[06-01-08-T7]

Distribution with signs - Again

Examples

- Ex 1: Simplify

```
11 - 2 (x + 4)
```

Solution (*the long story*)

We will use theorem F3 which says $-a \cdot b = -(a\,b)$.

```
11 - 2 (x + 4)  =  11 + [-(2 (x + 4))]   def sub
                =  11 + [-2 (x + 4)]     F3
                =  11 + [-2 x + (-2) 4]  dist
                =  11 + [-2 x + (-8)]    arith
                =  11 + [(-8) + (-2 x)]  comm
                =  [11 + (-8)] + (-2 x)  assoc
                =  3 + (-2 x)            arith
                =  3 - 2 x               def sub
```

Solution (*the short story*)

```
11 - 2 (x + 4)  =  11 - 2 x - 8  "negative 2 times x is -x.
                                  negative 2 times 4 is -8"
                =  3 - 2 x
```

- Ex 2: Simplify

```
11 - (x + 4)
```

Solution (*the long story*)

We will use theorem F3 which says $-a \cdot b = -(a\,b)$.

```
11 - (x + 4)  =  11 - 1 (x + 4)          Id·
              =  11 + [-(1 (x + 4))]     def sub
              =  11 + [-1 (x + 4)]       F3
              =  11 + [-1 x + (-1) (4)]  dist
              =  11 + [-x + (-8)]        Id· & arith
              =  11 + [(-4) + (-x)]      comm
              =  [11 + (-4)] + (-x)      assoc
              =  7 + (-x)                arith
              =  7 - x                   def sub
```

Solution (*the short story*)

```
11 - (x + 4)  =  11 - x - 4  "negative times x is -x.
                              negative times 4 is -4"
              =  7 - x
```

In practice, everyone does the "short story". In fact, it is probably much less likely that you will make a mistake doing the "short story".

■ **A. Simplify the following. Show as many or as few steps as you wish.**

[1] $12 + 3\,(x + 1)$

[2] $17 + 2\,(x - 8)$

[3] $20 + 2\,(-x - 5)$

[4] $10\,x + 3\,(-x + 6)$

■ **B. Simplify the following. Show as many or as few steps as you wish.**

[5] $13 - 5\,(x + 2)$

[6] $12 - 3\,(2 + x)$

[7] $100 - 5\,(5 + x)$

[8] $25 - (x + 8)$

[9] $8\,x - 2\,(x + 2)$

[10] $8\,x - 3\,(x + 2)$

[11] $2 - 2\,(x + 1)$

[12] $2 - 2\,(x + 1)$

[13] $20 - 7\,(-x - 2)$

[14] $1 - \frac{1}{3}\,(3\,x + 6)$

[15] $-10 - \frac{2}{3}\,(\frac{3\,x}{2} + 3)$

[16] $3\,\pi - (2\,x + 2\,\pi)$

■ **C. Simplify the following. Show as many or as few steps as you wish.**

[1] $12 - 3\,(x - 1)$

[2] $21 - 2\,(x - 8)$

[3] $10 - 5\,(-x + 3)$

[4] $32 - \pi(-x + 6)$

[5] $13 - 5\,(-x - 8)$

[6] $12 - 3\,(2 - x)$

[7] $100 - 5\,(-5 + x)$

[8] $25 - (-x - 8)$

[9] $8\,x - 2\,(x - 2)$

[10] $12 - 3\,(-x + 2)$

[11] $-2\,(-x - 3) - 5$

[12] $-3\,(-x - 2) - x$

[13] $1 + 3\,(-x - 5)$

[14] $\frac{2}{3} - \frac{1}{3}\,(-3\,x + 1)$

[06-01-08-T7] Answers

Distribution with signs - Again

■ **A. Simplify the following. Show as many or as few steps as you wish.**

[1] $3x + 15$
[2] $2x + 1$
[3] $-2x + 10$
[4] $7x + 18$

■ **B. Simplify the following. Show as many or as few steps as you wish.**

[5] $3 - 5x$
[6] $6 - 3x$
[7] $75 - 5x$
[8] $17 - x$

[9] $6x - 4$
[10] $5x - 6$
[11] $-2x$
[12] $-2x$

[13] $7x + 34$
[14] $-x - 1$
[15] $-x - 12$
[16] $\pi - 2x$

■ **C. Simplify the following. Show as many or as few steps as you wish.**

[1] $-3x + 15$
[2] $37 - 2x$
[3] $5x - 5$
[4] $\pi x - 6\pi + 32$

[5] $5x + 53$
[6] $12 - 3(2 - x)$
[7] $125 - 5x$
[8] $x + 33$

[9] $6x + 4$
[10] $3x + 6$
[11] $2x + 1$
[12] $2x + 6$

[13] $-3x - 14$
[14] 1/3 + x