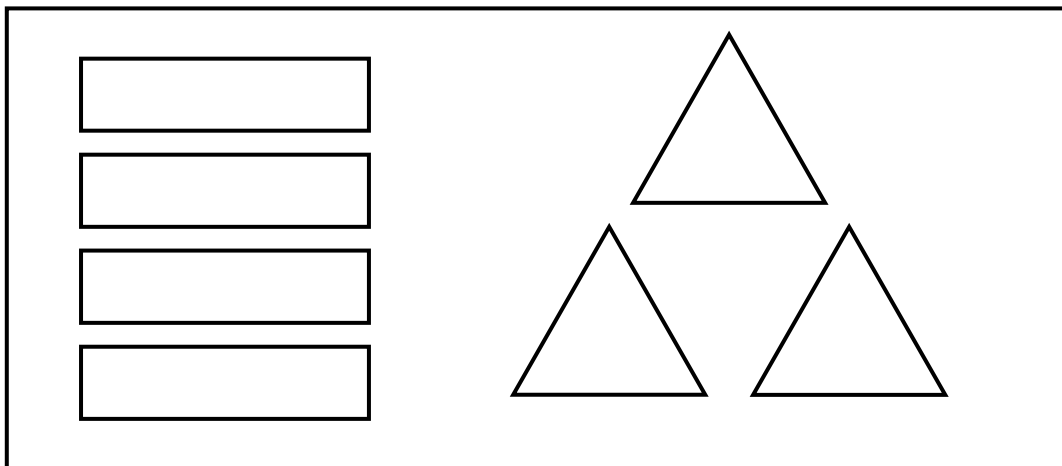| Primary 5 Math |
| :---: |
| Ratio |
| Notes - Teacher |

(A) <u>Ratio</u>

Ratio is used to show the relationship between two or more quantities of the **same unit**. All ratios have **no units**. Ratio is usually written in the **simplest form**.

Example 1

The ratio of the number of rectangles to the number of triangles is **4 : 3**

4 **:** 3 is read as ' four **is to** three'.

We can also say that the ratio of the number of triangles to the number of rectangle is **3:4.**

Example 2

There are 41 passengers in a bus. 16 of them are female. Express the ratio of the number of males to the number of females in the bus.

<u>Males:Female = (41-16):16=25:16</u>

Example 3

Express 40ml as a ratio of 1 litre in its simplest form.

40:1000=1:25

Example 4

Express 9 months as a ratio of $3\frac{1}{4}$ years.

9:($3\frac{1}{4}\times12)$**=9:39=3:13**

Exercise 1

a. Express 650 m as a ratio of 5 km.

650:5000=13:100

b. Express 18 seconds as a ratio of 1 hour.

18:3600=1:200

(B) Equivalent Ratios

Equivalent ratios are ratios having the **same** value when they are in their **simplest form.** It can be obtained either by **multiplying** or **dividing** the parts by a common factor.

For example:

$$11 : 19$$

$(\div 2)$

$$5.5 : 9.5$$

$(\times 4)$

$$22 : 38$$

Thus $11 : 19$, $5.5 : 9.5$ and $22 : 38$ are equivalent ratios.

Example 5

  a. $24 : 36 = $ **2** $: 3$

  b. $7 : 3$ $= 35 : $ **15**

  c. $5 : 3$ $= $ **35** $: 21$.

  d. $72 : 32 = $ **9** $: 4$

  e. $64 : 176 = $ **4** $: 11$

  f. $28 : 126 = $ **2** $: 9$

(C) Expressing Fraction in Ratio

Example 6

Express $2\dfrac{1}{2}$ as a ratio of $5\dfrac{2}{3}$.

1) Change to improper fraction $2\dfrac{1}{2} : 5\dfrac{2}{3}$ $\rightarrow$ $\dfrac{5}{2} : \dfrac{17}{3}$

2) Multiply by the LCM of the denominators $(\frac{5}{2} \times 6):(\frac{17}{3} \times 6)$ →   **15:34**

3) Reduce to the lowest term   →   **15:34**

Example 7

a. $\frac{4}{5} : \frac{2}{7} = 14:5$

b. $13:39 = \frac{1}{2} : 1\frac{1}{2}$

c. $2\frac{1}{5} : 3\frac{1}{2} = \underline{\mathbf{22:35}}$

(D) Expressing Decimal in Ratio

Example 8

> Express 4.8 as a ratio of 7.44

1) Change to whole number   **4.8:7.44**   →   **480:744**

2) Reduce to the lowest term   **480:744**   →   **20:31**

Example 9

a. $2.25 : 4.95 = \underline{\mathbf{5 : 11}}$

> Standard Worksheet 1

b. $2.7 : \underline{\mathbf{108.9}} = 0.3 : 12.1$

(E) Simple Ratio Word Problems

Example 10

In a shopping center, the ratio of the number of shops on level 1 to the number of shops on level 2 is 3 **:** 5. If there are 18 shops on level 1, how many shops are there altogether on level 1 and 2?

3 units   = **18** shops

1 unit   = **18** ÷ 3

           = **6** shops

8 units   = **8** x 6 = **48** shops

Example 11

The ratio of the length to the breadth of a rectangle is 9 **:** 4. If the perimeter of the rectangle is 52 cm, find
    (a) its length,
    (b) its area.

(a) 26units = 52
    1unit = 2
    Length = 9x2 = 18cm
(b) Area = 18x8 = 144cm^2

Standard Worksheet 2

(F) Comparing Three Quantities

To express the ratio of three quantities in its simplest form, we must find a common factor among them.

Example 12

The ratio of the number of apples to the number of oranges is 3**:**7. The ratio of the number of oranges to the number of lemons is 7**:**4. What is the ratio of the number of apples to the number of oranges to the number of lemons?

Apples	:	Oranges	:	Lemons
3	:	7		
		7	:	4
3	**:**	**7**	**:**	**4**

Ratio of the number of apples to the number of oranges to the number of lemons
= 3 : 7 : 4

Example 13

The ratio of Tony's savings to Edmund's savings is 3**:**5. The ratio of Edmund's savings to Colin's savings is 2**:**7. Express the ratio of Tony's savings to Edmund's savings to Colin's savings.

Tony	:	Edmund	:	Colin
3	:	5		
		2	:	7
6	:	10		
		10	:	35
6	:	**10**	:	**35**

(x 2) ... (x 5)

Ratio of Tony's savings to Edmund's savings to Colin's savings = 6 : 10 : 35

Example 14

Kelvin, Jack and Ivan shared a basket of durians in the ratio 4 **:** 11 **:** 7. Kelvin received 35 fewer durians than Jack, how many durians did Ivan receive?

(11-4)units = 35
1unit = 5
No. of durians Ivan received = 7x5 = 35

Example 15

For every 7 apples, there are 3 bananas and for every 4 coconuts, there are 9 bananas. Find the ratio of apples to coconuts.

Apples:Bananas:Coconuts
7	:	3		
		9	:	4
21	:	9	:	4

Apples:Coconuts = 21:4

Exercise 2

a. If x **:** y = 13 **:** 6, y **:** z = 3 **:** 7, find x **:** z

x :y:z
13:6
  3 :7
13:6:14
x:z=13:14

b. If a **:** b = 4 **:** 9, a **:** c = 1 **:** 3, find the ratio of a **:** b **:** c

a : b : c
4 : 9
1   : 3
4 : 9 :12
a:b:c=4:9:12

c. If m **:** n = 2 **:** 9, p **:** n = 7 **:** 2, find p **:** m **:** n

p : m : n
    2 : 9
7   : 2
63 : 4 : 18
p:m:n=63:4:18

(G) Changing Ratio

Type 1 - *(Total quantity remained the same)*

Example 16

Sam and Juvin shared some stamps in the ratio 5 **:** 8. After Juvin gave 21 of her stamps to Sam, they both have the same number of stamps. How many stamps did Juvin have at first?

5+8=13units
13÷2=6.5units
6.5-5=1.5units
1.5units = 21
1unit = 14
No. of stamps Juvin had at first = 8x14 = 112

Type 2 - *(One quantity remained unchanged)*

Example 17

In an examination hall, the ratio of the number of chairs to the number of tables was 5 **:** 9. When 189 chairs were brought into the hall, the ratio of the number of chairs to the number of tables became 4 **:** 3. Find the total number of tables and chairs that were in the hall at first.

4:3 = 12:9
**12-5=7units**
7units = 189
1unit = 27
Total no. of tables and chairs at first = 14x27 = 378

Type 3 - *(Both quantities changed)*

Example 18

At the beginning of a singing competition, there were an equal number of male and female contestants. After 25 male contestants and 61 female contestants were eliminated, the ratio of the remaining male to female contestants was 11 **:** 7. How many contestants were there in the beginning?
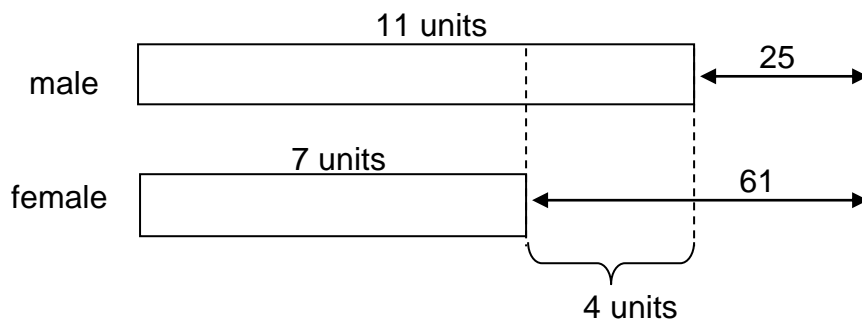
4units = 61-25=36

1unit = 9

No. of contestants in the beginning = (22x9)+50 = 248

Standard Worksheet 3

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