

# AFCAT MBT 11 Aug 2024

## Numerical Aptitude

**Q1** A rope is  $25\frac{1}{2}$  m long. How many pieces each of  $1\frac{1}{2}$  m length can be cut out from it?

- (A) 17 (B) 15  
(C) 8 (D) 9

**Q2** Two cards are drawn at random from a pack of 52 cards. The probability of these two being aces is:

- (A)  $\frac{1}{26}$   
(B)  $\frac{1}{221}$   
(C)  $\frac{1}{2}$   
(D) None of these

**Q3** If a person sells a ceiling fan for ₹ 557.75, then he gets a 15% profit. To get a 20% profit, at what amount should he sell the fan?

- (A) ₹ 582 (B) ₹ 572  
(C) ₹ 589 (D) ₹ 596

**Q4** 1500 becomes 1860 in 3 years at a certain rate of simple interest. If the rate of interest is increased by 3%, what amount will 1500 become in 4 years?

- (A) 1550 (B) 1660  
(C) 2050 (D) 2160

**Q5** A field is in the shape of a rectangle of length 90 m and breadth 75 m. In one corner of the field, a pit, which is 18 m long 15 m broad and 6 m deep, has been dug out. The earth taken out of it is evenly spread over the remaining part of the field. Find the rise in the level of the field ?

- (A) 27 cm (B) 25 cm  
(C) 28 cm (D) 24 cm

**Q6**  $5^6 - 1$  is divisible by?

- (A) 15 (B) 5  
(C) 13 (D) None of these

**Q7**

A sum of money becomes ₹ 12,600 after 6 years and ₹ 21,000 after 9 years on compound interest.

The sum invested is:

- (A) ₹4, 536 (B) ₹4, 500  
(C) ₹4, 550 (D) ₹4, 436

**Q8** A simple interest of Rs. 2500 was earned on a certain amount at the rate of 12.5% p.a in 5 years. What was the principal amount?

- (A) Rs.1500 (B) Rs.1000  
(C) Rs.2000 (D) Rs.4000

**Q9** If selling price is tripled, the profits increases by 4 times. Find profit %.

- (A) 125% (B) 150%  
(C) 175% (D) 200%

**Q10** The area of the circle whose circumference is equal to the perimeter of a square of side 11 cm is ?

- (A)  $154 \text{ cm}^2$   
(B)  $144 \text{ cm}^2$   
(C)  $134 \text{ cm}^2$   
(D)  $124 \text{ cm}^2$

**Q11** The area of the floor of a rectangular hall of length 40 m is  $960 \text{ m}^2$ . Carpets of size  $6\text{m} \times 4\text{m}$  are available. Then, how many carpets are required to cover the hall ?

- (A) 20 (B) 30  
(C) 40 (D) 45

**Q12** A lent Rs.5000 for 2 years and Rs.3000 for 4 years. The rate of simple interest is the same for both loans. If total interest is Rs.2200

- (A) 7% (B) 8%  
(C) 10% (D) 12%

**Q13** In a group of students,  $\frac{1}{5}$  are aged below 8 years. Of the remaining,  $\frac{2}{5}$  are above 8 years. What



fraction of the students are exactly 8 years of age?

- (A) 48 (B) 32  
(C) 40 (D) 52

**Q14** When an article is sold at 20% discount, the selling price is Rs 24. What will be the selling price when the discount is 30%?

- (A) Rs 25 (B) Rs 23  
(C) Rs 21 (D) Rs 20

**Q15** A passenger train takes 1 hour less for a journey of  $120\text{ km}$ , If its speed is increased by  $10\text{ km/hour}$  from its usual speed. What is its usual speed?

- (A)  $50\text{ km/hour}$   
(B)  $40\text{ km/hour}$   
(C)  $35\text{ km/hour}$   
(D)  $30\text{ km/hour}$

**Q16** A person spends 30% of monthly salary on rent, 25% on food, 20% on children's education, 12% on electricity's rent and the balance of Rs 1, 040 on the remaining items. What is the monthly salary of the person?

- (A) Rs. 8000 (B) Rs. 9000  
(C) Rs. 9600 (D) Rs. 10600

**Q17** 'A' can do a piece of work in 'x' days and 'B' can do the same work in  $3x$  days. To finish the work together they take 12 days. What is 'x' equal to ?

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

**Q18** Pipe P can fill a tank in 8 hours. Pipe Q can fill the same tank in 6 hours. How long will it take to fill the tank if both pipes P and Q are opened simultaneously?

- (A)  $\frac{7}{24}$   
(B)  $\frac{24}{7}$   
(C)  $\frac{4}{3}$   
(D)  $\frac{3}{4}$

**Q19** The cost of type A rice is Rs 25 per kg and type B is Rs 30 per kg. If both type A and type B are

mixed in the ratio 2:3, then the price per kg of the mixed variety of rice is

- (A) Rs 29 (B) Rs 28  
(C) Rs 27 (D) Rs 26

**Q20** In a college there are total 250 students. Average weight of boys is 50 and average weight of girls is 45. Also it is known that the overall average is 48. What is the number of boys in the college?

- (A) 125 (B) 170  
(C) 150 (D) 200



## Answer Key

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Q1 (A)

Q2 (B)

Q3 (A)

Q4 (D)

Q5 (B)

Q6 (C)

Q7 (A)

Q8 (D)

Q9 (D)

Q10 (A)

Q11 (C)

Q12 (C)

Q13 (A)

Q14 (C)

Q15 (D)

Q16 (A)

Q17 (D)

Q18 (B)

Q19 (B)

Q20 (C)

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## Hints & Solutions

### Q1 Text Solution:

#### Calculation

$$\text{Length of rope} = 25\frac{1}{2}m = \frac{51}{2}m$$

$$\text{Length of each piece} = 1\frac{1}{2}m = \frac{3}{2}m$$

$$\text{So the number of pieces} = \frac{51}{2} \div \frac{3}{2}$$

We can write it as

$$\frac{51}{2} \times \frac{2}{3} = 17 \text{ pieces}$$

### Q2 Text Solution:

If one card is drawn at random, then the probability of getting an ace is

$$P(A_1) = \frac{4}{52} = \frac{1}{13}$$

If one card is drawn at random, then the probability of getting a second ace without any replacement is

$$P(A_2) = \frac{3}{51} = \frac{1}{17}$$

Therefore, the probability that both are aces is

$$P(A_1) \times P(A_2) = \frac{1}{13} \times \frac{1}{17} = \frac{1}{221}$$

### Q3 Text Solution:

Selling price of ceiling fan = Rs. 557.75

Profit = 15%

Cost price of ceiling fan

$$= 557.75 \times \frac{100}{(100+15)} = \frac{55775}{115} = 485 \text{Rs}$$

If profit = 20%

Selling price of ceiling fan

$$= 485 \times \frac{(100+20)}{100} = 485 \times \frac{120}{100} = 582 \text{Rs}$$

Hence, the correct option is A.

### Q4 Text Solution:

$$S.I = (1860 - 1500) = 360$$

$$\therefore \text{Rate} = \frac{\text{simple interest} \times 100}{\text{Principle} \times \text{Time}}$$

$$= \frac{360 \times 100}{1500 \times 3} = 8\% \text{ year}$$

$$\therefore \text{New rate} = (8 + 3)\% = 11\%$$

$$\Rightarrow S.I = \frac{\text{principle} \times \text{Time} \times \text{Rate}}{100}$$

$$= \frac{1500 \times 4 \times 11}{100} = 660$$

$$\therefore \text{Amount} = (1500 + 660)$$

$$= 2160.$$

### Q5 Text Solution:

Given:-

A field is in the shape of a rectangle of length 90 m and breadth 75 m

In one corner of the field, a pit, which is 18 m long 15 m broad, and

6 m deep, has been dug out

**Formula used:-**

$$\text{Volume} = L \times B \times H$$

$$\text{Surface area} = L \times B$$

**Calculation:-**

According to the question,

The total area of the field

$$= 90 \times 75 = 6750 \text{ m}^2$$

$$\text{Area of the pit} = 18 \times 15 = 270 \text{ m}^2$$

$$\text{Remaining area} = 6750 - 270 = 6480 \text{ m}^2$$

The volume of the pit

$$= 18 \times 15 \times 6 = 1620 \text{ m}^3$$

While spreading the dug-out earth on the remaining field,

The volume of the pit = Volume of the remaining field

$$\Rightarrow 1620 = 6480 \times H$$

$$\Rightarrow H = \frac{1620}{6480} = \frac{1}{4} \text{ m or } 25 \text{ cm}$$

The rise in the level of the field is 25 cm

Hence, the correct answer is **Option (b)** i.e., 25 cm

### Q6 Text Solution:

#### Calculation

$$(5^6 - 1) = (5^3)^2 - (1)^2$$

$$= (125)^2 - (1)^2 = (125 + 1)(125 - 1)$$

$$= 126 \times 124 = 31 \times 4 \times 126$$

It is therefore clear that the expression is divisible by 31.

### Q7 Text Solution:

Calculation:

A sum of money becomes ₹ 12,600 after 6 years and ₹ 21,000 after 9 years on compound interest.

Let the rate of interest be r%.



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$$A = P\left(1 + \frac{r}{100}\right)^n$$

$$12,600 = P\left(1 + \frac{r}{100}\right)^6 \dots\dots\dots (1)$$

$$A = P\left(1 + \frac{r}{100}\right)^n$$

$$21,000 = P\left(1 + \frac{r}{100}\right)^9 \dots\dots\dots (2)$$

divide eq. (2) and eq. (1)

$$\frac{210}{126} = \left(1 + \frac{r}{100}\right)^3$$

put the value in eq. 1

$$12,600 = P\left\{\left(1 + \frac{r}{100}\right)^3\right\}^2$$

$$12,600 = P \times \frac{210}{126} \times \frac{210}{126}$$

$$P = ₹4,536$$

#### Q8 Text Solution:

**Given:-**

SI = Rs.2500

Rate(R) = 12.5%

Time(T) = 5year

**Formula used:-**

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

**Calculation:-**

$$P = \frac{2500 \times 100}{12.5 \times 5} = Rs. 4000$$

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

Rs.4000

#### Q9 Text Solution:

**Calculation:**

Let the C.P & S.P be  $x$  &  $y$  respectively.

$$\therefore \text{Profit} = \text{S.P} - \text{C.P} = y - x$$

Now, according to the question, if S.P is tripled i.e.,  $3y$

Then, the profit increase by 4 times. i.e.,

$$4(y - x)$$

$$\Rightarrow 3y - x = 4(y - x) \text{ [C.P remains same]}$$

$$\Rightarrow 3y - x = 4y - 4x$$

$$\Rightarrow 3x = y$$

$$\text{Profit \%} = \frac{\text{profit}}{\text{C.P}} \times 100 = \frac{y-x}{x} \times 100$$

$$= \frac{3x-x}{x} \times 100 = 200\%$$

Thus, the required profit % is 200%.

Hence, the correct answer is **option (d)** i.e., 200%

#### Q10 Text Solution:

**Given:-**

Side of a square = 11 cm

**Formula used:-**

Perimeter of square =  $4 \times \text{Side}$

Circumference of circle =  $2\pi r$

**Calculation:-**

According to the question

$$2\pi r = 44 \text{ cm}$$

Therefore,

$$r = \frac{44}{2\pi} = 7 \text{ cm}$$

Thus, area of circle

$$= \pi r^2 = \frac{22}{7} \times 7 \times 7 = 154 \text{ cm}^2$$

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

$$154 \text{ cm}^2$$

#### Q11 Text Solution:

**Given:-**

Area of the floor =  $960 \text{ m}^2$

Area of one carpet =  $6 \times 4 = 24 \text{ m}^2$

**Calculation:-**

Number of the carpets required

$$= \frac{\text{Area of the floor}}{\text{Area of one carpet}}$$

$$= \frac{960}{24} = 40$$

Therefore, 40 carpets are required to cover the hall.

Hence, the correct answer is **Option (c)** i.e., 40

#### Q12 Text Solution:

**Given:-**

A lent Rs.5000 for 2 years and Rs.3000 for 4 years.

Total interest = Rs.2200

**Formula used:-**

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

**Calculation:-**

Let the rate be  $R\%$  p.a

$$\text{Then, } \left(\frac{5000 \times R \times 2}{100}\right) + \left(\frac{3000 \times R \times 4}{100}\right) = 2200$$

$$\Rightarrow 100R + 120R = 2200$$

$$\Rightarrow R = \left(\frac{2200}{220}\right) = 10$$

$$\text{Rate} = 10\%$$

Hence, the correct answer is **Option (c)** i.e., 10%



**Q13 Text Solution:****Calculation:-**

Let the total number of students in the group be 100

Number of students who are below age 8  
 $= 100 \times \frac{1}{5} = 20$

Remaining students =  $100 - 20 = 80$

Number of students who are above age 8  
 $= 80 \times \frac{2}{5} = 32$

Number of students who are exactly 8 years old  
 $= 100 - 20 - 32 = 48$

Hence, the correct answer is **Option (a)**

**Q14 Text Solution:****Given:-**

Discount 1,  $D_1 = 20\%$

$SP = Rs\ 24$

Discount 2,  $D_2 = 30\%$

**Formula Used:-**

$$1. \text{Discount} = CP - SP$$

**Calculation:-**

$$CP = 24 \times \frac{100}{80} = Rs\ 30$$

Now if discount is  $30\%$

$$SP = 30 \times \frac{70}{100} = Rs\ 21$$

Hence, the correct answer is **Option C** i.e.,  
 $Rs\ 21$

**Q15 Text Solution:****Given:**

Train takes 1 hour less when its speed is increased by  $10\text{km/hr}$  for a distance of  $120\text{ km}$ .

**Formula Used:**

$$\bullet \text{ Time} = \frac{\text{Distance}}{\text{Speed}}$$

**Calculations:**

Let the speed of the train be  $x\text{ km/hr}$

Now, As per the question

$$\frac{120}{x+10} + 1 = \frac{120}{x}$$

$$\frac{120+x+10}{x+10} = \frac{120}{x}$$

$$\frac{130+x}{x+10} = \frac{120}{x}$$

$$130x + x^2 = 120x + 120$$

$$x^2 + 10x - 120 = 0$$

$$x^2 + 40x - 30x - 120 = 0$$

$$x(+40) - 30(x+40) = 0$$

$$(x+40)(x-30) = 0$$

$$x = -40, x = 30$$

Ignoring the negative value  $x = 30\text{ km/hr}$ .

Hence, the correct answer is **Option (d)** i.e.,  
 $30\text{ km/hr}$ .

**Q16 Text Solution:****Calculation:-**

Let the monthly salary of the person = Rs.  $x$

Then as per question;

$$\Rightarrow [100 - (30 + 25 + 20 + 12)]\% \text{ of } x$$

$$= Rs. 1040$$

$$\Rightarrow [100 - 87]\% \text{ of } x = Rs. 1040$$

$$\Rightarrow \frac{13}{100} \times x = Rs. 1040$$

Therefore,

$$\Rightarrow x = \frac{1040 \times 100}{13}$$

$$\Rightarrow 80 \times 100 = Rs. 8000$$

Hence, the correct answer is **Option (a)** i.e., Rs.  
 $8000$

**Q17 Text Solution:****Given:-**

'A' can do a piece of work in  $x$  days

'B' can do the same work in  $3x$  days

**Formula Used:-**

Unitary method

Work Energy

**Calculations:-**

$$\text{Work done by A in 1 day} = \frac{1}{x}$$

$$\text{Work done by B in 1 day} = \frac{1}{3x}$$

$$\text{Work done by A and B in 1 day} = \frac{1}{x} + \frac{1}{3x}$$

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

Number of days for completion of work if A

$$\Rightarrow \frac{\frac{4}{3x}}{\frac{4}{3x}} = \frac{3x}{4} = 12$$

$$x = 16$$

Hence, the correct answer is **Option(d)** i.e 16

**Q18 Text Solution:**

**Given:** Pipe P and Q can fill a tank in 8 hours and 6 hours respectively.

**Calculate:**

According to the given, the filling rates of pipes P and Q are



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$\frac{1}{8}$  and  $\frac{1}{6}$  tank per hour, respectively.

So, when both the pipes are open, the net filling rate will be

$\left(\frac{1}{8} + \frac{1}{6}\right)$  tank per hour.

$$\Rightarrow \frac{6+8}{48} \Rightarrow \frac{14}{48} = \frac{7}{24}$$

$\Rightarrow$  The net filling rate will be  $\frac{7}{24}$  tank per hour.

Therefore, it will take approximately  $\frac{24}{7}$  hours to fill the tank.

Hence, the correct answer is **option (b)** i.e,  $\frac{24}{7}$  hours

#### Q19 Text Solution:

**Given:**

The cost of type A rice is Rs 25 per kg

The cost of type B rice is Rs 30 per kg

**Calculation:-**

The cost of 2 part of type A =  $25 \times 2 = Rs\ 50$

The cost of 3 parts of type B =  $30 \times 3 = Rs\ 90$

Total cost of 5 parts of type A and type B  
 $= 50 + 90 = Rs\ 140$

Cost Price of 1 Kg mixed variety of rice  
 $= \frac{140}{5} = Rs\ 28$

#### Q20 Text Solution:

**Calculation**

Total students = 250

The average weight of boys = 50

The average weight of girls = 45

Overall Average = 48

Now by using Allegation

So the ratio of boys : girls would be =  $48 - 45 : 50 - 48$   
 $= 3 : 2$

$= 3 : 2$

so the number of boys =  $\frac{3}{5} \times 250 = 150$



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