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Solutions of

UNIT#18

Review Exercise

Class 10 Math Sindh Board

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📝 Review Exercise 18 - Complete Solutions

1. Multiple Choice Questions (MCQs)

1. (i) In a proportion $p : q :: r : s$, p is called

(a) third proportional (b) mean (c) fourth proportional (d) **first proportional** (e) none of these

1. (ii) In a ratio $u : v$, v is called

(a) **consequent** (b) antecedent (c) relation (d) none of these

1. (iii) In a ratio $u : v$, u is called

(a) **antecedent** (b) consequent (c) relation (d) none of these

1. (iv) If $a : b :: b : c$ are in continued proportion then b is called _____ proportion between a & c.

(a) 1st (b) **mean** (c) 3rd (d) None of these

1. (v) The mean proportional between a^2 and b^2 is

(a) $\sqrt{ab}$ (b) ab (c) **ab** (d) $-ab$

1. (vi) If $x + 5 : x + 7 :: 5 : 7$ then x is equal to

(a) 2 (b) -1 (c) 0 (d) 1

1. (vii) If $1, 9, x$ and 45 are in proportion, then $x =$

(a) 27 (b) 5 (c) 405 (d) $\frac{1}{5}$

1. (viii) If $p : q :: r : s$ then $p + r : q + s$ this property is called

(a) componendo (b) invertendo (c) dividendo (d) **alternando**

1. (ix) If $x : y :: z : w$ then according to componendo

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

1. (x) If $a : b :: c : d$ then according to alternando property

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

1. (xi) The fourth proportional to $3, 5, 12$ is

(a) 20 (b) 15 (c) 60 (d) 36

1. (xii) If $2x, 3y$ and $6z$ are in continued proportion then

(a) $y^2 = 12xz$ (b) $9y^2 = xz$ (c) $9y^2 = 12xz$ (d) $3y^2 = 4xz$

1. (xiii) If $\frac{x}{y} = \frac{w}{z}$ then according to dividendo property is

(a) $\frac{x-y}{y} = \frac{w-z}{z}$ (b) $\frac{x-y}{y} = \frac{w+z}{z}$ (c) $\frac{x+y}{y} = \frac{w+z}{z}$ (d) None of these

1. (xiv) Force and acceleration are in

(a) **direct proportion** (b) joint proportion (c) inverse proportion (d) None of these

1. (xv) If $a : 4 :: 15 : 5$ then $a =$

(a) 20 (b) 15 (c) 12 (d) 10

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2. Find the ratios of the following

(i) 100 m **and** 500 cm

Convert 100 m to cm: 100×100 cm $= 10000$ cm.

$$\text{Ratio} = \frac{10000}{500} = \frac{20}{1}$$

$$\text{Ratio} = \mathbf{20 : 1}$$

(ii) 50 kg **and** 300 g

Convert 50 kg to g: 50×1000 g $= 50000$ g.

$$\text{Ratio} = \frac{50000}{300} = \frac{500}{3}$$

$$\text{Ratio} = \mathbf{500 : 3}$$

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3. Find the value of x in the following

(i) $5x - 3 : x + 11 :: 3 : 4$

$$\frac{5x - 3}{x + 11} = \frac{3}{4}$$

$$4(5x - 3) = 3(x + 11)$$

$$20x - 12 = 3x + 33$$

$$17x = 45$$

$$\mathbf{x = \frac{45}{17}}$$

(ii) $9 : x - 10 :: x + 13 : 12$

$$\frac{9}{x - 10} = \frac{x + 13}{12}$$

$$108 = (x - 10)(x + 13)$$

$$108 = x^2 + 3x - 130$$

$$x^2 + 3x - 238 = 0$$

$$(x + 17)(x - 14) = 0$$

$$\textbf{x = 14} \quad \text{or} \quad \textbf{x = −17}$$

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4. If y varies directly as x and $y = 25$ when $x = 5$ then find y when $x = 44$.

1. **Variation:** $y = kx$
2. **Find k:** $25 = k(5) \implies k = 5$
3. **Find y:** $y = 5(44)$

$$\textbf{y = 220}$$

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5. If y varies inversely as x and $y = 100$ when $x = \frac{1}{2}$ then find y when $x = 4$.

1. **Variation:** $y = \frac{k}{x}$
2. **Find k:** $100 = \frac{k}{1/2} \implies k = 50$
3. **Find y:** $y = \frac{50}{4}$

$$\textbf{y = 12.5} \quad \text{or} \quad \frac{\textbf{25}}{\textbf{2}}$$

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6. If $x : y :: z : w$ then prove that $\frac{7x-5y}{7x+5y} = \frac{7z-5w}{7z+5w}$.

Given $\frac{x}{y} = \frac{z}{w}$. Multiply both sides by $\frac{7}{5}$:

$$\frac{7x}{5y} = \frac{7z}{5w}$$

Applying the **Componendo and Dividendo** theorem:

$$\frac{7x - 5y}{7x + 5y} = \frac{7z - 5w}{7z + 5w}$$

Proven.

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7. Solve $\frac{(x-3)(x-5)}{(x-7)(x-2)} = \frac{(x-6)(x-2)}{(x-1)(x-8)}$ **by componendo – dividendo theorem.**

First, apply the **Alternando** property to rearrange the terms:

$$\frac{(x - 3)(x - 5)}{(x - 6)(x - 2)} = \frac{(x - 7)(x - 2)}{(x - 1)(x - 8)}$$

Expand the factors:

$$\frac{x^2 - 8x + 15}{x^2 - 8x + 12} = \frac{x^2 - 9x + 14}{x^2 - 9x + 8}$$

Let $A = x^2 - 8x$ and $B = x^2 - 9x$.

$$\frac{A + 15}{A + 12} = \frac{B + 14}{B + 8}$$

Apply **Dividendo** ($\frac{M}{N} \implies \frac{M-N}{N}$) to both sides:

$$\frac{(A + 15) - (A + 12)}{A + 12} = \frac{(B + 14) - (B + 8)}{B + 8}$$

$$\frac{3}{A + 12} = \frac{6}{B + 8}$$

Simplify: $B + 8 = 2(A + 12)$

$$x^2 - 9x + 8 = 2(x^2 - 8x + 12)$$

$$x^2 - 9x + 8 = 2x^2 - 16x + 24$$

$$0 = x^2 - 7x + 16$$

The discriminant is $D = (-7)^2 - 4(1)(16) = 49 - 64 = -15$. Since the discriminant is negative, there are **no real solutions**.

$$\text{No real solution.}$$

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8. If x varies directly as y and inversely as z. If $x = 30$ when $y = 15$ and $z = 2$. Find x if $y = 20$ when $z = 12$.

1. **Variation:** $x = k\frac{y}{z}$
2. **Find k:** $30 = k\frac{15}{2} \implies 60 = 15k \implies k = 4$
3. **Find x:** $x = 4\frac{20}{12} = \frac{80}{12}$

$$\mathbf{x} = \frac{\mathbf{20}}{\mathbf{3}}$$

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9. The current in a circuit varies inversely with its resistance measured in ohms. When the current in a circuit is 40 ampere, the resistance in 10 ohms. Find the current if the resistance is 100 ohms.

1. **Variation:** $I = \frac{k}{R}$ (This is an application of **Ohm's Law**.)

2. **Find k:** $40 = \frac{k}{10} \implies k = 400$

3. **Find I:** $I = \frac{400}{100}$

$$\mathbf{I} = \mathbf{4}\ \text{amperes}$$