Bab 1 Tingkatan 4
FUNGSI DAN PERSAMAAN KUADRATIK DALAM SATU PEMBOLEHUBAH

PENGEMBANGAN UNGKAPAN ALGEBRA

EXPANSION OF ALGEBRAIC EXPRESSIONS

Kaedah anak panah

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

Cari hasil tambah sebutan serupa

Find the sum of like terms

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

$= x^2 + 2x + 3x + 6$

$= x^2 + 5x + 6$

Perlu ingat tanda

(+) (+) = +

(+) (-) = -

(-)(+) = -

(-)(-) = +

Kaedah kotak

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

Nota:

1. Asingkan kurungan ke dalam jadual.
   Separate the brackets into a table
2. Pastikan simbol operasi dimasukkan bersama
   Make sure the operating symbols are entered together
3. Kemudian darabkan.
   Then multiply
4. Seterusnya cari sebutan serupa dan selesaikan
   Next, find similar words and solve them.
5. Tulis pada ruang jawapan
   Write in the answer space

$(x+2)$

Darab	x	$+2$
x	x^2	$2x$
$+3$	$3x$	6

$(x+3)$

Tambah sebutan serupa

Add all the like terms

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

$= x^2 + 5x + 6$

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LIVEWORKSHEETS

LATIHAN PENGUKUHAN / *REINFORCEMENT EXERCISES*

1. $x(2-x) = \square - x^2$

2. $(x+6)(x+7) = x(\square) + 6(\square)$

$= \square$

3. $(2x-3)(x+2) = \square(x+2) + \square(x+2)$

$= \square$

4. $(-x+3)(2x+5)$

Darab	$2x$	$+5$
		$-5x$
$+3$	$6x$	

$=$ _____

5. $(-3x-2)(2x-7)$

Darab		-7
$-3x$	$-6x$	
-2	$-4x$	

$=$ _____

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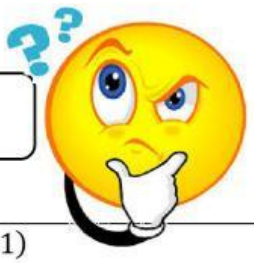
LIVEWORKSHEETS



LATIHAN PENGAYAAN/ *ENRICHMENT EXERCISES*

1. $-2(x^2+4)$	2. $(2x-3)(4x-1)$
3. $(2x+4y)(3x-y)$	4. $(3r+2s)^2$

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PEMFAKTORAN UNGKAPAN ALGEBRA

FACTORIZING ALGEBRAIC EXPRESSIONS

1. $3x - 18$

Kaedah 1

	$3x, -18$
3	$x, -6$

$$\boxed{3x - 18 = 3(x - 6)}$$

Kaedah 2

$3x - 18 = 3(x - 6)$

2. $14w^2 + 28w$

Kaedah 1

	$\mathbf{14w^2, 28w}$
14	$\mathbf{w^2, 2w}$
$\boldsymbol{w}$	$\mathbf{w, 2}$

$$\boxed{\mathbf{14w^2 + 28w = 14w(w^2 + 2)}}$$

Kaedah 2

$$\begin{aligned} 14w^2 + 28w &= 14(w^2 + 2w) \\ &= 14w(w^2 + 2) \end{aligned}$$

3. $a^2 - b^2 = (a - b)(a + b)$

Contoh:

1. $x^2 - 4^2 = (x - 4)(x + 4)$
2. $y^2 - 16^2 = (y - 16)(y + 16)$
3. $36 - x^2 = 6^2 - x^2$
   $= (6 - x)(6 + x)$
4. $(20 - 5x^2) = 5(4 - x^2)$
   $= 5(2^2 - x^2) = 5(2 - x)(2 + x)$

https://www.youtube.com/shorts/pzQuMunAD

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LATIHAN PENGUKUHAN / *REINFORCEMENT EXERCISES*

Cari punca bagi setiap persamaan/ *Find the roots of each equation*:

1.	$x^2 + 5x + 6 = 0$ $(\quad\quad)(\quad\quad) = 0$ $x =$ $\quad\quad$ $x =$	2.	$x^2 - 4 = 0$ $(\quad\quad)(\quad\quad) = 0$ $x =$ $\quad\quad$ $x =$
3.	$2x^2 - 10x = 0$ $(\quad\quad)(\quad\quad) = 0$ $x =$ $\quad\quad$ $x =$	4.	$x^2 + 3x = 10$ $(\quad\quad)(\quad\quad) = 0$ $x =$ $\quad\quad$ $x =$

LATIHAN PENGAYAAN/ *ENRICHMENT EXERCISES*

i. $3x^2 + 2x - 1 = 0$

ii. $x^2 - 8x + 12 = 3 - 2x$

iii. $2x(x + 3) = x^2 + 7x + 6$

iv. $x^2 + 2x + 1 = 0$

v. $x^2 + 6x + 5 = 0$

vi. $x^2 + 7x + 12 = 0$

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LIVEWORKSHEETS

FUNGSI KUADRATIK /*QUADRATIC FUNCTION*

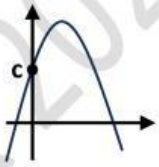
$$f(x) = a\,x^2 + b\,x + c \quad , \quad a \neq 0$$

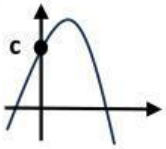
Tentukan bentuk graf *Determine the shape of the graph*	Tentukan paksi simetri *Determine axis of symmetry*	Tentukan pintasan-*y* *Determine the y- axis*

$a < 0$

$a > 0$

$$x = -\frac{b}{2a}$$





1. Lakarkan bentuk graf fungsi kuadratik yang berikut
Sketch the graph of the following quadratic function.

Bil./*No*	Soalan/ *Questions*	Penyelesaian/*Solution*	Jawapan/ *Answer*
i.	$x^2 - 4x + 3 = 0$	$a = 1$ $a > 0$	
ii.	$2x^2 + 3x - 10 = 0$		
iii.	$2x + 4 - x^2 = 0$		
iv.	$3x + 2x^2 - 10 = 0$		

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2. Tentukan persamaan paksi simetri dan titik minimum atau maksimum bagi setiap fungsi kuadratik
   Determine the equation of the axis of symmetry and the minimum or maximum point for each quadratic function.

Bil *No*	Fungsi *Function*	Penyelesaian *Solution*	Jawapan *Answer*
i.	$f(x) = x^2 - 3x - 40$	**Paksi simetri** ***Axes of symetry*** $x = -\frac{-3}{2(1)} = \frac{3}{2}$ **Nilai minimum** ***Minimum value*** $f\left(\frac{3}{2}\right) = \left(\frac{3}{2}\right)^2 - 3\left(\frac{3}{2}\right) - 40$ $= -\frac{169}{4}$ **Titik minimum** ***Minimum point*** $= \left(\frac{3}{2}, -\frac{169}{4}\right)$	**Paksi simetri** ***Axes of symetry*** $x = \frac{3}{2}$ **Titik minimum =** ***Minimum point*** $\left(\frac{3}{2}, -\frac{169}{4}\right)$
ii.	$f(x) = -2x^2 - 6x - 4$		

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iii.	$f(x) = 2x^2 - 8x + 9$		
iv.	$f(x) = 2x^2 + 9$		

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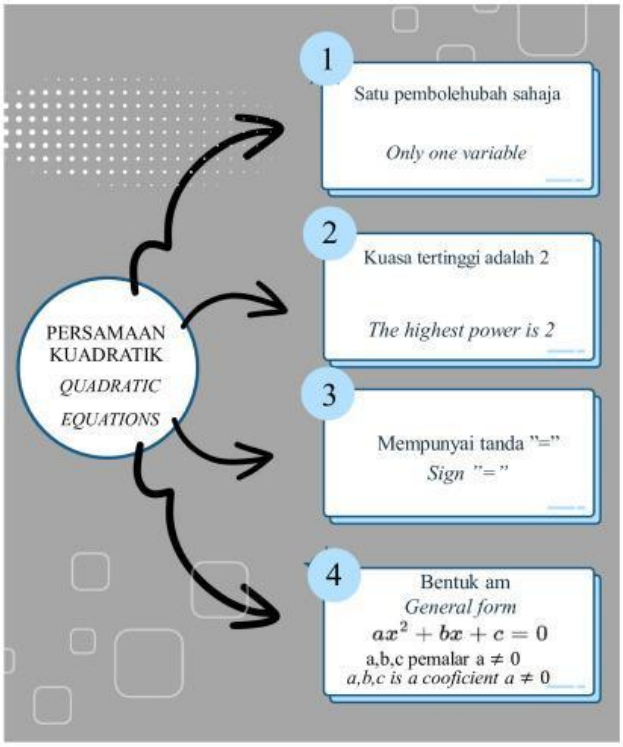
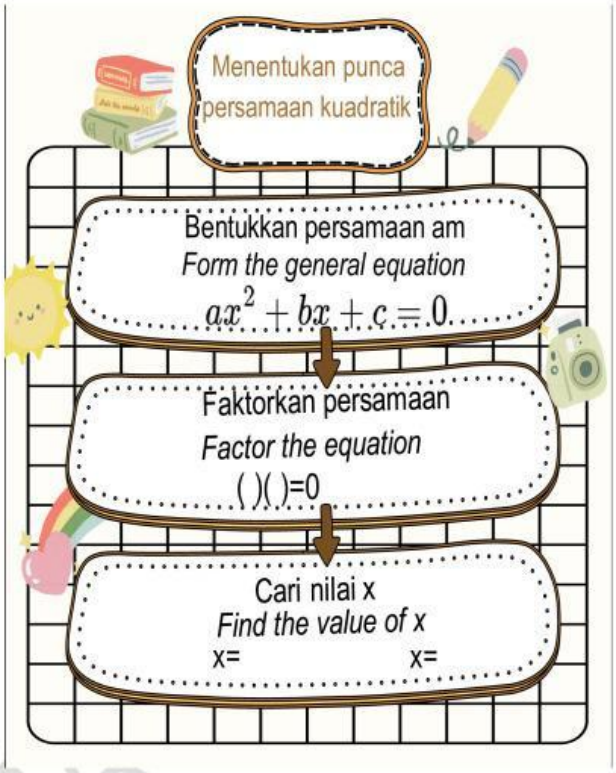




PENGGUNAAN KALKULATOR

MODE | MODE | MODE

1 | Untuk tekan | EQN

Pilih 2 | DEG

Seterusnya masukkan nilai a,b dan c

Untuk dapatkan nilai X

$-11x + 30 = 0$

Command	Screenshot
Converts 'Menu' to 'Equation/Function'. MENU ALPHA (−) 2 2	0
Enter the coefficient of the equation. 1 = (−) 1 1 = 3 0 =	30
Obtain the values of x. =	$ax^2+bx+c=0$ $x_1=$ 6
=	$ax^2+bx+c=0$ $x_2=$ 5

LIVEWORKSHEETS

contoh 1
example 1

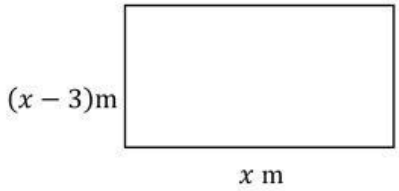
$$2x^2 - 5x - 12 = 0$$
$$a = 2, b = -5, c = -12$$
$$(2x - 3)(x + 4) = 0$$
$$x = \frac{3}{4}, x = -4$$

contoh 2
example 2

$$2x^2 - 5x = x + 1$$
$$2x^2 - 5 - x - 1 = 0$$
$$2x^2 - x - 6 = 0$$
$$a = 2, b = -1, c = -6$$
$$(2x + 3)(x - 2) = 0$$
$$x = \frac{-3}{2}, x = 2$$

Latihan / *Excercise*

1. Panjang sebuah taman berbentuk segi empat ialah x meter dan lebarnya ialah $(x - 3)$ meter.
The lenght of a rectangular shaded garden is x meter and the width is $(x - 3)$ *meter.*



Luas segi empat = Panjang x lebar

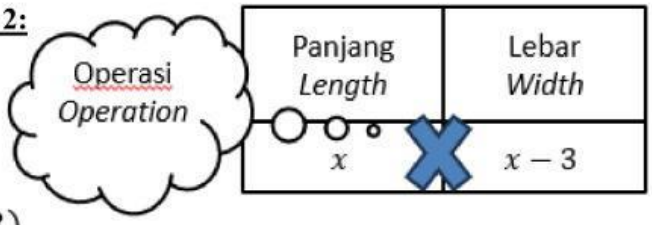
(*a*) Ungkapkan luas, L cm^2, bagi taman tersebut.
Express the area, L cm^2 *of the garden.*

Jawapan / *Answer:*

Langkah 1/*Step* 1:
Maklumat daripada soalan:
Information from question:

Panjang ***Length***	**Lebar** ***Width***
x	$(x - 3)$

Langkah 2/*Step* 2:



$$L = x(x - 3)$$
$$= x^2 - 3x$$

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(*b*) Jika luas taman itu ialah 40 m², tulis satu persamaan kuadratik dalam sebutan x.

If the area of the garden is 40 m², write a quadratic equation in terms of x.

Jawapan / *Answer*

Langkah 1:

Step 1:

Berdasarkan jawapan di (a)

$$L = x^2 - 3x$$

Langkah 2:

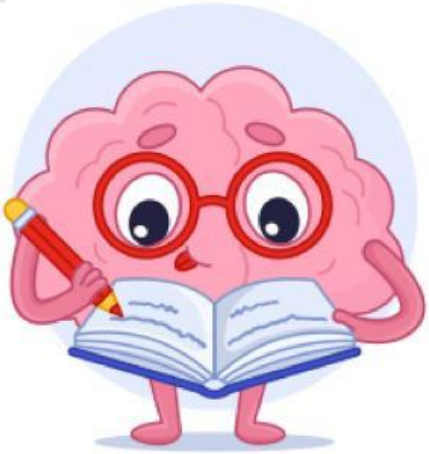
***Step 2*:**

Masukkan nilai $40 = x^2 - 3x$

Langkah 3:

Step 3

Susun semula mengikut bentuk yang dikehendaki $x^2 - 3x - 40 = 0$



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2. Jumlah umur Aina dan adiknya ialah 20 tahun. Jika umur Aina ialah x tahun dan umur adiknya ialah ($x - 4$) tahun. Hasil darab umur mereka ialah 96 tahun, cari umur Aina dan adiknya.
The sum of the ages of Aina and her sister is 20 years. If Aina's age is x years and her sister's age $(x - 4)$years. The product of their ages is 96 years, find the ages of Aina and her sister.

Jawapan / *Answer:*

Langkah 1/ *Step 1*:
Maklumat daripada soalan:

Aina	Adik
x	$(x - 4)$

Langkah 2
Operasi terlibat:

Darab ***Multiply***	x	$(x - 4)$

$x(x - 4) = 96$

$x^2 - 4x = 96$

$x^2 - 4x - 96 = 0$

$(x - 12)(x + 8) = 0$

$x - 12 = 0$ $\quad$ $x + 8 = 0$

$x = 12$ $\quad$ $x = -8$

$\therefore x = 12$

Umur Aina = 12

Umur adik Aina = 12 – 8= 4

NOTA
Umur sentiasa bernilai POSITIF

NOTE
Age ALWAYS positive value

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LIVEWORKSHEETS

3. Hasil darab dua nombor positif berturutan ialah 182. Cari kedua-dua nombor itu.
The product of multiplying two consecutive positive numbers is 182. Find the two numbers.
Jawapan / *Answer*:

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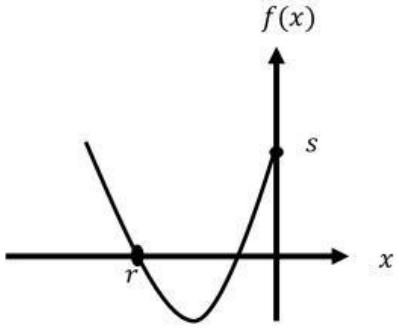
4. Rajah menunjukkan graf fungsi kuadratik $f(x) = x^2 + 6x + 8$
The diagram shows the graph of the quadratic function $f(x) = x^2 + 6x + 8$



tentukan / *determine*

(a) nilai r dan s.
the values of r and s.

(b) titik minimum bagi fungsi kuadratik itu.
the minimum point for the quadratic function.

Jawapan / *Answer:*

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LIVEWORKSHEETS

5. Diberi fungsi kuadratik $f(x) = x^2 + 6x - 16$
Given a quadratic equation $f(x) = x^2 + 6x - 16$

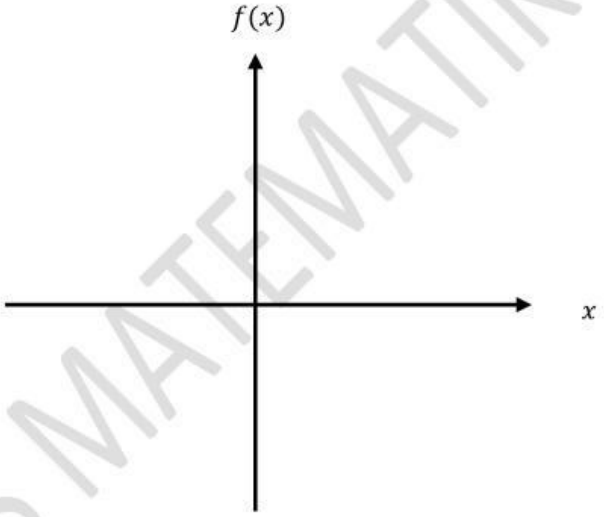
(a) Tentukan pintasan-x bagi fungsi kuadratik itu.
Determine the x-intercept of the quadratic function.

(b) Lakar graf fungsi kuadratik pada paksi di ruang jawapan yang disediakan.
Sketch the graph of the quadratic function on the axes in the answer space provided.

Jawapan / *Answer*

(a)

(b)



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