Today's Plan:

Learning Target (standard): I will solve real-world variation problems.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

---

p.405 #28-64 (by4)

$28) \{(-5,-5),(-1,-3),(3,-1),(7,1)\}$

$32) f^{-1}(x) = \dfrac{1}{2}x - 2$

$36) f^{-1}(x) = -\dfrac{1}{2}x + 1$

$40) f^{-1}(x) = \dfrac{4}{3}x + \dfrac{16}{3}$

$44) f^{-1}(x) = \dfrac{1}{3}x - \dfrac{4}{3}$

$48) f^{-1}(x) = \dfrac{1}{6}x + \dfrac{1}{2}$

52) no inverse

$56) no$

$60) no$

$64) f^{-1}(f(-4)) = -4$

$f(x) = x^2 + 1$
$g(x) = 2x - 1$
$h(x) = 1 - x$

$g(f(h(4))) =$

$h(4) = 1 - 4$
$h(4) = -3$
$f(-3) = (-3)^2 + 1$
$= 9 + 1$
$f(-3) = 10$

$g(10) = 2(10) - 1$
$= 20 - 1$
$g(10) = 19$

$\rightarrow g(f(h(4))) = 19$

$f(x) = x^2 + 1$
$g(x) = 2x - 1$
$h(x) = 1 - x$

$f(g(h(-1))) =$

$h(-1) = 1 - (-1)$
$= 1 + 1$
$h(-1) = 2$

$g(2) = 2(2) - 1$
$= 4 - 1$
$g(2) = 3$

$f(3) = 3^2 + 1$
$= 9 + 1$
$f(3) = 10$

$\rightarrow f(g(h(-1))) = 10$

Find the inverse, if it exists.

$$f(x) = \frac{2}{3}x - 5 \quad \text{1-1} \checkmark$$

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

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

$$\left[x + 5 = \frac{2}{3}y \right]^3$$

$$3x + 15 = 2y$$

$$\frac{3}{2}x + \frac{15}{2} = y$$

$$f^{-1}(x) = \frac{3}{2}x + \frac{15}{2}$$

Find the inverse, if it exists. Verify they are inverses.

$$f(\overset{y}{x}) = -3x - 4 \quad \text{1-1} \checkmark$$

$$x = -3y - 4$$

$$\frac{x}{-3} + \frac{4}{-3} = \frac{-3y}{-3}$$

$$-\frac{1}{3}x - \frac{4}{3} = y$$

$$\boxed{f^{-1}(x) = -\frac{1}{3}x - \frac{4}{3}}$$

Variation Problems:

- unknown quantities change (vary) in different ways with respect to other unknown quantities
- the constant of variation is *k*

Types of Variation:

- Direct $\quad y = kx$

- Inverse $\quad y = \dfrac{k}{x}$

- Joint $\quad z = kxy$

- Combined $\quad z = \dfrac{kx}{y}$

Process for Solving Variation Problems:

- Determine the type of variation and set up an equation using the given variables

- Use a set of known values to find the constant of variation

- Rewrite the original equation to account for the value of the constant of variation

- Use this equation to find the unknown value

The pressure (p) on a diver in the water varies directly as the depth (d). If the pressure is 3.6 lb/in^2 when the depth is 8 feet, what is the pressure when the depth is 30 feet?

① $P = kd$

$3.6 = 8k$

$k = 0.45$

② $P = 0.45d$

③ $P = 0.45(30)$

$P = 13.5 \, lb/in^2$

For a constant temperature, the pressure (P) of a gas varies inversely as the volume (V). If the pressure is 25 lb/in^2 when the volume is 400 ft^3, find the pressure when the volume is 150 ft^3.

① $P = \dfrac{k}{V}$

$25 = \dfrac{k}{400}$

$k = 10000$

② $P = \dfrac{10000}{V}$

③ $P = \dfrac{10000}{150}$

$P = 66.667 \, lb/in^2$

Assignment:

p.413 #2-10 even