

Apply the order of operations to simplify each expression. **PEMDAS** LEFT TO RIGHT RULE FOR M+D AND A+S

1. $11 - 8(9 - 5) + 2^2$
 $11 - 8(4) \div 4$
 $11 - 32 \div 4$
 $11 - 8$ 3

2. $5 + 8 \cdot 2 - 4$
 $5 + 16 - 4$
 $21 - 4$ 17

3. $6 + 10 \div (3 + 2)$
 $6 + 10 \div 5$
 $6 + 2$ 8

4. $\frac{20+4}{4+3^2-1}$ $\frac{24}{4+9-1}$ $\frac{24}{13-1}$ $\frac{24}{12}$ 2

Polynomials – Simplify by combining like terms.

5. $2(a + 5b)$
 $2a + 10b$

6. $6y - 1(9 - 8y)$
 $6y - 9 + 8y$
 $14y - 9$

7. $2w^2 - 4w^3 + 6w - 3 + 3w^3 - 2w + 4$
 $-w^3 + 2w^2 + 4w + 1$

8. $3(x^2 + 4x) + -4x - 8$
 $3x^2 + 12x - 4x - 8$
 $3x^2 + 8x - 8$

Equations – Solve each equation showing all work.

9. $4x - 7 = 25$
 $\frac{+7}{+7}$
 $\frac{4x}{4} = \frac{32}{4}$
 $x = 8$

10. $-\frac{2}{3}a + 5 = -7$
 $\frac{-3}{-3}$ $\frac{-2}{3}a = \frac{-12}{3}$ $\frac{-3}{2}$
 $a = 18$

11. $3(x + 1) - 1 = -14$
 $3x + 3 - 1 = -14$
 $3x + 2 = -14$
 $\frac{-2}{-2}$ $\frac{-2}{3} = \frac{-16}{3}$
 $x = -\frac{16}{3}$ $-5\frac{1}{3}$

12. $-30x + 1 = 18x$
 $\frac{+30x}{+30x}$ $\frac{+30x}{+30x}$
 $\frac{1}{48} = \frac{48x}{48}$
 $x = \frac{1}{48}$

13. $8x + 3 = 3x + 18$
 $\frac{-3x}{-3x}$ $\frac{-3}{-3x}$ $\frac{-3}{-3}$
 $\frac{5x}{5} = \frac{15}{5}$
 $x = 3$

14. $-4x - 5 = -2(3x - 6)$
 $-4x - 5 = -6x + 12$
 $\frac{+6x}{+6x}$ $\frac{+6x}{+6x}$ $\frac{+5}{+5}$
 $\frac{2x}{2} = \frac{17}{2}$
 $x = \frac{17}{2}$ $8\frac{1}{2}$

15. $-4(2x - 1) + 3 = 7 - 12x$
 $-8x + 4 + 3 = 7 - 12x$
 $-8x + 7 = 7 - 12x$
 $\frac{+12x}{+12x}$ $\frac{-7}{-7}$ $\frac{-7}{+12x}$
 $\frac{4x}{4} = \frac{0}{4}$ $x = 0$

Remember it will be easier to solve the following if you get rid of the fractions first!

16. $\frac{2}{3}x + 4 = -3\frac{1}{2}$
 $6 \left(\frac{2}{3}x + 4 = -\frac{7}{2} \right)$
 $4x + 24 = -21$
 $\frac{-24}{-24}$ $\frac{-24}{-24}$
 $\frac{4x}{4} = \frac{-45}{4}$
 $x = \frac{-45}{4} = -11\frac{1}{4}$

17. $12 \left(\frac{5}{6} + \frac{3}{4}x + \frac{1}{2} = \frac{1}{2}x - \frac{2}{3} \right)$
 $10 + 9x + 6 = 6x - 8$
 $9x + 16 = 6x - 8$
 $\frac{-6x}{-6x}$ $\frac{-16}{-6x-16}$ $\frac{-6x-16}{-6x-16}$
 $\frac{3x}{3} = \frac{-24}{3}$
 $x = -8$

Proportions – Solve each of the following for x.

18. $\frac{2x}{5} = \frac{9}{11}$

$$2x(11) = 5(9)$$

$$\frac{22x}{22} = \frac{45}{22}$$

$$x = \frac{45}{22} = 2\frac{1}{22}$$

19. $\frac{x-3}{9} = \frac{7}{8}$

$$8(x-3) = 9(7)$$

$$8x - 24 = 63$$

$$\frac{+24}{+24} \quad \frac{+24}{+24}$$

$$\frac{8x}{8} = \frac{87}{8}$$

$$x = \frac{87}{8} = 10\frac{7}{8}$$

20. $\frac{3x+4}{7} = \frac{5x-1}{3}$

$$3(3x+4) = 7(5x-1)$$

$$9x+12 = 35x-7$$

$$\frac{-9x+7}{-9x+7} \quad \frac{-9x+7}{-9x+7}$$

$$\frac{19}{26} = \frac{26x}{26}$$

$$x = \frac{19}{26}$$

Solve the following percent problems – showing the set up for each problem.

21. What is 35.1% of 140?

$$x = 0.351(140)$$

$$x = 49.14$$

22. What percent of 80 is 5.12?

$$\frac{x}{100}(80) = 5.12 \quad \text{OR} \quad \frac{x(80)}{80} = \frac{5.12}{80}$$

$$\frac{0.8x}{0.8} = \frac{5.12}{0.8}$$

$$x = 6.4\%$$

$$x = 0.064$$

$$6.4\%$$

23. 7% of what number is 10.5?

$$\frac{0.07(x)}{0.07} = \frac{10.5}{0.07}$$

$$x = 150$$

24. 4.05 is what percent of 90?

$$4.05 = \frac{x}{100}(90) \quad \text{OR} \quad \frac{4.05}{90} = \frac{x(90)}{90}$$

$$\frac{4.05}{0.9} = \frac{0.9x}{0.9}$$

$$x = 4.5\%$$

$$x = 0.045$$

$$4.5\%$$

Evaluate each formula using the given values of the variables.

25. Convert -45° Celsius to Fahrenheit

26. Simple Interest: $I = Prt$,

using the formula $F = \frac{9}{5}C + 32$

Find r if $I = \$60$, $P = \$2500$, and $t = 3$ years.

$$F = \frac{9}{5}(-45) + 32$$

$$F = -81 + 32 = -49^\circ F$$

$$60 = 2500(r)3$$

$$\frac{60}{7500} = \frac{7500r}{7500}$$

$$r = 0.008$$

$$0.8\%$$

Solve each formula for the indicated variable.

27. $A = \frac{1}{2}bh$ for h

$$(A = \frac{1}{2}bh)2$$

$$2A = bh$$

$$h = \frac{2A}{b}$$

28. $2x - 3y = 24$ for y

$$\frac{-2x}{-2x} \quad \frac{-24}{-2x}$$

$$\frac{-3y}{-3} = \frac{-2x+24}{-3}$$

$$y = \frac{-2x+24}{-3}$$

$$y = \frac{2}{3}x - 8$$

29. $P = 2L + 2W$ for W

$$P = 2L + 2W$$

$$\frac{P-2L}{2} = \frac{2W}{2}$$

$$W = \frac{P-2L}{2}$$

$$W = \frac{1}{2}P - L$$

Express each ratio in simplest form.

30. 80 seconds : 3 minutes

$$\frac{80 \text{ sec}}{180 \text{ sec}} \quad \frac{\times 60}{180}$$

$$\frac{4}{9} \quad 4:9$$

31. $51w : 17w$

$$\frac{51w}{17w} \quad \frac{3(17)}{17} \quad \frac{3}{1}$$

$$3:1$$

32. 150 mm : 5 m $1m = 1000 \text{ mm}$

$$\frac{150 \text{ mm}}{5000 \text{ mm}} \quad \frac{8.3}{5.100}$$

$$3:100$$

Write an algebraic expression for each statement given. (Let x represent the unknown.)

33. Five less than the product of eight and a number

$$8x - 5$$

34. Twice the difference of a number and nine is twenty.

$$2(x - 9) = 20$$

Applications – be sure to show the set-up/formula used on each question. No credit will be given for answers alone.

35. It takes 1½ cups of sugar to make 3 dozen chocolate chip cookies. How many cups of sugar will be needed to make 60 cookies?

$$\frac{1.5}{36} = \frac{x}{60}$$

$$36x = 1.5(60) \quad x = 2.5$$

2.5 CUPS OF SUGAR

36. Renee scored 11 points lower on her biology test than she did on her history test. The sum of her two grades was 185. What did she score on each test?

H = HISTORY TEST
H - 11 = BIOLOGY TEST

$$\begin{aligned} H + H - 11 &= 185 \\ 2H - 11 &= 185 \\ +11 & \quad +11 \\ \hline 2H &= 196 \\ \frac{2H}{2} &= \frac{196}{2} \end{aligned}$$

H = 98 ON HISTORY TEST
98 - 11 = 87 ON BIOLOGY TEST

37. Tushar earned a 94, 95, 87, 85 and 84 on his tests. What must he score on the sixth test in order to have an average score of 90?

$$\frac{94 + 95 + 87 + 85 + 84 + x}{6} = 90$$

$$6 \cdot \frac{445 + x}{6} = 90 \cdot 6$$

$$\begin{aligned} 445 + x &= 540 \\ -445 & \quad -445 \\ \hline x &= 95 \end{aligned}$$

NEEDS A 95 ON 6th TEST

38. During three summer months, Anna earned \$925. In August she earned twice as much as in July, and in June she earned \$25 less than in August. How much did she make in each month?

JUNE = 2x - 25
JULY = x
AUGUST = 2x

$$\begin{aligned} 2x - 25 + x + 2x &= 925 \\ 5x - 25 &= 925 \\ +25 & \quad +25 \\ \hline 5x &= 950 \\ \frac{5x}{5} &= \frac{950}{5} \end{aligned}$$

$$\begin{aligned} x &= 190 \text{ JULY} \\ 2x &= 380 \text{ AUG.} \\ 2x - 25 &= 355 \text{ JUNE} \\ \hline &925 \checkmark \end{aligned}$$

\$355 IN JUNE
\$190 IN JULY
\$380 IN AUGUST

39. Your salary goes from \$10.50/hr to \$12.50/hr. What was the percent increase?

$$\begin{aligned} \% \text{ INCR} &= \frac{\text{NEW} - \text{ORIGINAL}}{\text{ORIGINAL}} \cdot 100 \\ &= \frac{12.50 - 10.50}{10.50} \cdot 100 \\ &= 19.0476 \end{aligned}$$

19.05% INCREASE

40. You take your date out for dinner before the homecoming dance. If you tipped 15% and the total cost (meal plus tip) was \$80.50, what was the cost of the food and drinks?

LET MEAL = x

$$\begin{aligned} x + 0.15x &= 80.50 \\ 1.15x &= 80.50 \\ \frac{1.15x}{1.15} &= \frac{80.50}{1.15} \\ x &= 70 \end{aligned}$$

FOOD + DRINKS = \$70
TIP = 0.15(70) = 10.5
\$80.50 ✓