Name **Key**   Date _____

Algebra 2   Lesson 1-13

Modeling Rational Expressions & Equations

Do Now:

1. If the sum of a number n and ten times its reciprocal is 7, then a value of n may be

(1) $\frac{1}{2}$ (3) 3

(2) **2** ⟵ (circled)   (4) 4

$$n + 10 \cdot \frac{1}{n} = 7$$

$$n + \frac{10}{n} = 7$$

$$n^2 + 10 = 7n$$

$$n^2 - 7n + 10 = 0$$

$$(n-2)(n-5) = 0$$

$$n = 2 \mid n = 5$$

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1. Julie averaged 85 on the first three tests of the semester in her mathematics class. If she scores 93 on each of the remaining tests, her average will be 90. Which equation could be used to determine how many tests, T, are left in the semester?

(1) $\dfrac{255 + 93T}{3T} = 90$

(3) $\dfrac{255 + 93T}{T + 3} = 90$ ⟵ (circled)

(2) $\dfrac{255 + 90T}{3T} = 93$ (crossed out)

(4) $\dfrac{255 + 90T}{T + 3} = 93$ (crossed out)

2. Mallory wants to buy a new window air conditioning unit. The cost for the unit is $329.99. If she plans to run the unit three months out of the year for an annual operating cost of $108.78, which function models the cost per year over the lifetime of the unit, $C(n)$, in terms of the number of years, n, that she owns the air conditioner.

(1) $C(n) = 329.99 + 108.78n$

(3) $C(n) = \dfrac{329.99 + 108.78n}{n}$ ⟵ (circled)

(2) $C(n) = 329.99 + 326.34n$

(4) $C(n) = \dfrac{329.99 + 326.34n}{n}$

1 pound = 16 ounces

3. A manufacturing plant produces two different-sized containers of peanuts. One container weighs x ounces and the other weighs y pounds. If a gift set can hold one of each size container, which expression represents the number of gift sets needed to hold 124 ounces?

X ounces
Y pounds

(1) $\dfrac{124}{16x+y}$

(3) $\dfrac{124}{x+16y}$

(2) $\dfrac{x+16y}{124}$

(4) $\dfrac{16x+y}{124}$

4. A formula for work problems involving two people is shown below.

$$\frac{1}{t_1} + \frac{1}{t_2} = \frac{1}{t_3}$$

t_1 = the time taken by the first person to complete the job

t_2 = the time taken by the second person to complete the job

t_3 = the time it takes for them working together to complete the job

Fred and Barney are carpenters who build the same model desk. It takes Fred eight hours to build the desk while it only takes Barney six hours. Write an equation that can be used to find the time it would take both carpenters working together to build a desk. Determine, to the *nearest tenth of an hour*, how long it would take Fred and Barney working together to build a desk.

Fred → 8 hours
Barney → 6 hours

part 1:

$$\frac{1}{8} + \frac{1}{6} = \frac{1}{x}$$

part 2: $\dfrac{\overset{6}{48x}}{8} + \dfrac{\overset{8}{48x}}{6} = \dfrac{48x}{x}$ LCD: 48x

$6x + 8x = 48$

$14x = 48$

$\dfrac{14}{14} \quad \dfrac{14}{14}$

$X = 3.4$ hours

MODELING RATIONAL EXPRESSIONS & EQUATIONS PRACTICE

1. A group of x friends splits the cost of a family-style dinner for $50. In addition to the cost of the dinner, each person orders a $5 dessert. Which function gives the amount $A(x)$ that each person pays?

   (1) $A(x) = \frac{x}{50} + 5$

   (3) $A(x) = \frac{50}{x} + 5$ ⟵ Divide the bill by the 3 friends...

   (2) $A(x) = \frac{x}{5} + 50$

   (4) $A(x) = \frac{5}{x} + 50$

   $5 dessert that each person gets.

2. A number, minus twenty times its reciprocal, equals eight. What is the number?

   $$LCD = x$$

   $$\overset{x}{\cdot} x - \overset{x}{\cdot}\frac{20}{x} = \overset{x}{\cdot}\frac{8}{1}$$

   $$x^2 - 20 = 8x$$
   $$x^2 - 8x - 20 = 0$$
   $$(x - 10)(x + 2) = 0$$
   $$\overline{x = 10 \mid x = -2}$$

3. When 5 is divided by a number, the result is 3 more than 7 divided by twice the number. What is the number?

   (1) 1

   (3) $\frac{1}{2}$

   (2) 2

   (4) 5

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

   $$10 = 7 + 6x$$
   $$3 = 6x$$
   $$\frac{1}{2} = x$$