NCERT SOLUTIONS

CLASS - 6TH

Class : 6th
Subject : Maths
Chapter : 12
Chapter Name : RATIO AND PROPORTION

Exercise 12.1

Q1 There are 20 girls and 15 boys in a class.
(a) What is the ratio of number of girls to the number of boys?
(b) What is the ratio of number of girls to the total number of students in the class?

Answer. Number of girls = 20
Number of boys = 15
Total number of students = 20 + 15 = 35
(a) Ratio of number of gills to boys = 20/15 = 4/3
(b) Ratio of number of girls to total students = 20/35 = 4/7

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Q2 Out of 30 students in a class, 6 like football, 12 like cricket and remaining like tennis.
Find the ratio of (a) Number of students liking football to number of students liking
tennis. (b) Number of students liking cricket to total number of students.

Answer. Number of students who like football = 6
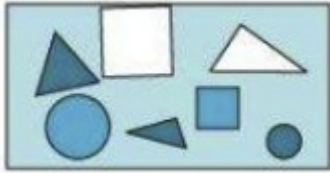Number of students who like cricket = 12
Number of students who like tennis = 30 - 6 - 12 = 12
(a) Ratio of the number of students liking football to the number of students liking
tennis = 6/12 = 1/2
(b) Ratio of the number of students liking cricket to the total number of students = 12/30
= 2/5

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Q3 See the figure and find the ratio of

(a) Number of triangles to the number of circles inside the rectangle. (b) Number of squares to all the figures inside the rectangle. (c) Number of circles to all the figures inside the rectangle

Answer. Number of triangles = 3
Number of circles = 2
Number of squares = 2
Total number of figures = 7
(a) Ratio of the number of triangles to the number of circles =3/2
(b) Ratio of the number of squares to all the figures in the rectangle = 2/7
(c) Ratio of the number of circles to all the figures in the rectangle = 2/7

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Q4 Distances travelled by Hamid and Akhtar in an hour are 9 km and 12 km. Find the ratio of speed of Hamid to the speed of Akhtar.

Answer. The distance travelled in an hour by a certain object is called the speed of that object.
Distance travelled by Hamid in one hour = 9 km
Distance travelled by Akhtar in one hour = 12 km
Hamid's speed = 9 km/hr
Akhtars speed = 12 km/hr
Ratio of speed Of Hamid to the speed Of Akhtar = 9/12 = 3/4

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Q5 Fill in the following blanks:

$$\frac{15}{18} = \frac{\square}{6} = \frac{10}{\square} = \frac{\square}{30}$$ [Are these equivalent ratios?]

Answer.
$$\frac{15}{18} = \frac{5 \times 3}{6 \times 3} = \frac{5}{6}$$
$$\frac{5}{6} = \frac{5}{6} \times \frac{2}{2} = \frac{10}{12}$$
$$\frac{5}{6} = \frac{5}{6} \times \frac{5}{5} = \frac{25}{30}$$

Therefore, 5, 12, 25 will come in the blanks respectively.
Yes, all these are equivalent ratios.

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Q6 Find the ratio of the following :
(a) 81 to 108
(b) 98 to 63
(c) 33 km to 121 km
(d) 30 minutes to 45 minutes

Answer. (a) $\frac{81}{108} = \frac{3 \times 3 \times 3 \times 3}{2 \times 2 \times 3 \times 3 \times 3} = \frac{3}{4}$
(b) $\frac{98}{63} = \frac{14 \times 7}{9 \times 7} = \frac{14}{9}$
(c) $\frac{33}{121} = \frac{3 \times 11}{11 \times 11} = \frac{3}{11}$
(d) $\frac{30}{45} = \frac{2 \times 3 \times 5}{3 \times 3 \times 5} = \frac{2}{3}$

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Q7 Find the ratio of the following:
(a) 30 minutes to 1.5 hours
(b) 40 cm to 1.5 m
(c) 55 paise to Rs. 1
(d) 500 mL to 2 litres

Answer. (a)
$30 \min = \frac{30}{60} = 0.5$ hours
Required ratio $= \frac{0.5}{1.5} = \frac{0.5 \times 1}{0.5 \times 3} = \frac{1}{3}$

(b) 40 cm to 1.5 m
1.5 m = 150 cm
Required ratio $= \frac{40}{150} = \frac{4}{15}$

(c) 55 paise to Re 1
Re 1 = 100 paise
Required ratio $= \frac{55}{100} = \frac{11 \times 5}{20 \times 5} = \frac{11}{20}$

(d) 500 mL to 2l
1l = 1000 mL
2l = 2000 mL
Required ratio $= \frac{500}{2000} = \frac{5}{20} = \frac{5}{5 \times 4} = \frac{1}{4}$

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Q8 In a year, Seema earns Rs 1,50,000 and saves Rs 50,000. Find the ratio of a) Money that Seema earns to the money she saves. (b) Money that she saves to the money she spends.

Answer. Money earned = Rs 150000

Money saved = Rs 50000

Money spent = Rs 150000 - Rs 50000 = Rs 100000

(a) Ratio of money earned to money saved = $\frac{150000}{50000} = \frac{3}{1}$

(b) Ratio of money saved to money spent = $\frac{50000}{100000} = \frac{1}{2}$

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Q9 There are 102 teachers in a school of 3300 students. Find the ratio of the number of teachers to the number of students.

Answer. Ratio required = $\frac{102}{3300} = \frac{2\times3\times17}{2\times3\times550} = \frac{17}{550}$

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Q10 In a college, out of 4320 students, 2300 are girls. Find the ratio of

(a) Number of girls to the total number of students.

(b) Number of boys to the number of girls.

(c) Number of boys to the total number of students.

Answer. Total number of students = 4320

Number of girls = 2300

Number of boys = 4320 - 2300 = 2020

(a) Required ratio = $\frac{2300}{4320} = \frac{2\times2\times5\times115}{2\times2\times5\times216} = \frac{115}{216}$

(b) Required ratio = $\frac{2020}{2300} = \frac{2\times2\times5\times101}{2\times2\times5\times115} = \frac{101}{115}$

(c) Required ratio = $\frac{2020}{4320} = \frac{2\times2\times5\times101}{2\times2\times5\times216} = \frac{101}{216}$

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Q11 Out of 1800 students in a school, 750 opted basketball, 800 opted cricket and remaining opted table tennis. If a student can opt only one game, find the ratio of (a) Number of students who opted basketball to the number of students who opted table tennis. (b) Number of students who opted cricket to the number of students opting

basketball. (c) Number of students who opted basketball to the total number of students.

Answer. (a) Required ratio = $\frac{750}{250} = \frac{3}{1}$
(b) Required ratio = $\frac{800}{750} = \frac{16}{15}$
(c) Required ratio = $\frac{750}{1800} = \frac{25}{60} = \frac{5}{12}$

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Q12 Cost of a dozen pens is Rs. 180 and cost of 8 ball pens is Rs. 56. Find the ratio of the cost of a pen to the cost of a ball pen.

Answer. Cost of a dozen pens = Rs 180
Cost of 1 pen 12 = 180/12 = Rs 15
Cost of 8 ball pens = Rs 56
Cost of a ball pen = 56/8 = Rs 7
Required ratio = 15/7

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Q13 Consider the statement: Ratio of breadth and length of a hall is 2 : 5. Complete the following table that shows some possible breadths and lengths of the hall.

Breadth of the hall (in metres)	10	?	40
Length of the hall (in metres)	25	50	?

Answer. (i) Length = 50 m
$\frac{\text{Breadth}}{50} = \frac{2}{5}$
$5 \times \text{Breadth} = 50 \times 2$(By cross-multiplication)
Breadth = 20 m
(ii) Breadth = 40 m
$\frac{40}{\text{Length}} = \frac{2}{5}$
$2 \times \text{Length} = 5 \times 40$(By cross-multiplication)
Length = 100 m

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Q14 Divide 20 pens between Sheela and Sangeeta in the ratio of 3 : 2.

Answer. Terms of 3 : 2 are 3 and 2.

Sum of these terms = 3 + 2 = 5

Sheela will get 3/5 of total pens and Sangeeta will get 2/5 of total pens.

Number of pens with Sheela = $\frac{3}{5} \times 20 = 12$

Number of pens with Sangeeta = $\frac{2}{5} \times 20 = 8$

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Q15 Mother wants to divide Rs 36 between her daughters Shreya and Bhoomika in the ratio of their ages. If age of Shreya is 15 years and age of Bhoomika is 12 years, find how much Shreya and Bhoomika will get.

Answer. Ratio of ages = $\frac{15}{12} = \frac{5}{4}$

Therefore, mother wants to divide Rs 36 in a ratio of 5 : 4.

Terms of 5 : 4 are 5 and 4.

Sum of these terms = 5 + 4 = 9

Shreya will get 5/9 of the total money and Bhoomika will get 4/9 of it.

Amount that Shreya will get = $\frac{5}{9} \times 36 = 20$

Amount that Bhoomika will get = $\frac{4}{9} \times 36 = 16$

Therefore, Shreya and Bhoomika will get Rs 20 and Rs 16 respectively.

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Q16 Present age of father is 42 years and that of his son is 14 years. Find the ratio of (a) Present age of father to the present age of son. (b) Age of the father to the age of son, when son was 12 years old. (c) Age of father after 10 years to the age of son after 10 years.(d) Age of father to the age of son when father was 30 years old.

Answer. (a) Present age of father = 42 years

Present age of son = 14 years

Required ratio = 42/14 = 3/1

(b) Two years ago, the age of the son was 12 years and the age of the father was 42 — 2 = 40 years

Required ratio = $\frac{40}{12} = \frac{4 \times 10}{4 \times 3} = \frac{10}{3}$

(c) After 10 years, the age of the father and son will be 52 years and 24 years respectively.

Required ratio = $\frac{52}{24} = \frac{4 \times 13}{4 \times 6} = \frac{13}{6}$

(d) 12 years ago, the father was 30 years old.

At that time, age of son 14 - 12 = 2 years

Required ratio = $\frac{30}{2} = \frac{2 \times 15}{2} = \frac{15}{1}$

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Exercise 12.2

Q1 Determine if the following are in proportion. (a) 15, 45, 40, 120 (b) 33, 121, 9,96 (c) 24, 28, 36, 48 (d) 32, 48, 70, 210 (e) 4, 6, 8, 12 (f) 33, 44, 75, 100

Answer. (a) $\frac{15}{45} = \frac{1}{3}, \frac{40}{120} = \frac{1}{3}$
 Therefore, $15 : 45 = 40 : 120$

 Hence, these are in proportion.
(b) $\frac{33}{121} = \frac{3}{11}, \frac{9}{96} = \frac{3}{32}$
 Therefore, $33 : 121 \neq 9 : 96$

 Hence, these are not in proportion.
(c) $\frac{24}{28} = \frac{6}{7}, \frac{36}{48} = \frac{3}{4}$
 Therefore, $24 : 28 \neq 36 : 48$

 Hence, these are not in proportion.
(d) $\frac{32}{48} = \frac{2}{3}, \frac{70}{210} = \frac{1}{3}$
 Therefore, $32 : 48 \neq 70 : 210$

 Hence, these are not in proportion.
(e) $\frac{4}{6} = \frac{2}{3}, \frac{8}{12} = \frac{2}{3}$
 Therefore, $4 : 6 = 8 : 12$

 Hence, these are in proportion.
(f) $\frac{33}{44} = \frac{3}{4}, \frac{75}{100} = \frac{3}{4}$
 Therefore, $33 : 44 = 75 : 100$

 Hence, these are in proportion.

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Q2 Write True (T) or False (F) against each of the following statements : (a) 16 : 24 :: 20 : 30 (b) 21: 6 :: 35 : 10 (c) 12 : 18 :: 28 : 12 (d) 8 : 9 :: 24 : 27 (e) 5.2 : 3.9 :: 3 : 4 (f) 0.9 : 0.36 :: 10 : 4

Answer. (a) $\frac{16}{24} = \frac{2}{3}, \frac{20}{30} = \frac{2}{3}$
 Therefore, $16 : 24 = 20 : 30$

 Hence, True
(b) $\frac{21}{6} = \frac{7}{2}, \frac{35}{10} = \frac{7}{2}$

Therefore, $21 : 6 = 35 : 10$

Hence, True

(c) $\frac{12}{18} = \frac{2}{3}, \frac{28}{12} = \frac{7}{3}$

Therefore, $12 : 18 \neq 28 : 12$

Hence, False

(d) $\frac{24}{27} = \frac{3 \times 8}{3 \times 9} = \frac{8}{9}$

Therefore, True

(e) $\frac{5.2}{3.9} = \frac{4}{3}$

Therefore, $5.2 : 3.9 \neq 3 : 4$

Hence, False

(f) $\frac{0.9}{0.36} = \frac{90}{36} = \frac{10}{4}$

Therefore, $0.9 : 0.36 = 10 : 4$

Hence, True

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Q3 Are the following statements true? (a) 40 persons : 200 persons = Rs 15 : Rs 75 (b) 7.5 litres : 15 litres = 5 kg : 10 kg (c) 99 kg : 45 kg = Rs 44 : Rs 20 (d) 32 m : 64 m = 6 sec : 12 sec (e) 45 km : 60 km = 12 hours : 15 hours

Answer. (a) $\frac{40}{200} = \frac{1}{5}, \frac{15}{75} = \frac{1}{5}$

True

(b) $\frac{7.5}{15} = \frac{1}{2}, \frac{5}{10} = \frac{1}{2}$

True

(c) $\frac{99}{45} = \frac{11}{5}, \frac{44}{20} = \frac{11}{5}$

True

(d) $\frac{32}{64} = \frac{1}{2}, \frac{6}{12} = \frac{1}{2}$

True

(e) $\frac{45}{60} = \frac{3}{4}, \frac{12}{15} = \frac{4}{5}$

False

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Q4 Determine if the following ratios form a proportion. Also, write the middle terms and extreme terms where the ratios form a proportion. (a) 25 cm : 1 m and Rs 40 : Rs 160 (b)39 litres : 65 litres and 6 bottles : 10 bottles (c) 2 kg : 80 kg and 25 g : 625 g (d) 200 mL : 2.5 litre and Rs 4 : RS 50

Answer. (a)

$25\text{cm} = \frac{25}{100}\text{m}$

$\frac{0.25}{1} = \frac{1}{4}$ and $\frac{40}{160} = \frac{1}{4}$

Yes. These are in proportion.

Middle terms are 1 m, Rs 40.

Extreme terms are 25 cm, Rs 160.

(b)

$\frac{39}{65} = \frac{3}{5}$ and $\frac{6}{10} = \frac{3}{5}$

Yes. These are in proportion.

Middle terms are 65 l, 6 bottles

Extreme terms are 39 l, 10 bottles.

(c)

$1l = 1000\text{mL}$

$2.5l = 2500\text{mL}$

$\frac{200}{2500} = \frac{2}{25}$ and $\frac{4}{50} = \frac{2}{25}$

Yes. These are in proportion

Middle terms are 2.5 l, Rs 4.

Extreme terms are 20 mL, Rs 50.

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Exercise 12.3

Q1 If the cost of 7 m of cloth is Rs 1470, find the cost of 5 m of cloth.

Answer. Cost of 7 m cloth = Rs 294

Cost of 1 m cloth = $\frac{294}{7} = \text{Rs } 42$

Therefore, cost of 5 m cloth = 42 x 5 = Rs 210

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Q2 Ekta earns Rs 3000 in 10 days. How much will she earn in 30 days?

Answer. Money earned in 10 days = Rs 1500

Money earned in 1 day = $\frac{1500}{10} = \text{Rs } 150$

Therefore, money earned in 30 days = 150 x 30 = Rs 4500

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Q3 If it has rained 276 mm in the last 3 days, how many cm of rain will fall in one full week (7 days)? Assume that the rain continues to fall at the same rate.

Answer. Measure of rain in 3 days = 276 mm

Measure of rain in 1 day = $\frac{276}{3} = 92$mm

Therefore, measure of rain in 7 days = 92 x 7 = 644 mm

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Q4 Cost of 5 kg of wheat is Rs 91.50. (a) What will be the cost of 8 kg of wheat? (b) What quantity of wheat can be purchased in Rs 183?

Answer. (a) Cost of 5 kg wheat = Rs 30.50

Cost of 1 kg wheat = $\frac{30.50}{5} = $ Rs 6.10

Therefore, cost of 8 kg wheat = $6.10 \times 8 = Rs 48.80$

(b) Wheat purchased in Rs 30.50 = 5 kg

Wheat purchased in Re 1 = $\frac{5}{30.50}$kg

Therefore, wheat purchased in Rs 61 = $\frac{5}{30.50} \times 61 = 10$kg

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Q5 The temperature dropped 15 degree celsius in the last 30 days. If the rate of temperature drop remains the same, how many degrees will the temperature drop in the next ten days?

Answer. Temperature drop in 30 days = $15°$C

Temperature drop in 1 day = $\frac{15}{30} = \left(\frac{1}{2}\right)^{°}$C

Thus, there will be a temperature drop in next 10 days = $\frac{1}{2} \times 10 = 5°$C

Thus, there will be temperature drop of $5°$C in the next ten days.

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Q6 Shaina pays Rs 15000 as rent for 3 months. How much does she has to pay for a whole year, if the rent per month remains same?

Answer. Rent for 3 months = Rs 7500

Rent for 1 month = 7500/3 = Rs 2500

Therefore, rent for 12 months= 25 00 x 12 = 30000
Thus, she has to pay Rs 30000 for a whole year.

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Q7 Cost of 4 dozen bananas is Rs 180. How many bananas can be purchased for Rs 90?

Answer. Numbers of bananas bought in Rs 60 = 4 dozens = 4 x 12 = 48
Number of bananas bought in Re 1 = 48/60
Therefore, number of bananas bought in Rs 12.50 = $\frac{48}{60} \times 12.50$ = 10 bananas
Thus, 10 bananas can be purchased for Rs 12.50.

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Q8 The weight of 72 books is 9 kg. What is the weight of 40 such books?

Answer. Weight of 72 books = 9 kg
Weight of 1 book = 9/72 = 1/8 kg
Therefore, weight of 40 books = 1/8 x 40 = 5 Kg
Thus, the weight of 40 such books is 5 kg.

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Q9 A truck requires 108 litres of diesel for covering a distance of 594 km. How much diesel will be required by the truck to cover a distance of 1650 km?

Answer. Diesel required for 594 km = 108 litres
Diesel require for 1 km = 108/594 = 2/11 litre
Therefore, diesel required for 1650 km = 2/11 x 1650 = 300 litres
Thus, 300 litres diesel will be required by the truck to cover a distance of 1650 km.

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Q10 Raju purchases 10 pens for Rs 150 and Manish buys 7 pens for Rs 84. Can you say who got the pens cheaper?

Answer. Raju purchased 10 pens for Rs 150.
∴ Price of 1 pen = 150/10 = Rs 15
Manish purchased 7 pens for Rs 84.
∴ Price of 1 pen = 84/7 = Rs 12
Therefore, manish got the pens cheaper.

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Q11 Anish made 42 runs in 6 overs and Anup made 63 runs in 7 overs. Who made more runs per over?

Answer. Runs made by Anish in 6 overs = 42

∴ Runs made by Anish in 1 over = 42/6 =7

Runs made by Anup in 7 overs = 63

∴ Runs made by Anup in 1 over = 63/7 = 9

Clearly, Anup made more runs per over.

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