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Maths Inequalities Questions for Bank and Insurance Exams

Maths inequalities Quiz 4

Directions: Study the following questions carefully and answer the questions given below.

1. The total surface area of a cube, sphere and cylinder are same. The height of the cylinder is double of its radius.

Quantity I: Volume of Cube
Quantity II: Volume of Sphere
Quantity III: Volume of Cylinder

A. Quantity III < Quantity II < Quantity I   B. Quantity II < Quantity III < Quantity I
C. Quantity II > Quantity III > Quantity I   D. Quantity I < Quantity II < Quantity III
E. Quantity I > Quantity III < Quantity II

2. A box contains 50 tiles, in which 5 are red tiles, 6 are green tiles, 9 are blue tiles and remaining are yellow tiles.

Quantity I: Probability of picking 2 tiles such that one is green and the other is blue
Quantity II: Probability of picking 3 tiles such that at least one of them is red
Quantity III: Probability of picking 3 tiles such that at least one of them is blue

A. Quantity III > Quantity I > Quantity II   B. Quantity II > Quantity III > Quantity I
C. Quantity III > Quantity II > Quantity I   D. Quantity I = Quantity II > Quantity III
E. Quantity I > Quantity III < Quantity II

3. Quantity I: No. of days in which A will work alone, given A and B can complete work in 8 days, B and C can complete work in 12 days, C and A can complete work in 8 days.

Quantity II: No. of days in which A will work alone, given A and B can complete work in 18 days, they started work together and after working for 6 days A left and B completed remaining work in 24 days.

A. Quantity: I > Quantity: II   B. Quantity: I ≥ Quantity: II
C. Quantity: II > Quantity: I   D. Quantity: II ≥ Quantity: I
E. Quantity I = Quantity II or relation can not be established

4. Find the distance if:

Quantity I: A man covers a distance in 15 hours. He covers first half at 12 km/h and second half at 15 km/h.

Quantity II: Two buses moves towards each other at a speed of 30 km/h and 40 km/h respectively. When they meet it is found that faster bus covers 30 km more than slower one.

A. Quantity: I > Quantity: II

B. Quantity: I ≥ Quantity: II

C. Quantity: II > Quantity: I

D. Quantity: II ≥ Quantity: I

E. Quantity I = Quantity II or relation can not be established

5. Quantity I: Two equal amounts are invested for 2 years at 9% per annum by Virat, one at simple interest and the other at compound interest. If the difference in the interests for the two years on the two amounts is 100, then what is the amount ?

Quantity II: Two equal amounts are invested for 2 years at 11% per annum by Virat, one at simple interest and the other at compound interest. If the difference in the interests for the two years on the two amounts is 97, then what is the amount ?

A. Quantity: I > Quantity: II

B. Quantity: I < Quantity: II

C. Quantity: I ≤ Quantity: II

D. Quantity: I = Quantity: II or No relation

E. Quantity: I ≥ Quantity: II

6. Quantity I: If four numbers are in arithmetic progression with common difference 2 then find the ratio between difference of third number and second number to difference of fourth number and first number.

Quantity II: If four numbers are in arithmetic progression with common difference 1 then find the ratio between difference of third number and first number to difference of fourth number and second number.

Quantity III: If four numbers are in arithmetic progression with common difference 3 then find the ratio between difference of third number and second number to difference of fourth number and first number.

A. Quantity II < Quantity I < Quantity III

B. Quantity = < Quantity III < Quantity I

C. Quantity I = Quantity II = Quantity III

D. Quantity II > Quantity I = Quantity III

E. Quantity II = Quantity III > Quantity I

7. Quantity I: Bhanu sells copy, pen and pencil at 12%, 14% and 21% profit respectively. If the ratio of the cost of the articles is ratio 1: 3: 6 and the ratio of the number of articles of each type sold is 3: 1: 1, what is his net profit?

Quantity II: Bhanu sells copy, pen and pencil at 10%, 15% and 20% profit respectively. If the ratio of the cost of the articles is ratio 2: 3: 5 and the ratio of the number of articles of each type sold is 4: 2: 1, what is his net profit?

A. Quantity: I > Quantity: II
B. Quantity: I ≥ Quantity: II
C. Quantity: II > Quantity: I
D. Quantity: II ≥ Quantity: I
E. Quantity I = Quantity II or relation can not be established

8. There are 5 couples who want to sit at different positions.
Quantity I: Number of ways in which men and women sit at alternate positions
Quantity II: Number of ways in which all men sit together and all women sit together.

A. Quantity: I > Quantity: II
B. Quantity: I ≥ Quantity: II
C. Quantity: II > Quantity: I
D. Quantity: II ≥ Quantity: I
E. Quantity I = Quantity II or relation can not be established

9. Quantity I: Ram borrowed an amount of Rs.20000 from informal lender at 10% per annum compound interest. If it is to be repaid in 2 equal annual installments, what is the value of each installment?

Quantity II: Ram borrowed an amount of Rs.20500 from informal lender at 9.5% per annum compound interest. If it is to be repaid in 2 equal annual installments, what is the value of each installment?

A. Quantity: I > Quantity: II
B. Quantity: I ≥ Quantity: II
C. Quantity: II > Quantity: I
D. Quantity: II ≥ Quantity: I
E. Quantity I = Quantity II or relation can not be established

10. Quantity I: A shopkeeper bought five toffees in one rupees and marks them up by 25%. If he allows a 12% discount, then how many toffees should be he sell at Rs.22?

Quantity II: A shopkeeper bought four toffees in one rupees and marks them up by 26%. If he allows a 10% discount, then how many toffees should be he sell at Rs.28.35?

A. Quantity: I > Quantity: II
B. Quantity: I < Quantity: II
C. Quantity: I ≤ Quantity: II
D. Quantity: I = Quantity: II or No relation
E. Quantity: I ≥ Quantity: II

1	2	3	4	5	6	7	8	9	10
C	C	C	C	A	D	A	A	C	D

Explanations:

1.

Let the cube's side is x, then the surface area of cube = $6x^2$ and volume = x^3

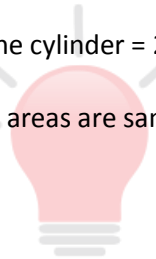Let the radius of the sphere is r, then its volume = $\frac{4}{3}\pi r^3$

3 and its surface area will be $4\pi r^2$.

Let the height of cylinder is 2h so, its radius will be h

Surface area of the cylinder = $2\pi h(2h) + 2\pi h^2 = 6\pi h^2$

Since the surface areas are same, $6 \times 2 = 4\pi r^2 = 6\pi h^2$

$$\Rightarrow r = \frac{\sqrt{3x}}{2\pi}$$

Volume of sphere $= \frac{\sqrt{6}}{\sqrt{\pi}} \times 3$

This will always be greater than x^3

So, Quantity II > Quantity I

$6x^2 = 4\pi r^2 = 6\pi h^2$

$\Rightarrow x = (\pi) h$

Volume of cylinder = $\pi h^2 (2h) = 2\pi h^3 = 2\pi \left(\frac{a}{\pi}\right)^3 = \frac{2a^3}{\pi} > a$

So, Quantity III > Quantity I

Volume of sphere = $\left(\frac{\sqrt{6}}{\pi}\right) a^3 > \frac{2a^3}{\pi}$

So, Quantity II > Quantity III > Quantity I

Hence option (C) is correct.

2.

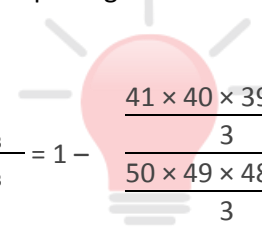**Quantity I:** Probability of picking 2 tiles such that one is green and the other is blue

$$= \frac{(6 \times 9)}{^{50}C_2} = \frac{\frac{54}{50 \times 59}}{2} = \frac{54}{1225} = 0.044$$

Quantity II: Probability of picking 3 tiles such that at least one of them is red

$$= 1 - \frac{^{45}C_3}{^{50}C_3} = 1 - \frac{\frac{45 \times 44 \times 43}{3}}{\frac{50 \times 49 \times 48}{3}} = 1 - \frac{14190}{19600} = \frac{541}{1960} = 0.276$$

Quantity III:

Probability of picking 3 tiles such that at least one of them is blue

$$= 1 - \frac{^{41}C_3}{^{50}C_3} = 1 - \frac{\frac{41 \times 40 \times 39}{3}}{\frac{50 \times 49 \times 48}{3}} = 1 - \frac{10660}{19600} = \frac{894}{1960} = 0.456$$

Hence, Quantity III > Quantity II > Quantity I

Therefore, option (C) is correct.

3.

Quantity I:

A + B complete in 8 days

B + C complete in 12 days

A + C complete in 8 days

LCM = 24

Therefore,

Efficiency of A + B = $\frac{24}{8}$ = 3

Efficiency of B + C = $\frac{24}{8}$ = 2

Efficiency of A + C = $\frac{24}{8}$ = 3

⇒ 2 × (A + B + C) = 3 + 2 + 3 = 8

⇒ A + B + C = 4

So, efficiency of A = (A + B + C) − (B + C) = 4 − 2 = 2

Hence, A = $\frac{24}{2}$ = 12 days

A takes 12 days

Quantity II:

A + B completes in 18 days

For 6 days, $\frac{6}{18}$ = $\frac{1}{3}$ work is completed

Now, $\frac{2}{3}$ remaining work is completed by B in 24 days

So, B completes in 36 days

While A completes in $\frac{1}{18}$ − $\frac{1}{36}$ = $\frac{1}{36}$

So, A does in 36 days

Hence, Quantity: I < Quantity: II

Therefore, option (C) is correct.

4.

Quantity I:

Average speed = $\frac{2vu}{v + u}$ = 2 × $\frac{12 \times 15}{12 + 15}$ = $13\frac{1}{3}$ km/h

Distance = Speed × Time = $13\frac{1}{3}$ × 15 = 200 km

Quantity II:

Speed difference for 1 hour = 40 – 30 = 10 Km/h

Therefore, In 1 hour faster bus will cover 10 km more than slower one

Hence to cover 30 km more it will take 3 hours.

Distance= Relative Speed × Time

D = (30 + 40) × 3 = 210 km

Hence, Quantity II > Quantity I

Hence, option (C) is correct.

5.

Quantity I:

The S.I. on amount x at the rate y (in % i.e. y/100) per annum for 2 years in 2 × x × y **………. (i)**

And C.I. for 2 year is x × y × (2 + y) **…………. (ii)**

According to question,

Difference = 100

$\Rightarrow$ x × y × (2 + y) – 2 × x × y = 100

$\Rightarrow$ x × y^2 = 100 $\Rightarrow$ x = $\dfrac{100}{0.0081}$

$\Rightarrow$ x = 12345.6

Hence amount = Rs. 12345.6

Quantity II:

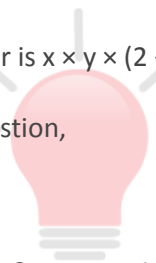The S.I. on amount x at the rate y (in % i.e. y/100) per annum for 2 years in 2×x×y…. (i)

And C.I. for 2 year is x × y × (2 + y) …. (ii)

According to question,

Difference = 97

$\Rightarrow$ x × y × (2 + y) – 2 × x × y = 97

$\Rightarrow$ x × y^2 = 97

$\Rightarrow x = \dfrac{97}{0.0121}$

$\Rightarrow x = 8016.5$

Hence amount = Rs. 8016.5

Therefore, option (A) is correct.

6.

Quantity I:

Let p, q, r and s are four numbers in arithmetic progression with common difference 2 then simply we can take p, q, r and s be 1, 3, 5 and 7 respectively.

To calculate, (r – q): (s – p)

So, (r – q): (s – p) = (5 – 3): (7 – 1) = 2: 6 = 1: 3 = 0.33

Quantity II:

Let p, q, r and s are four numbers in arithmetic progression with common difference 1 then simply we can take p, q, r and s be 1, 2, 3 and 4 respectively.

To calculate, (r – p): (s – q)

So, (r – p): (s – q) = (3 – 1): (4 – 2) = 2: 2 = 1: 1 = 1

Quantity III:

Let p, q, r and s are four numbers in arithmetic progression with common difference 3 then simply we can take p, q, r and s be 1, 4, 7 and 10 respectively.

To calculate, (r – q): (s – p)

So, (r – q): (s – p) = (7 – 4): (10 – 1) = 3: 9 = 1: 3 = 0.33

Hence, option (D) is correct.

7.

Quantity I:

Let cost of articles be Rs. 12, Rs. 14 and Rs. 21 for copy, pen and pencil respectively.

The ratio of sales of the three types of articles is (1 × 3): (3 × 1): (6 × 1) = 3: 3: 6 = 1: 1: 2

Hence net profit percentage

$$= \frac{(1 \times 12) + (1 \times 14) + (2 \times 21)}{(1 + 1 + 2)}\% = \frac{68}{4}\% = 17\%$$

Quantity II:

Let cost of articles be Rs. 10, Rs. 25 and Rs. 20 for copy, pen and pencil respectively.

The ratio of sales of the three types of articles is $(2 \times 4): (3 \times 2): (5 \times 1) = 8: 6: 5$

Hence net profit percentage
$$= \frac{(8 \times 10) + (6 \times 15) + (5 \times 20)}{(8 + 6 + 5)}\% = \frac{270}{19}\% = 14.2\%$$

Hence, option (A) is correct.

8.

Quantity I: Ways for men = 5!

Now 6 seats for 5 women,

So for choosing 5 seats it can be done $^6C_5$ ways, and then arrangement of these 5 women is 5!

So total number of ways = 5! × $^6C_5$ × 5! = 5! × 5! × 6

Quantity II: Ways for all men together = 5!

For all women together is 5!

Now arrangement of men and women as group = 2!

So total number of ways = 5! × 5! × 2! = 5! × 5! × 2

Hence, Quantity: I > Quantity: II

Therefore, option (A) is correct.

9.

Quantity I:

The amount borrowed by Ram is Rs. 20000

Let the present worth of the installment x,
Then amount paid after one year =   x

$$1.10$$

And amount paid after otwo year = $\dfrac{x}{(1.10)^2}$

According to question,

$$\dfrac{x}{1.10} + \dfrac{x}{(1.10)^2} = 20000$$

$$\Rightarrow \dfrac{x}{1.10} \times \left(1 + \dfrac{1}{1.10}\right) = 20000$$

$$\Rightarrow \dfrac{x}{1.10} = 20000 \times \dfrac{1.10}{2.10} \Rightarrow \dfrac{x}{1.10} = 10476$$

$$\Rightarrow x = 11524$$

Hence, the present worth of the installment is Rs. 11524

Quantity II:

The amount borrowed by Ram is Rs. 20500

Let the present worth of the installment x,

Then amount paid after one year = $\dfrac{x}{1.095}$

And amount paid after otwo year = $\dfrac{x}{(1.095)^2}$

According to question,

$$\dfrac{x}{1.095} + \dfrac{x}{(1.095)^2} = 20500$$

$$\Rightarrow \dfrac{x}{1.095} \times \left(1 + \dfrac{1}{1.095}\right) = 20500$$

$$\Rightarrow \dfrac{x}{1.095} = \left(20500 \times \dfrac{1.095}{2.095}\right) \Rightarrow \dfrac{x}{1.095} = 10715 \text{ (approx)}$$

$$\Rightarrow x = 11733 \text{ (approx)}$$

Hence, the present worth of the installment is Rs. 11733

Therefore, option (C) is correct.

10.

Quantity I:

Cost of each toffee = $\dfrac{1}{5}$

As toffees are marked up by 25% then

Marked price per toffee = 125% of $\dfrac{1}{5}$

Given that discount is 12%

So, the required selling price per toffee = 88% of 125% of $\dfrac{1}{5}$

= $\dfrac{88 \times 125 \times 1}{100 \times 100 \times 5}$ = 0.22

As, in Rs. 0.22 anyone can buy 1 toffee

So, in Rs. 1 anyone can buy $\dfrac{1}{0.22}$ toffees

Thus, in Rs. 22 anyone can buy $\dfrac{1}{0.22}$ × 22 = 100 toffees

Quantity II:

Cost of each toffee be $\dfrac{1}{4}$

As toffees are marked up by 26% then

Marked price per toffee = 126% of $\dfrac{1}{4}$

Given that discount is 10%

So, the required selling price per toffee = 90% of 126% of $\dfrac{1}{4}$

= $\dfrac{90 \times 126 \times 1}{100 \times 100 \times 4}$ = 0.2835

As, in Rs. 0.2835 anyone can buy 1 toffee

So, in Rs. 1 anyone can buy $\dfrac{1}{0.2835}$ toffees

Thus, in Rs. 22 anyone can buy $\dfrac{1}{0.2835} \times 28.35 = 100$ toffees

Hence, option (D) is correct.