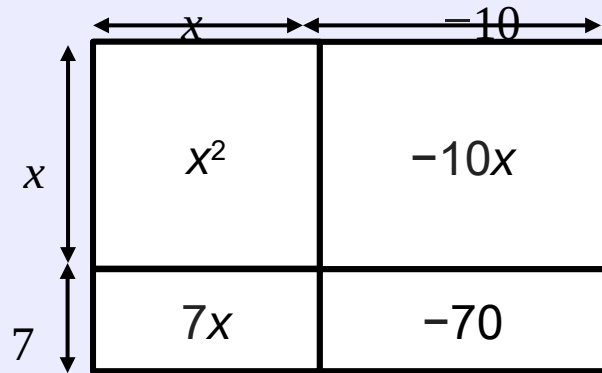


Balaadhi oo fududee $(x + 7)(x - 10)$

$$\equiv x(x - 10) + 7(x - 10)$$

$$\equiv x^2 - 10x + 7x - 70$$

$$\equiv x^2 - 3x - 70$$



Si hufan u dhufashada binomials (Multiplying binomials efficiently)

Dhufashada soo noqnoqota ee isla tibaaxa waxaa lagu matali karaa jibbaar (exponent).

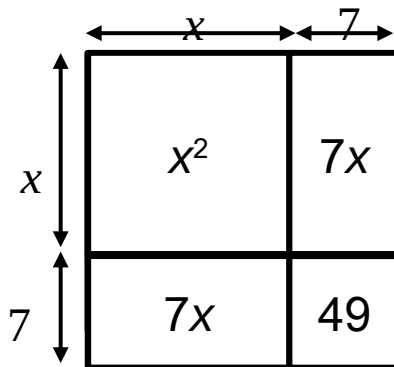
$$\text{E.g. } (x + 5)(x + 5) \equiv (x + 5)^2$$

Marka la laba jibaayo (squaring) binomial, waa caawimaad in loo qoro sida laba qaws (brackets) oo la isku dhuftay.

$$(x + 7)^2 \equiv (x + 7)(x + 7)$$

$$\equiv x^2 + 7x + 7x + 49$$

$$\equiv x^2 + 14x + 49$$



Cabdi iyo Suad waxay isku dayayaan inay $(x - 5)^2$ u qoraan qaab ballaaran (expanded form). Sharax sababta jawaab kastaa khalad u tahay.



Cabdi

Waxaan u malaynayaa waa $x^2 - 10x - 25$



Suad

Waxaan u malaynayaa waa $x^2 + 25$

Isticmaal qaab bedka (area model) si aad u soo saartid jawaabta saxda ah

Cabdi iyo Suad waxay isku dayayaan inay $(x - 5)^2$ u qoraan qaab ballaaran (expanded form). Sharax sababta jawaab kastaa khalad u tahay.



Cabdi

Waxaan u malaynayaa waa $x^2 - 10x - 25$

Wax soo saarka (product) laba qiime (value) oo taban (negative) had iyo jeer waa qiime (value) togan (positive) $-5 \times -5 = 25$



Suad

Waxaan u malaynayaa waa $x^2 + 25$

Suad waxay soo saartay oo kaliya laba ka mid ah wax soo saarka qayb ahaaneed (partial products).

Cabdi iyo Suad waxay isku dayayaan inay $(x - 5)^2$ u qoraan qaab ballaaran (expanded form). Sharax sababta jawaab kastaa khalad u tahay.

Isticmaal qaabka bedka (area model) si aad u ogaato jawaabta saxda ah.



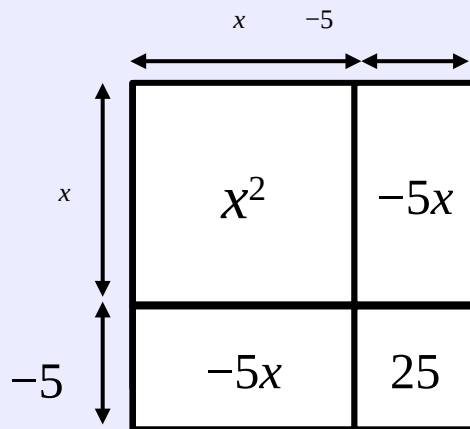
Cabdi

Waxaan u malaynayaa waa $x^2 - 10x - 25$



Suad

Waxaan u malaynayaa waa $x^2 + 25$



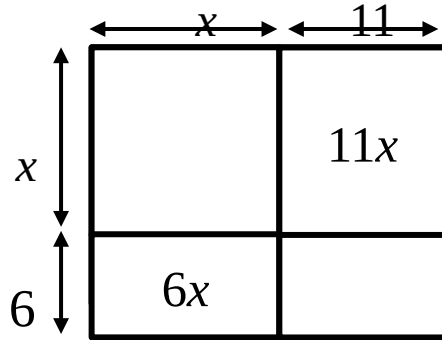
$$(x - 5)^2 \equiv (x - 5)(x - 5)$$

$$\equiv x^2 - 10x + 25$$

1) Qor mid kasta oo ka mid ah alaabooyinkan binomial ee qaabka la fidiyay.

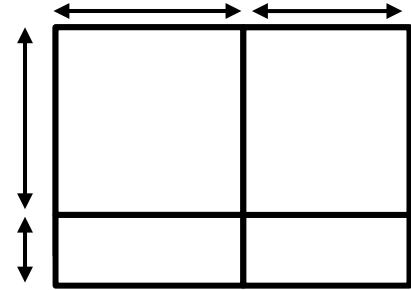
a) $(x + 6)(x + 11)$

$\equiv$ _____



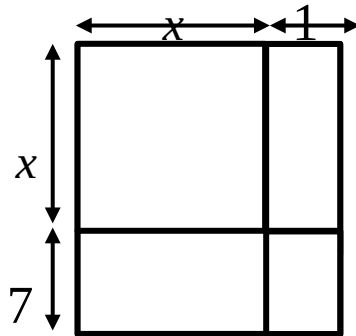
c) $(x + 4)(x + 15)$

$\equiv$ _____



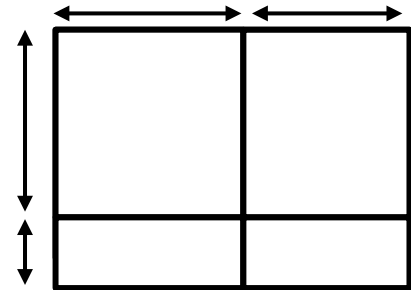
b) $(x + 7)(x + 1)$

$\equiv$ _____



d) $(x + 4)(x - 15)$

$\equiv$ _____



1) Qor mid kasta oo ka mid ah alaabooyinkan binomial ee qaabka la fidiyay.

e) $(x + 9)(x - 12)$

≡ _____

h) $(x - 6)^2$

≡ _____

f) $(x - 5)(x - 6)$

≡ _____

i) $(x + \underline{\hspace{1cm}})(x + \underline{\hspace{1cm}})$

≡ _____

	$9x$
$3x$	

g) $(x + 6)^2$

≡ _____

j) $(x \underline{\hspace{1cm}})(x \underline{\hspace{1cm}})$

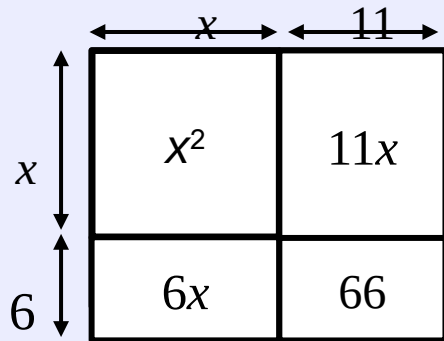
≡ _____

$-3x$	24

1) Qor mid kasta oo ka mid ah alaabooyinkan binomial ee qaabka la fidiyay.

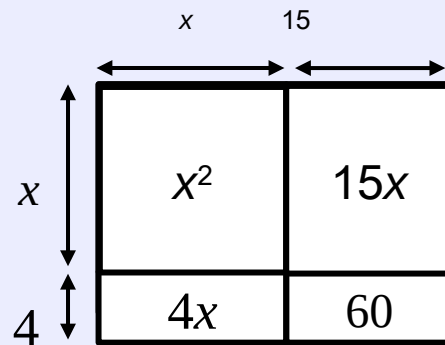
a) $(x + 6)(x + 11)$

$\equiv x^2 + 17x + 66$



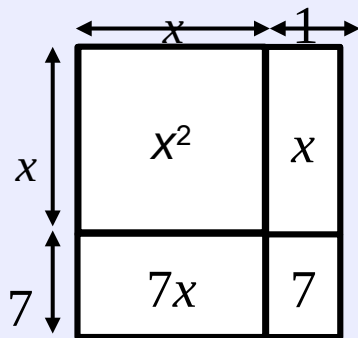
c) $(x + 4)(x + 15)$

$\equiv x^2 + 19x + 60$



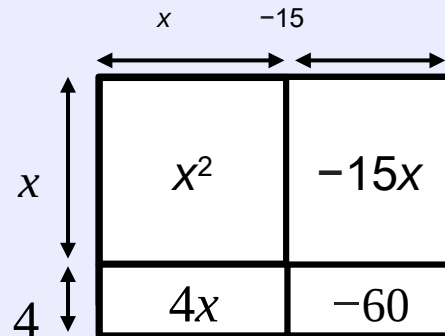
b) $(x + 7)(x + 1)$

$\equiv x^2 + 8x + 7$



d) $(x + 4)(x - 15)$

$\equiv x^2 - 11x - 60$



1) Qor mid kasta oo ka mid ah alaabooyinkan binomial ee qaabka la fidiyay.

e) $(x + 9)(x - 12)$

$\equiv x^2 - 3x - 108$

x^2	$-12x$
$9x$	-108

h) $(x - 6)^2$

$\equiv x^2 - 12x + 36$

x^2	$-6x$
$-6x$	36

f) $(x - 5)(x - 6)$

$\equiv x^2 - 11x + 30$

x^2	$-6x$
$-5x$	30

i) $(x + 3)(x + 9)$

$\equiv x^2 + 12x + 27$

x^2	$9x$
$3x$	27

g) $(x + 6)^2$

$\equiv x^2 + 12x + 36$

x^2	$6x$
$6x$	36

j) $(x - 3)(x - 8)$

$\equiv x^2 - 11x + 24$

x^2	$-8x$
$-3x$	24

Qaabka bedka (area model) waxaa loo isticmaali karaa in lagu helo alaabta laba binomial.

Waxaa muhiim ah in si sax ah loo isticmaalo sharciga qaybinta (distributive law) si aan loo seegin alaabooyin qayb ah.

Labada erey ee hal qaws (bracket) waa in lagu dhuftey labada erey ee qawska kale.