

Name: _____

★KEY★

Date: _____

Directions: Show all work on a separate sheet of paper. Record answers on the answer sheet provided.Part I – Writing equations, identifying variables

- 1) Ashley needs to complete an obstacle course where she has to crawl under barbed wire, go through 4 tires, and then run 50ft.
- Draw a picture to represent the scenario.
 - Identify your variables.
 - Write 4 equations that model the situation.
- 2) Helena's obstacle course is made up of a 100ft. run, jumping a mud puddle, and then going through 8 tires. :
- Draw a picture to represent the scenario.
 - Identify your variables.
 - Write 4 equations that model the situation.

Part II – Combining functions: simplify each expression using the following:

Let $f(x) = \frac{-2}{3}x - 9$

$g(x) = 4x^2 - 5x + 7$

$h(x) = 15 - 9x$

3) $g(x) + h(x)$

$$4x^2 - 5x + 7 + 15 - 9x$$

$$\boxed{4x^2 - 14x + 22}$$

4) $f(x) - h(x)$

$$\frac{-2}{3}x - 9 - (15 - 9x)$$

$$\frac{-2}{3}x - 9 - 15 + 9x$$

$$\boxed{\frac{25}{3}x - 24}$$

5) $-h(x)$

$$-(15 - 9x)$$

$$\boxed{-15 + 9x}$$

6) $\frac{-3}{2}f(x)$

$$\frac{-3}{2}\left(\frac{-2}{3}x - 9\right)$$

$$\boxed{x + \frac{27}{2}}$$

7) $2f(x) + 3h(x)$

$$2\left(\frac{-2}{3}x - 9\right) + 3(15 - 9x)$$

$$\frac{-4}{3}x - 18 + 45 - 27x$$

$$\boxed{\frac{-85}{3}x + 27}$$

Part III - story problems

8) The height of a football is modeled by the function $h(t) = -2t^2 + 5t + 7$, where $h(t)$ is the height in feet and t is the time in seconds after the football is thrown. According to the model, what is the height after 2 seconds?

$$h(t) = -2t^2 + 5t + 7 \quad t = 2 \text{ seconds}$$

$$h(t) = -2(2)^2 + 5(2) + 7 = -8 + 10 + 7 = \boxed{9 \text{ feet}}$$

9) A 3" tree grows 18 inches every year. This situation is represented by the equation $h(t) = 18t + 3$, where $h(t)$ is the height in inches and t is the time in years. According to the model, how much time has gone by if the tree is 70 inches tall?

$$70 = 18t + 3 \quad t = 67/18 \rightarrow$$

a. how tall is the plant after 2 years?

b. when is the plant 70 inches tall?

$$h(t) = 18(2) + 3$$

$$h(t) = 36 + 3$$

$$\boxed{39 \text{ inches}}$$

$$70 = 18t + 3$$

$$67 = 18t$$

$$t = 67/18 \approx 3.7 \text{ years}$$

10) Austin has a checking account with \$1000 and withdraws \$50 every month. This situation can be modeled by the equation $A(m) = -50m + 1000$, where $A(m)$ is the amount and m is the number of months Austin withdraws money.

a. When will Austin have exactly \$350 left?

b. how much is in the account after 6 months?

$$350 = -50m + 1000$$

$$-650 = -50m$$

$$m = \boxed{13 \text{ months}}$$

$$A(m) = -50(6) + 1000$$

$$A(m) = -300 + 1000$$

$$\boxed{A(m) = \$700}$$

Part IV - Function Notation

11) Let $f(x) = \frac{-3}{4}x + 5$. Let $g(x) = -2x^2 + 7$

a. Evaluate $f(3)$.

$$f(3) = \frac{-3}{4}(3) + 5$$

$$= \frac{-9}{4} + 5 = \boxed{1\frac{1}{4} \text{ or } 2.75}$$

b. Evaluate $g(-1)$.

$$g(-1) = -2(-1)^2 + 7$$

$$= -2 + 7$$

$$\boxed{= 5}$$

c. Evaluate $f(2) + g(2)$.

$$f(2) = \frac{-3}{4}(2) + 5 = 14/4$$

$$+$$

$$g(2) = -2(2)^2 + 7 = -1$$

$$= \boxed{10/4} \text{ or } 2.5$$

d. Find x when $f(x) = 15$.

$$15 = \frac{-3}{4}x + 5$$

$$-5 \quad -5$$

$$10 = \frac{-3}{4}x$$

$$\boxed{x = -40/3} \text{ or } -13.\bar{3}$$

e. Find x when $f(x) = -25$.

$$-25 = \frac{-3}{4}x + 5$$

$$-30 = \frac{-3}{4}x$$

$$\boxed{x = 40}$$

f. Find x when $f(x) = 3/4$

$$3/4 = \frac{-3}{4}x + 5$$

$$-17/4 = \frac{-3}{4}x$$

$$\boxed{x = 17/3} \text{ or } 5.\bar{6}$$

Part V - Solving equations

12) Solve each equation

a. $15 = 5c - 24$

$+24 \quad +24$

$\frac{39}{5} = \frac{5c}{5}$

$c = \frac{39}{5} \text{ or } 7.8$

b. $13 - x = 27$

$-13 \quad -13$

$-x = 14$

$x = -14$

c. $\frac{x-10}{3} = -12 \cdot 3$

$x-10 = -36$

$+10 \quad +10$

$x = -26$

d. $-8(2x+15) = 32$

$-16x - 120 = 32$

$+120 \quad +120$

$-16x = 152$

$-16 \quad -16$

$x = -\frac{152}{16} \text{ or } -9.5$

e. $\frac{1}{2}x - \frac{3}{4}x + 27 = 42$

$-\frac{1}{4}x + 27 = 42$
 $-27 \quad -27$

$-\frac{1}{4}x = 15$

$x = -60$

e. $14.7 + 5x = 10.5 - x$

$14.7 + 6x = 10.5$

$\frac{6x}{6} = \frac{-4.2}{6}$

$x = \frac{-4.2}{6} \text{ or } -0.7$

f. $5.2x = 3(x - 4.2)$

$5.2x = 3x - 12.6$

$\frac{2.2x}{2.2} = \frac{-12.6}{2.2}$

$x = -5.73$

g. $-3(2x - 5) = 5x - 9 - 12x$

$-6x + 15 = -7x - 9$

$x + 15 = -9$

$x = -24$

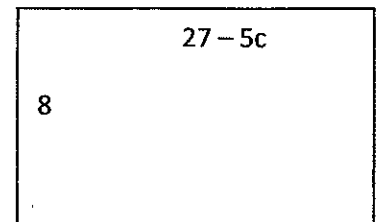
Part VII - Area and perimeter

13. a. Write an expression for the perimeter AND the area of the rectangle to the right.

$p = 8 + 8 + 27 - 5c + 27 - 5c$
 $p = 70 - 10c$
 $A = 8(27 - 5c)$
 $A = 216 - 40c$

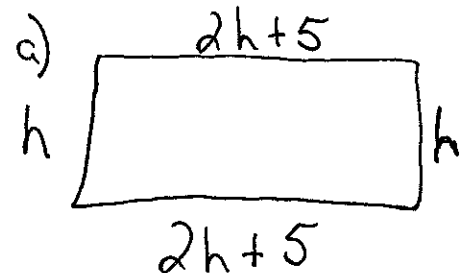
b. Solve for c if the perimeter is 27 inches.

$27 = 70 - 10c$
 $-43 = -10c$
 $c = 4.3$



14. The base of a rectangle is 5 more than twice its height.

- a. Draw this rectangle.
- b. Write an equation for the perimeter
- c. Solve for the height if the perimeter is 100cm.



b) $h + h + 2h + 5 + 2h + 5$
 $p = 6h + 10$

c) $100 = 6h + 10$
 $90 = 6h$
 $h = 15$