

# Systems - Age

#10

1/2 sheet

①  $x = \text{John}$   $y = \text{Sam}$

④  $x = \text{father}$   $y = \text{son}$

Time	John	Sam
Now	$x$	$y$
in 4 yrs.	$x+4$	$y+4$

$x = 4y$   
 $x+4 = 2(y+4)$

Time	father	son
Now	$x$	$y$
in 10 yrs.	$x+10$	$y+10$

$x = 10y$   
 $x+10 = 3(y+10)$

$x = 4(y+4)$   
 $x = 4y + 16$   
 $4y + 16 = 2y + 8$   
 $2y = -8$   
 $y = -4$   
 $x = 4(-4) = -16$

$2y + 4 = 2y + 8$   
 $y = 2$

$10y + 10 = 3y + 18$   
 $7y = 8$   
 $y = 4$

John is 8, Sam is 2.

②  $x = \text{father}$   $y = \text{son}$

Time	father	son
Now	$x$	$y$
15 yrs ago	$x-15$	$y-15$

$x = 3y$   
 $x-15 = 9(y-15)$

$x = 10(y+4)$   
 $x = 10y + 40$   
 $10y + 40 = 3y + 18$   
 $7y = -22$   
 $y = -4$   
 $x = 10(-4) = -40$

The man is 24 and his son is 4.

$x = 3(20)$   
 $x = 60$   
 $3y - 15 = 9y - 135$   
 $120 = 6y$   
 $20 = y$

The father is 60 and the son is 20.

③

Time	Helena	Melanie
Now	20	10
$y$ yrs ago	$20-y$	$10-y$

$20-y = 3(10-y)$   
 $20-y = 30-3y$   
 $2y = 10$   
 $y = 5$

5 years ago Helena was 3 times as old as Melanie.

⑤  $x = \text{James}$   $y = \text{Arthur}$

Time	James	Arthur
Now	$x$	$y$
10 yrs	$x+10$	$y+10$

$x = 3y$   
 $x+10 = 2(y+10)$

$3y+10 = 2y+20$

$y = 10$

$x = 3(10)$   
 $x = 30$

James is 30 and Arthur is 10.

⑦  $x = \text{Robert}$   $y = \text{Father}$

Time	Robert	Father
Now	$x$	$y$
12 yrs ago	$x-12$	$y-12$

$x = \frac{1}{2}y$   $x-12 = \frac{1}{2}(y-12)$

$\frac{1}{2}(2y-12) = \frac{1}{2}(y-12)$

$3y-72 = 2y-24$   
 $-2y+72 = -2y+72$

$y = 48$

$x = \frac{1}{2}(48)$   
 $x = 24$

Robert is 24, his father is 48.

⑥  $x = \text{Marion}$   $y = \text{Judy}$

Time	Marion	Judy
Now	$x$	$y$
3 yrs ago	$x-3$	$y-3$

$x = 2y$   
 $x-3 = 3(y-3)$

$2y-3 = 3y-9$   $x = 2(10)$   
 $x = 20$   $x = 12$

Marion is 20, Judy is 10.

⑧

Time	Josephine	Paul
Now	$22$	$10$
$n$ yrs	$22+n$	$10+n$

$22+n = 2(10+n)$   
 $22+n = 20+2n$   
 $-20-n = -20-n$   
 $2 = n$

In 2 years, Josephine will be twice as old as Paul.

The man is 30, daughter is 14.

$x+y = 50$   $50-y+8 = 2y+10$   
 $x+y = 50$   $-y+58 = 2y+10$   
 $x = 50-y$   $48 = 3y$   
 $14 = y$   $x = 36$

⑨

$x = \text{man}$   $y = \text{daughter}$

Time	man	daughter
Now	$x$	$y$
14 yrs	$x+14$	$y+14$

# Systems - Age

#7

1/2 sheet boxes

①  $X = \text{Larry's age}$   $y = \text{sister's age}$

Time	Larry	Sister
Now	$X$	$y$
In 3 yrs	$X + 3$	$y + 3$

Larry is 19 and his sister is 11.

$$X = y + 8$$

$$X + 3 = 2y$$

$$X = 11 + 8$$

$X = 19$

$$y + 8 + 3 = 2y$$

$$y + 11 = 2y$$

$11 = y$

②  $X = \text{Barry}$   $y = \text{sister}$

Time	Barry	Sister
Now	$X$	$y$
In 3 yrs.	$X + 3$	$y + 3$

Barry is 13 and his sister is 5.

$$X = y + 8$$

$$X + 3 = 2(y + 3)$$

$$X = 5 + 8$$

$X = 13$

$$y + 8 + 3 = 2(y + 3)$$

$$y + 11 = 2y + 6$$

$5 = y$

③  $X = \text{Jennifer}$   $y = \text{Sue}$

Time	Jennifer	Sue
Now	$X$	$y$
In 4 yrs.	$X + 4$	$y + 4$
5 yrs ago	$X - 5$	$y - 5$

Jennifer is 20 and sue is 20.

$$X = y + 4$$

$$X + 4 = 2(y - 5)$$

$$y + 4 + 4 = 2(y - 5)$$

$$y + 8 = 2y - 10$$

$20 = y$

$$X = 20 + 4$$

$X = 24$

④  $x = \text{Adam}$   $y = \text{Eve}$

Time	Adam	Eve
Now	$x$	$y$
1 yr.	$x+1$	$y+1$
4 yrs. ago	$x-4$	$y-4$

$x = 14 - 5$   
 $x = 9$

$x = y - 5$   
 $y + 1 = 3(x - 4)$

$y + 1 = 3(y - 5 - 4)$   
 $y + 1 = 3(y - 9)$   
 $28 = 2y$   
 $14 = y$

Adam is 9 & Eve is 14

⑤  $x = \text{Jack}$   $y = \text{Jill}$

Time	Jack	Jill
Now	$x$	$y$
2 yrs.	$x+2$	$y+2$
9 yrs. ago	$x-9$	$y-9$

$x = 2(19)$   
 $x = 38$

Jack is 38 & Jill is 19.

$x = 2y$   
 $x + 2 = 4(y - 9)$

$2y + 2 = 4y - 36$   
 $38 = 2y$   
 $19 = y$

⑥  $x = \text{Katie}$   $y = \text{Anne}$

Time	Katie	Anne
Now	$x$	$y$
4 yrs. ago	$x-4$	$y-4$
10 yrs.	$x+10$	$y+10$

Katie is 10 and Anne is 10.

$x - 4 = 2(y - 4)$   
 $y + 10 = x$

$y + 10 - 4 = 2(y - 4)$   
 $y + 2 = 2y - 8$   
 $10 = y$

$2y + 50 = 3y + 15$   
 $35 = y$

$\frac{1}{3}y + \frac{10}{3} + 5 = \frac{1}{2}(y + 5)$   
 $6\left(\frac{1}{3}y + \frac{10}{3} + 5\right) = 3y + 5$

$x - 5 = \frac{1}{3}y - \frac{5}{3}$   
 $x = \frac{1}{3}y + \frac{10}{3}$

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

Time	Tom	Father
Now	$x$	$y$
5 yrs. ago	$x-5$	$y-5$
15 yrs.	$x+5$	$y+5$

⑦  $x = \text{Tom}$   $y = \text{Father}$

$x + 5 = \frac{1}{2}(35 + 5)$   
 $x + 5 = 20$   
 $x = 15$

Tom is 15 & his dad is 35.

# Systems - Age

#8

What happened when Sparky crossed his wires...

① Time | Mr. K | daughter

Now	35	10
In y yrs.	35+y	10+y

$$35 + y = 2(10 + y)$$

$$35 + y = 20 + 2y$$

$$-20 - y = -20 - y$$

$$15 = y$$

In 15 years, Mr. K will be twice as old as his daughter.

② Time | George | mother

Now	7	37
In y yrs.	7+y	37+y

$$37 + y = 3(7 + y)$$

$$37 + y = 21 + 3y$$

$$\frac{16}{2} = \frac{2y}{2}$$

$$8 = y$$

In 8 years, Mr. Mother will be 3x as old as George.

③ Time | Pete | grandfather

Now	14	54
y yrs ago	14-y	54-y

$$54 - y = 6(14 - y)$$

$$54 - y = 84 - 6y$$

$$5y = 30$$

$$y = 6$$

6 years ago  
Mr. Grandfather was 6x as old.

④ Time | Dorothy | Eliza

Now	x	y
In 10 yrs.	x-10	y-10

$$x = y - 14$$

$$y - 10 = 3(x - 10)$$

$$y - 10 = 3(y - 14 - 10)$$

$$y - 10 = 3(y - 24)$$

$$y - 10 = 3y - 72$$

$$62 = 2y$$

$$31 = y$$

$$x = 31 - 14$$

$$x = 17$$

Patricia is 31 and Dorothy is 17.

⑤

Time | Ms. F | Ms. L

Now	48	35
y yrs ago	48-y	35-y

$$48 - y = 2(35 - y)$$

$$48 - y = 70 - 2y$$

$$y = 22$$

In 22 years, Ms. F is 2x as old as Ms. L.

⑥

Time | Steve | Jon

Now	x	y
In 7 yrs.	x+7	y+7

$$x = 5y$$

$$x + 7 = 2(y + 7)$$

→

$$5y + 12 = 2(y + 12)$$

$$5y + 12 = 2y + 24$$

$$3y = 12$$

$$y = 4$$

$$x = 5(4)$$

$$x = 20$$

Steve is 70 + John is 4.

⑦ Time | Mary | Tom | Sam  
Now | m | t | s

$$m = t + 4 \quad s = 2m \quad m + t + s = 8t$$

$$s = 2(t + 4) \quad t + 4 + t + 2t + 2 = 8t$$

$$s = 2t + 8 \quad 4t + 12 = 8t$$

$$m = 3 + 4$$

$$m = 7$$

$$s = 2(7)$$

$$s = 14$$

Mary is 7, Tom is 3, Sam is 14.

① What Did They Call The Big Prof...  
② Time | Mrs. W | Daughter

Now | x | y  
In yrs. | x + 10 | y + 10

Now | Mrs. W | Daughter  
In yrs. | x + 5 | y + 5

$$x = 2y \quad x + 10 + y + 10 = 60 \quad x = y + 23 \quad x + 5 + y + 5 = 63$$

$$2y + 10 + y + 10 = 60$$

$$3y + 20 = 60$$

$$3y = 40$$

$$y = 10$$

$$y + 23 + 5 + y + 5 = 63$$

$$2y + 33 = 63$$

$$2y = 30$$

$$y = 15$$

$$x = 2(10)$$

$$x = 20$$

$$y = 10$$

Andy is 32? Kate is 10.

$$x = 15 + 23$$

$$x = 38$$

$$y = 15$$

Mrs. W is 38 + Daughter is 15.

What did Tony do all the bug that... continued

③ Time | Matthew | Jerry

Now	X	Y
In 7 yrs.	X+7	Y+7

$$X = 3Y \quad X+7 = 2(Y+7)$$

$$3Y+7 = 2(Y+7)$$

$$3Y+7 = 2Y+14$$

$$Y = 7$$

$$X = 3(7)$$

$$X = 21$$

Matthew is 21, Jerry is 7

④ Time | Juan | Sister

Now	X	Y
In 2 yrs	X+2	Y+2

$$X = Y+8 \quad X+2 = 2(Y+2)$$

$$Y+8+2 = 2Y+4$$

$$Y+10 = 2Y+4$$

$$S = Y$$

$$X = S+8$$

$$X = 18$$

Juan is 18, his sister is 8

⑤ Time | Melissa | Joyce

Now	X	Y
In 2 yrs	X+2	Y+2

$$X = Y-24 \quad Y+2 = 3(X+2)$$

$$Y+2 = 3(Y-24+2)$$

$$Y+2 = 3(Y-22)$$

$$Y+2 = 3Y-66$$

$$108 = 2Y$$

$$24 = Y$$

$$X = 34-24$$

$$X = 10$$

Melissa is 10, Joyce is 34

⑥ Time | Tom | Jerry

Now	X	Y
9 yrs ago	X-9	Y-9

$$X = Y+4 \quad X-9 = 5(Y-9)$$

$$Y+4-9 = 5(Y-9)$$

$$Y-5 = 5Y-45$$

$$40 = 4Y$$

$$10 = Y$$

$$X = 10+4$$

$$X = 14$$

Tom is 14 and Jerry is 10

⑦ Time | Kathy | Bill

Now	X	Y
12 yrs ago	X-12	Y-12

$$X = Y-10 \quad Y-12 = 2(X-12)$$

$$Y-12 = 2(Y-10-12)$$

$$Y-12 = 2(Y-22)$$

$$Y-12 = 2Y-44$$

$$32 = Y$$

$$X = 24-10$$

$$X = 14$$

Kathy is 18, Bill is 24

⑧

TIME	Dr. G.	SDN
Now	X	Y
20 yrs. ago	X-20	Y-20

$$X = 2Y \quad X - 20 = 4(Y - 20)$$

$$2Y - 20 = 4(Y - 20)$$

$$2Y - 20 = 4Y - 80$$

$$\boxed{40 = 2Y}$$

$$\boxed{30 = Y}$$

$$\boxed{X = 2(30)}$$

$$\boxed{X = 60}$$

Dr. G is 60, his SDN is 30.



# Systems - Age

#2

①

Time	Bob	brother
Now	X	Y

$$X = Y + 3 \quad X + Y = 33$$

$$\begin{aligned} Y + 3 + Y &= 33 \\ 2Y + 3 &= 33 \\ 2Y &= 30 \\ Y &= 15 \end{aligned} \quad \begin{aligned} X &= 15 + 3 \\ X &= 18 \end{aligned}$$

Bob is 18

②

Time	Mom	Daughter
Now	X	Y

$$\begin{aligned} X + Y &= 83 \\ Y &= 83 - X \end{aligned} \quad \begin{aligned} 2X &= Y + 56 \\ 2X &= 83 - X + 56 \\ 3X &= 141 \\ X &= 47 \end{aligned}$$

$$\begin{aligned} Y &= 83 - 47 \\ Y &= 36 \end{aligned}$$

Let's Mom is 47, Daughter is 36.

③

Time	Carry	cat
Now	X	Y
In 4 yrs.	X + 4	Y + 4
4 yrs. ago	X - 4	Y - 4

$$\begin{aligned} Y + 4 &= \frac{3}{4}(X + 4) \\ Y - 4 &= \frac{1}{2}(X - 4) \end{aligned} \rightarrow \begin{aligned} Y - 4 &= \frac{1}{2}X - 2 \\ Y &= \frac{1}{2}X + 2 \end{aligned}$$

$$\begin{aligned} \frac{1}{2}X + 2 + 4 &= \frac{3}{4}(X + 4) \\ 8 \left( \frac{1}{2}X + 6 \right) &= \frac{3}{4}X + 9 \\ 4X + 48 &= 10X + 21 \\ 24 &= 2X \\ 12 &= X \end{aligned}$$

$$\begin{aligned} Y &= \frac{1}{2}(12) + 2 \\ Y &= 6 + 2 = 8 \end{aligned}$$

Carry is 12, her cat is 8.

④

Time	older	younger
Now	X	Y
10 yrs. ago	X - 10	Y - 10
In 30 yrs.	X + 30	Y + 30

$$\begin{aligned} X - 10 &= 4(Y - 10) & X + 30 &= 2(Y + 30) \\ X - 10 &= 4Y - 40 & X + 30 &= 2Y + 60 \\ X &= 4Y - 30 & & \end{aligned}$$

$$\begin{aligned} 4Y - 30 + 30 &= 2Y + 60 \\ 4Y &= 2Y + 60 \\ 2Y &= 60 \\ Y &= 30 \\ X &= 4(30) - 30 \\ X &= 90 \end{aligned}$$

The older one is 90, younger one is 30.

⑤

Time	Ed	Mother
Now	13	35
In Y yrs.	13 + Y	35 + Y

$$13 + Y = \frac{1}{2}(35 + Y) \rightarrow$$

$$13 + y = 17.5 + \frac{1}{2}y$$

$$\frac{1}{2}y = 4.5$$

In 9 yrs, Ed will be  $\frac{1}{2}$  as old as his mother.

⑧

Time	Father	Son
Now	X	y
15 yrs ago	X-15	y-15

$$X = 3y \quad X-15 = 9(y-15)$$

$$3y - 15 = 9(y - 15)$$

$$3y - 15 = 9y - 135$$

$$90 = 6y$$

$$15 = y$$

$$X = 3(15)$$

$$X = 45$$

Father is 45, son is 15.

⑩

Time	Pearl	Jose
Now	X	y
8 yrs ago	X-8	y-8

$$X = y + 4 \quad X - 8 = 2(y - 8)$$

$$y + 4 - 8 = 2(y - 8)$$

$$y - 4 = 2y - 16$$

$$12 = y$$

$$X = 12 + 4$$

$$X = 16$$

Pearl is 16, Jose is 12.

⑨

Time	Helen	Amy
Now	20	10
y yrs ago	20-y	10-y

$$20 - y = 3(10 - y)$$

$$20 - y = 30 - 3y$$

$$2y = 10$$

$$y = 5$$

5 years ago Helen was 3x Amy.

⑦

Time	John	Sara
Now	X	y
In 4 yrs.	X+4	y+4

$$X = 4y \quad X + 4 = 2(y + 4)$$

$$4y + 4 = 2(y + 4)$$

$$4y + 4 = 2y + 8$$

$$2y = 4$$

$$y = 2$$

$$X = 4(2)$$

$$X = 8$$

John is 8, Sara is 2.

⑩

Time	man	son
Now	X	y
In 10 yrs.	X+10	y+10

$$X = 6y \quad X + 10 = 3(y + 10)$$

$$6y + 10 = 3y + 30$$

$$3y = 20$$

$$y = 4$$

$$X = 6(4)$$

$$X = 24$$

Father is 24, son is 4.

II

Time James Arrives

11:00	x	y
1:00	x+10	y+10

$$x = 3y \quad x+10 = 2(y+10)$$

$$3y+10 = 2y+20$$

$$y = 10$$

$$x = 3(10)$$

$$x = 30$$

James is 30, Arrives 10.

12

Time man daughter

Now	x	y
in 8 yrs	x+8	y+8

$$x + y = 50 \quad x+8 = 2(y+8)$$

$$y = 50 - x$$

$$x + 8 = 2(50 - x + 8)$$

$$x + 8 = 2(58 - x)$$

$$x + 8 = 116 - 2x$$

$$3x = 108$$

$$x = 36$$

$$y = 50 - 36$$

$$y = 14$$

The father is 36, daughter is 14.

