4. 3 Solving Equations Literally

A Practice Understanding Task

try the left side

Solve each of the following equations for x:

1. $\frac{3x+2}{5} = 7$

2. $\frac{3x+2y}{5} = 7$ · 5

$3x+2y=35$

$-2y \quad -2y$

$\frac{3x}{3} = \frac{35}{3} - \frac{2y}{3}$

$x = \frac{35}{3} - \frac{2}{3}y$

3. $\frac{4x}{3} - 5 = 11$

4. $\frac{4x}{3} - 5y = 11$

$+8y \quad +5y$

$\frac{4x}{3} = 11 + 5y$ · 3 · 3

$\frac{4x}{4} = \frac{33}{4} + \frac{15y}{4}$

$x = \frac{33}{4} + \frac{15}{4}y$

5. $\frac{2}{5}(x+3) = 6$

6. $\frac{2}{5}(x+y) = 6$ · 5

$\frac{2(x+y)}{2} = \frac{30}{2}$

$x+y = 15$

$-y \quad -y$

$x = 15 - y$

7. $2(3x+4) = 4x + 12$

8. $2(3x+4y) = 4x + 12y$

$6x + 8y = 4x + 12y$

$-4x \quad -4x$

$2x + 8y = 12y$

$-8y \quad -8y$

$\frac{2x}{2} = \frac{4y}{2}$

$x = 2y$

Write a **verbal description** for each step of the equation solving process used to solve the following equations for ***x***. Your description should include statements about how you know what to do next. For example, you might write, "*First I* _____, *because* _____…"

Solve for X

9. $\frac{ax+b}{c} - d = e$

ADD D
Multiply C
Subtract B
Divide A

10. $r \cdot \sqrt{\frac{mx}{n} + s} = t$

Divide R
Square both sides
Subtract S
Multiply N
Divide M

Solve each equation for x. Provide the justifications for each step. See the first example as a reminder for the types of justifications that might be used.

Example:

$3x - 6 = 15$	Justification
$+6 \quad +6$	Addition Property of equality
$\frac{3x}{3} = \frac{21}{3}$	Division Property of equality
$x = 7$	

11.

$4x - 10 = 2$	Justification
$+10 \quad +10$	Addition Prop
$\frac{4x}{4} = \frac{12}{4}$	Division Prop
$x = 3$	

12.

$6x + 3 = x + 18$	Justification
$-x \quad -x$	Subtraction Prop
$5x + 3 = 18$	Subtraction Prop
$-3 \quad -3$	
$\frac{5x}{5} = \frac{15}{5}$	Division Prop
$x = 3$	

13.

$3x - 10 = 2x + 12$	Justification
$+10 \quad +10$	Addition Prop
$3x = 2x + 22$	Subtraction Prop
$-2x \quad -2x$	
$x = 22$	

14.

$12x + 3y = 15$	Justification
$-3y \quad -3y$	Subtraction Prop
$\frac{12x}{12} = \frac{15 - 3y}{12}$	Division Prop
$x = \frac{5}{4} - \frac{1}{4}y$	

15.

$x(B + 7) = 9$	Justification
$\frac{}{B+7} \quad \frac{}{B+7}$	Division
$x = \frac{9}{B+7}$	

3) Solve for x
$3x+y=z$ $x=\frac{z-y}{3}$ or $\frac{z}{3}-\frac{y}{3}$

11) Solve for d
$4d-p=m$ $d=\frac{m+p}{4}$ or $\frac{m}{4}+\frac{p}{4}$

14) Solve for V
$\frac{1}{5}V+gt=a$
$-gt \quad -gt$
$5\cdot\frac{1}{5}V=(a-gt)5$ $V=5a-5gt$
$V=5(a-gt)$
$5a-5gt$

16) Solve for x
$nxz-f=3f$ $x=\frac{4f}{nz}$

4) Solve for d
$q+ad=m$ $d=\frac{m-q}{a}$ $\frac{m}{a}-\frac{q}{a}$

Solve for w
13) $24=l\cdot w\cdot h$ $w=\frac{24}{lh}$

Solve for r
$8rs-8s=16p$
$+8s \quad +8s$
2) $\frac{8rs}{8s}=\frac{16p+8s}{8s}$ $r=\frac{2p}{s}+1$

Solve for d
6) $fd-m=8$ $d=\frac{8+m}{f}$ $\frac{8}{f}+\frac{m}{f}$

Solve for g
10) $2g-4f=6f$ $g=5f$

Solve for w
15) $2wy-8n=4k$
$+8n \quad +8n$
7) $2wy=4k+8n$ $w=\frac{2k+4n}{y}$

Solve for C $P=4C$

Solve for g
$bg+9f=27$