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MATHEMATICS

100 SOLVED MCQs

Correct Answers Ticked & Highlighted
Clear Step-by-Step Explanations

100	10	100
MCQs	Topics	Solutions

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Welcome, Scholar!

This book contains **100 solved Mathematics MCQs** arranged in 10 topics. Every page holds one question, its options and a full explanation.

How to read each page

✔ **Green box** = the correct option, ticked and highlighted.

A Other options stay plain white.

★ The **blue box** below each question explains the solution step by step.

Topics inside

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TOPIC 1 OF 10

Arithmetic & Number System

Questions 1 – 10

What you will practise

LCM, HCF, percentages, ratios, interest, speed and primes.

Question 1

What is the LCM of 12, 18 and 24?

A	36
B	48
C	**72** ✔
D	96

Explanation

✔ Correct Answer: C) 72

Prime factorise: $12 = 2^2 \times 3$, $18 = 2 \times 3^2$, $24 = 2^3 \times 3$. The LCM takes the highest power of every prime: $2^3 \times 3^2 = 8 \times 9 = 72$. Check: $72 \div 12 = 6$, $72 \div 18 = 4$ and $72 \div 24 = 3$, all exact.

Question 2

What is the HCF of 36 and 84?

A	6
B	**12** ✔
C	18
D	24

Explanation

✔ Correct Answer: B) 12

$36 = 2^2 \times 3^2$ and $84 = 2^2 \times 3 \times 7$. The HCF takes the lowest power of each common prime: $2^2 \times 3 = 12$. Check: $36 \div 12 = 3$ and $84 \div 12 = 7$, with no common factor left.

Question 3

Find the value of 25% of 480 + 15% of 200.

A	**150**	✔
B	140	
C	120	
D	160	

Explanation

✔ Correct Answer: A) 150

25% of 480 = 480 × 25/100 = 120. 15% of 200 = 200 × 15/100 = 30. Adding both parts: 120 + 30 = 150.

Question 4

A shirt marked at Rs. 800 is sold at a 20% discount. What is the selling price?

A	Rs. 600
B	Rs. 680
C	Rs. 720
D	**Rs. 640** ✔

Explanation

✔ Correct Answer: D) Rs. 640

Discount = 800 × 20/100 = Rs. 160. Selling price = marked price − discount = 800 − 160 = Rs. 640. Shortcut: paying 80% of 800 gives 0.8 × 800 = 640.

Question 5

Find the simple interest on Rs. 5000 at 8% per annum for 3 years.

A	Rs. 1000
B	**Rs. 1200** ✔
C	Rs. 1500
D	Rs. 1600

Explanation

✔ Correct Answer: B) Rs. 1200

Simple Interest = (P × R × T) / 100. Substituting: (5000 × 8 × 3) / 100 = 120000 / 100 = Rs. 1200.

Question 6

Which of the following is a prime number?

A	51
B	57
C	91
D	**61** ✔

Explanation

✔ Correct Answer: D) 61

51 = 3 × 17, 57 = 3 × 19 and 91 = 7 × 13, so each has factors other than 1 and itself. 61 is not divisible by 2, 3, 5 or 7 (all primes up to √61 ≈ 7.8), so 61 is prime.

Question 7

Two numbers are in the ratio 3 : 5 and their sum is 64. What is the larger number?

A	24
B	32
C	**40** ✔
D	44

Explanation

✔ Correct Answer: C) 40

Total ratio parts = 3 + 5 = 8, so one part = 64 ÷ 8 = 8. The larger number = 5 × 8 = 40 and the smaller = 3 × 8 = 24. Check: 40 + 24 = 64.

Question 8

A train running at 60 km/h covers 150 km. How much time does it take?

A	2 hours
B	**2.5 hours** ✔
C	3 hours
D	2.25 hours

Explanation

✔ Correct Answer: B) 2.5 hours

Time = Distance ÷ Speed = 150 ÷ 60 = 2.5 hours, which is 2 hours 30 minutes.

Question 9

What is the average of the first 10 natural numbers?

A	**5.5**	✔
B	5	
C	6	
D	10	

Explanation

✔ Correct Answer: A) 5.5

Sum of the first n natural numbers = n(n+1)/2 = 10 × 11 / 2 = 55. Average = 55 ÷ 10 = 5.5.

Question 10

Find the value of $\sqrt{144} + \sqrt[3]{27}$.

A	14
B	13
C	16
D	**15** ✔

Explanation

✔ Correct Answer: D) 15

$\sqrt{144} = 12$ because $12 \times 12 = 144$. $\sqrt[3]{27} = 3$ because $3 \times 3 \times 3 = 27$. Therefore the sum is $12 + 3 = 15$.

TOPIC 2 OF 10

Algebra

Questions 11 – 20

What you will practise

Identities, factorisation, indices and linear equations.

Question 11

What is the expansion of $(a + b)^2$?

A	$a^2 + b^2$
B	**$a^2 + 2ab + b^2$** ✔
C	$a^2 - 2ab + b^2$
D	$2a + 2b$

Explanation

✔ Correct Answer: B) $a^2 + 2ab + b^2$

$(a + b)^2 = (a + b)(a + b) = a^2 + ab + ba + b^2 = a^2 + 2ab + b^2$. Option A misses the middle term $2ab$, a very common mistake.

Question 12

If $x + 1/x = 3$, what is the value of $x^2 + 1/x^2$?

A	**7**	✔
B	9	
C	5	
D	11	

Explanation

✔ Correct Answer: A) 7

Square both sides: $(x + 1/x)^2 = x^2 + 2 + 1/x^2 = 9$.

Subtract 2 from both sides: $x^2 + 1/x^2 = 9 - 2 = 7$.

Question 13

Factorise $x^2 - 9$.

A	$(x - 3)^2$
B	$(x + 3)^2$
C	**$(x - 3)(x + 3)$** ✔
D	$(x - 9)(x + 1)$

Explanation

✔ Correct Answer: C) $(x - 3)(x + 3)$

$x^2 - 9 = x^2 - 3^2$, which is a difference of two squares. Using $a^2 - b^2 = (a - b)(a + b)$ gives $(x - 3)(x + 3)$.

Question 14

Find the value of (a − b)(a + b) when a = 7 and b = 3.

A	58
B	16
C	46
D	**40** ✔

Explanation

✔ Correct Answer: D) 40

(a − b)(a + b) = a² − b² = 49 − 9 = 40. Direct method: (7 − 3)(7 + 3) = 4 × 10 = 40.

Question 15

Simplify $2^3 \times 2^4$.

A	4096
B	**128** ✔
C	64
D	256

Explanation

✔ Correct Answer: B) 128

When multiplying powers with the same base, add the exponents: $2^3 \times 2^4 = 2^{3+4} = 2^7 = 128$. Do not multiply the exponents (that gives 4096).

Question 16

Solve for x: 3x − 7 = 11.

A	4
B	5
C	**6** ✔
D	7

Explanation

✔ Correct Answer: C) 6

Add 7 to both sides: 3x = 18. Divide both sides by 3: x = 6. Check: 3(6) − 7 = 18 − 7 = 11.

Question 17

If 2x + 3y = 12 and x = 3, what is the value of y?

A	3
B	4
C	1
D	**2** ✔

Explanation

✔ Correct Answer: D) 2

Substitute x = 3: 2(3) + 3y = 12, so 6 + 3y = 12.

Then 3y = 6 and y = 2.

Question 18

What is the sum of the roots of $x^2 - 5x + 6 = 0$?

A	**5**	✔
B	6	
C	−5	
D	1	

Explanation

✔ Correct Answer: A) 5

For $ax^2 + bx + c = 0$, the sum of roots = $-b/a$ = $-(-5)/1 = 5$. Check: the equation factors as $(x - 2)(x - 3)$, roots 2 and 3, and $2 + 3 = 5$.

Question 19

Which of the following equals $a^3 + b^3$?

A	$(a - b)(a^2 + ab + b^2)$
B	$(a + b)(a^2 + ab + b^2)$
C	**$(a + b)(a^2 - ab + b^2)$** ✔
D	$(a + b)^3$

Explanation

✔ Correct Answer: C) $(a + b)(a^2 - ab + b^2)$

The sum of cubes identity is $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$. Test with $a = 2$, $b = 1$: $8 + 1 = 9$ and $(3)(4 - 2 + 1) = 9$. ✔

Question 20

If 5^(x+1) = 125, find x.

A	1
B	3
C	**2** ✔
D	4

Explanation

✔ Correct Answer: C) 2

Write 125 as a power of 5: 125 = 5^3. So 5^(x+1) = 5^3, which means x + 1 = 3. Hence x = 2.

TOPIC 3 OF 10

Quadratics & Inequalities

Questions 21 – 30

What you will practise

Roots, discriminant, modulus, inequalities and simultaneous equations.

Question 21

Find the roots of $x^2 - 7x + 12 = 0$.

A	2 and 6
B	**3 and 4** ✔
C	−3 and −4
D	1 and 12

Explanation

✔ Correct Answer: B) 3 and 4

Find two numbers with product 12 and sum 7: they are 3 and 4. So $x^2 - 7x + 12 = (x - 3)(x - 4) = 0$, giving $x = 3$ or $x = 4$.

Question 22

What is the discriminant of $x^2 + 4x + 4 = 0$?

A	8
B	16
C	**0** ✔
D	−16

Explanation

✔ Correct Answer: C) 0

Discriminant $D = b^2 - 4ac = 4^2 - 4(1)(4) = 16 - 16 = 0$. Since $D = 0$, the roots are real and equal ($x = -2$ twice).

Question 23

If the discriminant of a quadratic equation is negative, the roots are:

A	Real and equal
B	Real and distinct
C	Rational and unequal
D	**Two complex (non-real) roots** ✔

Explanation

✔ Correct Answer: D) Two complex (non-real) roots

If $D < 0$ then $\sqrt{D}$ is imaginary, so the quadratic formula gives a pair of complex conjugate roots. The graph of the parabola never touches the x-axis.

Question 24

What is the product of the roots of $2x^2 - 8x + 6 = 0$?

A	**3**	✔
B	4	
C	−4	
D	6	

Explanation

✔ Correct Answer: A) 3

Product of roots = c/a = 6/2 = 3. Check: dividing by 2 gives $x^2 - 4x + 3 = (x - 1)(x - 3)$, roots 1 and 3, and $1 \times 3 = 3$.

Question 25

Solve |x − 2| = 5.

A	x = 7 only
B	x = −3 only
C	**x = 7 or x = −3** ✔
D	x = 3 or x = −7

Explanation

✔ Correct Answer: C) x = 7 or x = −3

|A| = 5 means A = 5 or A = −5. So x − 2 = 5 gives x = 7, and x − 2 = −5 gives x = −3. Both values satisfy the equation.

Question 26

Solve the inequality 2x + 5 < 13.

A	x < 8
B	x > 4
C	x < 9
D	**x < 4** ✔

Explanation

✔ Correct Answer: D) x < 4

Subtract 5 from both sides: 2x < 8. Divide by 2 (a positive number, so the inequality sign stays): x < 4.

Question 27

If x + y = 10 and x − y = 2, what is x?

A	4
B	**6** ✔
C	8
D	2

Explanation

✔ Correct Answer: B) 6

Add the two equations: 2x = 12, so x = 6. Then y = 10 − 6 = 4. Check: 6 − 4 = 2 ✔.

Question 28

What are the roots of $x^2 - 2x - 3 = 0$?

A	−3 and 1
B	3 and 1
C	**3 and −1** ✔
D	−3 and −1

Explanation

✔ Correct Answer: C) 3 and −1

Look for two numbers with product −3 and sum −2: they are −3 and +1. Then $x^2 - 2x - 3 = (x - 3)(x + 1) = 0$, so $x = 3$ or $x = -1$.

Question 29

If $x = 3$ is a root of $x^2 - kx + 12 = 0$, find k.

A	**7**	✔
B	3	
C	4	
D	5	

Explanation

✔ Correct Answer: A) 7

Substitute $x = 3$: $9 - 3k + 12 = 0$, so $21 - 3k = 0$.

Therefore $k = 7$. Check: $x^2 - 7x + 12 = (x - 3)(x - 4)$.

Question 30

What is the sum of the squares of the roots of $x^2 - 6x + 8 = 0$?

A	36
B	28
C	**20** ✔
D	12

Explanation

✔ Correct Answer: C) 20

The roots are 2 and 4 because $(x - 2)(x - 4) = x^2 - 6x + 8$. Sum of squares = $2^2 + 4^2 = 4 + 16 = 20$. Also $(\text{sum})^2 - 2(\text{product}) = 36 - 16 = 20$.

TOPIC 4 OF 10

Geometry

Questions 31 – 40

What you will practise

Triangles, polygons, circles and angle properties.

Question 31

What is the sum of the interior angles of a triangle?

A	90°
B	**180°** ✔
C	270°
D	360°

Explanation

✔ Correct Answer: B) 180°

In every triangle the three interior angles add up to 180°. This is proved by drawing a line through one vertex parallel to the opposite side and using alternate angles.

Question 32

What is the sum of the interior angles of a hexagon?

A	540°
B	900°
C	1080°
D	**720°** ✔

Explanation

✔ Correct Answer: D) 720°

Sum of interior angles of an n-sided polygon = (n − 2) × 180°. For a hexagon n = 6, so (6 − 2) × 180° = 4 × 180° = 720°.

Question 33

The two shorter sides of a right-angled triangle are 6 cm and 8 cm. Find the hypotenuse.

A	14 cm
B	12 cm
C	9 cm
D	**10 cm** ✔

Explanation

✔ Correct Answer: D) 10 cm

By Pythagoras: $h^2 = 6^2 + 8^2 = 36 + 64 = 100$.

Therefore $h = \sqrt{100} = 10$ cm. (6, 8, 10) is a multiple of the (3, 4, 5) triple.

Question 34

What is the measure of each interior angle of a regular pentagon?

A	100°
B	**108°** ✔
C	120°
D	72°

Explanation

✔ Correct Answer: B) 108°

Sum of interior angles = (5 − 2) × 180° = 540°. A regular pentagon has 5 equal angles, so each is 540° ÷ 5 = 108°.

Question 35

An angle inscribed in a semicircle measures:

A	45°
B	60°
C	**90°** ✔
D	180°

Explanation

✔ Correct Answer: C) 90°

The angle in a semicircle theorem states that any angle subtended by a diameter at the circumference is a right angle, i.e. 90°.

Question 36

How many diagonals does an octagon have?

A	**20**	✔
B	16	
C	24	
D	40	

Explanation

✔ Correct Answer: A) 20

Number of diagonals = n(n − 3)/2. For n = 8: 8 × 5 / 2 = 40 / 2 = 20 diagonals.

Question 37

Each exterior angle of a regular polygon is 36°. How many sides does it have?

A	8
B	9
C	**10** ✔
D	12

Explanation

✔ Correct Answer: C) 10

The exterior angles of any convex polygon add up to 360°. Number of sides = 360° ÷ 36° = 10, so it is a decagon.

Question 38

Two angles are supplementary. If one is 65°, what is the other?

A	25°
B	125°
C	295°
D	**115°** ✔

Explanation

✔ Correct Answer: D) 115°

Supplementary angles add up to 180°. The other angle = 180° − 65° = 115°. (25° would be the complement, since complementary angles add to 90°.)

Question 39

A triangle has sides 5 cm, 12 cm and 13 cm. What type of triangle is it?

A	Acute-angled
B	Obtuse-angled
C	**Right-angled** ✔
D	Equilateral

Explanation

✔ Correct Answer: C) Right-angled

Test Pythagoras with the longest side: $5^2 + 12^2 = 25 + 144 = 169 = 13^2$. The equation holds, so the triangle is right-angled.

Question 40

What is the angle between the hour hand and the minute hand of a clock at 3:00?

A	**90°**	✔
B	60°	
C	120°	
D	180°	

Explanation

✔ Correct Answer: A) 90°

The clock face has 360° divided into 12 hours, so each hour is 30°. At 3:00 the hands are 3 hours apart: 3 × 30° = 90°.

TOPIC 5 OF 10

Mensuration

Questions 41 – 50

What you will practise

Areas and volumes of plane and solid shapes (use π = 22/7).

Question 41

Find the area of a circle of radius 7 cm. (π = 22/7)

A	44 cm²
B	**154 cm²** ✔
C	308 cm²
D	22 cm²

Explanation

✔ Correct Answer: B) 154 cm²

Area = πr² = (22/7) × 7 × 7 = 22 × 7 = 154 cm².

Option A (44) is the circumference, not the area.

Question 42

Find the circumference of a circle with radius 14 cm. (π = 22/7)

A	44 cm
B	176 cm
C	616 cm
D	**88 cm** ✔

Explanation

✔ Correct Answer: D) 88 cm

Circumference = 2πr = 2 × (22/7) × 14 = 2 × 22 × 2 = 88 cm. (616 cm² would be the area, which is a different quantity.)

Question 43

What is the volume of a cube of side 5 cm?

A	25 cm³
B	75 cm³
C	**125 cm³** ✔
D	150 cm³

Explanation

✔ **Correct Answer: C) 125 cm³**

Volume of a cube = side³ = 5 × 5 × 5 = 125 cm³.

Question 44

Find the area of a triangle with base 10 cm and height 6 cm.

A	**30 cm²** ✔
B	60 cm²
C	16 cm²
D	45 cm²

Explanation

✔ Correct Answer: A) 30 cm²

Area = ½ × base × height = ½ × 10 × 6 = 30 cm².

The value 60 is the area of a rectangle with the same base and height.

Question 45

Find the volume of a cylinder with radius 7 cm and height 10 cm. (π = 22/7)

A	440 cm³
B	770 cm³
C	**1540 cm³** ✔
D	3080 cm³

Explanation

✔ Correct Answer: C) 1540 cm³

Volume = πr²h = (22/7) × 7 × 7 × 10 = 22 × 7 × 10 = 1540 cm³.

Question 46

Find the surface area of a sphere of radius 7 cm. (π = 22/7)

A	154 cm²
B	**616 cm²** ✔
C	1437 cm²
D	308 cm²

Explanation

✔ Correct Answer: B) 616 cm²

Surface area of a sphere = $4\pi r^2 = 4 \times (22/7) \times 49 = 4 \times 22 \times 7 = 616$ cm². (1437 cm³ is the volume, $(4/3)\pi r^3$.)

Question 47

A rectangle has perimeter 36 cm and length 10 cm. What is its area?

A	64 cm²
B	72 cm²
C	100 cm²
D	**80 cm²** ✔

Explanation

✔ Correct Answer: D) 80 cm²

Perimeter = 2(l + w) = 36, so l + w = 18 and w = 18 − 10 = 8 cm. Area = l × w = 10 × 8 = 80 cm².

Question 48

Find the volume of a cone with radius 3 cm and height 7 cm. (π = 22/7)

A	**66 cm³**	✔
B	198 cm³	
C	22 cm³	
D	132 cm³	

Explanation

✔ Correct Answer: A) 66 cm³

Volume of a cone = ⅓πr²h = ⅓ × (22/7) × 9 × 7 = ⅓ × 22 × 9 = 66 cm³.

Question 49

What is the length of the diagonal of a square of side 10 cm?

A	10 cm
B	**10√2 cm** ✔
C	20 cm
D	100 cm

Explanation

✔ Correct Answer: B) 10√2 cm

The diagonal splits the square into a right triangle with both legs 10 cm. So $d^2 = 10^2 + 10^2 = 200$ and $d = \sqrt{200} = 10\sqrt{2}$ cm (about 14.14 cm).

Question 50

What is the total surface area of a cube of side 6 cm?

A	36 cm²
B	144 cm²
C	72 cm²
D	**216 cm²** ✔

Explanation

✔ Correct Answer: D) 216 cm²

A cube has 6 identical square faces, so TSA = $6a^2$ = 6 × 6^2 = 6 × 36 = 216 cm².

TOPIC 6 OF 10

Trigonometry

Questions 51 – 60

What you will practise

Standard ratios, identities and complementary angles.

Question 51

What is the value of sin 30°?

A	√3/2
B	**1/2** ✔
C	1
D	1/√2

Explanation

✔ Correct Answer: B) 1/2

From the standard table, sin 30° = 1/2. It can be seen in a 30°-60°-90° triangle: the side opposite 30° is half of the hypotenuse.

Question 52

What is the value of tan 45°?

A	0
B	√3
C	**1** ✔
D	1/√3

Explanation

✔ Correct Answer: C) 1

At 45° the opposite and adjacent sides of the right triangle are equal, so tan 45° = opposite / adjacent = 1.

Question 53

Which identity is always true?

A	**$\sin^2\theta + \cos^2\theta = 1$** ✔
B	$\sin^2\theta + \cos^2\theta = 0$
C	$\sin^2\theta + \cos^2\theta = 2$
D	$\sin^2\theta + \cos^2\theta = \sin 2\theta$

Explanation

✔ Correct Answer: A) $\sin^2\theta + \cos^2\theta = 1$

This is the fundamental Pythagorean identity. In a unit circle, $\cos\theta$ and $\sin\theta$ are the x and y coordinates, and $x^2 + y^2 = 1$.

Question 54

What is the value of tan 60°?

A	1/√3
B	1
C	√3/2
D	**√3** ✔

Explanation

✔ Correct Answer: D) √3

In a 30°-60°-90° triangle with sides 1, √3 and 2, tan 60° = opposite / adjacent = √3 / 1 = √3.

Question 55

What is the value of cosec 30°?

A	1/2
B	**2** ✔
C	√2
D	2/√3

Explanation

✔ Correct Answer: B) 2

cosec θ = 1/sin θ. Since sin 30° = 1/2, cosec 30° = 1 ÷ (1/2) = 2.

Question 56

If sin θ = 3/5 and θ is acute, find cos θ.

A	3/4
B	5/3
C	**4/5** ✔
D	5/4

Explanation

✔ Correct Answer: C) 4/5

Use $\cos^2\theta = 1 - \sin^2\theta = 1 - 9/25 = 16/25$. So $\cos\theta = 4/5$ (positive, as θ is acute). This is the classic 3-4-5 triangle.

Question 57

What is the value of $\sec^2\theta - \tan^2\theta$?

A	-1
B	0
C	**1** ✔
D	2

Explanation

✔ Correct Answer: C) 1

Divide $\sin^2\theta + \cos^2\theta = 1$ by $\cos^2\theta$ to get $\tan^2\theta + 1 = \sec^2\theta$. Rearranging gives $\sec^2\theta - \tan^2\theta = 1$.

Question 58

Find the value of sin 45° × cos 45°.

A	1
B	√2
C	1/√2
D	**1/2** ✔

Explanation

✔ Correct Answer: D) 1/2

sin 45° = cos 45° = 1/√2. Their product is (1/√2) × (1/√2) = 1/2.

Question 59

sin(90° − θ) is equal to:

A	**cos θ** ✔
B	sin θ
C	−sin θ
D	cot θ

Explanation

✔ Correct Answer: A) cos θ

Complementary angle rule: sin(90° − θ) = cos θ.

Example: sin 60° = cos 30° = √3/2.

Question 60

If tan θ = 1 and 0° < θ < 90°, find θ.

A	30°
B	**45°** ✔
C	60°
D	90°

Explanation

✔ Correct Answer: B) 45°

tan 45° = 1 and tan is increasing between 0° and 90°, so θ = 45° is the only solution in this range.

TOPIC 7 OF 10

Coordinate Geometry

Questions 61 – 70

What you will practise

Distance, midpoint, slope and straight-line equations.

Question 61

Find the distance between the points (0, 0) and (3, 4).

A	7
B	25
C	**5** ✔
D	12

Explanation

✔ Correct Answer: C) 5

Distance = $\sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]} = \sqrt{(3^2 + 4^2)} = \sqrt{(9 + 16)} = \sqrt{25} = 5$ units.

Question 62

Find the midpoint of the line joining (2, 4) and (6, 10).

A	(8, 14)
B	(2, 3)
C	(4, 6)
D	**(4, 7)** ✔

Explanation

✔ Correct Answer: D) (4, 7)

Midpoint = $((x_1 + x_2)/2, (y_1 + y_2)/2) = ((2 + 6)/2, (4 + 10)/2) = (8/2, 14/2) = (4, 7)$.

Question 63

Find the slope of the line passing through (1, 2) and (3, 8).

A	**3**	✔
B	2	
C	6	
D	4	

Explanation

✔ Correct Answer: A) 3

Slope $m = (y_2 - y_1)/(x_2 - x_1) = (8 - 2)/(3 - 1) = 6/2 = 3$.

Question 64

What is the y-intercept of the line y = 2x + 3?

A	2
B	−3/2
C	**3** ✔
D	5

Explanation

✔ Correct Answer: C) 3

In the form y = mx + c, c is the y-intercept. Here c = 3. Put x = 0: y = 2(0) + 3 = 3, so the line crosses the y-axis at (0, 3).

Question 65

What is the distance of the point (−5, 12) from the origin?

A	17
B	**13** ✔
C	7
D	12

Explanation

✔ Correct Answer: B) 13

Distance from origin = $\sqrt{(x^2 + y^2)} = \sqrt{(25 + 144)} = \sqrt{169} = 13$ units. The negative sign vanishes because it is squared.

Question 66

What is the slope of any line parallel to y = 3x − 5?

A	−5
B	−1/3
C	5
D	**3** ✔

Explanation

✔ Correct Answer: D) 3

Parallel lines have equal slopes. The given line is in the form y = mx + c with m = 3, so every parallel line also has slope 3.

Question 67

In which quadrant does the point (−3, 4) lie?

A	First
B	Third
C	**Second** ✔
D	Fourth

Explanation

✔ Correct Answer: C) Second

A negative x-value and a positive y-value place the point in the second quadrant (top-left of the plane).

Question 68

Find the area of the triangle with vertices (0, 0), (4, 0) and (0, 3).

A	**6 sq. units**	✔
B	12 sq. units	
C	7 sq. units	
D	3 sq. units	

Explanation

✔ Correct Answer: A) 6 sq. units

The triangle is right-angled at the origin with base 4 and height 3. Area = ½ × 4 × 3 = 6 square units.

Question 69

If a line has slope 2, what is the slope of a line perpendicular to it?

A	2
B	−2
C	1/2
D	**−1/2** ✔

Explanation

✔ Correct Answer: D) −1/2

For perpendicular lines, $m_1 \times m_2 = -1$. So $m_2 = -1/2$. It is the negative reciprocal of 2.

Question 70

What is the equation of the line through (0, 0) and (2, 6)?

A	y = 2x
B	**y = 3x** ✔
C	y = x/3
D	y = 6x

Explanation

✔ Correct Answer: B) y = 3x

Slope = (6 − 0)/(2 − 0) = 3. The line passes through the origin, so c = 0 and the equation is y = 3x. Check: x = 2 gives y = 6 ✔.

TOPIC 8 OF 10

Calculus

Questions 71 – 80

What you will practise

Differentiation, integration, limits and optimisation basics.

Question 71

What is d/dx (x³)?

A	3x
B	x^2
C	**$3x^2$** ✔
D	$2x^3$

Explanation

✔ Correct Answer: C) $3x^2$

Power rule: d/dx (x^n) = $n \cdot x^{n-1}$. With n = 3, the derivative is $3x^{3-1} = 3x^2$.

Question 72

Evaluate ∫ 2x dx.

A	**$x^2 + C$** ✔
B	$2x^2 + C$
C	$x + C$
D	$2 + C$

Explanation

✔ Correct Answer: A) $x^2 + C$

Power rule for integration: $\int x^n\,dx = x^{n+1}/(n + 1) + C$. So $\int 2x\,dx = 2 \times x^2/2 + C = x^2 + C$. Differentiating x^2 gives back $2x$.

Question 73

What is d/dx (sin x)?

A	−cos x
B	−sin x
C	tan x
D	**cos x** ✔

Explanation

✔ Correct Answer: D) cos x

The derivative of sin x is cos x. (The derivative of cos x is −sin x, which is why −sin x is a tempting but wrong choice.)

Question 74

Find lim (x→0) of sin x / x.

A	0
B	∞
C	**1** ✔
D	−1

Explanation

✔ Correct Answer: C) 1

This is a standard limit. As x gets very small (in radians), sin x ≈ x, so the ratio approaches 1. For example, with x = 0.01, sin x / x ≈ 0.99998.

Question 75

What is d/dx (e^x)?

A	1/x
B ✔	e^x
C	$x \cdot e^{x-1}$
D	0

Explanation

✔ Correct Answer: B) e^x

The exponential function e^x is its own derivative. The power rule does not apply here because the variable is in the exponent, not the base.

Question 76

Evaluate ∫ cos x dx.

A	**sin x + C** ✔
B	−sin x + C
C	cos x + C
D	tan x + C

Explanation

✔ Correct Answer: A) sin x + C

Since d/dx (sin x) = cos x, the antiderivative of cos x is sin x + C.

Question 77

If $f(x) = 5x^2 + 3x$, find $f'(1)$.

A	8
B	10
C	15
D	**13** ✔

Explanation

✔ Correct Answer: D) 13

Differentiate: $f'(x) = 10x + 3$. At $x = 1$: $f'(1) = 10(1) + 3 = 13$.

Question 78

Evaluate the definite integral ∫ from 0 to 2 of x dx.

A	1
B	**2** ✔
C	4
D	8

Explanation

✔ Correct Answer: B) 2

∫x dx = x²/2. Apply the limits: (2²/2) − (0²/2) = 2 − 0 = 2. It also equals the area of a triangle with base 2 and height 2.

Question 79

What is d/dx (ln x)?

A	x
B	e^x
C	**1/x** ✔
D	1

Explanation

✔ Correct Answer: C) 1/x

The derivative of the natural logarithm is 1/x (for x > 0). Its inverse, e^x, has derivative e^x.

Question 80

The function $f(x) = x^2 - 4x + 5$ has its minimum value at $x =$

A	-2
B	0
C	4
D	**2** ✔

Explanation

✔ **Correct Answer: D) 2**

Set $f'(x) = 2x - 4 = 0$, which gives $x = 2$. Since $f''(x) = 2 > 0$, this is a minimum. The minimum value is $f(2) = 4 - 8 + 5 = 1$.

TOPIC 9 OF 10

Probability & Statistics

Questions 81 – 90

What you will practise

Probability, permutations, combinations, mean, median, mode and range.

Question 81

What is the probability of getting a head when a fair coin is tossed once?

A	1/4
B	1
C	**1/2** ✔
D	0

Explanation

✔ Correct Answer: C) 1/2

A fair coin has 2 equally likely outcomes (H, T) and only 1 of them is a head. So P(head) = 1/2.

Question 82

A fair die is rolled. What is the probability of getting a number greater than 4?

A	1/6
B	1/2
C	2/3
D	**1/3** ✔

Explanation

✔ Correct Answer: D) 1/3

Favourable outcomes: 5 and 6, which is 2 outcomes out of 6. So P = 2/6 = 1/3.

Question 83

Find the mean of 4, 8, 12, 16, 20.

A	**12**	✔
B	10	
C	14	
D	60	

Explanation

✔ Correct Answer: A) 12

Sum = 4 + 8 + 12 + 16 + 20 = 60. Number of values = 5. Mean = 60 ÷ 5 = 12.

Question 84

Find the median of 3, 7, 9, 12, 15.

A	7
B	12
C	**9** ✔
D	9.2

Explanation

✔ Correct Answer: C) 9

The data is already in ascending order. With 5 values, the median is the middle (3rd) value, which is 9. (9.2 is the mean, not the median.)

Question 85

Find the mode of 2, 3, 3, 5, 7, 3, 8.

A	2
B	**3** ✔
C	5
D	8

Explanation

✔ Correct Answer: B) 3

The mode is the value that occurs most often. The number 3 appears three times while every other number appears once, so the mode is 3.

Question 86

Two dice are rolled. What is the probability that the sum is 7?

A	1/12
B	7/36
C	1/36
D	**1/6** ✔

Explanation

✔ Correct Answer: D) 1/6

Total outcomes = 6 × 6 = 36. Sum 7 can occur as (1,6), (2,5), (3,4), (4,3), (5,2), (6,1), that is 6 ways. P = 6/36 = 1/6.

Question 87

In how many ways can the letters of the word MATH be arranged?

A	**24**	✔
B	16	
C	12	
D	4	

Explanation

✔ Correct Answer: A) 24

All 4 letters are different, so the number of arrangements = 4! = 4 × 3 × 2 × 1 = 24.

Question 88

What is the value of $^5C_2$ (5 choose 2)?

A	20
B	5
C	**10** ✔
D	25

Explanation

✔ Correct Answer: C) 10

$^nC_r = n! / [r!(n - r)!]$. So $^5C_2 = 5! / (2! \times 3!) = (5 \times 4) / (2 \times 1) = 20 / 2 = 10$.

Question 89

What is the probability of drawing an ace from a standard deck of 52 cards?

A	1/52
B	**1/13** ✔
C	1/4
D	4/13

Explanation

✔ Correct Answer: B) 1/13

A deck has 4 aces among 52 cards. P(ace) = 4/52 = 1/13.

Question 90

Find the range of the data 4, 9, 15, 22, 30.

A	30
B	22
C	15
D	**26** ✔

Explanation

✔ Correct Answer: D) 26

Range = largest value − smallest value = 30 − 4 = 26.

TOPIC 10 OF 10

Sequences, Logs & Sets

Questions 91 – 100

What you will practise

Arithmetic and geometric progressions, logarithms, sets and complex numbers.

Question 91

Find the 10th term of the AP 3, 7, 11, …

A	**39**	✔
B	36	
C	43	
D	40	

Explanation

✔ Correct Answer: A) 39

Here a = 3 and d = 4. The nth term is $a_n = a + (n - 1)d$, so $a_{10} = 3 + 9 \times 4 = 3 + 36 = 39$.

Question 92

What is the sum of the first 20 natural numbers?

A	200
B	190
C	**210** ✔
D	420

Explanation

✔ **Correct Answer: C) 210**

Sum = n(n + 1)/2 = 20 × 21 / 2 = 420 / 2 = 210.

Question 93

What is the common ratio of the GP 2, 6, 18, 54, …?

A	2
B	4
C	6
D	**3** ✔

Explanation

✔ Correct Answer: D) 3

In a GP, the common ratio r = (next term) ÷ (previous term). Here 6 ÷ 2 = 3 and 18 ÷ 6 = 3, so r = 3.

Question 94

Find the sum of the GP 1 + 2 + 4 + 8 + 16.

A	**31**	✔
B	32	
C	30	
D	63	

Explanation

✔ Correct Answer: A) 31

Using $S_n = a(r^n - 1)/(r - 1)$ with a = 1, r = 2, n = 5: $S_5 = (32 - 1)/(2 - 1) = 31$. Direct addition: 1 + 2 + 4 + 8 + 16 = 31.

Question 95

What is the value of $\log_{10} 1000$?

A	2
B	10
C	**3** ✔
D	100

Explanation

✔ Correct Answer: C) 3

$\log_{10} 1000$ asks: 10 raised to what power gives 1000?

Since $10^3 = 1000$, the answer is 3.

Question 96

Find the value of log 2 + log 5 (base 10).

A	log 7
B	**1** ✔
C	10
D	0

Explanation

✔ Correct Answer: B) 1

Product rule: log a + log b = log(ab). So log 2 + log 5 = log 10 = 1 (because $10^1 = 10$). It is not log 7, since logs of numbers do not add that way.

Question 97

If n(A) = 5, n(B) = 7 and n(A ∩ B) = 2, find n(A ∪ B).

A	12
B	14
C	9
D	**10** ✔

Explanation

✔ Correct Answer: D) 10

Formula: n(A ∪ B) = n(A) + n(B) − n(A ∩ B) = 5 + 7 − 2 = 10. We subtract 2 because the common elements were counted twice.

Question 98

How many subsets does a set with 4 elements have?

A	**16**	✔
B	8	
C	4	
D	32	

Explanation

✔ Correct Answer: A) 16

A set with n elements has 2^n subsets. For n = 4: 2^4 = 16 subsets (including the empty set and the set itself).

Question 99

If $i = \sqrt{-1}$, what is the value of i^4?

A	-1
B	**1** ✔
C	i
D	$-i$

Explanation

✔ **Correct Answer: B) 1**

$i^2 = -1$, so $i^4 = (i^2)^2 = (-1)^2 = 1$. The powers of i repeat in a cycle of 4: i, −1, −i, 1.

Question 100

Find the sum of the infinite GP 1 + 1/2 + 1/4 + 1/8 + …

A	1
B	3/2
C	∞
D	**2** ✔

Explanation

✔ Correct Answer: D) 2

For an infinite GP with |r| < 1, S∞ = a/(1 − r). Here a = 1 and r = 1/2, so S∞ = 1 / (1/2) = 2.

Quick Answer Key

1. C	21. B	41. B	61. C	81. C
2. B	22. C	42. D	62. D	82. D
3. A	23. D	43. C	63. A	83. A
4. D	24. A	44. A	64. C	84. C
5. B	25. C	45. C	65. B	85. B
6. D	26. D	46. B	66. D	86. D
7. C	27. B	47. D	67. C	87. A
8. B	28. C	48. A	68. A	88. C
9. A	29. A	49. B	69. D	89. B
10. D	30. C	50. D	70. B	90. D
11. B	31. B	51. B	71. C	91. A
12. A	32. D	52. C	72. A	92. C
13. C	33. D	53. A	73. D	93. D
14. D	34. B	54. D	74. C	94. A
15. B	35. C	55. B	75. B	95. C
16. C	36. A	56. C	76. A	96. B
17. D	37. C	57. C	77. D	97. D
18. A	38. D	58. D	78. B	98. A
19. C	39. C	59. A	79. C	99. B
20. C	40. A	60. B	80. D	100. D

Thank You!

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