CDS-AFCAT 1 2025

SSBCrack EXAMS

LIVE

MATHS

RATIO & PROPORTION

CLASS 2

NAVJYOTI SIR

SSBCrack EXAMS

15 Oct 2024 Live Classes Schedule

8:00AM	15 OCTOBER 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	15 OCTOBER 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

9:30AM	OVERVIEW ON GROUP TASKS	ANURADHA MA'AM

NDA 1 2025 LIVE CLASSES

11:30AM	GK - POLITY - DPSP & FUNDAMENTAL DUTIES	RUBY MA'AM
1:00PM	BIOLOGY - MCQ - CLASS 6	SHIVANGI MA'AM
4:00PM	MATHS - TRIGONOMETRY - CLASS 5	NAVJYOTI SIR
5:30PM	ENGLISH - SYNONYMS - CLASS 3	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	GK - POLITY - DPSP & FUNDAMENTAL DUTIES	RUBY MA'AM
1:00PM	BIOLOGY - MCQ - CLASS 6	SHIVANGI MA'AM
5:30PM	ENGLISH - SYNONYMS - CLASS 3	ANURADHA MA'AM
7:00PM	MATHS - RATIO & PROPORTION - CLASS 2	NAVJYOTI SIR

AFCAT 1 2025 LIVE CLASSES

4:00PM	STATIC GK - WORLD HERITAGE SITES IN INDIA	DIVYANSHU SIR
5:30PM	ENGLISH - SYNONYMS - CLASS 3	ANURADHA MA'AM
7:00PM	MATHS - RATIO & PROPORTION - CLASS 2	NAVJYOTI SIR

PROPORTION – DIRECT AND INDIRECT

Direct : x and y — x increases with y. ($x \uparrow$ and $y \uparrow$)

$x \propto y$

$x = ky$ (where k is a constant)

Indirect : (Inverse)

$x \propto \frac{1}{y}$ (y increases but x decreases)

$y \uparrow \Rightarrow x \downarrow$

$x = \frac{k}{y}$

Q.) If $x \propto y$, $y \propto \frac{1}{z}$ and $z \propto u$, then how is x related to u?

$x \propto y \Rightarrow x = k_1 y$

$y \propto \frac{1}{z} \Rightarrow y = \frac{k_2}{z}$

$z \propto u \Rightarrow z = k_3 u$

$\frac{y}{k_2} = k_3 u$

$\frac{\left(\frac{x}{k_1}\right)}{k_2} = k_3 u$

$\frac{x}{k_1} = k_2 k_3 u$

$x = k_1 k_2 k_3 u$

$x = ku \Rightarrow x \propto u$

Q) If a quantity y varies as the sum of three quantities of which the first varies as x, the second varies as $-x + x^2$, the third varies as $x^3 - x^2$, then what is y equal to?

(a) kx^3, where k is a constant

(b) $kx + lx^2 + mx^3$, where k, l, m are constants

(c) kx^2, where k is a constant

(d) kx, where k is a constant

$y \propto a+b+c$

$a \propto x$

$b \propto -x+x^2$

$c \propto x^3-x^2$

$y = k_1 x + k_2(-x+x^2) + k_3(x^3-x^2)$

$= (k_1-k_2)x + (k_2-k_3)x^2 + k_3 x^3$

$= kx + lx^2 + mx^3$

$k = k_1-k_2 \; ; \; l = k_2-k_3 \; ; \; m = k_3$

Q) If a quantity y varies as the sum of three quantities of which the first varies as x, the second varies as $-x + x^2$, the third varies as $x^3 - x^2$, then what is y equal to?

(a) kx^3, where k is a constant

(b) $kx + lx^2 + mx^3$, where k, l, m are constants

(c) kx^2, where k is a constant

(d) kx, where k is a constant

Ans: (b)

directly proportional

Q) The resistance of a wire is proportional to its length and inversely proportional to the square of its radius. Two wires of the same material have the same resistance and their radii are in the ratio 9 : 8. If the length of the first wire is 162 cms., find the length of the other.

(a) 64 cm (b) 120 cm

(c) 128 cm (d) 132 cm

$\left(\frac{r_1}{r_2} = \frac{9}{8}\right)$

$R \propto l$

$R \propto \frac{1}{r^2}$

$R \propto \frac{l}{r^2}$ (product)

$R = \frac{kl}{r^2}$ (k - Constant)

same

$R_1 = \frac{kl_1}{r_1^2}$; $R_2 = \frac{kl_2}{r_2^2}$

$\frac{R_1}{R_2} = \frac{\left(\frac{kl_1}{r_1^2}\right)}{\left(\frac{kl_2}{r_2^2}\right)}$

$1 = \frac{162}{l_2} \times \left(\frac{r_2}{r_1}\right)^2$

$l_2 = 162 \times \left(\frac{8}{9}\right)^2 = \frac{162 \times 64}{81}$

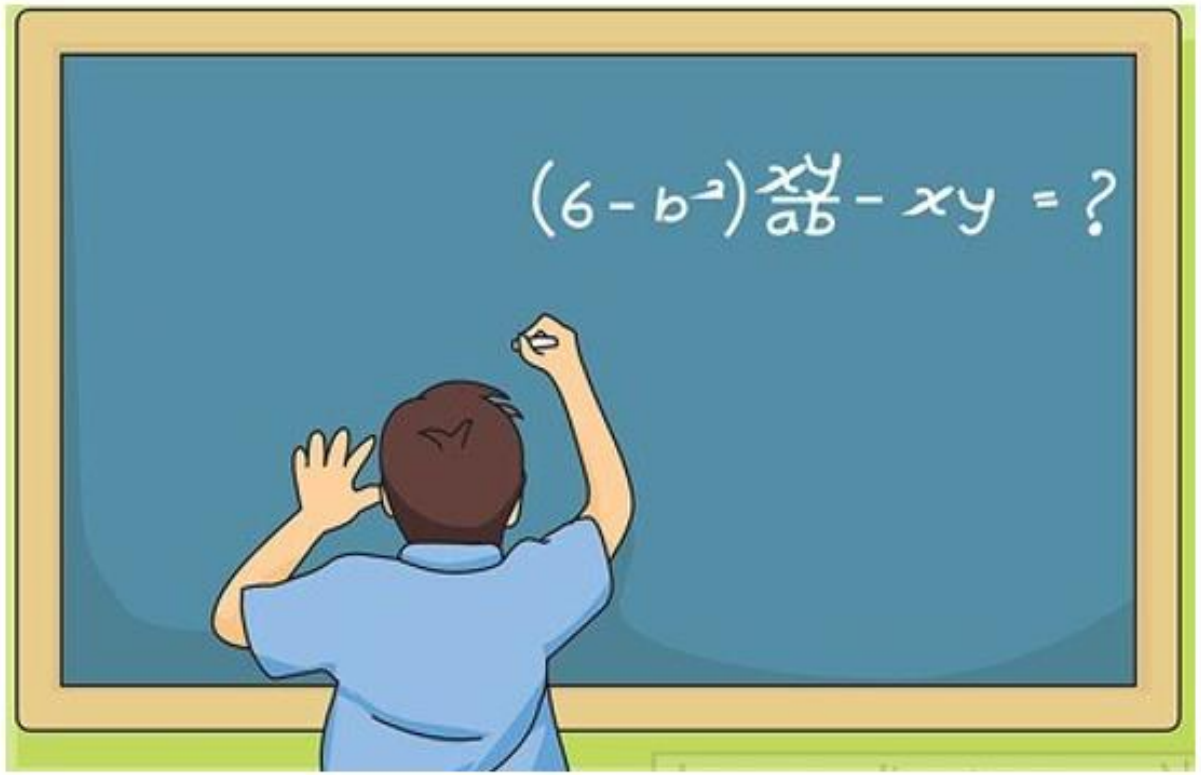
$= 128$ cm

Q) The resistance of a wire is proportional to its length and inversely proportional to the square of its radius. Two wires of the same material have the same resistance and their radii are in the ratio 9 : 8. If the length of the first wire is 162 cms., find the length of the other.

(a) 64 cm
(b) 120 cm
(c) 128 cm
(d) 132 cm

Ans: (c)

PRACTISE
TIME !



Q) When x is added to each of 2, 3, 30 and 35, then the numbers obtained in this order, are in proportion. What is the mean proportional between $(x+7)$ and $(x-2)$?

(a) 7 (b) 4 (c) 6 (d) 5

$$\frac{2+x}{3+x} = \frac{30+x}{35+x}$$

$$37x + 70 = 90 + 33x$$

$$4x = 20$$

$$x = 5$$

Mean proportional $= \sqrt{(5+7)(5-2)}$

$= \sqrt{12 \times 3}$

$= 6$

Q) When x is added to each of 2, 3, 30 and 35, then the numbers obtained in this order, are in proportion. What is the mean proportional between $(x+7)$ and $(x-2)$?

(a) 7 (b) 4 (c) 6 (d) 5

Ans: (c)

Q) In a school there were 1554 students and the ratio of the number of the boys and girls was 4 : 3. After few days, 30 girls joined the school but few boys left; as a result the ratio of the boys and girls became 7 : 6. The number of boys who left the school is

(a) 84 (b) 76 (c) 86 (d) 74

$$B = \frac{4}{7} \times 1554 = 888$$

$$G = \frac{3}{7} \times 1554 = 666$$

$$\frac{888 - x}{666 + 30} = \frac{7}{6}$$

$$\frac{888 - x}{696} = \frac{7}{6}$$

$$5328 - 6x = 4872$$

$$x = \frac{456}{6} = 76$$

Q) In a school there were 1554 students and the ratio of the number of the boys and girls was 4 : 3. After few days, 30 girls joined the school but few boys left; as a result the ratio of the boys and girls became 7 : 6. The number of boys who left the school is

(a) 84 (b) 76 (c) 86 (d) 74

Ans: (b)

Q) *A* and *B* have their monthly incomes in the ratio 8 : 5, while their monthly expenditures are in the ratio 5 : 3. If they have saved ₹ 12,000 and ₹ 10,000 monthly respectively, then the difference in their monthly income is

(a) ₹ 42,000 (b) ₹ 44,000
(c) ₹ 46,000 (d) ₹ 52,000

$8x - 5y = 12000$ —— ×3

$5x - 3y = 10000$ —— ×5

$24x - 15y = 36000$

$25x - 15y = 50000$

$x = 14000$

Diff. $= 3x = 3 \times 14000 = 42,000$

Q) *A* and *B* have their monthly incomes in the ratio 8 : 5, while their monthly expenditures are in the ratio 5 : 3. If they have saved ₹ 12,000 and ₹ 10,000 monthly respectively, then the difference in their monthly income is

(a) ₹ 42,000
(b) ₹ 44,000
(c) ₹ 46,000
(d) ₹ 52,000

Ans: (a)

Q) The ratio of the income of A to that of B is 5 : 7. A and B save ₹4,000 and ₹5,000 respectively. If the expenditure of A is equal to $66\frac{2}{3}\%$ of the expenditure of B, then the total income of A and B is:

$\left(\frac{2}{3}\right)$

(a) ₹25,200
(b) ₹24,000
(c) ₹26,400
(d) ₹28,800

$7x + 5x = 12x$

$5x - 2y = 4000 \quad \times 3$

$7x - 3y = 5000 \quad \times 2$

$15x - 6y = 12000$

$14x - 6y = 10000$

$x = 2000$

12×2000

$= 24000$

$A = \frac{2}{3}B$

$\frac{A}{B} = \frac{2}{3} = 2:3$

(expenditure)

Q) The ratio of the income of A to that of B is 5 : 7. A and B save ₹4,000 and ₹5,000 respectively. If the expenditure of A is equal to $66\frac{2}{3}\%$ of the expenditure of B, then the total income of A and B is:

(a) ₹25,200
(b) ₹24,000
(c) ₹26,400
(d) ₹28,800

Ans: (b)

Q) A started a business with a certain amount of money. After a few months B became his partner, contributing three times what A had contributed. At the end of the year, each was entitled to half the total profit. When did B join as a partner ?

(a) 10 months after A (b) 6 months after A
(c) 1 months after A (d) 8 months after A

↳ after x months.

A's investment $\longrightarrow$ y

B " " $\longrightarrow$ $3y$

$$\frac{1/2}{1/2} = \frac{y \times 12}{3y \times (12-x)}$$

$$3(12-x) = 12$$

$$36 - 3x = 12$$

$$3x = 24 \Rightarrow x = 8$$

Q) A started a business with a certain amount of money. After a few months B became his partner, contributing three times what A had contributed. At the end of the year, each was entitled to half the total profit. When did B join as a partner ?

(a) 10 months after A
(b) 6 months after A
(c) 1 months after A
(d) 8 months after A

Ans: (d)

Q) A and B started a partnership business investing in the ratio of 3 : 8. C joined them after 4 months with an amount equal to 3/4th of B. What was their profit (in ₹) at the end of the year if C got ₹ 24,000 as his share?

(a) 120000 (b) 150000 (c) 90000 (d) 180000

A → ₹ $3x$

B → ₹ $8x$

C → $\frac{3}{4}$ (₹ $8x$) = ₹ $6x$

$(3x) \times 12 : (8x) \times 12 : 6x \times 8$

$36 : 96 : 48$

$3 : 8 : 4$ (ratio of profits)

$\left(\frac{4}{3+8+4}\right) \times P = 24000$ (P – total profit at the end of year)

$$\frac{4}{15}P = \overset{6000}{\cancel{24000}}$$

$$P = 90,000$$

Q) A and B started a partnership business investing in the ratio of 3 : 8. C joined them after 4 months with an amount equal to 3/4th of B. What was their profit (in ₹) at the end of the year if C got ₹ 24,000 as his share?

(a) 120000 (b) 150000 (c) 90000 (d) 180000

Ans: (c)

Q) If x varies as y, then which of the following is/are correct?

1. $x^2 + y^2$ varies as $x^2 - y^2$ ✓
2. $\frac{x}{y^2}$ varies inversely as y
3. $\sqrt[n]{x^2 y}$ varies as $\sqrt[2n]{x^4 y^2}$

Select the correct answer using the code given below:

(a) 1 and 2 only (b) 2 and 3 only

(c) 3 only (d) 1, 2 and 3 ✓

$x \propto y$

$x = k_1 y$

① $x^2 + y^2 = k(x^2 - y^2)$

$\frac{x^2+y^2}{x^2-y^2} = k$ | $\frac{2x^2}{2y^2} = k \Rightarrow \frac{x^2}{y^2} = k = k_1^2$ ✓

(2) $\frac{x}{y^2} \propto \frac{1}{y}$

$x = k_1 y$

$\left(\frac{x}{y}\right) = k_1$

$\frac{x}{y^2} = \frac{k_2}{y} \Rightarrow \frac{x}{y} = k_2 = k_1$

(3) $\sqrt[n]{x^2 y} \propto \sqrt[2n]{x^4 y^2}$

$(x^2y)^{\frac{1}{n}} = k_3 (x^4y^2)^{\frac{1}{2n}}$

$\frac{(x^2y)^{\frac{1}{n}}}{(x^4y^2)^{\frac{1}{2n}}} = \frac{(x^2y)^{\frac{1}{n}}}{(x^2y)^{2 \times \frac{1}{2n}}} = 1 = \text{constant} = k_1 = k_3$

Q) If x varies as y, then which of the following is/are correct?

1. $x^2 + y^2$ varies as $x^2 - y^2$
2. $\frac{x}{y^2}$ varies inversely as y
3. $\sqrt[n]{x^2 y}$ varies as $\sqrt[2n]{x^4 y^2}$

Select the correct answer using the code given below:

(*a*) 1 and 2 only (*b*) 2 and 3 only

(*c*) 3 only (*d*) 1, 2 and 3

Ans: (d)

Q) A mixture contains milk and water in the ratio 5 : 1. On adding 5*l* of water, the ratio of milk and water becomes 5 : 2. What is the quantity of milk in the original mixture?

(a) 5 *l* (b) 25 *l*
(c) 27.5 *l* (d) 32.5 *l*

$5x = 5 \times 5 = 25\ l$

$$\frac{5x}{x+5} = \left(\frac{5}{2}\right)$$

$$10x = 5x + 25$$

$$x = 5$$

Q) A mixture contains milk and water in the ratio 5 : 1. On adding 5*l* of water, the ratio of milk and water becomes 5 : 2. What is the quantity of milk in the original mixture?

(a) 5 *l*
(b) 25 *l*
(c) 27.5 *l*
(d) 32.5 *l*

Ans: (b)

Q) If 78 is divided into 3 parts which are proportional to $1, \frac{1}{3}, \frac{1}{6}$, then the middle part is

(a) $\frac{28}{3}$ (b) 13 (c) $\frac{52}{3}$ (d) $\frac{55}{3}$

$x = 1k$; $y = \frac{1}{3}k$; $z = \frac{1}{6}k$

$k + \frac{1}{3}k + \frac{1}{6}k = 78$

$9k = 78 \times 6$

$k = \frac{\cancel{78}^{26} \times 6^{2}}{\cancel{9}_{\cancel{3}}} = 52$

$\frac{1}{3}k = \frac{52}{3}$

$x : y : z$

$= 1 : \frac{1}{3} : \frac{1}{6}$

$= 6 : 2 : 1$

$\frac{2}{\cancel{9}_{3}} \times \cancel{78}^{26} = \frac{52}{3}$ ✓

Q) If 78 is divided into 3 parts which are proportional to $1, \frac{1}{3}, \frac{1}{6}$, then the middle part is

(a) $\frac{28}{3}$ (b) 13 (c) $\frac{52}{3}$ (d) $\frac{55}{3}$

Ans: (c)

Q) A, B and C start a business by investing ₹ 2000, ₹ 3000 and ₹ 4000 respectively. But B increases his investment to ₹ 4000 after 4 months and C withdraws ₹ 1000 at the end of 9 months. What is A's share out of a total profit of ₹ 8475 earned in a year ?

(a) ₹1800 (b) ₹1600 (c) ₹1500 (d) ₹1700

A → 2000 × 12 = 24000 (for 1 year)

B → 3000 × 4 + 4000 × 8 = 44000 (")

C → 4000 × 9 − (1000) × 3 = 36000 − 3000 = 33000 (")

Ratio of profit → 24000 : 44000 : 33000

24 : 44 : 33

Q) A, B and C start a business by investing ₹ 2000, ₹ 3000 and ₹ 4000 respectively. But B increases his investment to ₹ 4000 after 4 months and C withdraws ₹ 1000 at the end of 9 months. What is A's share out of a total profit of ₹ 8475 earned in a year ?

(a) ₹ 1800 (b) ₹ 1600 (c) ₹ 1500 (d) ₹ 1700

Ans: (a)

Q) The train fare and bus fare between two stations is in the ratio 3 : 4. If the train fare increases by 20% and bus fare increase by 30%, then what is the ratio between revised train fare and revised bus fare?

(a) $\frac{9}{13}$ (b) $\frac{17}{12}$ (c) $\frac{32}{43}$ (d) $\frac{19}{21}$

$$\frac{3x\left(1+\frac{1}{5}\right)}{4x\left(1+\frac{3}{10}\right)} = \frac{3\left(\frac{12}{10}\right)}{4\left(\frac{13}{10}\right)} = \frac{36}{52} = \frac{18}{26} = \frac{9}{13}$$

Q) The train fare and bus fare between two stations is in the ratio 3 : 4. If the train fare increases by 20% and bus fare increase by 30%, then what is the ratio between revised train fare and revised bus fare?

(a) $\frac{9}{13}$ (b) $\frac{17}{12}$ (c) $\frac{32}{43}$ (d) $\frac{19}{21}$

Ans: (a)

Q) Given y is inversely proportional to $\sqrt{x}$, and $x = 36$ when $y = 36$. What is the value of x when $y = 54$?

(a) 54 (b) 27 (c) 16 (d) 8

Q) Given y is inversely proportional to $\sqrt{x}$, and $x = 36$ when $y = 36$. What is the value of x when $y = 54$?

(a) 54 (b) 27 (c) 16 (d) 8

Ans: (c)

Q) If $a : b = c : d = 1 : 6$, then what is the value of $\frac{a^2 + c^2}{b^2 + d^2}$?

(a) $\frac{1}{600}$ (b) $\frac{1}{60}$ (c) $\frac{1}{36}$ (d) $\frac{1}{6}$

if same power (degree) of each term

$a^2 \equiv ab$

directly put ratio's numbers.

$\frac{a}{b} = \frac{c}{d} = \frac{1}{6}$

$\frac{1^2 + 1^2}{6^2 + 6^2} = \frac{2}{72} = \frac{1}{36}$

Q) If $a : b = c : d = 1 : 6$, then what is the value of $\frac{a^2 + c^2}{b^2 + d^2}$?

$(a)\ \frac{1}{600}$ $(b)\ \frac{1}{60}$ $(c)\ \frac{1}{36}$ $(d)\ \frac{1}{6}$

Ans: (c)

Q) A and B start an enterprise together, with A as active partner. A invests ₹ 4000 and ₹ 2000 more after 8 months. B invests ₹ 5000 and withdraws ₹ 2000 after 9 months. Being the active partner, A takes ₹ 100 per month as allowance, from the profit. What is the share of B if the profit for the year is ₹ 6700?

(a) ₹ 3350 (b) ₹ 3250 (c) ₹ 2700 (d) ₹ 2800

Q) A and B start an enterprise together, with A as active partner. A invests ₹ 4000 and ₹ 2000 more after 8 months. B invests ₹ 5000 and withdraws ₹ 2000 after 9 months. Being the active partner, A takes ₹ 100 per month as allowance, from the profit. What is the share of B if the profit for the year is ₹ 6700?

(a) ₹3350 (b) ₹3250 (c) ₹2700 (d) ₹2800

Ans: (c)

Q) If $\frac{a}{b}=\frac{b}{c}=\frac{c}{d}$, then which of the following is/are correct?

1. $\frac{b^3+c^3+d^3}{a^3+b^3+c^3}=\frac{d}{a}$

2. $\frac{a^2+b^2+c^2}{b^2+c^2+d^2}=\frac{a}{d}$

Select the correct answer using the code given below.

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Q) If $\frac{a}{b}=\frac{b}{c}=\frac{c}{d}$, then which of the following is/are correct?

1. $\frac{b^3+c^3+d^3}{a^3+b^3+c^3}=\frac{d}{a}$

2. $\frac{a^2+b^2+c^2}{b^2+c^2+d^2}=\frac{a}{d}$

Select the correct answer using the code given below.

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

Ans: (a)

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