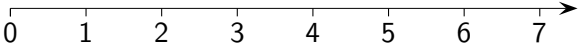
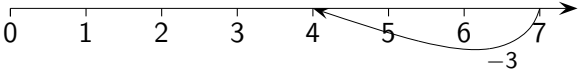
Ganze Zahlen

groolfs.de

Ganze Zahlen

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7
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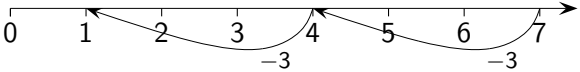
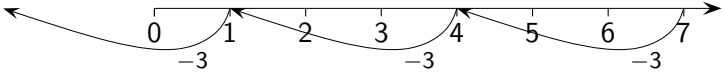

0
1
2
3
4
5
6
7
−3
−3


0
1
2
3
4
5
6
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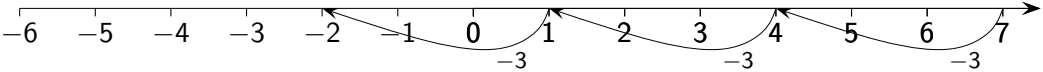
−3
−3
−3


−6
−5
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0
1
2
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4
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6
7
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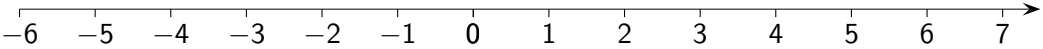
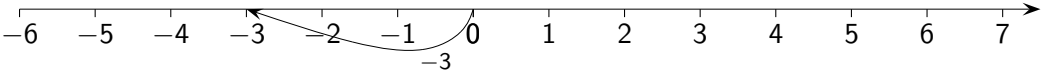
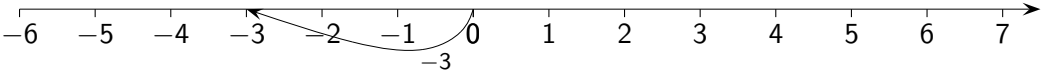
−3

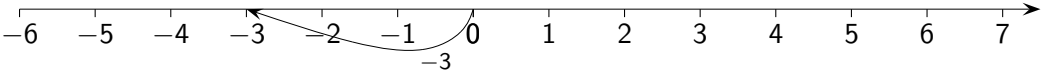
Ganze Zahlen



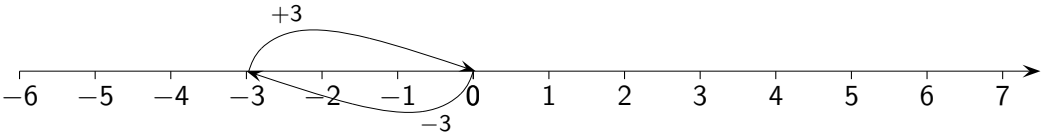

−6
−5
−4
−3
−2
−1
0
1
2
3
4
5
6
7
−3



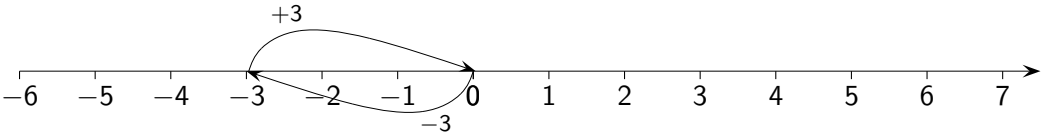
$$0 - 3 =$$



$$0 - 3 = -3$$

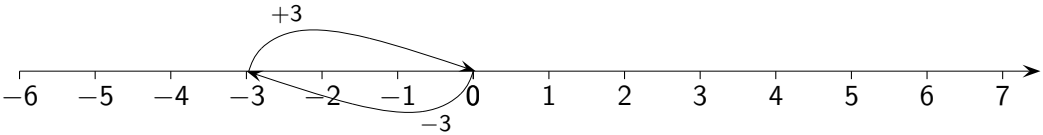


$$0 - 3 = -3$$



$$0 - 3 = -3$$

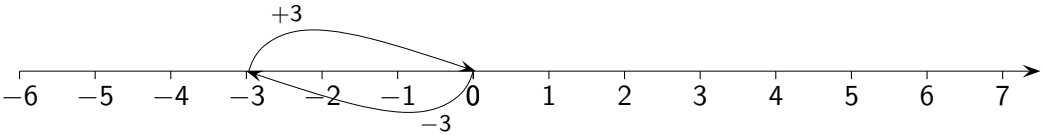
$$-3 + 3 = 0$$



$$0 - 3 = -3$$

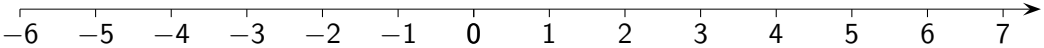
$$-3 + 3 = 0$$

$$-a + a =$$

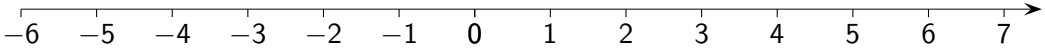


$$
\begin{aligned}
0 - 3 &= -3 \\
-3 + 3 &= 0 \\
-a + a &= 0
\end{aligned}
$$

Addition

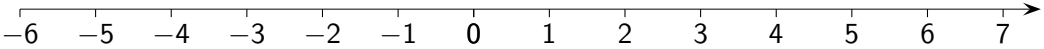


Addition



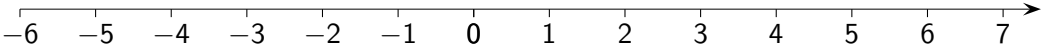
$$-4 + 6 =$$

Addition



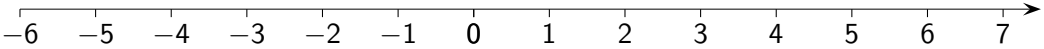
$$-4 + 6 \;=\; -4 +$$

Addition



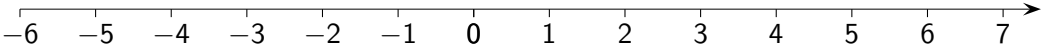
$$-4 + 6 \;=\; -4 + 4 + 2 =$$

Addition



$$-4 + 6 \;=\; -4 + 4 + 2 = 2$$

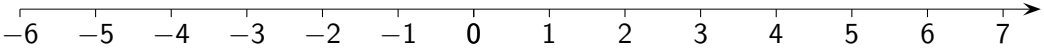
Addition



$$-4 + 6 = -4 + 4 + 2 = 2$$

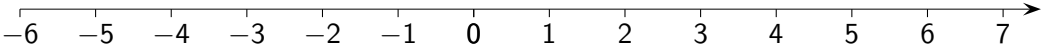
$$(-3) + (-2) =$$

Addition



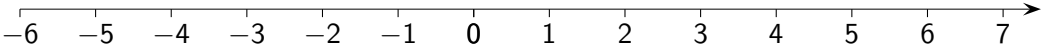
$$
\begin{aligned}
-4+6 &= -4+4+2=2 \\
(-3)+(-2) &= -5
\end{aligned}
$$

Addition



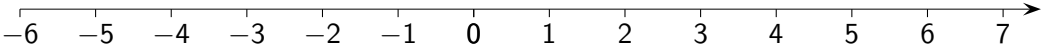
$$
\begin{aligned}
-4+6 &= -4+4+2=2 \\
(-3)+(-2) &= -5 \\
(-5)+4 &=
\end{aligned}
$$

Addition



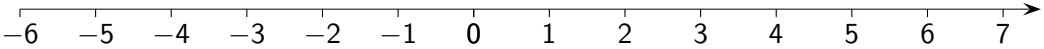
$$
\begin{aligned}
-4+6 &= -4+4+2=2\\
(-3)+(-2) &= -5\\
(-5)+4 &= -1
\end{aligned}
$$

Addition



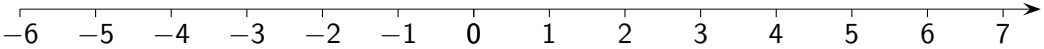
$$
\begin{aligned}
-4+6 &= -4+4+2=2\\
(-3)+(-2) &= -5\\
(-5)+4 &= -1\\
6+(-8) &=
\end{aligned}
$$

Addition



$$
\begin{aligned}
-4+6 &= -4+4+2=2\\
(-3)+(-2) &= -5\\
(-5)+4 &= -1\\
6+(-8) &= -2
\end{aligned}
$$

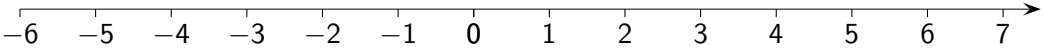
Addition



$$
\begin{aligned}
-4+6 &= -4+4+2=2\\
(-3)+(-2) &= -5\\
(-5)+4 &= -1\\
6+(-8) &= -2
\end{aligned}
$$

$$a+(-b) =$$

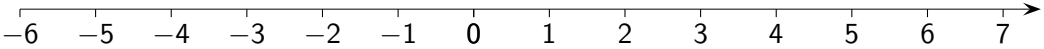
Addition



$$
\begin{aligned}
-4+6 &= -4+4+2=2\\
(-3)+(-2) &= -5\\
(-5)+4 &= -1\\
6+(-8) &= -2
\end{aligned}
$$

$$a+(-b) = a-b$$

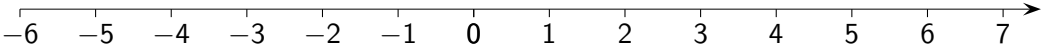
Addition



$$
\begin{aligned}
-4+6 &= -4+4+2=2\\
(-3)+(-2) &= -5\\
(-5)+4 &= -1\\
6+(-8) &= -2
\end{aligned}
$$

$$
\begin{aligned}
a+(-b) &= a-b\\
7+(-5) &=
\end{aligned}
$$

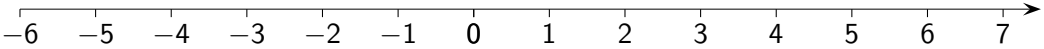
Addition



$$
\begin{aligned}
-4+6 &= -4+4+2=2\\
(-3)+(-2) &= -5\\
(-5)+4 &= -1\\
6+(-8) &= -2
\end{aligned}
$$

$$
\begin{aligned}
a+(-b) &= a-b\\
7+(-5) &= 7-5=
\end{aligned}
$$

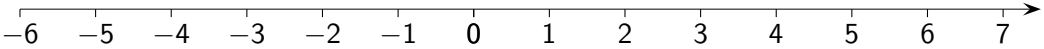
Addition



$$
\begin{aligned}
-4+6 &= -4+4+2=2\\
(-3)+(-2) &= -5\\
(-5)+4 &= -1\\
6+(-8) &= -2
\end{aligned}
$$

$$
\begin{aligned}
a+(-b) &= a-b\\
7+(-5) &= 7-5=2
\end{aligned}
$$

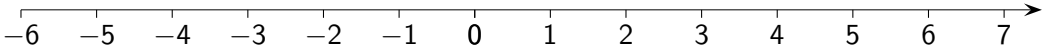
Addition



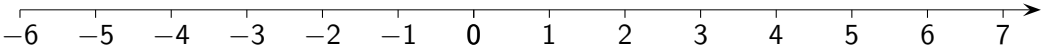
$$
\begin{aligned}
-4+6 &= -4+4+2=2\\
(-3)+(-2) &= -5\\
(-5)+4 &= -1\\
6+(-8) &= -2
\end{aligned}
$$

$$
\begin{aligned}
a+(-b) &= a-b\\
7+(-5) &= 7-5=2
\end{aligned}
$$

Multiplikation

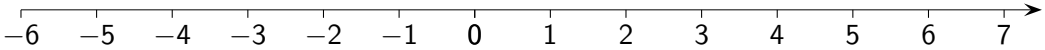


Multiplikation



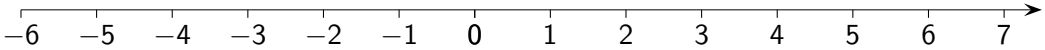
$$3 \cdot (-2) =$$

Multiplikation



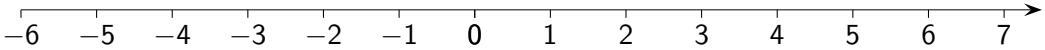
$$3 \cdot (-2) \;=\; (-2) + (-2) + (-2) \;=$$

Multiplikation



$$3 \cdot (-2) = (-2) + (-2) + (-2) = -6$$

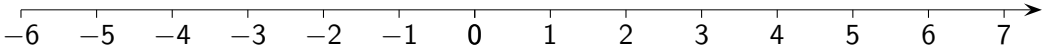
Multiplikation



$$3 \cdot (-2) = (-2) + (-2) + (-2) = -6$$

$$(-1) \cdot 2 =$$

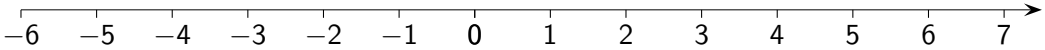
Multiplikation



$$3 \cdot (-2) = (-2) + (-2) + (-2) = -6$$

$$(-1) \cdot 2 = 2 \cdot (-1) =$$

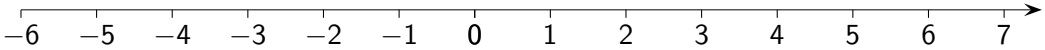
Multiplikation



$$3 \cdot (-2) = (-2) + (-2) + (-2) = -6$$

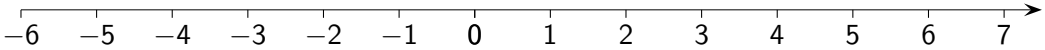
$$(-1) \cdot 2 = 2 \cdot (-1) = (-1) + (-1) =$$

Multiplikation



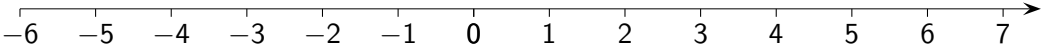
$$3 \cdot (-2) = (-2) + (-2) + (-2) = -6$$
$$(-1) \cdot 2 = 2 \cdot (-1) = (-1) + (-1) = -2$$

Multiplikation



$$
\begin{aligned}
3 \cdot (-2) &= (-2) + (-2) + (-2) = -6 \\
(-1) \cdot 2 &= 2 \cdot (-1) = (-1) + (-1) = -2 \\
(-1) \cdot a &= -a
\end{aligned}
$$

Multiplikation



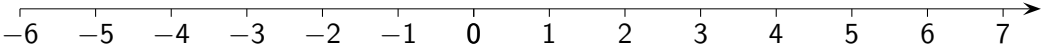
$$3 \cdot (-2) = (-2) + (-2) + (-2) = -6$$

$$(-1) \cdot 2 = 2 \cdot (-1) = (-1) + (-1) = -2$$

$$(-1) \cdot a = -a$$

$$7 + (-4) =$$

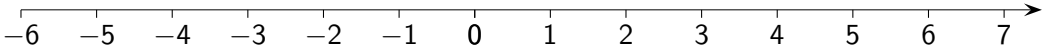
Multiplikation



$$3 \cdot (-2) = (-2) + (-2) + (-2) = -6$$
$$(-1) \cdot 2 = 2 \cdot (-1) = (-1) + (-1) = -2$$
$$(-1) \cdot a = -a$$

$$7 + (-4) = 3$$

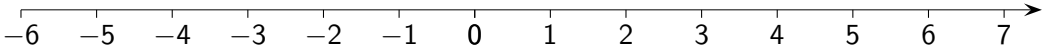
Multiplikation



$$
\begin{aligned}
3 \cdot (-2) &= (-2) + (-2) + (-2) = -6 \\
(-1) \cdot 2 &= 2 \cdot (-1) = (-1) + (-1) = -2 \\
(-1) \cdot a &= -a
\end{aligned}
$$

$$
7 + (-4) = 3 \qquad | \cdot 2
$$

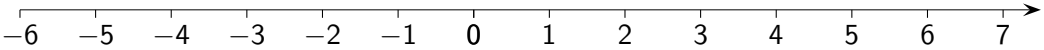
Multiplikation



$$3 \cdot (-2) = (-2) + (-2) + (-2) = -6$$
$$(-1) \cdot 2 = 2 \cdot (-1) = (-1) + (-1) = -2$$
$$(-1) \cdot a = -a$$

$$7 + (-4) = 3 \qquad | \cdot 2$$
$$14 +$$

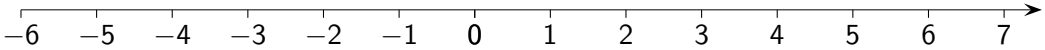
Multiplikation



$$
\begin{aligned}
3 \cdot (-2) &= (-2) + (-2) + (-2) = -6 \\
(-1) \cdot 2 &= 2 \cdot (-1) = (-1) + (-1) = -2 \\
(-1) \cdot a &= -a
\end{aligned}
$$

$$
\begin{aligned}
7 + (-4) &= 3 \qquad \mid \cdot 2 \\
14 + (-8) &=
\end{aligned}
$$

Multiplikation



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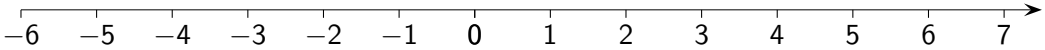
\begin{aligned}
3 \cdot (-2) &= (-2) + (-2) + (-2) = -6 \\
(-1) \cdot 2 &= 2 \cdot (-1) = (-1) + (-1) = -2 \\
(-1) \cdot a &= -a
\end{aligned}
$$

$$
\begin{aligned}
7 + (-4) &= 3 \qquad \mid \cdot 2 \\
14 + (-8) &= 6
\end{aligned}
$$

Multiplikation



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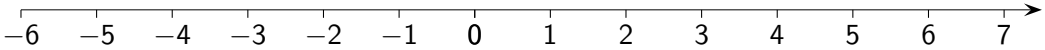
\begin{aligned}
3 \cdot (-2) &= (-2) + (-2) + (-2) = -6 \\
(-1) \cdot 2 &= 2 \cdot (-1) = (-1) + (-1) = -2 \\
(-1) \cdot a &= -a
\end{aligned}
$$

$$
\begin{aligned}
7 + (-4) &= 3 \qquad \mid \cdot 2 \\
14 + (-8) &= 6
\end{aligned}
$$

$$
7 + (-4) = 3
$$

Multiplikation

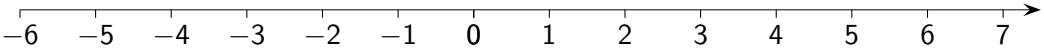


$$
\begin{aligned}
3 \cdot (-2) &= (-2) + (-2) + (-2) = -6 \\
(-1) \cdot 2 &= 2 \cdot (-1) = (-1) + (-1) = -2 \\
(-1) \cdot a &= -a
\end{aligned}
$$

$$
\begin{aligned}
7 + (-4) &= 3 \qquad \mid \cdot 2 \\
14 + (-8) &= 6
\end{aligned}
$$

$$
7 + (-4) = 3 \qquad \mid +5
$$

Multiplikation

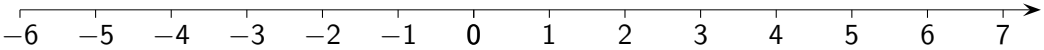


$$
\begin{aligned}
3 \cdot (-2) &= (-2) + (-2) + (-2) = -6 \\
(-1) \cdot 2 &= 2 \cdot (-1) = (-1) + (-1) = -2 \\
(-1) \cdot a &= -a
\end{aligned}
$$

$$
\begin{aligned}
7 + (-4) &= 3 \qquad \mid \cdot 2 \\
14 + (-8) &= 6
\end{aligned}
$$

$$
\begin{aligned}
7 + (-4) &= 3 \qquad \mid + 5 \\
12 + (-4) &=
\end{aligned}
$$

Multiplikation

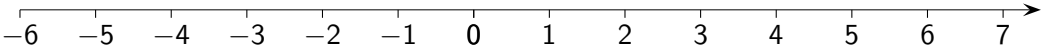


$$
\begin{aligned}
3 \cdot (-2) &= (-2) + (-2) + (-2) = -6 \\
(-1) \cdot 2 &= 2 \cdot (-1) = (-1) + (-1) = -2 \\
(-1) \cdot a &= -a
\end{aligned}
$$

$$
\begin{aligned}
7 + (-4) &= 3 \qquad \mid \cdot 2 \\
14 + (-8) &= 6
\end{aligned}
$$

$$
\begin{aligned}
7 + (-4) &= 3 \qquad \mid + 5 \\
12 + (-4) &= 8
\end{aligned}
$$

Multiplikation

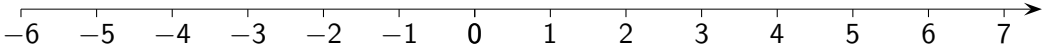


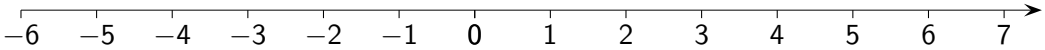
$$
\begin{aligned}
3 \cdot (-2) &= (-2) + (-2) + (-2) = -6 \\
(-1) \cdot 2 &= 2 \cdot (-1) = (-1) + (-1) = -2 \\
(-1) \cdot a &= -a
\end{aligned}
$$

$$
\begin{aligned}
7 + (-4) &= 3 \qquad \mid \cdot 2 \\
14 + (-8) &= 6
\end{aligned}
$$

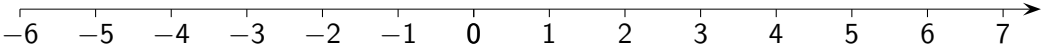
$$
\begin{aligned}
7 + (-4) &= 3 \qquad \mid + 5 \\
12 + (-4) &= 8
\end{aligned}
$$

Multiplikation



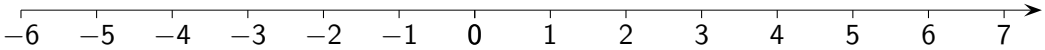


$$4 + (-4) =$$

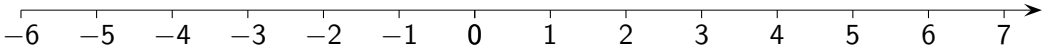


$$4 + (-4) = 0$$

Multiplikation

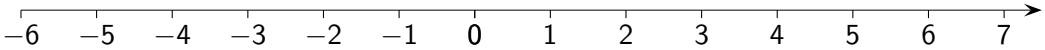


$$4 + (-4) \;=\; 0 \qquad\qquad | \cdot (-5)$$

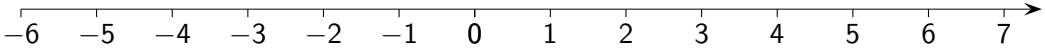


$$4 + (-4) = 0 \qquad | \cdot (-5)$$

$$-20 +$$

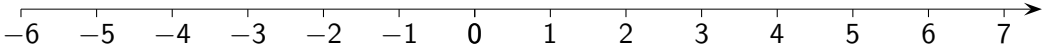


$$\begin{aligned} 4 + (-4) &= 0 \qquad\qquad | \cdot (-5) \\ -20 + (-5) \cdot (-4) &= \end{aligned}$$



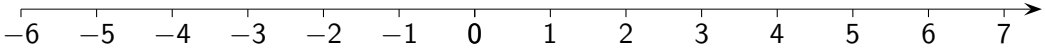
$$\begin{aligned} 4 + (-4) &= 0 \qquad \mid \cdot (-5) \\ -20 + (-5) \cdot (-4) &= 0 \end{aligned}$$

Multiplikation



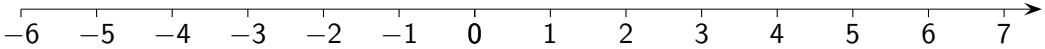
$$\begin{aligned} 4 + (-4) &= 0 && \mid \cdot (-5) \\ -20 + (-5) \cdot (-4) &= 0 && \mid +20 \end{aligned}$$

Multiplikation



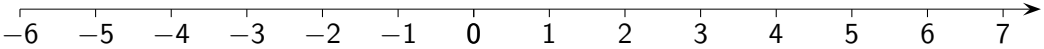
$$
\begin{aligned}
4 + (-4) &= 0 && \mid \cdot (-5) \\
-20 + (-5) \cdot (-4) &= 0 && \mid +20 \\
(-5) \cdot (-4) &= &&
\end{aligned}
$$

Multiplikation



$$
\begin{aligned}
4 + (-4) &= 0 && \mid \cdot (-5) \\
-20 + (-5) \cdot (-4) &= 0 && \mid +20 \\
(-5) \cdot (-4) &= 20
\end{aligned}
$$

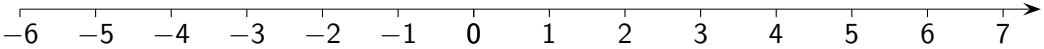
Multiplikation



$$
\begin{aligned}
4 + (-4) &= 0 && \mid \cdot (-5) \\
-20 + (-5) \cdot (-4) &= 0 && \mid +20 \\
(-5) \cdot (-4) &= 20
\end{aligned}
$$

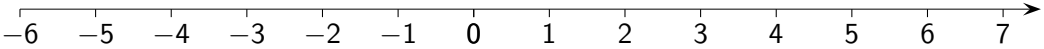
$$
(-a) \cdot (-b) =
$$

Multiplikation



$$
\begin{aligned}
4 + (-4) &= 0 && \mid \cdot (-5) \\
-20 + (-5) \cdot (-4) &= 0 && \mid +20 \\
(-5) \cdot (-4) &= 20
\end{aligned}
$$

$$
(-a) \cdot (-b) = a \cdot b
$$

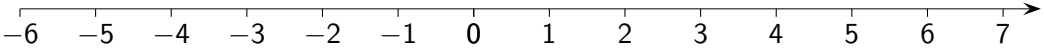


$$
\begin{aligned}
4 + (-4) &= 0 && \mid \cdot (-5) \\
-20 + (-5) \cdot (-4) &= 0 && \mid +20 \\
(-5) \cdot (-4) &= 20
\end{aligned}
$$

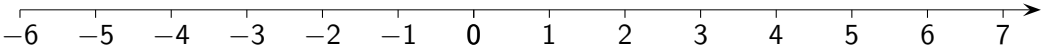
$$(-a) \cdot (-b) = a \cdot b$$

Minus mal Minus ergibt Plus

Subtraktion

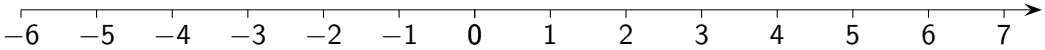


Subtraktion



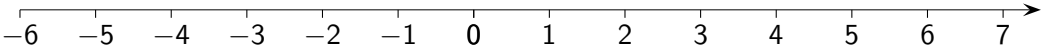
$$(-5) - (-5) \; =$$

Subtraktion



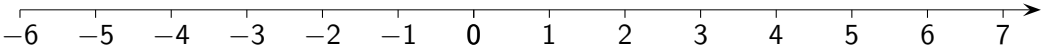
$$(-5) - (-5) = 0$$

Subtraktion



$$(-5) - (-5) \;=\; 0 \qquad |+5$$

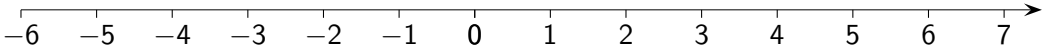
Subtraktion



$$(-5) - (-5) = 0 \qquad | + 5$$

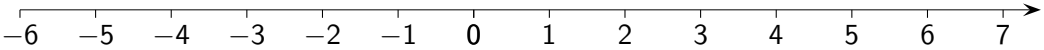
$$0$$

Subtraktion



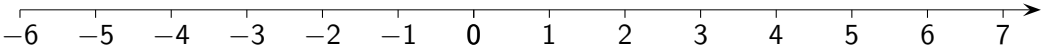
$$
\begin{aligned}
(-5) - (-5) &= 0 \qquad \mid +5 \\
0 - (-5) &=
\end{aligned}
$$

Subtraktion



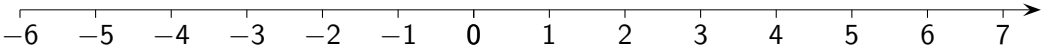
$$
\begin{aligned}
(-5) - (-5) &= 0 \qquad \mid +5 \\
0 - (-5) &= 5
\end{aligned}
$$

Subtraktion



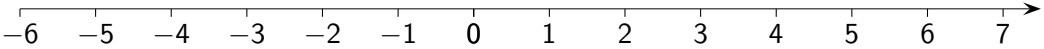
$$
\begin{aligned}
(-5) - (-5) &= 0 \qquad \mid +5 \\
0 - (-5) &= 5 \qquad \mid +4
\end{aligned}
$$

Subtraktion



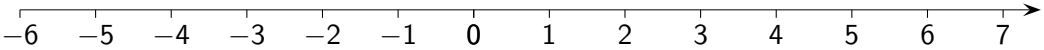
$$
\begin{aligned}
(-5) - (-5) &= 0 && \mid +5 \\
0 - (-5) &= 5 && \mid +4 \\
4 &
\end{aligned}
$$

Subtraktion



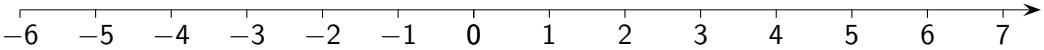
$$
\begin{aligned}
(-5) - (-5) &= 0 && \mid +5 \\
0 - (-5) &= 5 && \mid +4 \\
4 - (-5) &= &&
\end{aligned}
$$

Subtraktion



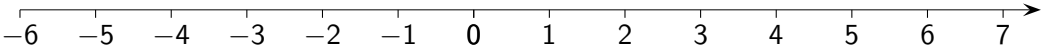
$$
\begin{aligned}
(-5) - (-5) &= 0 && \mid +5 \\
0 - (-5) &= 5 && \mid +4 \\
4 - (-5) &= 9
\end{aligned}
$$

Subtraktion



$$
\begin{aligned}
(-5)-(-5) &= 0 && \mid +5 \\
0-(-5) &= 5 && \mid +4 \\
4-(-5) &= 9 \\
-(-a) &=
\end{aligned}
$$

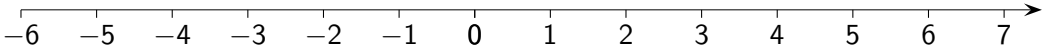
Subtraktion



$$
\begin{aligned}
(-5) - (-5) &= 0 && \mid +5 \\
0 - (-5) &= 5 && \mid +4 \\
4 - (-5) &= 9
\end{aligned}
$$

$$-(-a) = +a$$

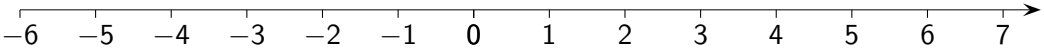
Subtraktion



$$
\begin{aligned}
(-5)-(-5) &= 0 && \mid +5 \\
0-(-5) &= 5 && \mid +4 \\
4-(-5) &= 9 \\
-(-a) &= +a
\end{aligned}
$$

$$(-3)-5 =$$

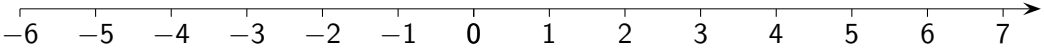
Subtraktion



$$
\begin{aligned}
(-5)-(-5) &= 0 && \mid +5 \\
0-(-5) &= 5 && \mid +4 \\
4-(-5) &= 9 \\
-(-a) &= +a
\end{aligned}
$$

$$(-3)-5 = (-3)$$

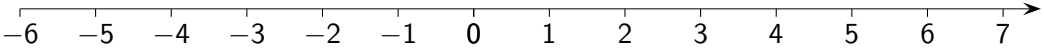
Subtraktion



$$
\begin{aligned}
(-5)-(-5) &= 0 && \mid +5 \\
0-(-5) &= 5 && \mid +4 \\
4-(-5) &= 9 \\
-(-a) &= +a
\end{aligned}
$$

$$(-3)-5 = (-3)+(-5) =$$

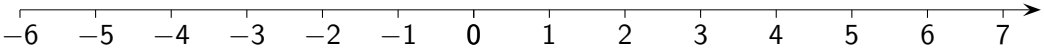
Subtraktion



$$
\begin{aligned}
(-5)-(-5) &= 0 && \mid +5 \\
0-(-5) &= 5 && \mid +4 \\
4-(-5) &= 9 \\
-(-a) &= +a
\end{aligned}
$$

$$(-3)-5 = (-3)+(-5) = -8$$

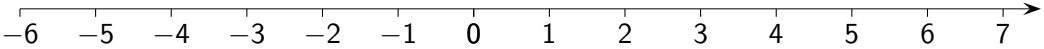
Subtraktion



$$
\begin{aligned}
(-5)-(-5) &= 0 && \mid +5 \\
0-(-5) &= 5 && \mid +4 \\
4-(-5) &= 9 \\
-(-a) &= +a
\end{aligned}
$$

$$
\begin{aligned}
(-3)-5 &= (-3)+(-5) = -8 \\
-a-b &=
\end{aligned}
$$

Subtraktion

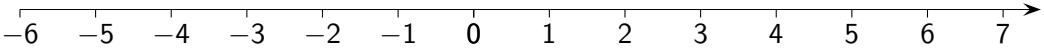


$$
\begin{aligned}
(-5)-(-5) &= 0 \qquad |+5\\
0-(-5) &= 5 \qquad |+4\\
4-(-5) &= 9
\end{aligned}
$$

$$-(-a) = +a$$

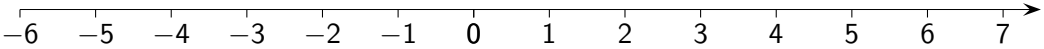
$$
\begin{aligned}
(-3)-5 &= (-3)+(-5) = -8\\
-a-b &= (-a)+(-b)
\end{aligned}
$$

Gegenzahl



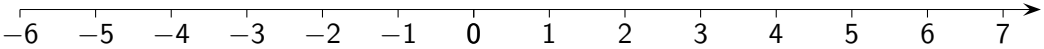
Jeder ganzen Zahl wird durch $a \xrightarrow{-\cdots} -a$
die Gegenzahl von a zugeordnet.

Gegenzahl



Jeder ganzen Zahl wird durch $a \xrightarrow{-\cdots} -a$
die Gegenzahl von a zugeordnet. Die Gegenzahl von 3 ist -3,

Gegenzahl



Jeder ganzen Zahl wird durch $a \xrightarrow{-\cdots} -a$
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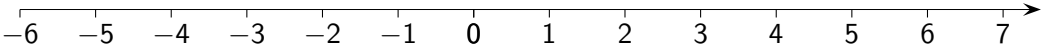
Gegenzahl



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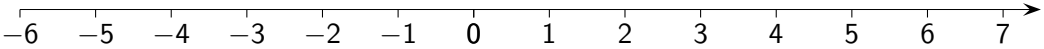
Gegenzahl



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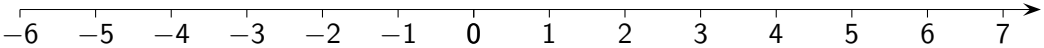
Die Gegenzahl von -3 ist $-(-3)$.

Gegenzahl



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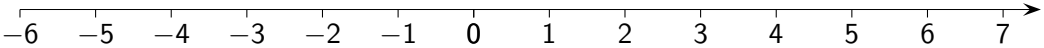
Die Gegenzahl von -3 ist $-(-3)$.

$-(-3) =$

Gegenzahl



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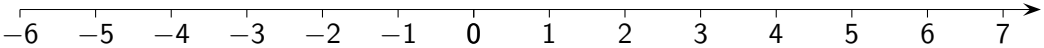
$-(-3) = 3$, weil

Gegenzahl



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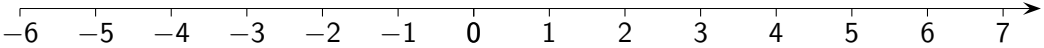
Gegenzahl



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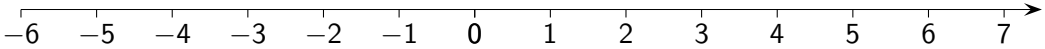
Die Zuordnung $a \xrightarrow{-\cdots} -a$ (Punktspiegelung am Ursprung) stimmt wegen
$(-1) \cdot a = -a$ mit der Multiplikation mit -1 überein.

Gegenzahl



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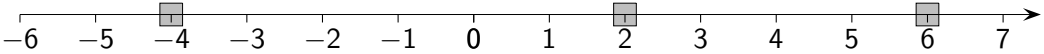
$$6 + (-4) = 2$$

Gegenzahl



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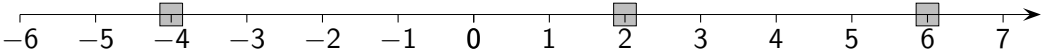
$$6 + (-4) \;=\; 2$$

Gegenzahl



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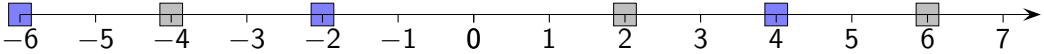
$$6 + (-4) \;=\; 2 \qquad | \cdot (-1)$$

Gegenzahl



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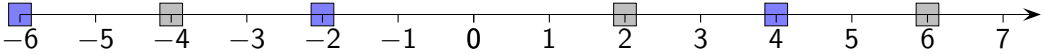
$$\begin{aligned} 6 + (-4) &= 2 \qquad | \cdot (-1) \\ -6 + 4 &= -2 \end{aligned}$$

Gegenzahl



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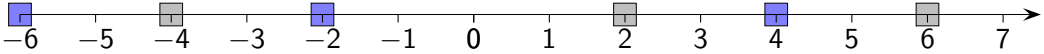
Gegenzahl



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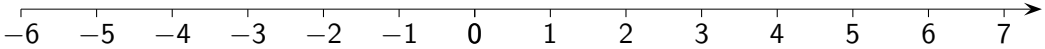
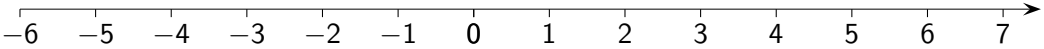
Minus mal Minus

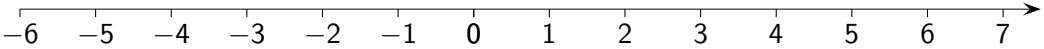


Minus mal Minus



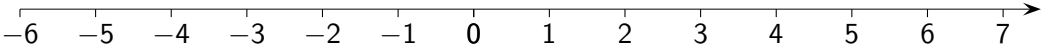
$$(-1) \cdot a \; =$$

Minus mal Minus



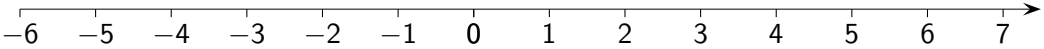
$$(-1) \cdot a \;=\; -a$$

Minus mal Minus



$$(-1) \cdot a \;=\; -a \qquad\qquad \Big|\, a = -5$$

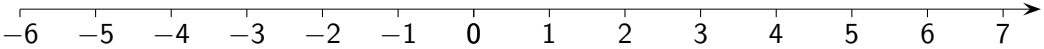
Minus mal Minus



$$(-1)\cdot a = -a \qquad \Big|\, a = -5$$

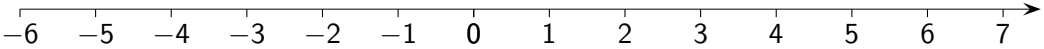
$$(-1)\cdot(-5) =$$

Minus mal Minus



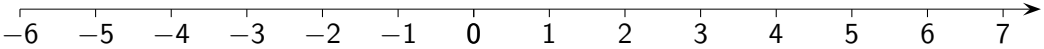
$$\begin{aligned} (-1)\cdot a &= -a \qquad\qquad \mid a=-5 \\ (-1)\cdot(-5) &= -(-5) \end{aligned}$$

Minus mal Minus



$$
\begin{aligned}
(-1)\cdot a &= -a \qquad\qquad \mid a = -5 \\
(-1)\cdot(-5) &= -(-5) = 5
\end{aligned}
$$

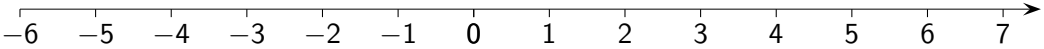
Minus mal Minus



$$
\begin{aligned}
(-1)\cdot a &= -a \qquad\qquad \mid a = -5 \\
(-1)\cdot(-5) &= -(-5) = 5
\end{aligned}
$$

$$
(-4)\cdot(-5) =
$$

Minus mal Minus

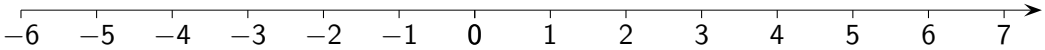


$$(-1)\cdot a = -a \qquad \Big|\, a = -5$$

$$(-1)\cdot(-5) = -(-5) = 5$$

$$(-4)\cdot(-5) = (-1)\cdot 4$$

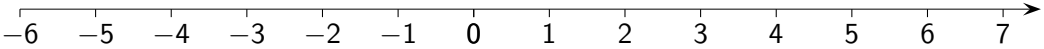
Minus mal Minus



$$
\begin{aligned}
(-1)\cdot a &= -a \qquad\qquad \mid a = -5 \\
(-1)\cdot(-5) &= -(-5) = 5
\end{aligned}
$$

$$
(-4)\cdot(-5) = (-1)\cdot 4\cdot(-1)\cdot 5
$$

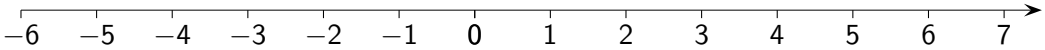
Minus mal Minus



$$
\begin{aligned}
(-1)\cdot a &= -a \qquad\qquad \mid a = -5 \\
(-1)\cdot(-5) &= -(-5) = 5
\end{aligned}
$$

$$
\begin{aligned}
(-4)\cdot(-5) &= (-1)\cdot 4\cdot(-1)\cdot 5 \\
&= (-1)\cdot(-1)\cdot
\end{aligned}
$$

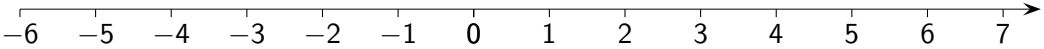
Minus mal Minus



$$
\begin{aligned}
(-1)\cdot a &= -a \qquad\qquad \mid a = -5 \\
(-1)\cdot(-5) &= -(-5) = 5
\end{aligned}
$$

$$
\begin{aligned}
(-4)\cdot(-5) &= (-1)\cdot 4\cdot(-1)\cdot 5 \\
&= (-1)\cdot(-1)\cdot 20
\end{aligned}
$$

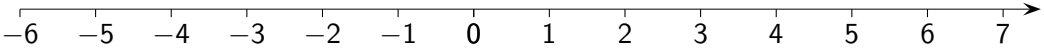
Minus mal Minus



$$
\begin{aligned}
(-1)\cdot a &= -a \qquad\qquad \mid a = -5 \\
(-1)\cdot(-5) &= -(-5) = 5
\end{aligned}
$$

$$
\begin{aligned}
(-4)\cdot(-5) &= (-1)\cdot 4\cdot(-1)\cdot 5 \\
&= (-1)\cdot(-1)\cdot 20 \\
&= (-1)\cdot(-20) =
\end{aligned}
$$

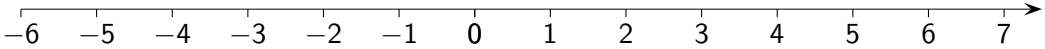
Minus mal Minus



$$
\begin{aligned}
(-1)\cdot a &= -a \qquad\qquad \big|\, a = -5 \\
(-1)\cdot(-5) &= -(-5) = 5
\end{aligned}
$$

$$
\begin{aligned}
(-4)\cdot(-5) &= (-1)\cdot 4\cdot(-1)\cdot 5 \\
&= (-1)\cdot(-1)\cdot 20 \\
&= (-1)\cdot(-20) = -(-20)
\end{aligned}
$$

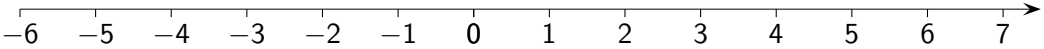
Minus mal Minus



$$
\begin{aligned}
(-1)\cdot a &= -a \qquad\qquad \mid a = -5 \\
(-1)\cdot(-5) &= -(-5) = 5
\end{aligned}
$$

$$
\begin{aligned}
(-4)\cdot(-5) &= (-1)\cdot 4\cdot(-1)\cdot 5 \\
&= (-1)\cdot(-1)\cdot 20 \\
&= (-1)\cdot(-20) = -(-20) = 20
\end{aligned}
$$

Minus mal Minus

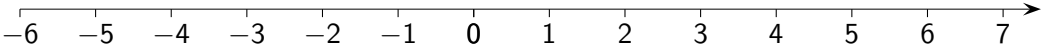


$$
\begin{aligned}
(-1)\cdot a &= -a \qquad\qquad \mid a = -5 \\
(-1)\cdot(-5) &= -(-5) = 5
\end{aligned}
$$

$$
\begin{aligned}
(-4)\cdot(-5) &= (-1)\cdot 4\cdot(-1)\cdot 5 \\
&= (-1)\cdot(-1)\cdot 20 \\
&= (-1)\cdot(-20) = -(-20) = 20
\end{aligned}
$$

Minus mal Minus entpricht

Minus mal Minus



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\end{aligned}
$$

Minus mal Minus entpricht Gegenzahl von der Gegenzahl

$-(-a)$

$-(-a)$ wird häufig „Minus mal Minus“ gelesen.

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Wegen $-(-a) = (-1) \cdot (-1) \cdot a$
bleiben die Rechnungen korrekt.

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bleiben die Rechnungen korrekt.

Anschaulich:
Zwei hintereinander ausgeführte Punktspiegelungen ergeben wegen $(-1) \cdot (-1) \cdot a = a$ die Ausgangszahl (Ausgangsgleichung).

Ausblick

$$20 - 4 \cdot (x - 5) \;=\; 4$$

Ausblick

$$20 - 4 \cdot (x - 5) \;=\; 4 \qquad\qquad \mid : 4$$

Ausblick

$$\begin{aligned} 20 - 4 \cdot (x - 5) &= 4 \qquad && \mid : 4 \\ 5 - (x - 5) &= 1 \end{aligned}$$

Ausblick

$$
\begin{aligned}
20 - 4 \cdot (x - 5) &= 4 && \mid : 4 \\
5 - (x - 5) &= 1 && \mid - 1
\end{aligned}
$$

Ausblick

$$
\begin{aligned}
20 - 4 \cdot (x - 5) &= 4 && \mid : 4 \\
5 - (x - 5) &= 1 && \mid - 1 \\
4 - (x - 5) &= 0
\end{aligned}
$$

Ausblick

$$
\begin{aligned}
20 - 4 \cdot (x - 5) &= 4 && \mid : 4 \\
5 - (x - 5) &= 1 && \mid - 1 \\
4 - (x - 5) &= 0 && \mid + (x - 5)
\end{aligned}
$$

Ausblick

$$
\begin{aligned}
20 - 4 \cdot (x - 5) &= 4 && \mid : 4 \\
5 - (x - 5) &= 1 && \mid - 1 \\
4 - (x - 5) &= 0 && \mid + (x - 5) \\
4 &= x - 5
\end{aligned}
$$

Ausblick

$$
\begin{aligned}
20 - 4 \cdot (x - 5) &= 4 && \mid : 4 \\
5 - (x - 5) &= 1 && \mid - 1 \\
4 - (x - 5) &= 0 && \mid + (x - 5) \\
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Ausblick

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20 - 4 \cdot (x - 5) &= 4 && \mid : 4 \\
5 - (x - 5) &= 1 && \mid - 1 \\
4 - (x - 5) &= 0 && \mid + (x - 5) \\
4 &= x - 5 && \mid + 5 \\
9 &= x
\end{aligned}
$$

Ausblick

$$
\begin{aligned}
20 - 4 \cdot (x - 5) &= 4 && \mid : 4 \\
5 - (x - 5) &= 1 && \mid - 1 \\
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4 &= x - 5 && \mid + 5 \\
9 &= x
\end{aligned}
$$

$$20 + (-4) \cdot (x - 5) = 4$$

Ausblick

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\begin{aligned}
20 - 4 \cdot (x - 5) &= 4 && \mid : 4 \\
5 - (x - 5) &= 1 && \mid - 1 \\
4 - (x - 5) &= 0 && \mid + (x - 5) \\
4 &= x - 5 && \mid + 5 \\
9 &= x
\end{aligned}
$$

$$
\begin{aligned}
20 + (-4) \cdot (x - 5) &= 4 \\
20
\end{aligned}
$$

Ausblick

$$
\begin{aligned}
20 - 4 \cdot (x - 5) &= 4 && \mid : 4 \\
5 - (x - 5) &= 1 && \mid - 1 \\
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\end{aligned}
$$

$$
\begin{aligned}
20 + (-4) \cdot (x - 5) &= 4 \\
20 - 4x
\end{aligned}
$$

Ausblick

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\begin{aligned}
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20 - 4x + 20 &=
\end{aligned}
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Ausblick

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\begin{aligned}
20 + (-4) \cdot (x - 5) &= 4 \\
20 - 4x + 20 &= 4 \\
40 - 4x &= 4
\end{aligned}
$$

Ausblick

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\begin{aligned}
20 + (-4) \cdot (x - 5) &= 4 \\
20 - 4x + 20 &= 4 \\
40 - 4x &= 4 && \mid -40
\end{aligned}
$$

Ausblick

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\begin{aligned}
20 - 4 \cdot (x - 5) &= 4 && \mid : 4 \\
5 - (x - 5) &= 1 && \mid -1 \\
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4 &= x - 5 && \mid + 5 \\
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\end{aligned}
$$

$$
\begin{aligned}
20 + (-4) \cdot (x - 5) &= 4 \\
20 - 4x + 20 &= 4 \\
40 - 4x &= 4 && \mid -40 \\
-4x &= -36
\end{aligned}
$$

Ausblick

$$
\begin{aligned}
20 - 4 \cdot (x - 5) &= 4 && \mid : 4 \\
5 - (x - 5) &= 1 && \mid - 1 \\
4 - (x - 5) &= 0 && \mid + (x - 5) \\
4 &= x - 5 && \mid + 5 \\
9 &= x
\end{aligned}
$$

$$
\begin{aligned}
20 + (-4) \cdot (x - 5) &= 4 \\
20 - 4x + 20 &= 4 \\
40 - 4x &= 4 && \mid - 40 \\
-4x &= -36 && \mid : (-4)
\end{aligned}
$$

Ausblick

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20 + (-4) \cdot (x - 5) &= 4 \\
20 - 4x + 20 &= 4 \\
40 - 4x &= 4 && \mid - 40 \\
-4x &= -36 && \mid : (-4) \\
x &= 9
\end{aligned}
$$

Ausblick

$$(\underbrace{5 + (-2)}_{3})^2 =$$

Ausblick

$$\underbrace{(5 + (-2))}_{3}{}^2 = 9$$

Ausblick

$$\underbrace{(5 + (-2))}_{3}{}^2 = 9$$

$$25 - 20 + 4 = 9$$

Ausblick

$$\underbrace{(5+(-2))}_{3}{}^2 = 9$$

$$25 - 20 + 4 = 9 \qquad \text{mit} \quad (-2)^2 = 4$$

Ausblick

$$\underbrace{(5+(-2))}_{3}{}^2 = 9$$

$$25 - 20 + 4 = 9 \qquad \text{mit} \quad (-2)^2 = 4$$