D51

Key	1
Exams	

Gina has a pile of 50 dimes and nickels worth $4.30. How many coins of each type does she have?

To solve this problem we need to write 2 equations.
1 for the Amount and 1 for the value (% of $1)
Then we solve this system of linear equations using the graphing substitution or +/− method.

Amount

$n + d = 50$

① $-n \quad = -n$

$d = 50 - n$

③ $d = 50 - 14$

$\boxed{d = 36}$

Value (% of $1)

$5n + 10d = 430$

② $5n + 10(50 - n) = 430$

$5n + 500 - 10n = 430$

$-5n + 500 = 430$

$-500 \quad = -500$

$\frac{-5n}{-5} = \frac{-70}{-5}$

$\boxed{n = 14}$

Solving mixture problems is very similar

A store sells a mixture of raisons and nuts. Raisins sell for $3.50/kg and nuts sell for $4.75/kg. How many kgs of each should be mixed to make 20kg of snack worth $4.00/kg?

Amount

$r + n = 20$

① $-r \quad = -r$

$n = 20 - r$

③ $n = 20 - 12$

$\boxed{n = 8}$

Value (% of $1)

$350r + 475n = 20(400)$

② $350r + 475(20 - r) = 8000$

$350r + 9500 - 475r = 8000$

$-125r + 9500 = 8000$

$-9500 \quad = -9500$

$\frac{-125r}{-125} = \frac{-1500}{-125}$

$\boxed{r = 12}$

(A51)

Key

Iams

. Joanne makes a mixture of dried fruits by mixing dried apples (l) costing \$6.00/kg with dried apricots (t) costing \$8.00/kg. How many kg of each are needed to make 20 kg of mixture worth \$7.20/kg?

Amount

$l + t = 20$

① $-l \quad = -l$

$t = 20 - l$

③ $t = 20 - 8$

$\boxed{t = 12}$

Value

$600l + 800t = (720/\text{kg})(20\text{kg})$

② $600l + 800(20 - l) = 14{,}400$

$600l + 16{,}000 - 800l = 14{,}400$

$-200l + 16{,}000 = 14{,}400$

$-16{,}000 \quad = -16{,}000$

$\frac{-200l}{-200} = \frac{-1600}{-200}$

$\boxed{l = 8}$

14. A farm stand owner mixes apple juice (a) and cranberry juice (c). How much should she charge if she mixes 8L of apple juice selling for \$.45/L with 10L of cranberry juice selling for \$1.08/L?

Amount

$a + c = \text{total}$

$8L + 10L = 18L$

Value

$45a + 108c = x\ (\text{total})$

$45(8) + 108(10) = x \cdot 18$

$360 + 1080 = 18x$

$\frac{1440}{18} = \frac{18x}{18}$

$\boxed{\$.80 = x}$

20. A wholesaler has 100kg of mixed nuts that sell for \$4.00/kg. In order to make the price less expensive, she plans to mix in some cheaper nuts worth \$3.20/kg. If the wholesaler wants to sell the mixture for \$3.40/kg, how many kgs of the cheaper nuts should be used?

Amount

$m + c = \text{new}$

$100\text{kg} + c = 100\text{kg} + c$

Value

$400(100) + 320(c) = 340(\text{new})$

$400(100) + 320(c) = 340(100 + c)$

$40{,}000 + 320c = 34000 + 340c$

$-34{,}000 - 320c = -34000 - 320c$

$\frac{6{,}000}{20} = \frac{20c}{20}$

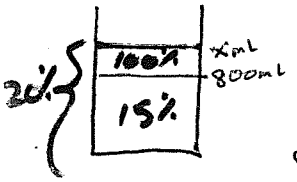
$\boxed{300\text{kg} = c}$

D52

Key	
Iams	

Day 52– Now instead of mixing things like nuts we are going to mix liquids. But don't worry (be ☺) the procedure stays the same. Just like with coin problems we write 2 equations 1 for the Amount and 1 for the Value (% of)

Ex 1: If 800mL of a juice drink is 15% grape juice, how much grape juice should be added to make a drink that is 20% grape juice?



Amount (of drink)

orig + GJ = new

$800mL + X = (800 + X)$

Value (% juice)

$15 \cdot 800 + 100X = 20(800+X)$

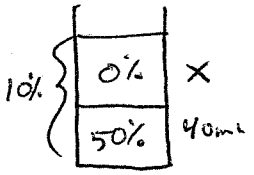
$12{,}000 + 100X = 16000 + 20X$

$-12{,}000 \quad -20X = -12{,}000 \quad -20X$

$\frac{80X}{80} = \frac{4{,}000}{80}$

$X = 50mL$

Ex. 2: A chemist has 40mL of a solution that is 50% acid. How much water should she add to make a solution that is 10% acid?



Amount (of solution)

orig + water = new

$40mL + X = (40 + X)$

Value (% acid)

$50 \cdot 40 + 0 \cdot X = 10(40+X)$

$2000 + 0 = 400 + 10X$

$-400 \quad = -400$

$\frac{1600}{10} = \frac{10X}{10}$

$160mL = X$

(A52)

Key	
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9. How many liters of water must be added to 50 L of a 30% acid solution in order to produce a 20% acid solution?

Amount

$x + 50 = (x+50)$

Value (% of Acid)

$0x + 30 \cdot 50 = 20(x+50)$

$1500 = 20x + 1000$

$-1000 \quad = \quad -1000$

$500 = 20x$

$\frac{500}{20} = \frac{20x}{20}$

$\boxed{25\text{ L} = x}$

17. A chemist wishes to mix some pure acid with some water to produce 16 L of a solution that is 30% acid. How much pure acid and how much water should be mixed?

Amount

$A + W = 16\text{ L}$

Value (% of Acid)

$\frac{100A}{100} + \frac{0W}{} = \frac{30 \cdot 16\text{ L}}{100}$

$\boxed{A = 4.8\text{ L}}$

$4.8\text{ L} + W = 16\text{ L}$

$-4.8\text{ L} \quad = -4.8\text{ L}$

$\boxed{W = 11.2\text{ L}}$

19. How many liters of water must be evaporated from 20 L of a 30% salt solution to produce a 50% solution?

Amount

$20\text{ L} - W = (20 - W)$

Value (% of salt)

$30 \cdot 20 - 0 \cdot W = 50(20 - W)$

$600 = 1000 - 50W$

$-1000 \quad = -1000$

$\frac{-400}{-50} = \frac{-50W}{-50}$

$\boxed{8\text{ L} = W}$

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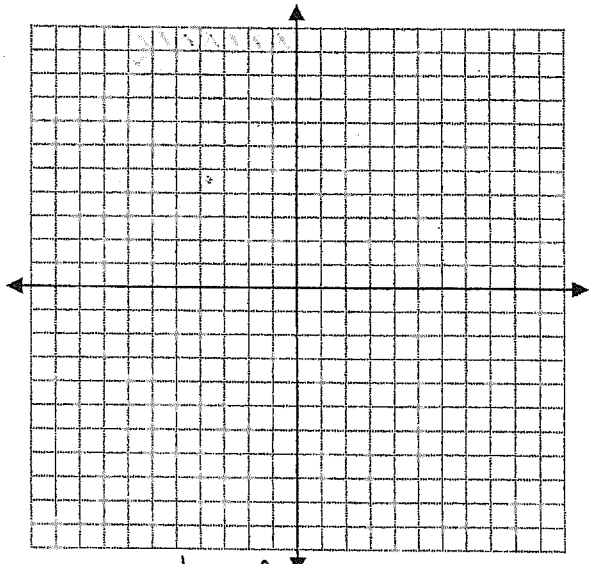
Key

Iams



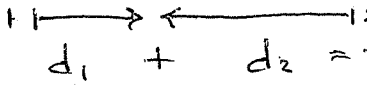
GOB: I "x"-ed out all the boxes in quadrants I and II in ____ min and ____ sec. Therefore I estimate it would take me _____ min (round to the nearest minute) to "x" out the entire graph.

With your partner help each other answer the Qs below:
What is the rate at which you can "x" out the entire graph? (hint: think about the rate cars drive on the freeway)

rate = Fraction done in a given unit of time
(per)
↳ in denominator
[Reciprocal of how long]

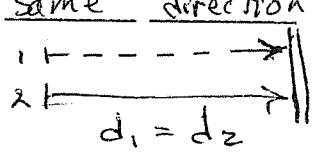
Now recall rate * time = distance
Complete the drawings and equations for the 3 scenarios we solved 1st semester.

(A)
Motion in the opposite direction



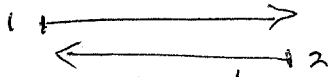
$d_1 + d_2 = \text{total}$

(B)
Motion in same direction



$d_1 = d_2$

(C)
round trip



$d_1 = d_2$

You estimated that it would take you 5 min to "x" out the entire graph. Your partner estimated that it would take them 4 min to "x" out the entire graph. Estimate how long it would take the two of you if you were working together: _____ min. Imagine you and your partner just worked together to "x" out the entire graph. Did you do an equal amount of work? NO Why or why not?

This problem seems most like (A) (B) or (C) from above because: A

Name	rate	• time	= work done
Mr. Iams	$\frac{1 \text{ job}}{10 \text{ min}}$	• X min	= $\frac{X}{10}$
Student	$\frac{1 \text{ job}}{6 \text{ min}}$	• X min	= $\frac{X}{6}$

10 min

6 min

work done Mr. Iams + work done Student = 1 job entire graph X-ed out.

$$\frac{30}{1}\left[\frac{X}{10} + \frac{X}{6} = 1\right]$$

$$3X + 5X = 30$$

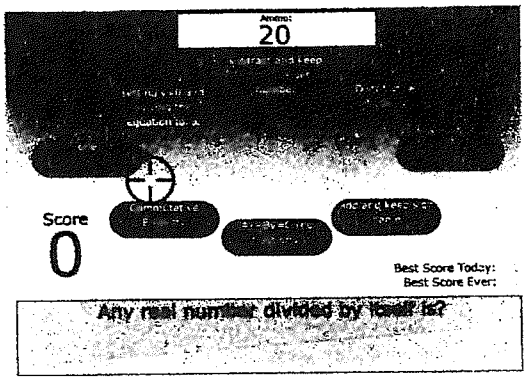
$$\frac{8X}{8} = \frac{30}{8}$$

$$X = 3\frac{6}{8} = 3\frac{3}{4}\text{ min}$$

3 min 45 sec.

D53 page 2

Jams



You win a particular video game when you clear 3 levels. It took Student 1 120 seconds to clear 3 levels. He/she tries again and is helped by Student 2 30 seconds after starting. Working together they clear the 3 levels in 60 seconds more. How long would it take Student 2 to clear the 3 levels by themself?

Name	rate	time	= work done
student 1	$\frac{1}{120\text{sec}}$	90sec	$= \frac{90}{120}$
student 2	$\frac{1}{x\text{ sec}}$	60sec	$= \frac{60}{x}$

wd1 + wd2 = total

$$\frac{4x}{1}\left[\frac{3}{4} + \frac{60}{x} = 1\right]$$

$$3x + 240 = 4x$$
$$-3x \quad\quad = -3x$$
$$240\text{sec} = x$$

State the work rate.

1. Beatrice can wallpaper a room in 8 h. $\frac{1\text{ room}}{8\text{ hr}}$
2. Marty read a novel in 10 h. $\frac{1\text{ novel}}{10\text{ hr}}$
3. Annie can wax her car in 45 min. $\frac{1\text{ car}}{45\text{ min}}$
4. A hose can fill a swimming pool in 3 days. $\frac{1\text{ pool}}{3\text{ day}}$

Complete the charts. Do not solve the problems.

5. Using a new lawn mower, Abby can mow the lawn in 2 h. Her sister Carla uses an older mower and takes 3 h to mow the same lawn. How long will it take them if they work together?

	Work rate × Time = Work done		
Abby	$\frac{1}{2}$	x	$\frac{x}{2}$
Carla	$\frac{1}{3}$	x	$\frac{x}{3}$

6. Phil can paint the garage in 12 h, and Rick can do it in 10 h. They work together for 3 h. How long will it take Rick to finish the job alone?

	Work rate × Time = Work done		
Phil	$\frac{1}{12}$	3	$\frac{3}{12}$
Rick	$\frac{1}{10}$	$x+3$	$\frac{x+3}{10}$

7. Chuck can shovel the snow off his driveway in 40 min. He shovels for 20 min and then is joined by Joan. If they shovel the remaining snow in 10 min, how long would it have taken Joan to shovel the driveway alone?

20
+10

	Work rate × Time = Work done		
Chuck	$\frac{1}{40\text{min}}$	30min	$\frac{30}{40}$
Joan	$\frac{1}{x\text{ min}}$	10min	$\frac{10}{x}$

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from DS3 page 2 Solve problems

Key	
Iams	

5. work done Abby + work done Carla = 1 job done

$\frac{6}{1}\left[\frac{x}{2} + \frac{x}{3} = 1\right]$

$3x + 2x = 6$

$\frac{5x}{5} = \frac{6}{5}$

(5) $x = 1\frac{1}{5}$ hr

6. Wd Phil + wd Rick = 1 job done

$\frac{20}{1}\left[\frac{1}{4} + \frac{x+3}{10} = 1\right]$

$5 + 2x + 6 = 20$

$2x + 11 = 20$

$-11 \quad -11$

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

(6) $x = 4\frac{1}{2}$ hr

7. Wd Chuck + wd Team = 1 job done

$\frac{4x}{1}\left[\frac{3}{4} + \frac{10}{x} = 1\right]$

$3x + 40 = 4x$

$-3x \quad = -3x$

$40_{km} = x$

(A 53) page 2

Key

Iams

11. A roofing contractor estimates that he can shingle a house in 20 h and that his assistant can do it in 30 h. How long will it take them to shingle the house working together?

	rate	· time	= work done
contractor	$\frac{1}{20h}$	$\times$ hr	= $\frac{x}{20}$
Assistant	$\frac{1}{30h}$	$\times$ hr	= $\frac{x}{30}$

$\frac{60}{1}\left[\frac{x}{20} + \frac{x}{30} = 1\right]$

$3x + 2x = 60$

$\frac{5x}{5} = \frac{60}{5}$

(11) $x = 12$

Fast: x hr, Slow: $2x$ hr

13. One printing machine works twice as fast as another. When both machines are used, they can print a magazine in 3 h. How many hours would each machine require to do the job alone?

	rate	· time	= work done
Fast	$\frac{1}{x \text{ hrs}}$	3 hrs	= $\frac{3}{x}$
Slow	$\frac{1}{2x \text{ hrs}}$	3 hrs	= $\frac{3}{2x}$

$\frac{2x}{1}\left[\frac{3}{x} + \frac{3}{2x} = 1\right]$

$6 + 3 = 2x$

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

(13)

Fast	4.5 hrs	= x
Slow	9 hrs	

19. Ramona can do a job in 12 days. After she has worked for 4 days, she is joined by Carlotta and it takes them 2 days working together to finish the job. How long would it have taken Carlotta to do the whole job herself?

	rate	· time	= work done
Ramona	$\frac{1}{12 \text{ days}}$	4 + 2	= $\frac{1}{2}$
Carlotta	$\frac{1}{x}$	2	= $\frac{2}{x}$

$\frac{2x}{1}\left[\frac{1}{2} + \frac{2}{x} = 1\right]$

$x + 4 = 2x$

$-x \quad = -x$

(19) $4 \text{ days} = x$