MISCELLANEOUS EXERCISE – 3

Q. 1 Multiple Choice Questions

Four possible answers are given for the following questions. Tick (✓) the correct answer.

1. If $u \propto v^2$, then

(a) $u \propto v^2$ (b) $u = kv^2$

(c) $uv^2 = k$ (d) $uv^2 = 1$

2. The third proportional of x^2 and y^2 is

(a) $\frac{y^2}{x^2}$ (b) x^2y^2

(c) $\frac{y^4}{x^2}$ (d) $\frac{y^2}{x^4}$

3. The fourth proportional w of x:y::v:w is……..

(a) $\frac{xy}{v}$ (b) $\frac{vy}{x}$

(c) xyv (d) $\frac{x}{vy}$

4. If a: b=x: y, then alternando property is

(a) $\frac{a}{x} = \frac{b}{y}$ (b) $\frac{a}{b} = \frac{x}{y}$

(c) $\frac{a+b}{b} = \frac{x+y}{y}$ (d) $\frac{a-b}{x} = \frac{x-y}{y}$

5. In continued proportion a: b = b: c, $ac = b^2$, b is said to be ___ proportional.

(a) third (b) fourth

(c) means (d) none of these

6. In continued proportion a: b = b: c, c is said to be __ proportional to a and b.

(a) third (b) fourth

(c) means (d) None of these

7. If a : b = x : y, then invertendo property is

(a) $\frac{a}{x} = \frac{b}{y}$ (b) $\frac{a}{a-b} = \frac{x}{x-y}$

(c) $\frac{a+b}{b} = \frac{x+y}{y}$ (d) $\frac{b}{a} = \frac{y}{x}$

8. In a ratio a: b, a is called

(a) relation (b) antecedent

(c) consequent (d) None of these

9. If $\frac{a}{b}=\frac{c}{d}$, then componendo property is

(a) $\frac{a}{a+b}=\frac{c}{c+d}$ (b) $\frac{a}{a-b}=\frac{c}{c-d}$

(c) $\frac{ad}{bc}$ (d) $\frac{a-b}{b}=\frac{c-d}{d}$

10. If $\frac{24}{7}=\frac{6}{x}$, then 4x = ...

(a) 7 (b) $\frac{7}{4}$

(c) 4 (d) $\frac{42}{24}$

11. In a ratio x: y, y is called

(a) relation (b) antecedent

(c) consequent (d) None of these

12. In a proportion a: b:: c: d, a and d are called

(a) means

(b) extremes

(c) forth proportional

(d) None of these

13. In a proportion a:b::c: d, b and c are called

(a) means

(b) extremes

(c) fourth proportional

(d) None of these

14. Find x in proportion 4:x::5:15

(a) $\frac{75}{4}$ (b) $\frac{4}{3}$

(c) $\frac{3}{4}$ (d) 12

15. If $y^2 \propto \frac{1}{x^3}$, then

(a) $y^2=\frac{k}{x^3}$ (b) $y^2=\frac{1}{x^3}$

(c) $y^2=x^2$ (d) $y^2=kx^3$

16. If w varies inversely as p^2, then k = ...

(a) $\frac{w}{P^2}$ (b) wp^2

(c) $\frac{P^2}{w}$ (d) wp

17. If 6: m:: 9: 12, then m = ...

(a) 6 (b) 9

(c) 1 (d) 8

18. If x and y varies directly, then x = ...

(a) y (b) ky

(c) $\frac{k}{y}$ (d) k

19. If $\frac{u}{v}=\frac{v}{w}=k$, then

(a) $u=wk^2$ (b) $u=vk^2$

(c) $u=w^2k$ (d) $u=v^2k$

20. If $\frac{5a}{3x}=\frac{15b}{y}$, then ay = ...

(a) $\frac{9bx}{y}$ (b) $\frac{9y}{9b}$

(c) 5ay = 45bx (d) 9bx

21. Fourth proportional of 5, 8, 15 is .....

(a) 120 (b) 40

(c) 24 (d) 20

22. Newton's law of Gravitation is an example of

(a) variation

(b) direct variation

(c) inverse variation

(d) joint variation

23. The relation between radius and circumference of a circle is an example of .....

(a) variation

(b) direct variation

(c) inverse variation

(d) joint variation

24. If v varies directly as u^3, then u^3 = ...

(a) vk (b) $\frac{k}{v}$

(c) $\frac{v}{k}$ (d) vk^3

25. The simplest form of the ratio $\frac{(x+y)(x^2+xy+y^2)}{x^3-y^3}$ is.....

(a) $\frac{x-y}{x+y}$ (b) $\frac{x+y}{x-y}$

(c) 1 (d) 2

26. A third proportional of 12 and 4, is.....

(a) $\frac{3}{4}$ (b) $\frac{4}{3}$

(c) 12 (d) 16

27. What is the value of p in the continued proportion of 5, p, 45?

(a) 225 (b) ± 50

(c) ± 15 (d) ± 9

28. Fourth proportional of $4x^4$, $2x^3$, $18x^5$ is .....

(a) $36x^8$ (b) $9x^2$

(c) $9x^{12}$ (d) $9x^4$

29. Mean Proportional of 20 and 45 is ...

(a) ± 30 (b) ± 25

(c) ± 20 (d) ± 15

30. The mean proportional of $9p^6q^4$ and r^8 is.....

(a) $\pm 3p^3q^2r^4$ (b) $\pm 9p^6q^2r^8$

(c) $\pm 9p^3q^2r^4$ (d) $\pm 3p^6q^4q^8$

31. There are ..... types of variation.

(a) one (b) two

(c) three (d) four

32. In proportion 7:4::p:8, p =.....

(a) 1 (b) 28

(c) 14 (d) 56

33. The mean proportional of $4m^2n^4$ and p^6 is.....

(a) $\pm 2mnp$ (b) $\pm mnp$

(c) $\pm\frac{2m^2n}{P^3}$ (d) $\pm 2mn^2p^3$

34. The continued proportion of 4, m, 9 is.....

(a) 4 : m : : m : 9

(b) 4 : 9 : : 9 : m

(c) 9 : 4 : : 4 : m

(d) 9 : 4 : : m : m

35. What is the value of P in continued proportion of 12, p, 3?

(a) ± 4 (b) ± 6

(c) ± 30 (d) ± 2

36. The fourth proportional of 15, 6, 5 is ...

(a) 30 (b) 15

(c) 2 (d) 1

37. What is the value of x in the continued proportion of 8, x, 18?

(a) ± 144 (b) ± 8

(c) ± 18 (d) ± 12

38. If $\frac{9pq}{2\ell m} = \frac{18p}{5m}$, then 5q = ...

(a) 4m (b) 4p

(c) 4ℓ (d) 4q

39. Third proportional of 6, 12 is .....

(a) 24 (b) 2

(c) 18 (d) 84

40. Mean proportional of $20x^3y^5$, $5x^7y$

(a) $\pm 10x^5y^6$ (b) $\pm 10x^5y^3$

(c) $\pm 10x^{10}y^6$ (d) $100x^{10}y^6$

41. Third proportional of a^3, $3a^2$ is .....

(a) $3a^5$ (b) 9a

(c) $9a^4$ (d) $9a^7$

ANSWER KEY

1.	b	2.	c	3.	b	4.	a	5.	c
6.	a	7.	d	8.	b	9.	a	10.	a
11.	c	12.	b	13.	a	14.	d	15.	a
16.	b	17.	d	18.	b	19.	a	20.	d
21.	c	22.	d	23.	b	24.	c	25.	b
26.	b	27.	c	28.	d	29.	a	30.	a
31.	b	32.	c	33.	d	34.	a	35.	b
36.	c	37.	d	38.	c	39.	a	40.	b
41.	b								

Q.2: Write short answer of the following questions:

(i) Define ratio and give one example.

Answer: A relation between two quantities of the same kind is called ratio and ratio has no unit. If 'a' and 'b' are two quantities of the same kind and b is not zero, then their ratio is defined as a : b or $\frac{a}{b}$ or a ÷ b.

Example: If a hockey team wins 4 matches and losses 5, then ratio of the games won to the games lost is 4 : 5 or in fraction $\frac{4}{5}$.

(ii) Define proportion.

Proportion:

A proportion is a statement, which is expressed as an equivalence of two ratios.

If two ratios a : b and c : d are equal, then we can write a : b = c : d

Symbolically the proportion of a, b, c and d is written as

a : b : : c : d

(iii) Define direct variation.

Direct variation:

If two quantities are related in such a way that increase (decrease) in one quantity causes increase (decrease) in the other quantity in the same ratio, then this variation is called direct variation.

If a quantity y varies directly with regard to a quantity x, we say that y is directly proportional to x and is written as

$y \propto x$ or $y = kx$ where $k \neq 0$.

(iv) Define inverse variation.

Inverse Variation:

If two quantities are related in such a way that when one quantity increases, the other decreases in the same ratio is called inverse variation.

If a quantity y varies inversely with regard to quantity x, we say that y is inversely proportional to x or y varies inversely as x and is written as

$$y \propto \frac{1}{x} \quad \text{or} \quad y = \frac{k}{x}$$

i.e $xy = k$, where $k \neq 0$ is the constant of variation.

(v) State theorem of componedndo–dividendo.

Theorem of componendo–dividendo

If a : b = c : d, then componendo–dividendo theorem is written as:

(i) a + b : a – b = c + d : c – d

(ii) a – b : a + b = c – d : c + d

(vi) Find x, if 6:x:: 3: 5.

Solution:

6 : x : : 3 : 5

Product of Means = Product of Extremes:

$3(x) = 6 \times 5$

$3x = 30$

$$x = \frac{30}{3}$$

$$\boxed{x = 10}$$

(vii) If x and y^2 varies directly, and x = 27 when y = 4. Find the value of y when x=3.

Solution:

$\boxed{x \propto y^2}$ $\boxed{\begin{matrix} x = 27 \\ y = 4 \end{matrix}}$ $\boxed{\begin{matrix} y = ? \\ x = 3 \end{matrix}}$

$y^2 \propto x$

$y^2 = kx$ .....(i)

To find K,

Put x = 27 and y = 4 in equation (i)

$(4)^2 = k(27)$

$$\frac{16}{27} = k \quad \Rightarrow \quad \boxed{k = \frac{16}{27}}$$

To find y,

Put $k = \frac{16}{27}$ and x = 3 in equation (i)

$y^2 = kx$

$$y^2 = \frac{16}{27} \times 3$$

$$y^2 = \frac{16}{9}$$

$$\sqrt{y^2} = \pm\sqrt{\frac{16}{9}} \quad \Rightarrow \boxed{y = \pm\frac{4}{3}}$$

(viii) If u and v varies invarsely, and u = 8, when v = 3, find v when u = 12.

Solution:

$\boxed{v \propto \frac{1}{u}}$ $\boxed{\begin{matrix} u = 8 \\ v = 3 \end{matrix}}$ $\boxed{\begin{matrix} v = ? \\ u = 12 \end{matrix}}$

$$v \propto \frac{1}{u}$$

$$v = \frac{k}{u} \quad \text{.....(i)}$$

To find k,

Put u = 8 and v = 3 in equation (i)

$$3 = \frac{k}{8}$$

$$3 \times 8 = k$$

$$24 = k$$

$\Rightarrow \quad \boxed{k = 24}$

To find y,

Put k = 24 and u = 12 in equation (i)

$$v = \frac{k}{u}$$

$$v = \frac{24}{12}$$

$$\boxed{v = 2}$$

(ix) Find a fourth proportional to 8, 7, 6.

Solution:

Let 4th proportional is x.

then 8, 7, 6, x

By Proportion

$$8 : 7 :: 6 : x$$

Product of Extremes = Product of Means:

$$8\,(x) = 7 \times 6$$

$$x = \frac{42}{8}$$

$$\boxed{x = \frac{21}{4}}$$

(x) Find a mean proportional to 16 and 49.

Solution:

Let mean proportional is m,

Then 16, m, 49

By proportion

$$16 : m :: m : 49$$

Product of Means = Product of Extremes:

$$m.\ m = 16 \times 49$$

$$m^2 = 4^2 \times 7^2$$

$$m^2 = (4 \times 7)^2$$

$$m^2 = (28)^2$$

Taking square root

$$\sqrt{m^2} = \pm\sqrt{(28)^2}$$

$$\boxed{m = \pm 28}$$

(xi) Find third proportional to 28 and 4.

Solution:

Let 3rd proportional is x

Then 28, 4, x

By Proportion

$$28 : 4 :: 4 : x$$

Product of Extremes = Product of Means.

$$28\,(x) = 4 \times 4$$

$$x = \frac{16}{28}$$

$$\boxed{x = \frac{4}{7}}$$

(xii) If $y \propto \frac{x^2}{z}$ and y = 28 when x = 7, z = 2, then find y.

Solution:

$\boxed{x \propto \frac{x^2}{z}}$ $\boxed{\begin{matrix} y = 28 \\ x = 7 \\ z = 2 \end{matrix}}$ $\boxed{y = ?}$

$$y \propto \frac{x^2}{z}$$

$$y = \frac{kx^2}{z} \quad \text{.....(i)}$$

To find k,

Put y = 28, x = 7 and z = 2 in equation (i)

$$28 = \frac{k(7)^2}{2}$$

$$28 \times 2 = k\,(49)$$

$$\frac{56}{49} = k$$

$$k = \frac{\cancel{56}\ 8}{\cancel{49}\ 7}$$

$$\boxed{k = \frac{8}{7}}$$

To find y,

Put $k = \frac{8}{7}$ in equation (i)

$$y = k\frac{x^2}{z}$$

$$y = \frac{8}{7}\frac{x^2}{z}$$

(xiii) **If $z \propto xy$ and z = 36, when x = 2, y = 3, then find z.**

Solution:

$\boxed{z \propto xy}$ $\boxed{z = 36,\ x = 2,\ y = 3}$ $\boxed{z = ?}$

$$z \propto xy$$

$$z = kxy \ldots\ldots\ldots\ldots\ldots \text{(i)}$$

To find k,

put z = 36; x = 2 and y = 3 in equation (i)

$$36 = k\,(2)\,(3)$$

$$36 = k\,(6)$$

$$\frac{36}{6} = k$$

$$6 = k$$

$\Rightarrow$ $\boxed{k = 6}$

To find z,

Put k = 6 in equation (i)

$$z = k\,xy$$

$$\boxed{z = 6xy}$$

(xiv) **If $w \propto \frac{1}{v^2}$ and w = 2 when v = 3 then find w.**

Solution:

$\boxed{w \propto \frac{1}{v^2}}$ $\boxed{\begin{matrix} w = 2 \\ v = 3 \end{matrix}}$ $\boxed{w = ?}$

$$w \propto \frac{1}{v^2}$$

$$w = \frac{k}{v^2} \ldots\ldots\ldots\ldots\ldots\ldots \text{(i)}$$

To find K,

Put w = 2 and v = 3 in equation (i)

$$2 = \frac{k}{(3)^2}$$

$$2 = \frac{k}{9}$$

$$2 \times 9 = k$$

$$18 = k$$

$\Rightarrow$ $\boxed{k = 18}$

To find w,

Put k = 18 in equation (i)

$$w = \frac{k}{v^2}$$

$$w = \frac{18}{v^2}$$

Fill in the blanks

1. The simplest form of the ratio $\frac{(x+y)(x^2+xy+y^2)}{x^3-y^3}$ is_____.
2. In a ratio x: y; x is called _____.
3. In a ratio a: b , b is called_____.
4. In a proportion a : b:: x:y, a and y are called_____.
5. In a proportion p : q :: m : n ; q and m are called_____.
6. In proportion 7:4::p:8, p =____.
7. If 6: m:: 9: 12, then m = _____.
8. If x and y varies directly, the x = ____.
9. If v varies directly as u^3, then u^3 = _____.
10. If w varies inversely as p^2, then k = _____.
11. A third proportional of 12 and 4, is_____.
12. The fourth proportional of 15, 6, 5 is ____.
13. The mean proportional of $4m^2n^4$ and p^6 is_____.
14. The continued proportion of 4, m and 9 is_____.

ANSWER KEY

1	$\frac{x+y}{x-y}$	**2**	Antecedent	**3**	Consequent
4	Extremes	**5**	Means	**6**	P = 14
7	m = 8	**8**	ky	**9**	$\frac{v}{k}$
10	p^2w	**11**	$\frac{4}{3}$	**12**	2
13	$\pm 2mn^2\ p^3$	**14**	m = ± 6		