

Unit Transfer Method

Primary 5

Before & After

Lesson 3: Difference Unchanged

Website: www.mathsheuristics.com
Email: enquiry@mathsheuristics.com
Support: www.facebook.com/groups/mathsheuristics

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LESSON 3: DIFFERENCE UNCHANGED QUANTITIES

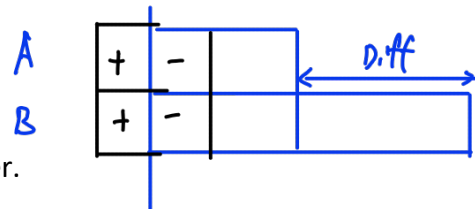
DEFINITION

The **difference** in quantity remains unchanged before-change and after-change.

Before: Ali has \$10 and Ben has \$35.

Change: Each of them receives \$3 from their father.

After: Does their Difference in money Before and After changes? (Yes / No)



	Ali	Ben	Diff
Before	10	35	25
[Change	+3	+3]	
After	13	38	25

Conclusion:
 Same no. , same signs
 ∴ Difference Unchanged

▪ Age difference

Before: A is 40 years old and B is 10 years old.

Change: 4 years ago

After: Their age difference remains unchanged.

	Ali	Ben	Diff
Before	40	10	30
Change	-4	-4	
After	36	6	30

Conclusion:
 Age Difference
 always remain
 unchanged.

GUIDED EXAMPLE 1

Present { Ali is 46 years old.
 He is 24 years older than his son.
 How many years ago was ~~Ali's~~ ^{Ali} age 2.5 times his son's age? $2.5 = \frac{5}{2}$

* Age Diff Unchanged

	Ali	Son	Diff
Present	46	22	24
Change	-?	-?	
Past	5×8 40	2×8 16	3×8 24

$46 - 40 = 6$

Ans: 6 years ago

GUIDED EXAMPLE 2

In the year 1998, Mike was 18 and his uncle was 46.
 In which year was Mike's uncle 5 times as old as Mike?

* Age Diff Unchanged

	M	U	Diff
1998	18	46	28
Change	-?	-?	
(?)	1×7 7 ↓	5×7 35 ↓	4×7 28 ↓

$$18 - 7 = 11$$

$$1998 - 11 = 1987$$

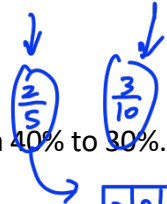
Ans : 1987

GUIDED EXAMPLE 3

Change

There were a group of children in the park.
 One hour later, 30 boys and 30 girls left the park.
 As a result, the percentage of boys decreased from 40% to 30%.
 How many children were there in the park at first?

Before After



$$40\% = \frac{40}{100} = \frac{2}{5}$$

$$30\% = \frac{30}{100} = \frac{3}{10}$$



	Boys	Girls	Diff	Total
Before	2 × 4 8u ↓	3 × 4 12u ↓	1 × 4 4u ↓	20u
Change	-30	-30		
After	3 3u ↓	7 7u ↓	4 4u ↓	

Difference Unchanged

$$8u - 3u = 30$$

$$5u = 30$$

$$1u = 30 \div 5$$

$$= 6$$

$$20u = 20 \times 6$$

$$= 120$$

Ans : 120

GUIDED EXAMPLE 4

- B [Belinda had 159 beads and Emily had 282 beads.]
 C [After both girls gave away an equal number of beads,]
 A [Emily had $\frac{5}{2}$ times as many beads as Belinda.]
 How many beads did Belinda have in the end?

$$2.5 = \frac{5}{2}$$

$$3 \times _ = 123$$

$$_ = 123 \div 3$$

	B	E	Diff
B	159	282	123
C	-?	-?	
A	2×41 82	5×41 205	3×41 123

Difference Unchanged

Ans : 82

GUIDED EXAMPLE 5

- B [The number of pupils in the soccer club was 4 times the number of pupils in golf club.]
 C [After an equal number of pupils joined each club,]
 A [there were 2 times as many pupils in the golf club as there were in the soccer club.]
 A [If there were 30 pupils in the golf club now,]
 find how many pupils were there in the soccer club at first?

	S	G	Diff
B	4 × 10 40	1 × 10 10	3 × 10 30
C	+?	+?	
A	2 × 30 60	1 × 30 30	1 × 30 30

Difference Unchanged

Ans : 40

GUIDED EXAMPLE 6

B [Jug A contained 2.8 litres of water.]
 C [Jug B contained 4.4 litres of water.]
 A [After an equal amount of water was removed from each jug,]
 A [Jug A now had $\frac{1}{5}$ as much water as Jug B.]
 How much water was there in both jugs in the end?

$$\begin{aligned}
 4 \times _ &= 1.6 \\
 _ &= 1.6 \div 4 \\
 &= 0.4
 \end{aligned}$$

$$2.0 + 0.4 = 2.4$$

Ans: 2.4l

	A	B	Diff
B	2.8	4.4	1.6
[C	-?	-?]
A	1×0.4 0.4	5×0.4 2.0	4×0.4 1.6

Difference Unchanged

BUILD YOUR UNDERSTANDING

1. Naomi is 26 years old.
 She is 18 years older than her brother.
How many years ago was Naomi 4 times as old as her brother?

	Naomi	Brother	Diff
Present	26 .	8	18
change	-? //	-? .	
past	4 x 6 24 .	1 x 6 6	3 x 6 18

$26 - 24 = 2$

Ans: 2 years ago

2. Ravi and Charmaine shared some sweets in the ratio of 9 : 11.
 After both of them gave away 48 sweets each,
 the ratio of Ravi's sweets to that of Charmaine's sweets became 5 : 7.
 How many sweets did they have altogether in the end?

	Ravi	Charmaine	Diff	Total
Before	9u	11u	2u	
Change	-48	-48		
After	5u	7u	2u	12u

Difference Unchanged

$$\begin{aligned}
 9u - 5u &= 48 \\
 4u &= 48 \\
 1u &= 48 \div 4 \\
 &= 12 \\
 12u &= 12 \times 12 \\
 &= 144 \\
 \text{Ans: } &\underline{144}
 \end{aligned}$$

3. Lionel is 3 years old. His father is 28 years older than him.

In how many years would Lionel be $\frac{1}{3}$ of his father's age?

	L	F	Diff
Present	3	31	28
Change	+?	+?	
Future	1×14 ↓ 14	3×14 ↓ 42	2×14 ↓ 28

* Age Diff unchanged

$$14 - 3 = 11$$

Ans : 11 years

4. Ginny baked 116 cookies and Mabel baked 176 cookies.
 After each of them gave away an equal number of cookies,
 Mabel had 7 times as many cookies as Ginhy.
 How many cookies did both girls give away altogether?

	G	M	Diff
B	116	176	60
C	-? (-106)	-? (-106)	
A	10	70	60

Handwritten notes:
 - Above the '116' and '176' in row B, there are small blue '7's.
 - In row C, there are blue arrows pointing from the '116' and '176' columns to the '-?' cells.
 - In row A, there are blue arrows pointing from the '10', '70', and '60' cells to the right, with 'x10' written above each.
 - A bracket on the left side of the table spans rows C and A, with the text 'Difference Unchanged' written below it.

$$116 - 10 = 106$$

$$2 \times 106 = 212$$

Ans: 212

5. Pauline had \$1143 and Julie had \$1878.
 After spending the same amount of money each,
 the ratio of Pauline's money to Julie's money then became 3 : 10.
- a) How much money did each of them spend?
 b) How much money did they have left altogether?

	P	J	Diff
B	1143	1878	735
C	<u>-?</u> ^(a)	-?	
A	$3 \times 105 \downarrow$ 315	$10 \times 105 \downarrow$ 1050	$7 \times 105 \downarrow$ 735

Diff Unchanged

a) $1143 - 315 = 828$

b) $315 + 1050 = 1365$

Ans : a) \$828

b) \$1365

6. A container contains some red and some green marbles.
 At first, the number of red marbles was 30% that of the number of green marbles.
 After adding 75 marbles of each colour, the number of red marbles becomes 80% that of the green marbles.
 How many marbles of each colour were there at first?

$$30\% = \frac{3}{10}, \quad 80\% = \frac{4}{5}$$

	Red	Green	Diff
Before	3 ↓ 3u	10 ↓ 10u	7 ↓ 7u
Change	+75	+75	
After	4 x 7, ↓ 28u	5 x 7, ↓ 35u	1 x 7, ↓ 7u

→ Difference Unchanged

$$\begin{aligned} 28u - 3u &= 75 \\ 25u &= 75 \\ u &= 75 \div 25 \\ &= 3 \\ 3u &= 3 \times 3 \\ &= 9 \\ 10u &= 10 \times 3 \\ &= 30 \end{aligned}$$

Ans : Red : 9
Green : 30

CHALLENGE YOURSELF

In year 2020, Janelle is 11 years old and her mother is 40 years old.
 In which year will she be $\frac{1}{2}$ of her mother's age?

	J	M	Diff
2020	11	40	29
Change	+?	+?	
(?)	1 $\times 29$ 29	2 $\times 29$ 58	1 $\times 29$ 29

$$29 - 11 = 18$$

$$2020 + 18 = 2038$$

Ans : 2038

CHALLENGE YOURSELF

Three brothers, Andy, Benny and Calvin shared some money in the ratio of 6 : 5 : 1.

After their mother gave each of them \$27, the ratio became 15 : 13 : 5.

Find the amount of money each of the boys had at first.

* $A - B, B - C, A - C$
remain unchanged

	Andy	Benny	Calvin	Diff (A - B)
Before	6 x 2 12u ↓	5 x 2 10u ↓	1 x 2 2u ↓	1 x 2 2u ↓
[Change	+27	+27	+27]	
After	15 15u ↓	13 13u ↓	5 5u ↓	2 2u ↓

$$\begin{aligned}
 15u - 12u &= 27 \\
 3u &= 27 \\
 1u &= 27 \div 3 \\
 &= 9 \\
 12u &= 12 \times 9 \\
 &= 108 \\
 10u &= 10 \times 9 \\
 &= 90 \\
 2u &= 2 \times 9 \\
 &= 18
 \end{aligned}$$

$$\begin{aligned}
 \text{Ans: Andy: } &\underline{\underline{\$108}} \\
 \text{Benny: } &\underline{\underline{\$90}} \\
 \text{Calvin: } &\underline{\underline{\$18}}
 \end{aligned}$$