

AFCAT 17 feb 2024

Numerical Aptitude

Q1 Rohit purchased 12 kg of oranges for a total price of ₹ 480 and 18 kg of guavas at ₹ 30 per kg. What is the per kg average cost of the fruits purchased by Rohit?

- (A) ₹ 36.00 (B) ₹ 34.00
(C) ₹ 37.20 (D) ₹ 38.20

Q2 A boat goes 30 km upstream and 44 km downstream in a total of 10 hours. It also goes 40 km upstream and 55 km downstream in a total of 13 hours. The speed of the stream is:

- (A) 3km/hr (B) 10 km/hr
(C) 5 km/hr (D) 9km/hr

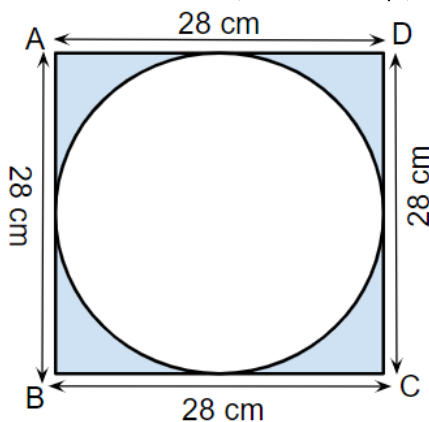
Q3 The value of $\frac{\frac{5}{2} - \frac{3}{7} \times 1\frac{4}{5} \div 3\frac{6}{7}}{\frac{3}{2} + 1\frac{2}{5} \div 3\frac{1}{2} \times 1\frac{1}{4}}$ is:

- (A) $2\frac{3}{20}$
(B) $1\frac{2}{20}$
(C) $1\frac{3}{20}$
(D) $1\frac{7}{20}$

Q4 Solve: $\{1 + 7 + (16 \div 8 \div 2)\}$
 $+ \left\{ (6 \times 2^2 + 6) \times \frac{2}{\sqrt{36}} \right\}$

- (A) 17 (B) 21
(C) 19 (D) 12

Q5 Find the area of shaded region, If ABCD is square whose side is 28 cm. (Use, $\pi = \frac{22}{7}$)



- (A) 784 cm^2 (B) 168 cm^2
(C) 616 cm^2 (D) 186 cm^2

Q6 If three numbers are in the ratio of 3 : 5 : 7 and their LCM is 2415, what is the difference between the second number and the first number?

- (A) 92 (B) 46
(C) 23 (D) 69

Q7 Out of a sum of Rs.625 a part was lent at 5% and the other at 10% simple interest. If the interest on the first part after 2 year is equal to the interest on the second part after 4 year, then the second sum (in Rs.) is ?

- (A) Rs.125 (B) Rs.200
(C) Rs.250 (D) Rs.300

Q8 Rs. 15000 is divided among E, F and G. E's share and F's share are in the ratio of 3: 2. F's share and G's share are in the ratio of 6: 5. How much amount will F receive?

- (A) Rs. 3750 (B) Rs. 6750
(C) Rs. 4500 (D) Rs. 6000

Q9 A man spends 65% of his income. His income increases by 20% and his expenditure also increases by 10%. The percentage of increase in his savings is _____.

- (A) 38.5% (B) 35.8%
(C) 10% (D) 20%

Q10 In an assembly election, a candidate got 60% of the total valid votes. 2% of the total votes were declared invalid. If the total number of voters is 1,50,000, then find the number of valid votes polled in favour of that candidate.

- (A) 90,000 (B) 78,000
(C) 86,400 (D) 88,200

Q11 Two dice are thrown simultaneously. What is the probability of getting two numbers whose product is even?

- (A) $\frac{3}{4}$ (B) $\frac{2}{7}$

(C) $\frac{9}{13}$

(D) $\frac{1}{2}$

Q12 The ratio between the ages of A and B is 2 : 5. After 8 years, their ages will be in the ratio 1 : 2. What is the difference between their present ages?

- (A) 20 years (B) 22 years
(C) 24 years (D) 25 years

Q13 Product is sold to B at 10% loss by A and B sold the product at 20% profit and he sold it Rs 54000. Find the initial cost price of the product?

- (A) Rs 45,000 (B) Rs 51000
(C) Rs 50000 (D) Rs 55,000

Q14 1000 gm of sugar sells at 1st part at 8% profit and 2nd part at 18% profit. on a whole he sells at 14% profit. What 2nd part he sells at 18% profit?

- (A) 600gm (B) 400gm
(C) 200gm (D) 700gm

Q15 The sum of twice a number and thrice its reciprocal is $\frac{25}{2}$. What is the number?

- (A) 4 (B) 5
(C) 6 (D) 7

Q16 The area of a rectangle is thrice that of a square. The length of the rectangle is 20 cm and the breadth of the rectangle is $\frac{3}{2}$ times that of the side of the square. Find the length of the diagonal of square.

- (A) 20 (B) $5\sqrt{2}$
(C) 15 (D) $10\sqrt{2}$

Q17 Rs 3900 are distributed A, B, C and D. the ratio of A:B=C:D = 2 : 3, what is the share of A?

- (A) 761 (B) 830
(C) 600 (D) 800

Q18 A bus is going from A to B at a speed of 40km/hr and returning to A in 60 km/hr find the Average speed of the bus in the journey

- (A) 48km/hr (B) 55 km/hr
(C) 30 km/hr (D) 35km/hr

Q19 if the Tile size of 20 cm \times 30 cm is given. How many tiles would be required to cover the square of $30m^2$

- (A) 500 (B) 700
(C) 900 (D) 1100

Q20 A and B can do a piece of work in 8 days, B and C can do the same work in 12 days. If A, B and C can complete the same work in 6 days, in how many days can A and C complete the same work ?

- (A) 8 (B) 10
(C) 12 (D) 16

Answer Key

Q1 (B)

Q2 (A)

Q3 (C)

Q4 (C)

Q5 (B)

Q6 (B)

Q7 (A)

Q8 (C)

Q9 (A)

Q10 (D)

Q11 (A)

Q12 (C)

Q13 (C)

Q14 (A)

Q15 (C)

Q16 (D)

Q17 (A)

Q18 (A)

Q19 (A)

Q20 (A)

Hints & Solutions

Q1 Text Solution:

The cost price of 12 kg oranges is ₹ 480

The cost price of 1 kg guava is ₹ 30

The total cost price of 18 kg guavas is $18 \times 30 = ₹ 540$

Total cost price of $(12+18)=30$ kg fruits is $= 480+540 = ₹ 1020$

The cost price of 1 kg fruit is $= \frac{1020}{30} = ₹ 34$

Hence, Option B is the correct answer.

Q2 Text Solution:

Given:

- A man can row 30 km upstream and 44 km downstream in 10 hours.

- A man can row 40 km upstream and 55 km downstream in 13 hours.

We need to find the speed of the boat in still water and the speed of the current.

Calculation:

Let

- x as the speed of the boat in still water (km/hr),

- y as the speed of the current (km/hr).

The upstream speed is $x - y$ and the downstream speed is $x + y$.

From the given conditions, we can write the following equations:

For 30 km upstream and 44 km downstream in 10 hours:

$$\frac{30}{x - y} + \frac{44}{x + y} = 10$$

For 40 km upstream and 55 km downstream in 13 hours:

$$\frac{40}{x - y} + \frac{55}{x + y} = 13$$

Let $a = x - y$ (upstream speed) and $b = x + y$ (downstream speed).

Rewriting the equations:

$$\frac{30}{a} + \frac{44}{b} = 10 \quad (1)$$

$$\frac{40}{a} + \frac{55}{b} = 13 \quad (2)$$

We can multiply both equations by their respective denominators to eliminate the fractions:

Multiply Equation (1) by ab :

$$30b + 44a = 10ab \quad (3)$$

Multiply Equation (2) by ab :

$$40b + 55a = 13ab \quad (4)$$

Now, let's solve the system of linear equations (3) and (4). First, we will simplify and align these equations for elimination.

Rewrite Equation (3) and Equation (4) in standard form:

$$30b + 44a = 10ab \quad (3)$$

$$40b + 55a = 13ab \quad (4)$$

We will use the elimination method to eliminate one of the variables:

First, multiply Equation (3) by 4 and Equation (4) by 3:

$$120b + 176a = 40ab \quad (5)$$

$$120b + 165a = 39ab \quad (6)$$

Subtract Equation (6) from Equation (5):

$$120b + 176a - (120b + 165a) = 40ab - 39ab$$

$$176a - 165a = ab$$

$$11a = ab$$

Since $a \neq 0$:

$$11 = b$$

Now we know $b = 11$. Substitute $b = 11$ back into

one of the original equations to solve for a . Using Equation (3):

$$30 \cdot 11 + 44a = 10a \cdot 11$$

$$330 + 44a = 110a$$

$$330 = 66a$$

$$a = 5$$

So, we have:

$$a = x - y = 5$$

$$b = x + y = 11$$

Now, solve for x and y :

Add the two equations:

$$(x - y) + (x + y) = 5 + 11$$

$$2x = 16$$

$$x = 8 \text{ km/hr (speed of the boat in still water)}$$

Subtract the first equation from the second:

$$(x + y) - (x - y) = 11 - 5$$

$$2y = 6$$

$$y = 3 \text{ km/hr (speed of the current)}$$

Therefore, the speed of the current is $\boxed{3 \text{ km/hr}}$.

Hence, the correct answer is option (a), i.e 3kmph

Q3 Text Solution:

$$\begin{aligned} & \frac{\frac{5}{2} - \frac{3}{7} \times 1 \frac{4}{5} \div 3 \frac{6}{7}}{\frac{3}{2} + 1 \frac{2}{5} \div 3 \frac{1}{2} \times 1 \frac{1}{4}} \\ &= \frac{\frac{5}{2} - \frac{3}{7} \times \frac{9}{5} \times \frac{7}{27}}{\frac{3}{2} + \frac{7}{5} \times \frac{2}{7} \times \frac{5}{4}} \\ &= \frac{\frac{5}{2} - \frac{1}{2}}{\frac{3}{2} + \frac{1}{2}} = \frac{23}{10 \times 2} = 1 \frac{3}{20} \end{aligned}$$

Hence, Option C is the correct answer.

Q4 Text Solution:

$$\begin{aligned} & \{1 + 7 + (16 \div 8 \div 2)\} + \{(6 \times 2^2 + 6) \times \frac{2}{\sqrt{36}}\} \\ &= \{8 + (16 \times \frac{1}{8} \times \frac{1}{2})\} + \{(6 \times 4 + 6) \times \frac{2}{6}\} \\ &= \{8 + 1\} + \{30\} \times \frac{1}{3} \\ &= 9 + 10 \\ &= 19 \end{aligned}$$

Hence, Option C is the correct answer.

Q5 Text Solution:

Given,

ABCD is a square and side of the square = 28cm.

$$\therefore \text{Area of square} = \text{side} \times \text{side} = 28 \times 28 = 784 \text{ cm}^2$$

We know that, diameter of circle is equal to the side of square.

So, diameter = 28 cm

\therefore Radius, $r = 14$ cm

$$\therefore \text{Area of circle} = \pi r^2 = \frac{22}{7} \times 14 \times 14$$

$$= 616 \text{ cm}^2$$

Area of Shaded Region

$$= \text{Area of square} - \text{Area of circle}$$

$$= 784 - 616$$

$$= 168 \text{ cm}^2$$

Hence, the correct answer is (B).

Q6 Text Solution:

Let the numbers be $3x$, $5x$ and $7x$ respectively.

Then LCM will be $105x$

$$\text{Here } 105x = 2415$$

$$\text{Then } x = \frac{2415}{105} = 23$$

Now, difference between $5x$ and $3x = 2x = 2(23) = 46$

Therefore, option B is correct.

Q7 Text Solution:

Given:-

$$\text{Total sum} = 625$$

One part at 5% and other part at 10%

Formula used:-

$$SI = \frac{P \times R \times T}{100}$$

Calculation:-

Let the first part and the second part be Rs. x and

$$\text{Rs. } (625 - x),$$

Therefore,

The Simple interest on both part is same

$$\text{So, } \frac{x \times 5 \times 2}{100} = \frac{(625 - x) \times 10 \times 4}{100}$$

$$\Rightarrow 10x = (625 - x)40$$

$$\Rightarrow x = (625 - x)4$$

$$\Rightarrow x = \text{Rs. } 500$$

$$\text{Second part} = \text{Rs. } (625 - 500) = \text{Rs. } 125$$

Hence, the correct answer is **Option (a)** i.e., Rs.125

Q8 Text Solution:

Given,

E share and F share are in the ratio of 3: 2.

F share and G share are in the ratio of 6: 5.

Therefore,

$$(E : F) \times 3 = (3 : 2) \times 2 = 9 : 6$$

\therefore We can write $E : F : G = 9 : 6 : 5$

\therefore F will receive $= 15000 \times \frac{6}{20} = ₹ 4,500$

Hence, Option C is the correct answer.

Q9 Text Solution:

Let the income be Rs. 100

Expenditure = 65% of 100 = Rs. 65

Saving = 100 – 65 = Rs. 35

New income = 100 + 20% of 100

= 100 + 20 = Rs. 120

New expenditure = 65 + 10% of 65

= 65 + 6.5 = Rs. 71.5

New savings = 120 – 71.5 = Rs. 48.5

Required % = $\frac{48.5-35}{35} \times 100$

= $\frac{13.5}{35} \times 100 = 38.5\%$

Hence, Option A is the correct answer.

Q10 Text Solution:

Total number of votes = 1,50,000

\therefore Valid votes = $\frac{98}{100} \times 150000 = 147000$

\therefore Votes got by candidate = $\frac{60}{100} \times 147000 = 88,200$

Hence, Option D is the correct answer.

Q11 Text Solution:

Concept:-

We are using the probability concept to find the solution.

Formula Used:-

Probability of an event E

$$= \frac{\text{Number of favorable outcomes}}{\text{Number of possible outcomes}}$$

Explanation:-

In a simultaneous throw of two dice,

we have $n(S) = (6 \times 6) = 36$.

Then, $E = \{(1, 2), (1, 4), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 2), (3, 4), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 2), (5, 4), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$

$n(E) = 27$.

Therefore, $P(E) = \frac{n(E)}{n(S)}$

$$= \frac{27}{36}$$

$$= \frac{3}{4}$$

Q12 Text Solution:

Given:-

Age of A: Age of B = 2 : 5

After 8 years, Age of A: Age of B = 1 : 2

Calculation:-

Let the present age of A and B be respectively

= $2x$ and $5x$

According to the question,

$$\frac{(2x+8)}{(5x+8)} = \frac{1}{2}$$

$$\Rightarrow 4x + 16 = 5x + 8$$

$$\Rightarrow x = 8$$

Age difference between A and B at present

$$\Rightarrow 5x - 2x = 3x = 24 \text{ years}$$

Hence, the correct answer is **Option (c)** i.e.,

24 years

Q13 Text Solution:

Calculation:

Let's the initial cost price of the product as C .

10% = 0.10

20% = 0.20

A sells the product to B at a 10% loss. This means B buys the product for:

$$C \times (1 - 0.10) = 0.90C$$

B then sells the product at a 20% profit. If B sells it for Rs 54,000, we can set up the equation:

$$0.90C \times (1 + 0.20) = 54000$$

$$0.90C \times 1.20 = 54000$$

$$1.08C = 54000$$

Now, solve for C :

$$C = \frac{54000}{1.08}$$

$$C = 50000$$

Hence, the correct answer is option (c), i.e. Rs 50,000.

Q14 Text Solution:

Given:

a total of 1000 grams of sugar is sold, with one part sold at an 8% profit and another part at an 18% profit, and the overall profit is 14%, we need to determine the quantity of the second part that is sold at an 18% profit.

Calculation:

Let

- x as the amount of sugar sold at an 8% profit,
- $1000 - x$ as the amount of sugar sold at an 18% profit.

The total profit from the first part is:

$$0.08x$$

The total profit from the second part is:

$$0.18(1000 - x)$$

The combined profit is:

$$0.08x + 0.18(1000 - x)$$

According to the problem, the overall profit is 14% of 1000 grams, which is:

$$0.14 \times 1000 = 140 \text{ grams}$$

Setting up the equation for the total profit:

$$0.08x + 0.18(1000 - x) = 140$$

Simplifying the equation:

$$0.08x + 180 - 0.18x = 140$$

$$-0.10x + 180 = 140$$

$$-0.10x = 140 - 180$$

$$-0.10x = -40$$

$$x = \frac{-40}{-0.10} = 400 \text{ grams}$$

So, $x = 400$ grams is sold at an 8% profit.

The second part, which is sold at an 18% profit, is:

$$1000 - x = 1000 - 400 = 600 \text{ grams}$$

Therefore, the second part he sells at 18% profit is

$$\boxed{600 \text{ grams}}.$$

Hence, the correct answer is option (a), i.e 600 gram

Q15 Text Solution:

Given: The sum of twice a number and thrice its reciprocal is $\frac{25}{2}$.

Calculation:

Let the number as x .

According to the problem, we have:

$$2x + \frac{3}{x} = \frac{25}{2}$$

Multiply both sides by $2x$ to clear the fraction:

$$2x \cdot 2x + 2x \cdot \frac{3}{x} = \frac{25}{2} \cdot 2x$$

$$4x^2 + 6 = 25x$$

Rearrange the equation to form a standard quadratic equation:

$$4x^2 - 25x + 6 = 0$$

Now, solve this quadratic equation by factoring. First, rewrite the middle term:

$$4x^2 - 25x + 6 = 0$$

We need to split the middle term $-25x$ into two terms whose coefficients multiply to $4 \times 6 = 24$ and add up to -25 . These terms are $-24x$ and $-x$:

$$4x^2 - 24x - x + 6 = 0$$

Group the terms:

$$4x(x - 6) - 1(x - 6) = 0$$

Factor by grouping:

$$(4x - 1)(x - 6) = 0$$

Set each factor equal to zero:

$$4x - 1 = 0$$

$$x - 6 = 0$$

Solve for x :

$$4x = 1$$

$$x = \frac{1}{4}$$

And:

$$x = 6$$

Therefore, the possible numbers are $\frac{1}{4}$ and 6.

Hence, the correct answer is option (c), i.e 6

Q16 Text Solution:

Given:

- Length of the rectangle (l) = 20 cm
- Breadth of the rectangle (b) = $\frac{3}{2} \times$ (Side of the square)
- Area of the rectangle = 3 \times Area of the square

Calculation:

Let's the side length of the square by a .

The breadth of the rectangle (b) is:

$$b = \frac{3}{2} \times a$$

The area of the rectangle is:

$$\begin{aligned} \text{Area of the rectangle} &= l \times b = 20 \\ &\times \left(\frac{3}{2} \times a \right) = 20 \times \frac{3}{2} \times a = 30a \end{aligned}$$

The area of the square is:

$$\text{Area of the square} = a^2$$

According to the problem, the area of the rectangle is three times the area of the square:

$$30a = 3a^2$$

Solving for a , we divide both sides by a :

$$30 = 3a$$

$$a = 10 \text{ cm}$$

Next, we need to find the length of the diagonal of the square. The formula for the diagonal (d) of a square with side length a is:

$$d = a\sqrt{2}$$

Substituting $a = 10$ cm:

$$d = 10\sqrt{2}$$

Hence, the correct answer is option (d), i.e $10\sqrt{2}$

Q17 Text Solution:

Given

Ratio of A : B = 2 : 3

B : C = 2 : 3

C : D = 2 : 3

Calculation

So ratio of A : B : C : D = 8 : 12 : 12 : 9

Total ratio = 41

3900 distributed among A, B, C and D

Share of A = $\frac{8}{41} \times 3900 = \text{Rs } 761$ (Approx)

Q18 Text Solution:

To find the average speed of the bus for the entire journey, we'll use the formula:

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}}$$

When the two speed are given, Average speed = $\frac{2xy}{x+y}$

When three speeds are given, Average speed =

$\frac{3xyz}{(xy + yz + zx)}$ Note: All the above formula is only used when the distance travels by all the speed is equal.

Since the distance from A to B is the same as the distance from B to A, we can use the harmonic mean of the speeds to find the average speed.

Given:

- Speed from A to B = 40 km/hr

- Speed from B to A = 60 km/hr

Calculate the average speed using the formula.

$$\text{Average speed} = \frac{2 \times 40 \times 60}{40 + 60}$$

Simplify to find the average speed.

Let's plug in the values and calculate:

$$\text{Average speed} = \frac{2 \times 40 \times 60}{40 + 60}$$

$$= \frac{4800}{100}$$

$$= 48 \text{ km/hr}$$

So, the average speed of the bus for the entire journey is 48 km/hr.

Q19 Text Solution:

Calculation:

Convert the area from square meters to square centimeters:

$$1 \text{ m}^2 = 10,000 \text{ cm}^2$$

$$30 \text{ m}^2 = 30 \times 10,000 \text{ cm}^2 = 300,000 \text{ cm}^2$$

Calculate the area of one tile in square centimeters:

$$\text{Tile size} = 20 \text{ cm} \times 30 \text{ cm}$$

$$\text{Area of one tile} = 20 \times 30 = 600 \text{ cm}^2$$

Determine the number of tiles required:

$$= \frac{\text{Number of tiles} \times \text{Total area to be covered}}{\text{Area of one tile}}$$

$$\text{Number of tiles} = \frac{300,000 \text{ cm}^2}{600 \text{ cm}^2} = 500$$

Therefore, 500 tiles of size 20 cm × 30 cm are required to cover an area of 30 square meters.

Hence, the correct answer is option (a), i.e 500

Q20 Text Solution:

Given:

A and B can do a piece of work in 8 days

B and C can do the same work in 12 days

A, B and C can complete the same work in 6 days

Concept used:

Total work= LCM

Time= Work/Efficiency

Calculation:

LCM of (8 and 12)= 24= Total work

$$\text{Efficiency of } (A + B) = \frac{24}{8} = 3 \text{ units/day}$$

$$\text{Efficiency of } (B + C) = \frac{24}{12} = 2 \text{ units/day}$$

$$\text{Let efficiency of } (A + C) = \frac{24}{X} \text{ units/day}$$

Total efficiency of

$$2(A + B + C) = (3 + 2 + \frac{24}{X}) \text{ units/day}$$

$$\text{Efficiency of } (A + B + C) = \frac{24}{6} \text{ (given)}$$

$$= \frac{1}{2}(3 + 2 + \frac{24}{X})$$

Thus, $X = 8$ days

8 days can be taken by A and C to complete the same work

Hence, the correct answer is Option A i.e. 8 Days

[Android App](#) | [iOS App](#) | [PW Website](#)