**5. RATIO AND PROPORTION**

**Solutions Exercise – Easy**

1. (d) : Since, *B* is the common member which associates *A* and *C*, so we shall try to make *B* equal in both the cases.

Age of *A* : Age of *B* = 2 × 3 : 5 × 3 = 6 : 15

Age of *B* : Age of *C* = 3 × 5 : 4 × 5 = 15 : 20

Since, ratio of B is same in both the cases, hence, age of *A* : Age of *B* : Age of *C* = 6 : 15 : 20.

2. (c) : Since the angle sum of triangle is 180°, *A* + *B + C* = 180°. Forming two of the ratios yields:



Solving the first equation for *B* yields



Solving the second equation for *C* yields



Hence,

*A + B + C* = 180

⇒ 

⇒ 30*A* = 180 × 5

∴

3. (d) : Let the required number be *y*. Then,



⇒ 81 − 3*y* = 70 − 2*y*

∴ *y* = 81 − 70 = 11

4. (b) : *x α* *y* ⇒ *x = ky*

15 = l × 7 ⇒ *k* = 

*x = ky* =  × 14 = 30

Hence, the required value of *x* is 30.

5. (a) : Let the 4th proportional = *x*

Then, 5 : 20 : : 7 : *x*

or 

⇒ 5*x* = 7 20

∴ *x* = 

6. (b) : Given that 

⇒ *b*2 = *ac*

∴ *a*4 : *b*4 = *a*4 : *a*2*c*2 = *a*2 : *c*2

7. (a) : Given that 4*a* = 5*b*

∴ 

Also, 7*b* = 9*c*

∴ 

∴ *a* : *b* = 5 : 4 = (5 × 9) : (4 × 9) = 45 : 36

*b* : *c* = 9 : 7 = (9 × 4) : (7 × 4) = 36 : 28

∴ *a* : *b* : *c* = 45 : 36 : 28

8. (c) : Given that 

∴ 

or *P* : *Q* = 1 : 4

Also, 

or 

or *Q* : *R* = 1 : 2

Now, we have

*P* : *Q* = 1 : 4

*Q* : *R* = 1 : 2

= (1 × 4) : (2 × 4) = 4 : 8

∴ *P* : *Q* : *R* = 1 : 4 : 8

9. (a) : 

⇒ 3*p* + 3*q* = 5*p* − 5*q*

⇒ 2*p* = 8*q*

⇒ *p* = 4*q*

∴ 

= 

= 

∴ (*p*2 + *q*2) : (*p*2 − *q*2) = 17 : 15

10. (a) : Let angles be 3*x*, 5*x* and *x*, respectively,

According to the question,

3*x* + 5*x* + *x* = 180°

[ Sum of angles of a triangle = 180°

∴ 9*x* = 180

∴ *x* = 

∴ Largest angle = 5*x* = 5 × 20° = 100°

11. (b) : Let 1st number = *x* and 2nd number = *y*

According to the question,

70% of *x* = 

⇒ 

⇒ 

⇒ *x* : *y* = 6 : 7

12. (a) : If *a*, *b* and *c* are in continued proportion, the mean proportional is *b*.

Therefore, *b*2 = *ac*, *b*2 = 8 × 98, *b* = 

13. (c) : Let that man left Rs. *x*.

∴ Share of daughter = 

⇒ 

⇒ *x* = Rs. 270000

14. (c) : Ashok's present age = 26 − 6 = 20 years

∴ Pradeekp's present age = 

15. (c) : let incomes of Chanda and Kim are 9*x* and 4*x* respectively and their expenditures are 7*y* and 3*y* respectively.

∴ 9*x* − 7*y* = 2000 ..... (1)

and 4*x* − 3*y* = 2000 ..... (2)

On solving equations (1) and (2), we get

*y* = 10000

∴ Chandra's expenditure = 7 × 10000 = Rs. 70000

16. (a) : Let the numbers 3*x*, 2*x*, 5*x*.

We have 9*x*2 + 4*x*2 + 25*x*2 = 1862

∴ 38 *x*2 = 1862

∴ *x*2 = 49 = 72

∴ *x* = 7

Hence, the required numbers are 21, 14 and 35.

∴ Sum of the numbers = 21 + 14 + 35 = 70.

17. (a) : Let these parts be *x* and *y*. Then,

 or 8*x* : 5*y* = 3 : 4

∴ 

Thus, *x* : *y* = 15 : 32

Now, sum of ratios = 15 + 32 = 47.

∴ First part =,

Second part =.

18. (a) : 

∴ 

19. (b) : Let the first and the second numbers be *x* and *y* respectively then,

*y* + 30% of *x* = 140% of *y* or, *y* + 0.3*x* = 1.4*y*

or, 0.3*x* = 0.4*y*

∴ *x* : *y* = 0.4 : 0.3 = 4 : 3

20. (c) : Let the numbers be *x* and *y* respectively.





21. (d) : *P* : *Q* : *R* = 

= 

= 6 : 8 : 9

Share of *R* = Rs. 

22. (a) : Let number of Rs. 1 coins = 8*x*

Number of 50 paise coins = 9*x*

Number of 25 paise coins = 11*x*

According to the question,



⇒ 32*x* + 18*x* + 11*x* = 1464

⇒ 61*x* = 1464

∴ *x* = 

 Number of 25 paise coins = 11*x* = 11 × 24 = 264

23. (d) : Let the number added be *x*. Then,

, 12 + 3*x* = 14 + 2*x*

*x* = 2

24. (d) : *P*'s share

= 

Where P = Profit and *x*, *y* and *z* are respective shares of *P*, *Q* and *R*.

25. (c) : . Let *A*'s share = 2*a*, *B*'s share = 9*a*

 or 2 : 7

26. (d) : ,

⇒ 136 − 2*x* = 147 − 3*x*

*x* = 11

27. (d) : 4*a* = 3*b* = 5*c*

 and 

⇒ *a* : *b* : *c* = 15 : 20 : 12

28. (d) : In a ratio *A* : *B*, *A* is called the antecedent and *B* is called the consequent.

Let antecedent = 3*x* and consequent be 4*x*.

3*x* = 36 ⇒ 4*x* = 48.

29. (b) : Option (a):

Numbers = 9*x*, 3*x*

12*x* = 84

*x* = 7; Possible.

Option (b):

8*x* = 84 ⇒ No whole number *x* is possible.

Option (c) & (d):

4*x* = 84

*x* = 21; Possible.

30. (d) : Initially number of boys

= 

∴ Number of girls

= 

22 more girls get admitted.

∴ Required ratio

= 

31. (c) : Let number of students in three classes be 2*x*, 2*x* and 5*x* respectively.

∴ Original number of students

= 2*x* + 3*x* + 5*x* = 10*x*

Now, the number of students in each class is increased by 20.

Then,

= 

⇒ 12*x* + 80 = 10*x* + 100

⇒ 2*x* = 20 ⇒ *x* = 

∴ Required number of students

= 10*x* = 10 × 10 = 100

32. (a) : 

33. (b) : *p* = pressure, *v* = volume

*p* =  [*k* = constant term]

*k* = *pv*

*p* is reduced by 20% i.e., by 

then *V* is increased  i.e., 25%

34. (c) : Let the side of the square be *s* units

Increased side of square = 

Area = *s*2

∴ The ratio of their areas = 

= 4*s*2 : 9*s*2 = 4 : 9

35. (c) : . Let P = 3*x*, Q = 7*x*

*P + Q* = 45 ; 3*x* + 7*x* = 50, *x* = 

*Q* = 7*x* = 35

36. (d) : Let the fraction be 



37. (b) : Volume of milk in the mixture = 

Volume of water = 9 litres,

Let *x* litres of water is added.



⇒ 42 = 9 + *x*

∴ *x* = 42 − 9 = 33

Hence, the required quantity of water is 33 litres.

38. (c) : Volume of milk in mixtre = 

Volume of water = 44 *l*

Let *x* litres of water is added



112 = 44 + *x*

*x* = 68

39. (a) : Ratio of their investment = 12000 : 18000 = 2 : 3

A's share in profit = 

40. (c) : Quantities of hydrochloric acid and sulphuric acid in the mixture are  and 40 − 30 = 10 litres respectively.

Let *a* be the quantity of sulphuric acid added, then

 ⇒ *a* = 80

41. (c) : Let quantity of alcohol = 4*x*

and quantity of water = 3*x*

According to the question,



⇒ 16*x* = 3 (3*x* + 14)

⇒ 16*x* = 9*x* + 42

⇒ 7*x* = 42

∴ *x* = 

∴ Quantity of alcohol = 4*x* = 4 × 6 = 24 *L*

42. (d) : Required ratio = 

To find the simple ratio, we will multiply each of these by the LCM of 2, 3 and 4

= 12  = 6 : 4 : 3

43. (a) : Let the nos. be 5*x* and 3*x*

then, 5*x* − 3*x* = 10

2*x* = 10, *x* = 5

Required product = 5*x* × 3*x* = 5 × 5 × 3 × 5 = 375

44. (b) : Let the number be *x*, 3*x*, 4*x* and 7*x*

then, *x* + 3*x* + 4*x* + 7*x* = 75

15*x* = 75 ⇒ *x* = 5

Required value = 7 × 5 = 35

45. (c) : Let the fraction be .





46. (d) : 

So, the minimum number of pens that the person should have

= 20 + 15 + 12 + 10 = 57

47. (d) : Quantity of milk = 

Quantity of water = 

Quantity of water added = *x L* (suppose)

Now, 

⇒ *x* = 60 *L*

48. (b) : Total investment = 50000 + 25000 = Rs. 75000

*A*'s share = 

*B*'s share = 

49. (b) : *B*'s money = 

*C*'s = 

Therefore, total amount of money = Rs. 4125

50. (c) : *A*'s contribution = 12000 for 6 months

= 12000 × 6 = 72000

*B*'s contribution = 10000 for 8 months

= 10000 × 8 = 80000

*C*'s contribution = 8000 for 12 months

= 8000 × 12 = 96000

Total = 248000

*A*'s share = 

*B*'s share = 

*C*'s share = 

**Solutions Exercise – Medium**

1. (d) : Let the incomes of Sapna and Kavita be 3*x* and 5*x*.

And their expenses be *y* and 3*y*.

Since, we don't know the relationship between *x* and *y*, we cannot tell, who is saving more.

2. (d) : Let the ages of Chintamani family 5 years ago be 2*y*, 3*y*, 7*y* and 8*y*.

Their ages now are: 2*y +* 5, 3*y* + 5, 7*y* + 5 and 8*y* + 5.

∴ 20*y* + 20 = 140

⇒ 20*y* = 140 − 20 = 120

∴ 

Present age of Dipa = 2 × 6 + 5 = 17 years

Present age of mother = 7 × 6 + 5 = 47 years

Difference in present age = (47 − 17) = 30 years

Hence, after 30 years Dipa would be as old as the present age of her mother.

3. (a) : If *X* is taking 3 days to do some work, then *Y* takes 6 days to do the same work. Now, both of them will take 2 days to complete the work.

So, *Z* takes 6 days to complete the same work.

Hence, earnings should be distributed in the ratio of their efficiency *i.e*., 2 : 1 : 1.

4. (d) : Ratio of investments of *A*, *B* and *C*

= 337.50 : 1125 : 637.50

= 27 : 90 : 51 = 9 : 30 : 17

Let the investments of *A*, *B* and *C* be 9*x*, 30*x* and 17*x* respectively.

∴ 9*x* + 30*x* + 17*x* = 14000

⇒ *x* = 250

So, required difference = 30*x* − 9*x* = 21*x* = Rs. 5250

5. (a) : Ratio of values of the coins = 

Value of one-rupee coins = 

Value of 50 paise coins = 

Value of 25 paise coins = 

∴ Number of one-rupee coins = 200

Number of 50 paise coins = (120 × 2) = 240

Number of 25 paise coins = (70 × 4) = 280.

6. (b) : Suppose *Q* puts in *x* cows.

The ratio of *P*'s and *Q*'s rents = 

Then,  QWDIOQFGJKFor, *x* = 

7. (d) : Let 5*x*, 6*x* and 7*x* be the amount *P*, *Q* and *R* get.

And *y* be the amount that each of S & T get.

Then, *y* = 5*x* − 2100.

From here we cannot find the value of '6*x*'.

8. (c) : Four years ago, let ages of *A* and *B* be 13*x* and 9*x* years respectively.

then, 

⇒ 39*x* + 36 = 36*x* + 48

Or, 3*x* = 12

⇒ *x* = 4

Hence, present age of *A* = 13*x* + 4 = 13 × 4 + 4 = 56

And present age of *B* = 9 × 4 + 4 = 40

Difference = 56 − 40 = 16

9. (b) : Area of semicircle = 

Area of sector = 

= 

10. (b) : *V* α *W*2

*V* = *KW*2, *V* = Value of diamond and *W* = Weight of diamond

*K* = Constant

10000 = *K* . (10)2

⇒ *K* = 100

Hence, *V* = 100 × 42 = 1600

*V* = 100.62 = 3600

Net loss = (Rs. (10000 − 5200) = Rs. 4800 *i.e*. 48%

11. (b) : Weight of two pieces of Watermelon = 3 × 12*y* : 5 × 12*y*

(We are assuming the weight to be the multiple of 12 because the bigger of two pieces has to be cut in the ratio 5 : 7.)

Now, 5 × 12 has to be cut in the 5 : 7. So, the two parts will be 25*y* and 35*y*.

So, finally the ratio is 36 : 25 : 35.

12. (a) : Anil's effective investment = 16000 × 6 = Rs. 96,000

Pawan's effective investment = 12000 × 8 = Rs. 96,000

Rajan's effective investment = 1000 × 12 = Rs. 12,000

Profit sharing ratio = 96 : 96 : 12 or 8 : 8: 1.

13. (b) : *a*'s share ⇒ 3*x* + 30

*b*'s share ⇒ 4*x* + 20

*c*'s share ⇒ 5*x* + 50

Sum is 9700

12*x* + 100 = 9700,

12*x* = 9600,

*x* = 800

*b*'s share = 4*x* + 20 = 3200 + 20 = 3220

14. (b) : 

*A* : *B* : *C* = 1 : 2 : 1

Share of *A*, *B*, *C* are *x*, 2*x*, *x*

= 

15. (d) : Let present age of son = *x* and

present age of father = *y*

(*y* − 4) = 6(*x* − 4) ..... (1)

(*y* + 12) = 2(*x* + 12) ..... (2)

From (1) and (2),

*y* − 6*x* + 20 = 0

*y* − 2*x* − 12 = 0

4*x* = 32, *x* = 8 years, *y* = 28 years

Ratio of their present ages = 

16. (c) : For every 100 paise that *X* gets, *Y* gets 65 paise and *Z* gets 35 paise.

*Z*'s share = 560 = 

∴ Sum = Rs. 3,200

17. (d) : Let Sunil's income = Rs. 3*x*

Rahul's income = Rs. 2*x*

Sunil's expenses = Rs. 5*y*

Rahul's expenses = Rs. 3*y*

Sunil's savings = 3*x* − 5*y* = 3000 ..... (1)

Rahul's savings = 2*x* − 3*y* = 3000 ..... (2)

Solving (1) and (2),

*x* = 6000

Rahul's income = 2*x* = Rs. 12,000

18. (c) : Let *P*'s, *Q*'s and *R*'s investments be 8*x*, 7*x*, 5*x*.

*P*'s effective investment = (8*x*) ´ 5 + (4*x*) × 7

= 40*x* + 28*x* = 68*x*

*Q*'s effective investment = 7*x* × 12 = 84*x*

*R*'s effective investment = 5*x* × 12 = 60*x*

*Q*'s share = 

19. (d) : Total salary of the three = 350000

Ravi's spent = 70%, therefore Ravi's saving = 30%

Ajay's spent = 75%, therefore Ajay's saving = 25%

Bhuvan's spent = 80%, therefore Bhuvan's saving = 20%

30% of Ravi's salary : 25% of Ajay's salary : 20% of Bhuvan's salary = 15 : 10 : 25

= 

30 *R* : 25 *A* : 20 *B* = 15 : 10 : 25

From here 

Also, 

Now, *R* : *A* : *B* = 34 : 24 : 75

Ravi's salary = 

Ajay's salary = 

Bhuvan's salary = 

20. (b) : Solution volume = 6 litres, with 25% alcohol

Therefore alcohol = 

Suppose *X* litres of alcohol is added to make it 50% solutions

Therefore, 

*X* = 3 litres

21. (a) : Expenses = *E* = *F* + *kV* ; where *F* is the fixed cost, *V* is the number of students, and *k* is the constant.

15000 = *F* + *k* × 20 ..... (1)

20000 = *F* + *k* × 30 ..... (2)

Solving (1) and (2), we get

5000 = 10 × *k* ⇒ *k* = Rs. 500

So, *F* = Rs. 5000

Hence, the expenses for 40 students

= Rs. 5000 + Rs. 500 × 40

= Rs. 5000 + Rs. 20000 = Rs. 25000

22. (c) : Let *y* gold coins given to 1st daughter. Then, number of gold coins given to 2nd daughter = 

And number of gold coins given to 3rd daughter = 

∴ 

⇒ 

∴ 

Hence, required number of coins

= 

= 105 + 75 + 45 = 225

23. (b) : Since, the total number of men employed is 50, then women and children are employed 100 and 150 respectively.

Let the men, women and children wages are 6*x*, 3*x* and 2*x* respectively.

∴ 50 × 6*x* + 100 × 3*x* + 150 × 2*x* = 4500

⇒ 900*x* = 4500

⇒ *x* = 5

∴ Per day wages of men, women and children are Rs. 30, Rs. 15 and Rs. 10.

∴ Weekly wages of men, women and children are Rs.. 210, Rs. 105 and Rs. 70.

24. (b) : Let the peresent and last year salary of Mahesh's and Suresh's be *x*, *x*′ and *y*, *y*′ respectively.

According to the given condition,



and 

∴ 

⇒ 

⇒ 

⇒ 

Also, *x + y* = 43000

⇒ 

⇒ 

25. (d) : If the original cost of article is Rs. 6.

then, original raw material cost = Rs. 2

New cost of raw material = 

Original manufacturing expenses = (6 − 2) = Rs. 4

New manufacturing expenses = 

∴ New cost of article = 4.80 + 5 = Rs. 9.80

26. (b) : 12.5% of profit = 

Remaining Rs. 770 is divided in the ratio

= 5000 : 6000 = 5 : 6

Profit of Anu = 

rofit of Bimla = 

27. (c) : Let he purchase *x* pairs of brown socks.

Price of black socks and brown socks be Rs. 2*a* and Rs. *a* per pair respectively.

∴ 

⇒ 

⇒ 

⇒ 

⇒ *x* = 16

∴ Required ratio = 

28. (b) : *X*'s investment

= 

= Rs. 7320

*Y*'s investment = 600 × 12 = Rs. 7200

∴ *X*'s share from profit

= 

29. (b) : Let the shares of *A*, *B* and *C* be (*x* − 3), (2*x* − 7) and (3*x* − 9) respectively.

then, (*x* − 3) + (2*x* − 7) + (3*x* − 9) = 671

⇒ 6*x* = 690

∴ *x* = 115

*A* = Rs. 112

*B* = Rs. 223

and *C* = Rs. 336

30. (a) : Let the sum of *A*, *B* and *C* be 6*x*, 19*x* and 7*x*.

∴ Total sum = 6*x* + 19*x* + 7*x* = 32*x*

From the question

6*x* : 19*x* + 200 : 7*x* − 200 = 3 : 10 : 3

*i.e*. 6*x* = 7*x* − 200

∴ *x* = 200

∴ Total sum = 32 × 200 = Rs. 6400

31. (c) : Suppose *Y*'s capital was used for *x* months. Following the above rule, we have, 

or, *x* = 

Therefore, *Y*'s capital was used for 7 months.

32. (a) : Let Vijay's joined after '*x*' months, then applying the given formula, we have 

∴ *x* = 4

33. (d) : 4 leaps of cat = 3 leaps of dog

⇒ 1 leap of cat =  leap of dog

Cat takes 5 leaps for every 4 leaps of dog

∴ Required ratio

= (5 × cat's leap) : (4 × dog's leap)

= 

= 15 : 16

34. (d) : Ratio of the amounts collected from 1st and 2nd classes fairs

= (3 × 1) : (1 × 50) = 3 : 50

∴ Amount collected from 2nd class passengers

= 

35. (c) : For triangle *A*,

3*x* + 4*x* + 5*x* = 180

⇒ 12*x* = 180

∴ 

∴ Largest angle = 5*x* = 5 × 15 = 75°

For triangle *B*,

5*y* + 6*y* + 7*y* = 180°

∴ 18*y* = 180°

∴ 

∴ The smallest angle = 5*y* = 5 × 10 = 50°

∴ Required difference = 75° − 50° = 25°

36. (b) : Number of employees of type



Wages of every employee of type



Required wages = Rs. (27 × 2000) = Rs. 54000

37. (c) : Let *x* gold coins were given to 1st queen. The number of gold coins given to 2nd queen = 

And number of gold coins given to 3rd queen = 

then, 

*x* = 105

Required number = 

38. (c) : Let their ages 5 years ago be 2*x*, 3*x*, 7*x* and 8*x*.

Their ages now 2*x* + 5, 3*x* + 5, 7*x* + 5, 8*x* + 5.

Or, 20*x* + 20 = 140

⇒ 20*x* = 120

⇒ *x* = 6

Present age of Nishu = 2 × 6 + 5 = 17 years

Present age of mother = 7 × 6 + 5 = 47 years

Hence, required years (47 − 17) years = 30 years

39. (c) : Let salary of Anil = Rs. *x*

Bhuvan's salary = 

Chandra's salary = 



⇒ 

Anil's salary= 450

Bhuvan's salary = 180

Chandra's salary = 140

40. (d) : Let his salary be Rs. *x*

Money spent on house rent = 

Money spent on food = 

Money spent on travel = 

Money spent = 

= 

Money left = 

Money spent on clothes = 

Money left = 

*i.e*., 

*x* = 1500 × 40 = 60000

Required amount = 5000

41. (d) : Let 5*x* and 3*x* be the number of males and females originally at the party.

Now, 

5*x* − 10 = 3*x*

⇒2*x* = 10

⇒ *x* = 5

Number of people originally at the party = 8*x* = 40

42. (a) : Number of deers, bears and foxes = 3*x* : 7*x* : 5*x*

Difference between the number of deers and bears = 4*x*

Now, 4*x* has to be a multiple of 21. So, *x* has to be a multiple of 21.

So, Total number of animals = 15*x* = 15 × 21 = 315

43. (d) : Let the weights of the three pieces be *x*, 3*x* and 6*x*.

Value (*V*) α Square of weight

*V* α *W*2 ⇒ 





⇒ loss of value

= 

= 

**Alternate Method:**

Value of the pieces broken = (1)2 + (3)2 + (6)2 = 46

Total value = (1 + 3 + 6)2 = 100.

Loss = 100 − 46 = 54.

Actual loss = 

44. (c) : Ratio of their profits = Ratio of their investments

= 4000 × 12 : 8000 × 9 : 12000 × 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 48 | : | 72 | : | 24 |
| 2 | : | 3 | : | 1 |

*Q*'s share = 

45. (d) : M : L : O = 5 : 7 : 3

Let Labour cost be 5*x*, Raw Material cost = 7*x*

Overheads = 3*x*, Total cost = 15*x*

Profits = 20% of 15*x* = 3*x*

= 

46. (a) : Iron percentage = 

Total grams required = 18

Serving required = serving in a day.

47. (c) : Let total expenses be *E*, *x* be the fixed part and *y* be the variable part.

∴ *E = x + y*

Since, the variable part varies with the number of km travelled in the month

∴ *y = kn*

Where *n* is the number of km travelled in a month and *k* is constant of proportionality.

∴ *E = x + kn*

According to the questions, we have

3400 = *x + k* × 150 ..... (1)

4000 = *x + k* × 200 ..... (2)

Subtracting equation (1) from (2) we have

600 = 50*k*

∴ *k* = 12

Put value of *k* in equation (1), we have

3400 = *x* + 12 × 150

∴ *x* = 2000

So, when Sumit travels 300 km then his expenses

= *x + k* × 300

= 1600 + 12 × 300 = 5200

48. (b) : Ram's 12 goats for 6 months = 12 × 6 *i.e.* 72 goats for 1 month.

Rahim's 10 goats for 5 months = 10 × 5 *i.e*. 50 goats for 1 month.

Mohan's 14 goats for 10 months = 14 × 10 *i.e*. 140 goats for 1 month.

Shyam's 9 goats for 7 months = 9 × 7 *i.e*. for 63 goats for 1 month.

Hence, Ratio of their shares = 72 : 50 : 140 : 63

Sum of ratios = 72 + 50 + 140 + 63 = 325

Hence,

Ram's share of rent = Rs. 72

Rahim's share of rent = Rs. 50

Mohan's share of rent = Rs. 140

Shyam's share of rent = Rs. 65

So, Amount paid as rent by Mohan and Shyam = 140 + 65 = 205.

49. (b) :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 1st Alloy | | 2nd Alloy | |
|  | Iron | Copper | Iron | Copper |
| Proportion of iron in the alloys |  | |  | |

So, in the new alloy total iron will be 38 kg and copper will be 11 kg.

 Iron = 8 + 30 = 38

and Copper = 14 + 35 − (8 + 30) = 11

∴ Ratio of copper to iron = 11 : 38

50. (b) : *P* + *G* = 340 ..... (1)

2*P* + 4*G* = 1060 ..... (2)

We get, *P* = 150 and G = 190

Alternate Method:

Go through options and consider option (b).

|  |  |  |
| --- | --- | --- |
|  | **Pigeons** | **Goats** |
| Heads (340) | 150 (×2) | 190 (×4) |
| Legs (1060) | 300 | 760 |

**Solutions Exercise – Difficult**

1. (d) : Given that *a*, *b*, *c* are in continued proportion

⇒ *b*2 = *ac* ..... (1)

Also *b*, *c*, *a* are in continued proportion

⇒ *c*2 = *ab* ..... (2)

From (1) and (2),

*b*2*c*2 = *a*2*bc* ⇒ *a*2 = *bc* ..... (3)

Conditions (1), (2) and (3) can only be satisfied when *a* = *b* = *c* = *k* (say).

∴ = 





2. (d) : Let the ages of the hare and tortoise be *h* and *t* respectively.

given *t* = 3 × (2*h*)

⇒ *t* = 6*h* ..... (1)

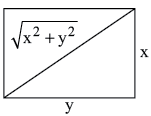
and *t* + (*t* − *h*) = 11*h*

⇒ 6*h* + 6*h* − *h* = 11*h* ..... (2) which follows form (1).

Hence we cannot find the present age of the hare and tortoise.

3. (d) : Total distance − Distance travelled = ;

Given, (*x* + *y*) − 



⇒ 

Now, using options we find that option (d) satisfies the above relationship 3 + 2 =  ⇒ 5 = 5.

***Solutions for questions 4 and 6:***

The best way to solve this sum is to work backwards. Let us assume that Alphonso’s total property was of Rs.*x*.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Who was on death bed?** |  | **Who gave what share to whom?** | | | | | |
|  | **Widow** | **Mother** | **Ben** | **Carl** | **Dave** | **Total Share** |
| Alphonso |  | - |  |  |  | *x* |
| Ben |  | - | - |  |  |  |
| Carl |  | - | - | - |  |  |
| Dave |  |  | - | - | - |  |

4. (d) : Since Alphonso’s wife is also the mother of Dave, the total share of this lady would be . And this share is equal to 1,575,000. So, *x* = 2400000 or 24 lakhs. This is the worth of the total property.

5. (d) : Carl’s original share was .

6. (b) : The ratio’s of the property’s owned by the widows of the 3 sons = .

7. (d) :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of electors** | **Number of Votes** | | | |
|  | **P** | **Q** | **R** | **S** |
| 120*x* (Total) out of which half is considered | 60*x* | 30*x* | 20*x* | 10*x* |
| From the remaining half we have | − | 30*x* | 20*x* | 10*x* |
| Again for 1/2 of the remaining electors | − | − | 15*x* | 15*x* |
| Total of the votes | 60*x* | 60*x* | 55*x* | 35*x* |

According to the question:

15*x* = 1680

∴ *x* = 112

Number of votes of *P* = 60 × 112 = 6720

Number of votes of *Q* = 60 × 112 = 6720

Number of votes of *R* = 55 × 112 = 6160

Number of votes of *S* = 35 × 112 = 3920

So, Number of votes or *R* = 6160

8. (b) : 

*D* = Distance,

*F* = Fuel,

*T* = Time,

*W* = No. of wagons.





⇒ *k* = 6

again 

⇒  = 20 ⇒ *F* = 400 litres

∴ Fuel used per km = 

9. (b) : Ratio of

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *W*1 | *M*1 | *W*2 | *M*2 | *W*3 | *M*3 |
| 1 : 3 | | 2 : 3 | | 2 : 5 | |

Proportion of water 

⇒ 

⇒ 

Now, since all these three mixtures are mixed in the ratio of 3 : 2 : 4.

Therefore, new ratio = 

= 

Now, the amount of water = 105 + 112 + 160 = 377

∴ The amount of milk = 420 + 280 + 560 − 377 = 883

∴ Ratio of milk to water = 883 : 377

10. (b) :

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **B** | | | |  | **A** | | |
| *x* | *y* | | 0 |  | 20% | 70% | 10% |
|  |  | |  |  |  |  |  |
| **Mixture** | | | | | | |  |
| 26% | | 68% | | | | 6% |

This 6% of K is obtained only from *A*.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ∴ **B** | | | |  |  | **A** | | |
| *N* | | *P* | *K* |  |  | *N* | *P* | *K* |
| *x* | | *y* | 0 |  |  | 120 | 420 | 60 |
| **Mixture** | | | | | | | |  |
|  | *N* | | | *P* | | *K* | |
|  | 260 | | | 680 | | 60 | |

*NA + NB = NM* ⇒ *NB* + 120 = 260

*N* = Nitrogen,

*P* = Phosphorus

and *PA + PB = PM* ⇒ *PB* + 420 = 680

∴ Amount of Nitrogen in *A* = 140

and amount of Phosphorus in *B* = 260

∴ Ratio of *N* : *P* = 7 : 13 ⇒ 35 : 65

***Solution for questions 11 and 12:***

Let *F* be the weight of free luggage,

*R* be the weight of Raja's luggage and

*P* be the weight of Praja's luggage

So, *F + F + R + P* = 60

⇒ 2*F + R + P* = 60 ..... (1)

Also, *F + R* = 1200

*F + P* = 2400

⇒ *R : P* = 1 : 2

Now, *F + R + P* = 5400 (if entire luggage belonged to one of them)

where, *R* = 1200

*P* = 2400

Value of *F* will be nil as it will not be charged.

Then, *F* comes out to be = 1800

So, the ratio will be = *R* : *F* : *P* = 2 : 3 : 4 ..... (2)

Putting these values in equation (1),

we get 2 × 3*x* + 2*x* + 4*x* = 60

*x* = 5

So, amount of free luggage = 3*x* = 15 kg

∴ Praja's total luggage = 15 + 20 = 35 kg

Raja's luggage = 2*x* = 10

Praja's luggage = 20 kg.

Raja's total luggage = 10 + 15 = 25

Praja's total luggage = 20 + 15 = 35

11. (d)

12. (b)

13. (d) : *a* = 6*b* = 12*c* and 2*b* = 9*d* = 12*e*.

Dividing the first equations by 12 and second by 36, we get



*i.e*. 

∴ 

∴ *a* : *b* : *c* : *d* : *e* = 108 : 18 : 9 : 4 : 3.

∴  is not an integer.

***Solutions for questions 14 and 15:***

From BA and MBA2, we get BA ≥ MBA2 because

*n*1 + *n*2 ≥ *n*1 .

From BA and MBA1, we get BA ≥ MBA1 because



Now from MBA1 and MBA2, we get



14. (d) : From the above information, BA ≥ MBA1 ≥ MBA2

None of these is the right answer.

15. (b) : BA = 50 where there is no incomplete innings means

*r*2 = *n*2 = 0 50 ⇒ 

MBA1 = 

= 

= 50 + 0 = 50

BA = 

MBA2 = 

Hence, BA will increase, MBA2 will decrease.

16. (c) : The vehicle travels 19.5 km/L at the rate of 50 km/hr.

So, it should travel  km/L at the rate of 70 km/hr = 15 km/L.

The distance covered at 70 km/hr with 10 L = 10 × 15 = 150 km

17. (c) : For Car :

The ratio of distances from *A* to *C* and *C* to *B* = 4 : 1

The ratio of average speeds from *A* to *C* and from *C* to *B* = 2 : 1

Let the distances be 4*x* and *x* and the average speeds be 2*y* and *y* from *A* to *C* and *C* to *B* respectively.

The time taken will be  for *A* to *C* and *C* to *B* respectively.

∴ Average speed = 

∴ 

∴ *y* = 27 km/hr

∴ The average speed from *C* to *B* is 27 km/hr by car.

For Train :

The ratio of distances from *A* to *C* and *C* to *B* = 1 : 4

The ratio of speeds from *A* to *C* and from *C* to *B* = 2 : 1

Let the distance be *x* and 4*x* and the average speeds be 2*y* and *y* from *A* to *C* and *C* to *B* respectively.

The time taken will be  respectively.

∴ Average speed = 

∴ 

∴ *y* = 40.5 km/hr

∴ The average speed from *C* to *B* is 40.5 km/hr by train.

∴ The difference between the average speeds of the train and car between *C* to *B* = 40.5 − 27 = 13.5 km/hr

***Solutions for questions 18 to 20:***

*A* ⇒ , *B* ⇒ < , *C* ⇒ < 

|  |  |  |  |
| --- | --- | --- | --- |
|  | **A** | **B** | **C** |
|  | 3 : | 2 : | 1 |
| 1st round (*B* lost) |  |  |  |
| 2nd round (*C* lost) |  |  |  |
| 3rd round (A lost) |  |  |  |
| 4th round (*B* lost) |  |  |  |



7*x* − 6*x* = 20

*x* = 20

18. (b) : Total sum of money they had = 3*x* + 2*x* + *x* = 6*x*

= 6 × 20 = 120

19. (b) : A would have been stopped after 2nd round itself.

20. (c) : *B* did not have any chance of making profit in any of the rounds.

21. (d) : Suppose *N* = 5*x* + 1

A took (*x* + 1) biscuit.

Now 4*x* is of the form 5*y* + 1 then x must be in the form 5*z* + 4

4(5*z* + 4) = 5*y* + 1

*y* = 4*z* + 3 and *x* = 5*z* + 4

The ratio of number of biscuits that *A* and *B* took is

[(5*z* + 4) + 1] : [(4*z* + 3) + 1] = 5 : 4

So, we can say that any two successive persons *A*, *B*, *C* and *D* take coins in the ratio of 5:4

Let the number of biscuits that *A*, *B*, *C* and *D* took be *a*, *b*, *c* and *d* respectively.

*a* : *b* = *b* : *c* = *c* : *d* = 5 : 4

*a* : *b* : *c* : *d*=125 : 100 : 80 : 64

*a* = 125*k*

*x* = 125*k* − 1 and *N* = 5*x* + 1 = 625*k* − 4

As, *N* > 1000, the least value of *N* is when *k* = 2

*N* = 12

22. (c) : Suppose *N* = 5*x* + 1

A took (*x* + 1) biscuit.

Now 4*x* is of the form 5*y* + 1 then x must be in the form 5*z* + 4

4(5*z* + 4) = 5*y* + 1

*y* = 4*z* + 3 and *x* = 5*z* + 4

The ratio of number of biscuits that *A* and *B* took is

[(5*z* + 4) + 1] : [(4*z* + 3) + 1] = 5 : 4

So, we can say that any two successive persons *A*, *B*, *C* and *D* take coins in the ratio of 5 : 4.

Let the number of biscuits that *A*, *B*, *C* and *D* took be *a*, *b*, *c* and *d* respectively.

*a* : *b* = *b* : *c* = *c* : *d* = 5 : 4

*a* : *b* : *c* : *d*=125 : 100 : 80 : 64

*a* = 125*k*

*x* = 125*k* − 1 and *N* = 5*x* + 1 = 625*k* − 4

As, *N* > 1000, then *k* = 1

*N* = 621

621 = (5 × 124) + 3

4 × 124 = (5 × 99) + 1

4 × 99 = (5 × 79) + 1

4 × 79 = (5 × 63) + 1

After the fourth man took his share (5 × 63 + 1), the biscuits lefts is 4 × 63 = 252

23. (b) : Suppose *N* = 5*x* + 1

A took (*x* + 1) biscuit.

Now 4*x* is of the form 5*y* + 1 then x must be in the form 5*z* + 4

4(5*z* + 4) = 5*y* + 1

*y* = 4*z* + 3 and *x* = 5*z* + 4

The ratio of number of biscuits that *A* and *B* took is

[(5*z* + 4) + 1] : [(4*z* + 3) + 1] = 5 : 4

So, we can say that any two successive persons *A*, *B*, *C* and *D* take coins in the ratio of 5 : 4.

Let the number of biscuits that *A*, *B*, *C* and *D* took be *a*, *b*, *c* and *d* respectively.

*a* : *b* = *b* : *c* = *c* : *d* = 5 : 4

*a* : *b* : *c* : *d*=125 : 100 : 80 : 64

*a* = 125*k*

*x* = 125*k* − 1 and *N* = 5*x* + 1 = 625*k* − 4

As, *N* > 1000, then *k* = 1

*N* = 621

621 = (5 × 124) + 3

4 × 124 = (5 × 99) + 1

4 × 99 = (5 × 79) + 1

4 × 79 = (5 × 63) + 1

The number of biscuits hidden by 3rd and the 4th men is 79 + 1 = 80 and 63 + 1 = 64 *i.e*. *A* total of 144.

24. (b) : Let the stones with Ram, Rajeev and Rahul be *m*, *r* and *b* respectively.

Given,

5*r* = 7*m* and 5*m* = 7*b*

25*r* = 35*m* and 35*m* = 49*b*

25*r* = 35*m* = 49*b* = *k*

*r*49 = *m*35 = *b*25

The least possible integral values for *r*, *m*, *b* will be

*r* = 49, *m* = 35 and *b* = 25

Total = 49 + 35 + 25 = 109.

25. (b) : Let 1 : *k* be the ratio in which Rajesh mixed the two types of rice.

Then a sample of (1 + *k*) ounces of the mixture should equal 1 ounce of rice of the first type, and *k* ounces of rice of the second type.

The rice of the first type costs 5 cents an ounce and that of the second type costs 6 cents an ounce. Hence, it cost him:

(1 ounce 5 cents per ounce) + (k ounces 6 cents per ounce) = 5 + 6*k*

Since he sold the mixture at 7 cents per ounce, he must have sold the net 1 + *k* ounces of the mixture at 7(1 + *k*).

Since he earned 20% profit doing this, 7(1 + *k*) must be 20% more than 5 + 6*k*.

Hence, we have the equation

7(1 + *k*) = (1+ 20100)(5 + 6*k*)

7 + 7*k* = (120100)(5 + 6*k*)

7 + 7*k* = (65)(5 + 6*k*)

7 + 7*k* = (65) 5 + (65) 6*k*

7 + 7*k* = 6 + 36*k*5

1 = *k*5

*k* = 5

Hence, the required ratio is 1 : *k* = 1 : 5