

JSSC Para Teacher PRT and Upper Primary Paper 2 Mathematics Set 1 - English

Q.1 In $\triangle ABC$, if $\frac{1}{2}\angle A + \frac{1}{3}\angle C + \frac{1}{2}\angle B = 80^\circ$, then $\angle C$ will be:

- A. 70°
- B. 60°
- C. 50°
- D. 100°

Answer: B

Sol: Given: $\frac{1}{2}\angle A + \frac{1}{3}\angle C + \frac{1}{2}\angle B = 80^\circ$

Using: $\angle A + \angle B + \angle C = 180^\circ \Rightarrow \angle A + \angle B = 180^\circ - \angle C$

Substitute:

$$\frac{1}{2}(\angle A + \angle B) + \frac{1}{3}\angle C = 80^\circ$$

$$\frac{1}{2}(180 - \angle C) + \frac{1}{3}\angle C = 80^\circ$$

$$90 - \frac{1}{2}\angle C + \frac{1}{3}\angle C = 80^\circ$$

$$90 - \left(\frac{1}{2} - \frac{1}{3}\right)\angle C = 80^\circ$$

$$90 - \frac{1}{6}\angle C = 80^\circ$$

$$\Rightarrow \frac{1}{6}\angle C = 10^\circ$$

$$\Rightarrow \angle C = 60^\circ$$

Q.2 If $2x - 3y = 79$, $x + 6y = 47$, then what will be the value of $(x - y)$?

- A. 40
- B. 32
- C. 38
- D. 42

Answer: A



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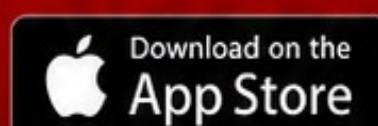


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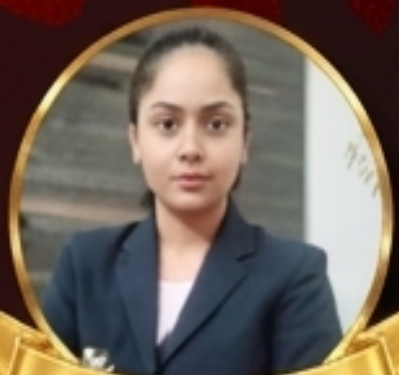
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Sol: Given $2x - 3y = 79$ -----] x 2
 $4x - 6y = 158$ -----(1)

$x + 6y = 47$ ------(2)

Adding equation (1) & (2)

$5x = 205$

$x = 41$ put in equation (2)

$41 + 6y = 47$

$6y = 6$

$y = 1$

$x - y = 41 - 1 = 40$

Q.3 From the month of July, whose first day is Monday, a day is selected at random. The probability that it is not a Monday is :

- A. $\frac{6}{31}$
- B. $\frac{5}{31}$
- C. $\frac{26}{31}$
- D. $\frac{25}{31}$

Answer: C

Sol: Given:
Month = July (31 days)

First day = Monday

Formula Used:

Probability = $\frac{\text{Number of days not Monday}}{\text{Total days}}$

Solution:

Total days = 31

Mondays in July:

Since the first day is Monday, Mondays will fall on: 1st, 8th, 15th, 22nd, and 29th → 5 Mondays.

Days that are not Monday = $31 - 5 = 26$

Thus,

Probability = $\frac{26}{31}$

Q.4 There is a target of increase in number of students in a University by 10% every year. If in year 2016 this number was 1500, then in year 2018 on completion of target how many students will be there in University?

- A. 1800
- B. 1815
- C. 1700
- D. 1915

Answer: B

Sol: Given, in year 2016 this number was 1500.
According to question

in year 2018 on completion of target students will be there in University

= 1500 x 110% x110%
= 15 x 11 x 11
= 1815

Q.5 A solid cube of side 12 cm is cut into small cubes of side 4 cm each. What will be the relation between the total surface area of the original cube and the new total surface area of the small cubes so formed?

- A. New total surface area will be thrice the original total surface area.
- B. New total surface area will be $\frac{1}{2}$ of the original total surface area.
- C. New total surface area will be twice the original total surface area.
- D. New total surface area will be $\frac{1}{3}$ of the original total surface area.

Answer: A

Sol: Given:
Side of original cube = 12 cm
Side of each small cube = 4 cm
Concept used:
Surface area of a cube: $6a^2$

Number of small cubes: $\left(\frac{\text{Side of original cube}}{\text{Side of small cube}}\right)^3$

Formula used:
Surface area of cube = $6a^2$

Solution:
Number of small cubes = $\left(\frac{12}{4}\right)^3 = 3^3 = 27$

Surface area of original cube = $6 \times 12^2 = 6 \times 144 = 864 \text{ cm}^2$

Surface area of each small cube = $6 \times 4^2 = 6 \times 16 = 96 \text{ cm}^2$

Total surface area of small cubes = $27 \times 96 = 2592 \text{ cm}^2$

Ratio = $\frac{2592}{864} = 3$

Correct answer is (A) New total surface area will be thrice the original total surface area.

Q.6 What is the equivalent single decrease of successive decrease of 20%, 20%, and 10%?

- A. 50%
- B. 42%
- C. 42.4%
- D. 44%

Answer: C

Sol: Given:

$$\begin{aligned}d_1 &= 10\% = 0.10 \\d_2 &= 20\% = 0.20 \\d_3 &= 20\% = 0.20\end{aligned}$$

Formula used:

$$\text{Equivalent Discount} = 1 - (1 - d_1)(1 - d_2)(1 - d_3)$$

Solution:

$$\begin{aligned}&= 1 - (1 - 0.10)(1 - 0.20)(1 - 0.20) \\&= 1 - (0.90 \times 0.80 \times 0.80) \\&= 1 - (0.90 \times 0.64) \\&= 1 - 0.576 \\&= 0.424 = 42.4\%\end{aligned}$$

Correct answer is (C)

Q.7 What is the value of $\sin^2 17.5^\circ + \sin^2 72.5^\circ$?

- A. $-\cos^2 90^\circ$
- B. $\tan^2 45^\circ$
- C. $\cos^2 30^\circ$
- D. $\sin^2 45^\circ$

Answer: B

Sol: Given:

$$\sin^2 17.5^\circ + \sin^2 72.5^\circ$$

Formula used:

$$\begin{aligned}\sin^2 x + \cos^2 x &= 1 \\(\text{Since } \sin(90^\circ - x) &= \cos x, \text{ we can write: } \sin^2 x + \sin^2(90^\circ - x) = 1)\end{aligned}$$

Solution:

$$\begin{aligned}\sin^2 17.5^\circ + \sin^2 72.5^\circ &= \sin^2 17.5^\circ + \cos^2 17.5^\circ = 1 \\ \tan 45^\circ = 1 &\Rightarrow \tan^2 45^\circ = 1\end{aligned}$$

Correct answer is (B)

Q.8 In a class, 20 students opted for Physics, 17 for Maths, 12 for both physics and maths and 10 students for other subjects. The class contains how many students?

- A. 52
- B. 35
- C. 60
- D. 42

Answer: B

Sol: Given:

$$n(P) = 20, \quad n(M) = 17, \quad n(P \cap M) = 12, \quad \text{Others} = 10$$

Formula used:

$$n(P \cup M) = n(P) + n(M) - n(P \cap M)$$

$$\text{Total students} = n(P \cup M) + \text{Others}$$

Solution:

$$n(P \cup M) = 20 + 17 - 12 = 25$$

$$\text{Total} = 25 + 10 = 35$$

Correct answer is (B) **35**.

Q.9 If $x + y = 2a$, then the value of $\frac{a}{(x-a)} + \frac{a}{(y-a)}$ is –

- A. 2
- B. $2a^2$
- C. 0
- D. $2a$

Answer: C

Sol: Given: $x + y = 2a$

$$\text{Expression: } \frac{a}{x-a} + \frac{a}{y-a}$$

Solution:

$$\frac{a}{x-a} + \frac{a}{y-a}$$

$$= \frac{a(y-a) + a(x-a)}{(x-a)(y-a)}$$

$$= \frac{a(y-a+x-a)}{(x-a)(y-a)}$$

$$= \frac{a(x+y-2a)}{(x-a)(y-a)}$$

$$= \frac{a(2a-2a)}{(x-a)(y-a)}$$

$$= \frac{0}{(x-a)(y-a)} = 0$$

Correct answer is (c) **0**.

Q.10 If the numerator of a fraction is increased by 60% and the denominator is increased by 300%, the resultant fraction is $\frac{20}{17}$ What was the original fraction?

- A. $\frac{2}{7}$
- B. $\frac{16}{17}$
- C. $\frac{17}{50}$
- D. $\frac{4}{7}$

Answer: C

Sol: Given:

Numerator is increased by 60%

Denominator is increased by 300%

$$\text{New fraction} = \frac{20}{17}$$

We are to find the original fraction.

Let original fraction be $\frac{x}{y}$

New numerator = $1.6x$, New denominator = $4y$

$$\Rightarrow \frac{1.6x}{4y} = \frac{20}{17}$$

$$\Rightarrow \frac{1.6x}{4y} = \frac{20}{17}$$

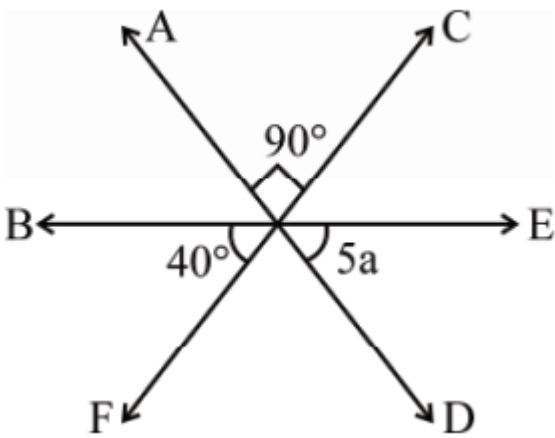
$$\Rightarrow \frac{8x}{20y} = \frac{20}{17}$$

$$\Rightarrow 136x = 400y \Rightarrow \frac{x}{y} = \frac{400}{136} = \frac{50}{17}$$

Correct original fraction is $\frac{50}{17}$

Q.11

In the given figure, the value of a is



- A. 5°
- B. 10°
- C. 20°
- D. 50°

Answer: B

Sol:

We can see that angle BFC is a straight line, which means it measures 180 degrees.

We also know that angle BFD is 90 degrees.

Therefore, angle CFD must be $180 - 90 = 90$ degrees.

Now, we can see that angle CFD is divided into two angles: 40 degrees and $5a$ degrees.

So, we can write the equation:

$$40 + 5a = 90$$

Solving for a:

$$5a = 90 - 40$$

$$5a = 50$$

$$a = 10^\circ$$

Therefore, the value of a is 10 degrees.

Q.12 At what simple rate of interest a sum is double in 8 years ?

- A. 11.0 %
- B. 12.5 %
- C. 12 %
- D. 13.5 %

Answer: B

Sol:

1. **Substitute the known values** Simple Interest (SI) = (Principal x Rate x Time) / 100
2. Let the principal amount be 'P'.

Time (T) = 8 years

Simple Interest (SI) = P (since the sum doubles)

$P = (P * R * 8) / 100$

$1 = (R * 8) / 100$

$R = 100 / 8$

$R = 12.5\%$

Q.13 The largest number among $\sqrt{7}-\sqrt{5}$, $\sqrt{5}-\sqrt{3}$, $\sqrt{9}-\sqrt{7}$, $\sqrt{11}-\sqrt{9}$ is–

- A. $\sqrt{7}-\sqrt{5}$
- B. $\sqrt{5}-\sqrt{3}$
- C. $\sqrt{9}-\sqrt{7}$
- D. $\sqrt{11}-\sqrt{9}$

Answer: B

Sol: Given:

Expressions: $\sqrt{7} - \sqrt{5}$, $\sqrt{5} - \sqrt{3}$, $\sqrt{9} - \sqrt{7}$, $\sqrt{11} - \sqrt{9}$

Approximate values:

$\sqrt{3} \approx 1.732$, $\sqrt{5} \approx 2.236$, $\sqrt{7} \approx 2.646$

$\sqrt{9} = 3$, $\sqrt{11} \approx 3.317$

Differences:

$\sqrt{5} - \sqrt{3} \approx 0.504$

$\sqrt{7} - \sqrt{5} \approx 0.410$

$\sqrt{9} - \sqrt{7} \approx 0.354$

$\sqrt{11} - \sqrt{9} \approx 0.317$

Conclusion:

Largest value is $\sqrt{5} - \sqrt{3}$

Correct answer is (B) $\sqrt{5} - \sqrt{3}$

Q.14 A and B can do a piece of work in 12 days, B and C in 15 days, C and A in 20 days. How long would A take to do the same work alone?

- A. 10 days
- B. 40 days
- C. 30 days
- D. 20 days

Answer: C

Sol: Given:

$A + B = \frac{1}{12}$, $B + C = \frac{1}{15}$, $C + A = \frac{1}{20}$

Formula used:

Add all three equations: $(A + B) + (B + C) + (C + A) = 2(A + B + C)$

Solution:

$2(A + B + C) = \frac{1}{12} + \frac{1}{15} + \frac{1}{20}$

LCM of 12, 15, 20 = 60 => $\frac{5 + 4 + 3}{60} = \frac{12}{60} = \frac{1}{5}$

=> $A + B + C = \frac{1}{10}$

Now, $A = (A + B + C) - (B + C) = \frac{1}{10} - \frac{1}{15} = \frac{3 - 2}{30} = \frac{1}{30}$

Correct answer is (c) **30 days**

Exam Hall Method:

$$12, 15, 20 \} \rightarrow \textcircled{60} \text{ Total Work}$$

$$\begin{array}{rcl} A+B=5 & B+C=4 & C+A=3 \\ \hline 2(A+B+C)=12 & \rightarrow & A+B+C=6 \\ & \downarrow & \\ & A=6-4=2 & \end{array}$$

$$60/2 = \boxed{30}$$

Q.15 Find a point on the y-axis which is equidistant from the points A (6, 5) and B (-4, 3).

- A. (9, 0)
- B. (0, 9)
- C. (0, 0)
- D. (9, 9)

Answer: B

Sol: Given:

Points: A = (6, 5), B = (-4, 3)

Let point P on the y-axis be (0, y), and it is equidistant from A and B.

Formula used:

Distance formula:

$$\text{Distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Solution:

$$PA = \sqrt{(6 - 0)^2 + (5 - y)^2} = \sqrt{36 + (5 - y)^2}$$

$$PB = \sqrt{(-4 - 0)^2 + (3 - y)^2} = \sqrt{16 + (3 - y)^2}$$

Equating the distances:

$$\sqrt{36 + (5 - y)^2} = \sqrt{16 + (3 - y)^2}$$

Squaring both sides:

$$36 + (5 - y)^2 = 16 + (3 - y)^2$$

$$36 + 25 - 10y + y^2 = 16 + 9 - 6y + y^2$$

$$61 - 10y + y^2 = 25 - 6y + y^2$$

Canceling y^2 :

$$61 - 10y = 25 - 6y$$

$$36 = 4y \Rightarrow y = 9$$

So, the point is (0, 9)

Correct answer is (b) **(0, 9)**

Q.16 Eight solid spheres of equal size are made by melting a solid metal cylinder of base diameter 6 cm and height 32 cm. The diameter of each sphere is:

- A. 3 cm
- B. 6 cm
- C. 12 cm
- D. 8 cm

Answer: B

Sol: Given:

Cylinder base diameter = 6 cm $\rightarrow$ radius = 3 cm

Cylinder height = 32 cm

8 equal spheres are formed
Need diameter of each sphere

Formula used:

Volume of cylinder = $\pi r^2 h$

Volume of sphere = $(4/3)\pi R^3$

Solution:

$$V_{\text{cylinder}} = \pi \times 3^2 \times 32 = 288\pi$$

$$8 \times \frac{4}{3}\pi R^3 = 288\pi$$

$$\frac{32}{3}\pi R^3 = 288\pi$$

$$R^3 = \frac{288 \times 3}{32} = \frac{864}{32} = 27$$

$$R = 3 \text{ cm}$$

Diameter of each sphere = $2R = 6 \text{ cm}$
Correct answer is (b) 6 cm

- Q.17** For three non-zero real numbers a, b, c if $\frac{a}{2} = \frac{b}{3} = \frac{c}{4} = \frac{2a - 3b + 5c}{k}$, the value of K is
- A. 15
B. 10
C. 20
D. 25

Answer: A

Sol: Given:

$$\frac{a}{2} = \frac{b}{3} = \frac{c}{4} = \frac{2a - 3b + 5c}{k}$$

Formula used:

Let the common value be x. Then:

$$\frac{a}{2} = x \Rightarrow a = 2x$$

$$\frac{b}{3} = x \Rightarrow b = 3x$$

$$\frac{c}{4} = x \Rightarrow c = 4x$$

Solution:

$$\frac{2a - 3b + 5c}{k}$$

$$= \frac{2(2x) - 3(3x) + 5(4x)}{k}$$

$$= \frac{4x - 9x + 20x}{k}$$

$$= \frac{15x}{k}$$

Now equate this to x :

$$x = \frac{15x}{k} \Rightarrow k = 15$$

Correct answer is (A) **15**.

- Q.18** If the HCF of 65 and 117 is in the form $65m - 117$, then the value of m is.
- A. 1
B. 2
C. 3
D. 4

Answer: B

Sol: Given:

HCF of 65 and 117 is in the form "65m - 117".

Solution:

Apply the Euclidean algorithm to find the HCF of 65 and 117:

$$117 = 65 \times 1 + 52$$

$$65 = 52 \times 1 + 13$$

$$52 = 13 \times 4 + 0$$

So, the HCF is 13.

Now, express 13 as a linear combination of 65 and 117:

$$13 = 65 - 52$$

Since $52 = 117 - 65$, substitute this into the equation:

$$13 = 65 - (117 - 65)$$

$$13 = 65 - 117 + 65$$

$$13 = 2 \times 65 - 117$$

Comparing this with "65m - 117", we see that m = 2.

Correct answer is (b) **2**.

Q.19 If the length and breadth of a room is decreased by 10% and 20% respectively, while height is increased by 5%, then what percentage will be changes in the volume of the room?

- A. 24.4%
- B. 24.6%
- C. 24%
- D. 24.2%

Answer: A

Sol: Given:

Length ↓ 10%, Breadth ↓ 20%, Height ↑ 5%.

Concept used :

$V = L \times B \times H$; successive percentage changes multiply as factors.

Formula used:

$$V_{\text{new}} = V_{\text{old}} \times 0.90 \times 0.80 \times 1.05$$

Solution:

$$0.90 \times 0.80 = 0.72, \quad 0.72 \times 1.05 = 0.756.$$

$$\Rightarrow \frac{V_{\text{new}}}{V_{\text{old}}} = 0.756 = 75.6\%$$

$$\text{Change} = 100\% - 75.6\% = 24.4\%(\text{decrease}).$$

Correct answer is (A) 24.4% decrease.

Q.20 There are 10 persons in a party. If: each one of them shakes hand with others exactly once. The total number of handshakes is -

- A. 105
- B. 55
- C. 45
- D. None of these

Answer: C

Sol: Given:

Total number of persons = 10

Each person shakes hands with every other person **exactly once**

Concept used:

The total number of handshakes is the number of **combinations of 2 people from 10**, since a handshake involves 2 people and each pair shakes hands only once.

Formula used:

$$\text{Number of handshakes} = \frac{n}{2} = \frac{n(n-1)}{2}$$

Solution:

$$\frac{10 \times 9}{2} = 45$$



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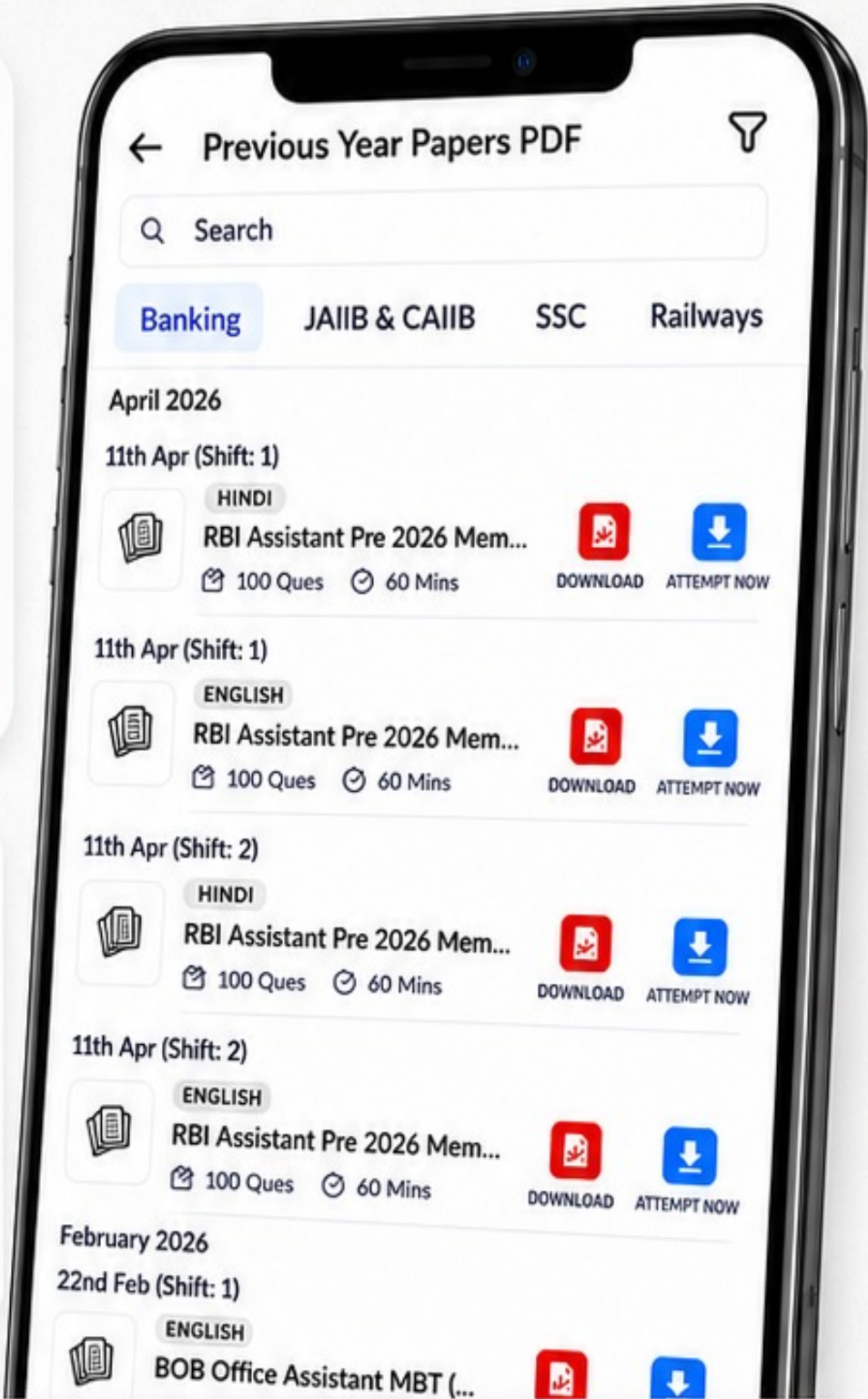
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Correct answer is (C) 45.

