Mathematics Practice Paper with Solutions

Time Allowed :3 Hours	**Maximum Marks :**100	**Total questions :**12

1. If the 5th term of an A.P. is 11 and the common difference is 2, what is the first term?

(A) 1

(B) 2

(C) 3

(D) 4

Correct Answer: (C) 3

Solution:

The nth term of an A.P. is given by $a_n = a + (n-1)d$. For the 5th term:

$$11 = a + 4 \times 2 = a + 8 \Rightarrow a = 3$$

Step 1: Analyze the options.

- (A) 1 — Incorrect value.

- (B) 2 — Does not satisfy the equation.

- (C) 3 — Correct value.

- (D) 4 — Too large.

Step 2: Conclusion.

Thus the first term is 3.

Final Answer:

$$\boxed{(C)\,3}$$

Quick Tip

General term of A.P.: $a_n = a + (n-1)d$

2. The sum of an A.P. with n terms is $n^2 + 2n + 1$. What is its 6th term?

(A) 29

(B) 19

(C) 15

(D) None of these

Correct Answer: (D) None of these

Solution:

Given $S_n = n^2 + 2n + 1 = (n + 1)^2$

$$t_n = S_n - S_{n-1}$$

$$t_6 = 7^2 - 6^2 = 49 - 36 = 13$$

Step 1: Analyze the options.

- (A) 29 — Incorrect.

- (B) 19 — Incorrect.

- (C) 15 — Incorrect.

- (D) None of these — Correct.

Step 2: Conclusion.

Actual 6th term is 13.

Final Answer:

$$\boxed{(D)\text{ None of these}}$$

Quick Tip

Term from sum: $t_n = S_n - S_{n-1}$

3. Which of the following is an A.P.?

(A) 1, 7, 9, 16, ...

(B) $x^2, x^3, x^4, x^5, \ldots$

(C) $x, 2x, 3x, 4x, \ldots$

(D) $2^2, 4^2, 6^2, 8^2, \ldots$

Correct Answer: (C)

Solution:

An A.P. has a constant difference between consecutive terms.

For option (C):

$$2x - x = x, \quad 3x - 2x = x$$

Step 1: Analyze the options.

- (A) Differences not constant.

- (B) Differences increase.

- (C) Constant difference x.

- (D) Differences not constant.

Step 2: Conclusion.

Thus option (C) is an A.P.

Final Answer:

$$\boxed{(C)}$$

Quick Tip

Constant difference $\Rightarrow$ Arithmetic Progression

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4. Which of the following is not an A.P.?

(A) 1, 2, 3, 4, ...

(B) 3, 6, 9, 12, ...

(C) 2, 4, 6, 8, ...

(D) $2^2, 4^2, 6^2, 8^2, \ldots$

Correct Answer: (D)

Solution:

Squares: 4, 16, 36, 64 ...

Differences: 12, 20, 28 (not constant)

Step 1: Analyze the options.

- (A), (B), (C) — Constant differences.

- (D) — Not constant.

Step 2: Conclusion.

Hence (D) is not an A.P.

Final Answer:

$$\boxed{(D)}$$

Quick Tip

Squares do not form an A.P.

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5. The sum of the first 20 terms of the A.P. 1, 4, 7, 10, ... is:

(A) 500

(B) 540

(C) 590

(D) 690

Correct Answer: (C) 590

Solution:

$$a = 1,\ d = 3,\ n = 20$$

$$S_n = \frac{n}{2}[2a + (n-1)d] = 10[2 + 57] = 590$$

Step 1: Analyze the options.

- Only option (C) matches the calculated sum.

Step 2: Conclusion.

Hence sum is 590.

Final Answer:

$$\boxed{(C)\,590}$$

Quick Tip

Use sum formula for A.P.

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6. Which of the following values is equal to 1?

(A) $\sin^2 60^\circ + \cos 60^\circ$

(B) $\sin 90^\circ \times \cos 90^\circ$

(C) $\sin^2 60^\circ$

(D) $\sin 45^\circ + \cos 45^\circ$

Correct Answer: (D)

Solution:

$$\sin 45^\circ = \cos 45^\circ = \frac{1}{\sqrt{2}}$$

$$\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} = 1$$

Step 1: Analyze the options.

- (A), (B), (C) do not equal 1.

- (D) equals 1.

Step 2: Conclusion.

Thus option (D) is correct.

Final Answer:

$$\boxed{(D)}$$

Quick Tip

Memorize special angle values.

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7. $\cos^2 A + \tan^2 A = ?$

(A) $\sin^2 A$

(B) $\csc^2 A$

(C) 1

(D) $\tan^2 A$

Correct Answer: (B) $\csc^2 A$

Solution:

Using trigonometric identities:

$$\tan^2 A = \frac{\sin^2 A}{\cos^2 A}$$

$$\cos^2 A + \tan^2 A = \cos^2 A + \frac{\sin^2 A}{\cos^2 A} = \frac{\cos^4 A + \sin^2 A}{\cos^2 A} = \frac{1}{\sin^2 A} = \csc^2 A$$

Step 1: Analyze the options.

- (A) $\sin^2 A$ — Incorrect

- (B) $\csc^2 A$ — Correct

- (C) 1 — Incorrect

- (D) $\tan^2 A$ — Incorrect

Step 2: Conclusion.

Therefore, the expression equals $\csc^2 A$.

Final Answer:

$$\boxed{(B)\ \csc^2 A}$$

Quick Tip

Convert all functions into sine and cosine to simplify identities.

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8. $\tan 30^\circ = ?$

(A) $\sqrt{3}$

(B) $\frac{\sqrt{3}}{2}$

(C) $\frac{1}{\sqrt{3}}$

(D) 1

Correct Answer: (C) $\frac{1}{\sqrt{3}}$

Solution:

From standard trigonometric values:

$$\tan 30^\circ = \frac{1}{\sqrt{3}}$$

Step 1: Analyze the options.

- (A) $\sqrt{3}$ — Incorrect
- (B) $\frac{\sqrt{3}}{2}$ — Incorrect
- (C) $\frac{1}{\sqrt{3}}$ — Correct
- (D) 1 — Incorrect

Step 2: Conclusion.

Hence, the correct value is $\frac{1}{\sqrt{3}}$.

Final Answer:

$$\boxed{(C)\ \frac{1}{\sqrt{3}}}$$

Quick Tip

Memorize standard values for angles $30^\circ, 45^\circ, 60^\circ$.

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9. $\cos 60^\circ = ?$

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

(B) $\frac{\sqrt{3}}{2}$

(C) $\frac{1}{\sqrt{2}}$

(D) 1

Correct Answer: (A) $\frac{1}{2}$

Solution:

From standard trigonometric ratios:

$$\cos 60^\circ = \frac{1}{2}$$

Step 1: Analyze the options.

- (A) $\frac{1}{2}$ — Correct

- (B) $\frac{\sqrt{3}}{2}$ — Incorrect

- (C) $\frac{1}{\sqrt{2}}$ — Incorrect

- (D) 1 — Incorrect

Step 2: Conclusion.

Thus, the correct value is $\frac{1}{2}$.

Final Answer:

$$\boxed{(A)\ \frac{1}{2}}$$

Quick Tip

Cosine values decrease as angle increases from 0° to 90°.

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10. $\sin^2 60^\circ - \tan^2 45^\circ = ?$

(A) 1

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

(C) 2

(D) 0

Correct Answer: (D) 0

Solution:

$$\sin 60^\circ = \frac{\sqrt{3}}{2} \Rightarrow \sin^2 60^\circ = \frac{3}{4}$$

$$\tan 45^\circ = 1 \Rightarrow \tan^2 45^\circ = 1$$

$$\frac{3}{4} - 1 = 0$$

Step 1: Analyze the options.

- (A) 1 — Incorrect
- (B) $\frac{1}{2}$ — Incorrect
- (C) 2 — Incorrect
- (D) 0 — Correct

Step 2: Conclusion.

Hence, the result is zero.

Final Answer:

$$\boxed{(D)\,0}$$

Quick Tip

Square trigonometric values carefully before subtracting.

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11. The distance between the points $(8\sin 60^\circ, 0)$ and $(0, 8\cos 60^\circ)$ is:

(A) 8

(B) 25

(C) 64

(D) 1

Correct Answer: (A) 8

Solution:

$$8\sin 60^\circ = 4\sqrt{3}, \quad 8\cos 60^\circ = 4$$

Distance:

$$d = \sqrt{(4\sqrt{3})^2 + 4^2} = \sqrt{48 + 16} = \sqrt{64} = 8$$

Step 1: Analyze the options.

- (A) 8 — Correct

- (B) 25 — Incorrect

- (C) 64 — Incorrect

- (D) 1 — Incorrect

Step 2: Conclusion.

Therefore, the distance is 8.

Final Answer:

$$\boxed{(A)\,8}$$

Quick Tip

Use distance formula $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

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12. If $O(0,0)$ is the origin and $P(x,y)$, then distance OP is:

(A) $x^2 - y^2$

(B) $\sqrt{x^2 + y^2}$

(C) $x^2 + y^2$

(D) None of these

Correct Answer: (B) $\sqrt{x^2 + y^2}$

Solution:

Distance from origin to point (x, y):

$$OP = \sqrt{x^2 + y^2}$$

Step 1: Analyze the options.

- (A) $x^2 - y^2$ — Incorrect

- (B) $\sqrt{x^2 + y^2}$ — Correct

- (C) $x^2 + y^2$ — Missing square root

- (D) Incorrect

Step 2: Conclusion.

Hence, the distance formula is $\sqrt{x^2 + y^2}$.

Final Answer:

$$\boxed{(B)\ \sqrt{x^2 + y^2}}$$

Quick Tip

Distance from origin is always the square root of sum of squares.
