1. True

2. Percent - a part out of 100

3. Yes, this is a proportion

$$\frac{-30}{-120} = \frac{6}{24}$$

* In all proportions the cross-products are equal - check:

$$-30(24) = -120(6)$$
$$-720 = -720 \checkmark$$

4. Rational Numbers - fractions that are made from integers

5. 72.2

$$.18x = 13$$
$$x = \frac{13}{.18} = 72.2$$

6. 1840

$$.05x = 92$$
$$x = \frac{92}{.05} = 1840$$

7. rate

$$\text{miles per hour} = \frac{\text{miles}}{\text{hour}} \quad \text{rate}$$

8. 9 cylinders

$y = kx$ direct variation

$c = kh$ c = number cylinders, h = horse power

find k, $2 = k(20)$

$20k = 2$

$k = \frac{1}{10}$

$c = \frac{1}{10}h$

$c = \frac{1}{10}(90)$

$c = 9$ 9 cylinders for 90 hp.

9. $\frac{x}{5}$

$$\frac{2x^2}{10x} = \frac{2 \cdot x \cdot x}{2 \cdot 5 \cdot x} = \frac{x}{5}$$

10. $\frac{x-y}{3}$

$$\frac{x^2-y^2}{3x+3y} = \frac{(x+y)(x-y)}{3(x+y)} =$$

$$\frac{x-y}{3}$$

11. $\frac{-3y^5x^4}{4z^2}$

$$\frac{-9y^3x^5z}{3z^3 4xy^{-2}} = \frac{-3y^3x^5z \cdot z^{-3}x^{-1}y^2}{4}$$

$$= \frac{-3y^5x^4z^{-2}}{4} = \frac{-3y^5x^4}{4z^2}$$

12. $\dfrac{4}{x+3}$

$$\frac{4x-8}{x^2+x-6} = \frac{4(x-2)}{(x-2)(x+3)} = \frac{4}{x+3}$$

13. $\dfrac{3(2y-1)}{y}$

$$\frac{3y}{(y+2)} \cdot \frac{2y^2+3y-2}{y^2} =$$

$$\frac{3y}{(y+2)} \cdot \frac{(y+2)(2y-1)}{y \cdot y} = \frac{3(2y-1)}{y}$$

14. $\dfrac{x(5x+1)}{(x+2)(3x-2)}$

$$\frac{5x+1}{x+2} \div \frac{3x-2}{x}$$

$$\frac{\frac{5x+1}{x+2}}{} \cdot \frac{x}{3x-2} = \frac{x(5x+1)}{(x+2)(3x-2)}$$

15. $\dfrac{-2y+11}{y+2}$

$$\frac{4}{y+2} + \frac{-2y+7}{y+2} =$$

$$\frac{4 + -2y+7}{y+2} = \frac{-2y+11}{y+2}$$

16. $$\frac{11x^2+4}{2x(x+2)} =$$

LCD $= 2x(x+2)$

$$\frac{2x}{2x} \cdot \frac{6x}{(x+2)} - \frac{x-2}{2x} \cdot \frac{(x+2)}{(x+2)} =$$

$$\frac{12x^2}{2x(x+2)} - \frac{(x-2)(x+2)}{2x(x+2)} =$$

$$\frac{12x^2 - [x^2-4]}{2x(x+2)} =$$

$$\frac{11x^2+4}{2x(x+2)} =$$

17. $x = 2/3$

$$\frac{8}{x+2} = \frac{2}{x}$$

$$8x = 2(x+2)$$
$$8x = 2x + 4$$
$$6x = 4$$
$$x = 4/6 = 2/3$$

Verify

$$\frac{8}{(2/3 + 2)} = \frac{2}{2/3}$$

$$\frac{8}{(8/3)} = 3$$

$3 = 3$ ✓

18. $x = 14$

$$10\left(\frac{x-4}{5} + \frac{x+2}{2} = 10\right)$$

$$10 \cdot \frac{(x-4)}{5} + 10\frac{(x+2)}{2} = 10 \cdot 10$$

$$2(x-4) + 5(x+2) = 100$$

$$2x - 8 + 5x + 10 = 100$$

$$7x + 2 = 100$$

$$7x = 98$$

$$x = 98/7$$

$$x = 14$$

$$\frac{(x-4)}{5} + \frac{(x+2)}{2} = 10$$

$$\frac{(14-4)}{5} + \frac{(14+2)}{2} = 10$$

$$\frac{10}{5} + \frac{16}{2} = 10$$

$$2 + 8 = 10$$

$$10 = 10 \checkmark$$

19. $y=-2$

$$\frac{7}{(y-2)} = \frac{3}{2y} + \frac{4}{(y-2)}$$

LCD $= 2y(y-2)$

$$2y(y-2)\left(\frac{7}{(y-2)} = \frac{3}{2y} + \frac{4}{(y-2)}\right)$$

$$2y(7) = 3(y-2) + 2y(4)$$

$$14y = 3y - 6 + 8y$$

$$14y = 11y - 6$$

$$3y = -6$$

$$y = -2$$

verify

$$\frac{7}{(y-2)} = \frac{3}{2y} + \frac{4}{(y-2)}$$

$$\frac{7}{(-2-2)} = \frac{3}{2(-2)} + \frac{4}{(-2-2)}$$

$$-\frac{7}{4} = -\frac{3}{4} + -\frac{4}{4}$$

$$-\frac{7}{4} = -\frac{7}{4} \checkmark$$

20. $w=-12$ and $w=1$

$$\frac{2w+1}{6}+4=\frac{w+8}{2w}$$

LCD: $6(2w)=12w$

$$12w\left(\frac{2w+1}{6}+4=\frac{w+8}{2w}\right)$$

$$12w\cdot\frac{(2w+1)}{6}+12w\cdot 4=\frac{12w(w+8)}{2w}$$

$$2w(2w+1)+48w=6(w+8)$$

$$4w^2+2w+48w=6w+48$$

$$4w^2+44w-48=0$$

$$4(w^2+11w-12)=0$$

$$w^2+11w-12=0$$

$$(w+12)(w-1)=0$$

$w+12=0$ $\qquad$ $w-1=0$

$w=-12$ $\qquad$ $w=1$

Verify both $w=-12$ and $w=1$

$$\frac{2w+1}{6}+4=\frac{w+8}{2w}$$

$w = -12$

$$\frac{2w+1}{6} + 4 = \frac{w+8}{2w}$$

$$\frac{2(-12)+1}{6} + 4 = \frac{-12+8}{2(-12)}$$

$$-\frac{23}{6} + \frac{24}{6} = \frac{-4}{-24}$$

$$\frac{1}{6} = \frac{1}{6} \checkmark$$

$w = 1$

$$\frac{2w+1}{6} + 4 = \frac{w+8}{2w}$$

$$\frac{2(1)+1}{6} + 4 = \frac{1+8}{2(1)}$$

$$\frac{3}{6} + \frac{24}{6} = \frac{9}{2}$$

$$\frac{27}{6} = \frac{9}{2}$$

$$\frac{9}{2} = \frac{9}{2} \checkmark$$