SAAT Mathematics

Sample Paper – 10

Duration: 40 Minutes **Maximum Marks: 40**

Instructions

- This paper contains **40** Multiple Choice Questions (Single Correct Answer), modelled on the Mathematics section of the **SAAT** (Siksha 'O' Anusandhan Admission Test).
- Each correct answer carries **+1 mark**. There is **no negative marking** for incorrect or unattempted answers.
- Only **one** option is correct. Attempt every question, since wrong answers are not penalised.
- Use of mobile phones, calculators, or other electronic gadgets is strictly prohibited.

Q1. If $A = \{a, b\}$ and $B = \{1, 2, 3\}$, then the total number of relations from A to B is

(A) 64

(B) 32

(C) 6

(D) 8

Q2. Which of the following functions $f : \mathbb{R} \to \mathbb{R}$ is the identity function?

(A) $f(x) = 5$

(B) $f(x) = x$

(C) $f(x) = x^2$

(D) $f(x) = -x$

Q3. For the complex number $z = 2 + 5i$, the value of $z\,\bar{z}$ is

(A) $\sqrt{29}$

(B) 21

(C) 29

(D) 7

Q4. If ω is a non-real cube root of unity, then $(1+\omega)^3$ equals

(A) 1

(B) 0

(C) ω

(D) -1

Q5. For what values of k does the equation $x^2 - 6x + k = 0$ have real roots?

(A) $k > 9$

(B) $k \leq 9$

(C) $k = 9$

(D) $k < 0$

Q6. A square matrix A is said to be singular if

(A) $A = A^T$

(B) $|A| = 1$

(C) $|A| = 0$

(D) A is of even order

Q7. If two rows of a determinant are interchanged, the value of the determinant

(A) changes sign but keeps its magnitude

(B) becomes zero

(C) is unchanged

(D) is doubled

Q8. The rank of the matrix $\begin{pmatrix} 1 & 2 \\ 2 & 4 \end{pmatrix}$ is

(A) 0

(B) 3

(C) 2

(D) 1

Q9. The number of ways in which 5 people can be seated in a row is

(A) 25

(B) 120

(C) 24

(D) 60

Q10. The value of ${}^8C_0 + {}^8C_8$ is

(A) 2

(B) 1

(C) 16

(D) 0

Q11. The term independent of x in the expansion of $\left(x + \frac{1}{x}\right)^6$ corresponds to the term with index $r =$

(A) 2

(B) 4

(C) 3

(D) 6

Q12. The sum of the first 10 terms of the arithmetic progression $3, 7, 11, \ldots$ is

(A) 200

(B) 190

(C) 185

(D) 210

Q13. The recurring decimal $0.\overline{4} = 0.444\ldots$, expressed as a fraction, equals

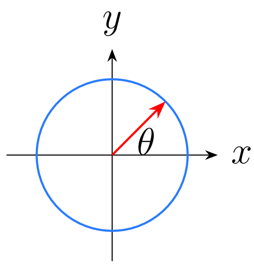
(A) $\frac{4}{10}$

(B) $\frac{4}{9}$

(C) $\frac{2}{5}$

(D) $\frac{4}{99}$

Q14. Given that $\sin\theta\cos\theta = \frac{1}{2}\sin 2\theta$, the value of $\sin\theta\cos\theta$ when $\theta = 45°$ is, using the unit circle shown,



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

(B) 1

(C) $\frac{1}{4}$

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

Q15. The general solution of the equation $\cos 2\theta = 0$ is ($n \in \mathbb{Z}$)

(A) $n\pi$

(B) $2n\pi$

(C) $(2n+1)\frac{\pi}{4}$

(D) $\dfrac{n\pi}{2}$

Q16. The principal value of $\cos^{-1}\left(-\dfrac{1}{2}\right)$ is

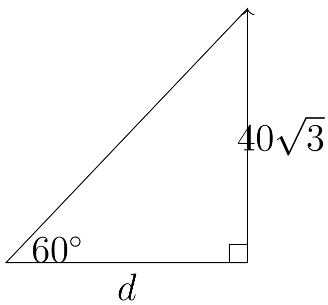
(A) $\dfrac{\pi}{3}$

(B) $\dfrac{\pi}{6}$

(C) $\dfrac{\pi}{2}$

(D) $\dfrac{2\pi}{3}$

Q17. From a point on the ground the angle of elevation of the top of a tower of height $40\sqrt{3}$ m is $60°$, as shown. The distance of the point from the foot of the tower is



(A) 40 m

(B) 120 m

(C) 80 m

(D) $40\sqrt{3}$ m

Q18. The value of $\lim\limits_{x\to 0} \dfrac{\ln(1+x)}{x}$ is

(A) 0

(B) 1

(C) e

(D) does not exist

Q19. If $f(x) = \dfrac{x^2 - 9}{x - 3}$ for $x \neq 3$, the value of $f(3)$ that makes f continuous at $x = 3$ is

(A) 0

(B) 3

(C) 6

(D) 9

Q20. At the point $x = 2$, the function $f(x) = |x - 2|$ is

(A) discontinuous

(B) differentiable with derivative 0

(C) differentiable with derivative 1

(D) continuous but not differentiable

Q21. The derivative of a^x (with $a > 0$, $a \neq 1$) with respect to x is

(A) $a^x \ln a$

(B) $x\, a^{x-1}$

(C) a^x

(D) $\dfrac{a^x}{\ln a}$

Q22. A ladder 5 m long leans against a wall. If the bottom slides away from the wall at 2 m/s, when the bottom is 3 m from the wall (top 4 m up), the top slides down the wall at the rate of

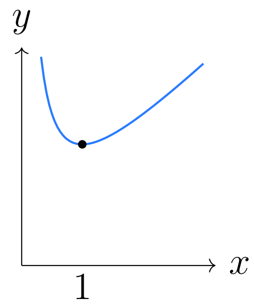
(A) 2 m/s

(B) 1.5 m/s

(C) 2.5 m/s

(D) 3 m/s

Q23. For $x > 0$, the function $f(x) = x + \dfrac{1}{x}$, whose graph is shown, attains its minimum value



(A) 0

(B) 1

(C) 4

(D) 2

Q24. The value of $\int \sec^2 x\, dx$ is

(A) $\sec x + C$

(B) $\cot x + C$

(C) $\tan x + C$

(D) $-\tan x + C$

Q25. The value of $\int \frac{1}{x}\, dx$ is

(A) $\ln|x| + C$

(B) $-\frac{1}{x^2} + C$

(C) $\frac{x^2}{2} + C$

(D) $\frac{1}{x^2} + C$

Q26. The value of $\int_0^{\pi} \sin x\, dx$ is

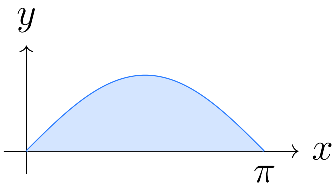
(A) 0

(B) 2

(C) 1

(D) π

Q27. The area of the shaded region bounded by $y = \sin x$ and the x-axis from $x = 0$ to $x = \pi$, shown below, is



(A) 0

(B) 1

(C) 2

(D) π

Q28. The order of the differential equation $\left(\frac{dy}{dx}\right)^4 + 3y\frac{dy}{dx} + x = 0$ is

(A) 4

(B) 3

(C) 2

(D) 1

Q29. The general solution of the differential equation $\frac{dy}{dx} = -y$ is

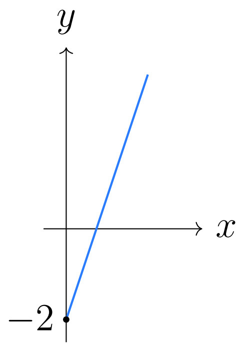
(A) $y = Ce^x$

(B) $y = Ce^{-x}$

(C) $y = Cx$

(D) $y = x + C$

Q30. The slope of the straight line $y = 3x - 2$, shown below, is



(A) 3

(B) −2

(C) −3

(D) 2

Q31. The three lines $x + y = 2$, $2x - y = 1$ and $x - 2y = k$ are concurrent if k equals

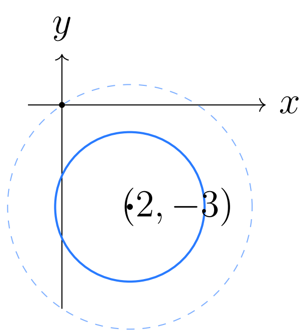
(A) 1

(B) 0

(C) 2

(D) −1

Q32. A circle concentric with $x^2 + y^2 - 4x + 6y - 3 = 0$ and passing through the origin has its centre at



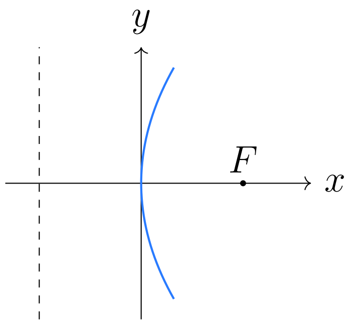
(A) $(-2, 3)$

(B) $(4, -6)$

(C) $(2, -3)$

(D) $(2, 3)$

Q33. A parabola has focus $(3, 0)$ and directrix $x = -3$, as suggested below. Its equation is



(A) $y^2 = 12x$

(B) $x^2 = 12y$

(C) $y^2 = 6x$

(D) $y^2 = 3x$

Q34. The equations of the asymptotes of the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ are

(A) $y = \pm\frac{3}{2}x$

(B) $y = \pm\frac{2}{3}x$

(C) $y = \pm x$

(D) $y = \pm\frac{4}{9}x$

Q35. The scalar projection of $\vec{a} = 3\hat{i} + 4\hat{j}$ on $\vec{b} = \hat{i}$ is

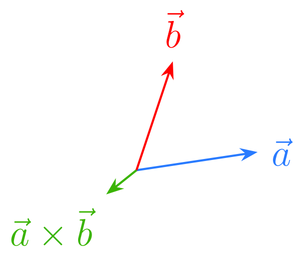
(A) 4

(B) 5

(C) 3

(D) 7

Q36. For two non-parallel vectors $\vec{a}$ and $\vec{b}$, the vector $\vec{a} \times \vec{b}$ is



(A) parallel to $\vec{a}$

(B) parallel to $\vec{b}$

(C) the zero vector

(D) perpendicular to both $\vec{a}$ and $\vec{b}$

Q37. The distance of the origin from the plane $2x + 2y + z = 6$ is

(A) 2

(B) 6

(C) 3

(D) $\frac{6}{5}$

Q38. If each observation in a data set with mean 20 is increased by 5, the new mean is

(A) 20

(B) 25

(C) 100

(D) 15

Q39. For two mutually exclusive events with $P(A) = 0.3$ and $P(B) = 0.4$, the value of $P(A \cup B)$ is

(A) 0.12

(B) 0.1

(C) 0.7

(D) 1

Q40. A fair die is rolled once. The expected value of the number obtained is

(A) 3

(B) 6

(C) 4

(D) 3.5

Detailed Solutions

Q1.

Solution

Concept — Number of relations: A relation from A to B is any subset of the Cartesian product $A \times B$. If a set has m elements, the number of its subsets is 2^m. Hence the number of relations from A to B is $2^{n(A)\cdot n(B)}$.

Step 1 — Count the elements of each set:
$n(A) = 2$ (the elements a and b).
$n(B) = 3$ (the elements 1, 2 and 3).

Step 2 — Find the number of ordered pairs in $A \times B$:
$n(A \times B) = n(A) \times n(B)$.
$n(A \times B) = 2 \times 3$.
$n(A \times B) = 6$.

Step 3 — Count the subsets (relations):
Number of relations $= 2^{n(A\times B)}$.
Number of relations $= 2^6$.
$2^6 = 64$.

Why other options are wrong: $32 = 2^5$ uses the wrong exponent; 6 is just $n(A \times B)$, not the number of subsets; $8 = 2^3$ counts subsets of a 3-element set.

Final Answer: 64 relations $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q1

Q2.

Solution

Concept — Identity function: The identity function is the function that returns its input unchanged. That is, $f(x) = x$ for every x, so the output always equals the input.

Step 1 — Test $f(x) = 5$:
$f(0) = 5$, $f(1) = 5$, $f(2) = 5$.
The output is always 5 regardless of the input, so this is a constant function, not the identity.

Step 2 — Test $f(x) = x$:
$f(0) = 0$, $f(1) = 1$, $f(2) = 2$.
Every output equals its input, so this is the identity function.

Step 3 — Test $f(x) = x^2$:
$f(2) = 2^2 = 4 \neq 2$, so the output differs from the input. Not the identity.

Step 4 — Test $f(x) = -x$:
$f(2) = -2 \neq 2$, so the output differs from the input. Not the identity.

Why other options are wrong: 5 is a constant map; x^2 is the squaring map; $-x$ is the negation map. None returns the input unchanged.

Final Answer: $f(x) = x \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q2

Q3.

Solution

Concept — Conjugate product: For a complex number $z = a + bi$, its conjugate is $\bar{z} = a - bi$. The product $z\bar{z}$ equals $|z|^2 = a^2 + b^2$, which is always a real number.

Step 1 — Identify the real and imaginary parts:
$z = 2 + 5i$, so $a = 2$ and $b = 5$.

Step 2 — Write the conjugate:
$\bar{z} = 2 - 5i$.

Step 3 — Multiply z by $\bar{z}$:
$z\bar{z} = (2 + 5i)(2 - 5i)$.
$z\bar{z} = 2^2 - (5i)^2 \quad$ (difference of squares).
$z\bar{z} = 4 - 25i^2$.

Step 4 — Use $i^2 = -1$:
$z\bar{z} = 4 - 25(-1)$.
$z\bar{z} = 4 + 25$.
$z\bar{z} = 29$.

Why other options are wrong: $\sqrt{29}$ is $|z|$, not $|z|^2$; 21 comes from $25 - 4$; 7 adds the parts $2 + 5$.

Final Answer: $z\bar{z} = 29 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q3

Q4.

Solution

Concept — Cube roots of unity: The non-real cube roots of unity satisfy two key facts: the sum $1 + \omega + \omega^2 = 0$, and $\omega^3 = 1$.

Step 1 — Rearrange the sum identity:
$1 + \omega + \omega^2 = 0.$
Subtract ω^2 from both sides: $1 + \omega = -\omega^2$.

Step 2 — Substitute into the expression:
$(1 + \omega)^3 = (-\omega^2)^3.$

Step 3 — Cube the right side:
$(-\omega^2)^3 = (-1)^3(\omega^2)^3.$
$= -\omega^6.$

Step 4 — Simplify ω^6 using $\omega^3 = 1$:
$\omega^6 = (\omega^3)^2.$
$= 1^2.$
$= 1.$

Step 5 — Combine:
$(1 + \omega)^3 = -\omega^6 = -1.$

Why other options are wrong: 1 drops the negative sign; 0 and ω ignore both the cube and the identity.

Final Answer: $(1 + \omega)^3 = -1 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q4

Q5.

Solution

Concept — Real roots condition: A quadratic $ax^2 + bx + c = 0$ has real roots when its discriminant $D = b^2 - 4ac$ is greater than or equal to zero.

Step 1 — Identify the coefficients:
Comparing $x^2 - 6x + k = 0$ with $ax^2 + bx + c = 0$:
$a = 1$, $b = -6$, $c = k$.

Step 2 — Form the discriminant:
$D = b^2 - 4ac.$
$D = (-6)^2 - 4(1)(k).$
$D = 36 - 4k.$

Step 3 — Apply the real-roots condition $D \geq 0$:
$36 - 4k \geq 0$.

Step 4 — Solve the inequality:
Subtract 36: $-4k \geq -36$.
Divide by -4 (reverse the inequality): $k \leq 9$.

Why other options are wrong: $k > 9$ gives $D < 0$ (complex roots); $k = 9$ is only the equal-root boundary case; $k < 0$ is far too restrictive.

Final Answer: $k \leq 9 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q5

Q6.

Solution

Concept — Singular matrix: The inverse of a square matrix A is $A^{-1} = \frac{1}{|A|}\text{adj}(A)$. This formula only works when $|A| \neq 0$, since we cannot divide by zero.

Step 1 — State when the inverse fails:
If $|A| = 0$, the factor $\frac{1}{|A|}$ is undefined, so A^{-1} does not exist.

Step 2 — Name this case:
A matrix with no inverse is called singular.
Therefore A is singular $\iff |A| = 0$.

Why other options are wrong: $A = A^T$ describes a symmetric matrix; $|A| = 1$ means the matrix is non-singular (invertible); the order (size) of the matrix has nothing to do with singularity.

Final Answer: $|A| = 0 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q6

Q7.

Solution

Concept — Row interchange property: One of the basic properties of determinants states that interchanging any two rows (or two columns) multiplies the value of the determinant by -1.

Step 1 — Apply the property:
If the original determinant has value D, then after swapping two rows the new

value is $-D$.

Step 2 — Interpret the result:
The number $-D$ has the same magnitude $|D|$ as D but the opposite sign.
So the value changes sign while keeping its magnitude.

Why other options are wrong: It becomes zero only when two rows are identical; it stays unchanged when a multiple of one row is added to another; it doubles only when a single row is multiplied by 2.

Final Answer: Changes sign, same magnitude $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q7

Q8.

Solution

Concept — Rank of a matrix: The rank equals the number of linearly independent rows (equivalently, linearly independent columns).

Step 1 — Write down the rows:
Row $1 = (1,\ 2)$.
Row $2 = (2,\ 4)$.

Step 2 — Check for dependence:
Multiply Row 1 by 2: $2 \times (1, 2) = (2, 4)$.
This is exactly Row 2, so Row $2 = 2\times$ Row 1. The two rows are dependent.

Step 3 — Confirm with the determinant:
$|A| = (1)(4) - (2)(2)$.
$|A| = 4 - 4$.
$|A| = 0$, so the rank is less than 2.

Step 4 — Count independent rows:
Only Row 1 is independent (Row 2 is a multiple of it), and the matrix is not the zero matrix.
Therefore rank $= 1$.

Why other options are wrong: 0 would require the zero matrix; 3 exceeds the order 2; 2 would need $|A| \neq 0$.

Final Answer: Rank $= 1 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q8

Q9.

Solution

Concept — Arrangement in a row: The number of ways to arrange n distinct objects in a row is $n!$ (read "n factorial"), which is the product of all whole numbers from 1 up to n.

Step 1 — Identify n:
There are 5 people, so $n = 5$ and the number of arrangements is $5!$.

Step 2 — Write out the factorial:
$5! = 5 \times 4 \times 3 \times 2 \times 1.$

Step 3 — Multiply step by step:
$5 \times 4 = 20.$
$20 \times 3 = 60.$
$60 \times 2 = 120.$
$120 \times 1 = 120.$

Why other options are wrong: $25 = 5^2$ uses the wrong rule; $24 = 4!$ counts only 4 people; $60 = \frac{5!}{2}$ wrongly halves the count.

Final Answer: 120 arrangements $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q9

Q10.

Solution

Concept — Boundary combinations: The combination formula is ${}^nC_r = \dfrac{n!}{r!\,(n-r)!}$. Using $0! = 1$, the boundary values give ${}^nC_0 = 1$ and ${}^nC_n = 1$ for every n.

Step 1 — Evaluate ${}^8C_0$:
$${}^8C_0 = \frac{8!}{0!\,8!} = \frac{8!}{1 \cdot 8!} = 1.$$

Step 2 — Evaluate ${}^8C_8$:
$${}^8C_8 = \frac{8!}{8!\,0!} = \frac{8!}{8! \cdot 1} = 1.$$

Step 3 — Add the two values:
${}^8C_0 + {}^8C_8 = 1 + 1 = 2.$

Why other options are wrong: 1 counts only one of the two terms; 16 and 0 misuse the boundary values.

Final Answer: Sum $= 2 \Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q10

Q11.

Solution

Concept — General term of a binomial expansion: For $(a+b)^n$, the general term is $T_{r+1} = {}^nC_r\, a^{n-r}\, b^r$. The term independent of x is the one whose total power of x is zero.

Step 1 — Write the general term:
Here $a = x$, $b = \frac{1}{x}$, $n = 6$.
$T_{r+1} = {}^6C_r\, x^{6-r} \left(\frac{1}{x}\right)^r$.

Step 2 — Combine the powers of x:
$\left(\frac{1}{x}\right)^r = x^{-r}$.
$T_{r+1} = {}^6C_r\, x^{6-r} \cdot x^{-r}$.
$T_{r+1} = {}^6C_r\, x^{6-r-r}$.
$T_{r+1} = {}^6C_r\, x^{6-2r}$.

Step 3 — Set the power equal to zero:
For the term independent of x: $6 - 2r = 0$.

Step 4 — Solve for r:
$2r = 6$.
$r = 3$.

Why other options are wrong: $r = 2$ leaves x^2; $r = 4$ leaves x^{-2}; $r = 6$ leaves x^{-6} – none independent of x.

Final Answer: $r = 3 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q11

Q12.

Solution

Concept — Sum of an AP: The sum of the first n terms of an arithmetic progression with first term a and common difference d is $S_n = \frac{n}{2}\,[2a + (n-1)d]$.

Step 1 — Identify a, d and n:
First term $a = 3$.
Common difference $d = 7 - 3 = 4$.
Number of terms $n = 10$.

Step 2 — Substitute into the formula:
$S_{10} = \frac{10}{2}[2(3) + (10 - 1)(4)]$.

Step 3 — Simplify inside the bracket:
$2(3) = 6$.
$(10 - 1)(4) = 9 \times 4 = 36$.
Bracket $= 6 + 36 = 42$.

Step 4 — Multiply by the front factor:
$\frac{10}{2} = 5$.
$S_{10} = 5 \times 42$.
$S_{10} = 210$.

Why other options are wrong: 200, 190 and 185 result from using a wrong value of a, d or n.

Final Answer: $S_{10} = 210 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q12

Q13.

Solution

Concept — Recurring decimal as an infinite GP: A repeating decimal can be written as the sum of an infinite geometric progression with $|r| < 1$, whose sum is $S = \frac{a}{1-r}$.

Step 1 — Expand the decimal as a sum:
$0.\overline{4} = 0.4 + 0.04 + 0.004 + \cdots$.
$0.\overline{4} = \frac{4}{10} + \frac{4}{100} + \frac{4}{1000} + \cdots$.

Step 2 — Identify a and r:
First term $a = \frac{4}{10}$.
Common ratio $r = \frac{4/100}{4/10} = \frac{1}{10}$.

Step 3 — Apply the sum-to-infinity formula:
$S = \frac{a}{1-r} = \frac{4/10}{1 - 1/10}$.

Step 4 — Simplify the denominator:
$1 - \frac{1}{10} = \frac{9}{10}$.
$S = \frac{4/10}{9/10}$.

Step 5 — Divide the fractions:

$$S = \frac{4}{10} \times \frac{10}{9} = \frac{4}{9}.$$

Why other options are wrong: $\frac{4}{10}$ is only the first term; $\frac{2}{5}$ and $\frac{4}{99}$ are unrelated values.

Final Answer: $0.\bar{4} = \frac{4}{9} \Rightarrow \boxed{B}$

Answer: (B) Go Back to Q13

Q14.

Solution

Concept — Product to double angle: The double-angle identity $\sin 2\theta = 2\sin\theta\cos\theta$ rearranges to $\sin\theta\cos\theta = \frac{1}{2}\sin 2\theta$.

Step 1 — Find the double angle:
$\theta = 45°$, so $2\theta = 2 \times 45° = 90°$.

Step 2 — Evaluate $\sin 2\theta$:
$\sin 2\theta = \sin 90° = 1$.

Step 3 — Substitute into the identity:

$$\sin\theta\cos\theta = \frac{1}{2}\sin 2\theta.$$

$$\sin\theta\cos\theta = \frac{1}{2} \times 1.$$

$$\sin\theta\cos\theta = \frac{1}{2}.$$

Step 4 — Cross-check directly:

$$\sin 45° = \cos 45° = \frac{1}{\sqrt{2}}.$$

$$\sin 45° \cos 45° = \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} = \frac{1}{2}. \quad \text{(Matches.)}$$

Why other options are wrong: 1 forgets the factor $\frac{1}{2}$; $\frac{1}{4}$ comes from squaring incorrectly; $\frac{\sqrt{3}}{2}$ corresponds to $60°$.

Final Answer: $\sin\theta\cos\theta = \frac{1}{2} \Rightarrow \boxed{A}$

Answer: (A) Go Back to Q14

Q15.

Solution

Concept — When cosine is zero: The cosine of an angle is zero at all odd multiples of $\frac{\pi}{2}$. That is, $\cos\phi = 0 \Rightarrow \phi = (2n+1)\frac{\pi}{2}$, where $n \in \mathbb{Z}$.

Step 1 — Set the inside angle to ϕ:
Let $\phi = 2\theta$, so the equation $\cos 2\theta = 0$ becomes $\cos\phi = 0$.

Step 2 — Apply the zero-cosine rule:
$\phi = (2n+1)\frac{\pi}{2}$.
$2\theta = (2n+1)\frac{\pi}{2}$.

Step 3 — Solve for θ:
Divide both sides by 2:
$\theta = (2n+1)\frac{\pi}{2} \times \frac{1}{2}$.
$\theta = (2n+1)\frac{\pi}{4}$.

Why other options are wrong: $n\pi$ and $2n\pi$ give $\cos 2\theta = 1$, not 0; $\frac{n\pi}{2}$ also includes points where $\cos 2\theta \neq 0$.

Final Answer: $\theta = (2n+1)\frac{\pi}{4} \Rightarrow \boxed{C}$

Answer: (C) Go Back to Q15

Q16.

Solution

Concept — Principal value of $\cos^{-1}$: The principal value of $\cos^{-1} x$ must lie in the range $[0, \pi]$. We need the angle in this range whose cosine is $-\frac{1}{2}$.

Step 1 — Find the reference angle:
$\cos\frac{\pi}{3} = \frac{1}{2}$, so the reference angle is $\frac{\pi}{3}$.

Step 2 — Use the correct quadrant:
Cosine is negative in the second quadrant, and the second quadrant lies inside $[0, \pi]$.
The required angle is $\pi - \frac{\pi}{3}$.

Step 3 — Compute the angle:
$\pi - \frac{\pi}{3} = \frac{3\pi}{3} - \frac{\pi}{3} = \frac{2\pi}{3}$.

Step 4 — Verify:
$\cos\frac{2\pi}{3} = -\frac{1}{2}$, and $\frac{2\pi}{3} \in [0, \pi]$. (Correct.)

So $\cos^{-1}\left(-\frac{1}{2}\right) = \frac{2\pi}{3}$.

Why other options are wrong: $\frac{\pi}{3}$ gives $+\frac{1}{2}$; $\frac{\pi}{6}$ gives $\frac{\sqrt{3}}{2}$; $\frac{\pi}{2}$ gives 0.

Final Answer: $\frac{2\pi}{3} \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q16

Q17.

Solution

Concept — Angle of elevation: In the right triangle formed by the tower, the ground and the line of sight, the tangent of the elevation angle equals the opposite side (height) over the adjacent side (distance): $\tan(\text{angle}) = \frac{\text{height}}{\text{distance}}$.

Step 1 — Write the relation:
$\tan 60^\circ = \frac{\text{height}}{\text{distance}} = \frac{40\sqrt{3}}{d}$.

Step 2 — Substitute the known tangent value:
$\tan 60^\circ = \sqrt{3}$.
$\sqrt{3} = \frac{40\sqrt{3}}{d}$.

Step 3 — Solve for d:
Multiply both sides by d: $\sqrt{3}\,d = 40\sqrt{3}$.
Divide both sides by $\sqrt{3}$: $d = \frac{40\sqrt{3}}{\sqrt{3}}$.
$d = 40$ m.

Why other options are wrong: 120 multiplies by 3; 80 doubles; $40\sqrt{3}$ wrongly keeps the height as the answer.

Final Answer: $d = 40$ m $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q17

Q18.

Solution

Concept — A standard limit: This is one of the standard limits, $\lim_{x\to 0} \frac{\ln(1+x)}{x} = 1$. We can see why using the series expansion of $\ln(1+x)$.

Step 1 — Expand $\ln(1+x)$ near $x = 0$:
$\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \cdots$.

Step 2 — Divide the series by x:
$\dfrac{\ln(1+x)}{x} = 1 - \dfrac{x}{2} + \dfrac{x^2}{3} - \cdots.$

Step 3 — Let $x \to 0$:
Every term containing x vanishes, leaving:
$\lim_{x\to 0} \dfrac{\ln(1+x)}{x} = 1 - 0 + 0 - \cdots = 1.$

Why other options are wrong: The limit exists and equals 1, so 0, e and "does not exist" are all incorrect.

Final Answer: Limit $= 1 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q18

Q19.

Solution

Concept — Removable discontinuity: To make a function continuous at a point where it is currently undefined, set the function value equal to the limit at that point. So we need $f(3) = \lim_{x\to 3} f(x)$.

Step 1 — Factor the numerator:
$x^2 - 9 = (x-3)(x+3)$ (difference of squares).

Step 2 — Cancel the common factor:
$\dfrac{x^2-9}{x-3} = \dfrac{(x-3)(x+3)}{x-3}.$
For $x \neq 3$ we cancel $(x-3)$: $= x + 3$.

Step 3 — Take the limit as $x \to 3$:
$\lim_{x\to 3}(x+3) = 3 + 3 = 6.$

Step 4 — Set the function value:
For continuity, $f(3) = 6$.

Why other options are wrong: 0, 3 and 9 do not equal the limit 6, so they would leave a discontinuity.

Final Answer: $f(3) = 6 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q19

Q20.

Solution

Concept — Corner point of a modulus function: A function is differentiable at a point only if its left-hand and right-hand derivatives are equal there. The graph of $|x-2|$ makes a sharp "V" corner at $x=2$.

Step 1 — Check continuity at $x=2$:
$f(2)=|2-2|=0.$
$\lim_{x\to 2}|x-2|=0.$
Since the limit equals $f(2)$, the function is continuous at $x=2$.

Step 2 — Find the right-hand derivative:
For $x>2$, $|x-2|=x-2$, so the slope is $+1$.
Right-hand derivative $=+1$.

Step 3 — Find the left-hand derivative:
For $x<2$, $|x-2|=-(x-2)=2-x$, so the slope is -1.
Left-hand derivative $=-1$.

Step 4 — Compare the one-sided derivatives:
Left derivative $-1\neq$ right derivative $+1$.
They are not equal, so f is not differentiable at $x=2$.

Why other options are wrong: The function is not discontinuous, and it is not differentiable there, so the derivative is neither 0 nor 1.

Final Answer: Continuous but not differentiable $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q20

Q21.

Solution

Concept — Derivative of an exponential: For a constant base a, the derivative of a^x is $a^x\ln a$. We can derive this by writing a^x as an exponential of base e.

Step 1 — Rewrite a^x using base e:
$a^x=e^{x\ln a}$ (since $a=e^{\ln a}$).

Step 2 — Differentiate using the chain rule:
$\frac{d}{dx}e^u=e^u\cdot\frac{du}{dx}$, with $u=x\ln a$.
$\frac{du}{dx}=\ln a$ (a constant).

Step 3 — Combine:

$\frac{d}{dx}a^x = e^{x \ln a} \cdot \ln a.$
$= a^x \ln a \quad$ (rewriting $e^{x \ln a}$ back as a^x).

Why other options are wrong: $x\,a^{x-1}$ wrongly applies the power rule (the exponent is the variable here); a^x drops the factor $\ln a$; $\frac{a^x}{\ln a}$ divides instead of multiplying.

Final Answer: $a^x \ln a \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q21

Q22.

Solution

Concept — Related rates: The ladder, wall and ground form a right triangle, so $x^2 + y^2 = 5^2$, where x is the distance of the foot from the wall and y is the height of the top. Differentiating this with respect to time links their rates.

Step 1 — Write the constraint:
$x^2 + y^2 = 25.$

Step 2 — Differentiate both sides with respect to t:
$\frac{d}{dt}(x^2) + \frac{d}{dt}(y^2) = \frac{d}{dt}(25).$
$2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0.$

Step 3 — Substitute the known values:
$x = 3,\ y = 4,\ \frac{dx}{dt} = 2.$
$2(3)(2) + 2(4)\frac{dy}{dt} = 0.$

Step 4 — Simplify:
$12 + 8\frac{dy}{dt} = 0.$

Step 5 — Solve for $\frac{dy}{dt}$:
$8\frac{dy}{dt} = -12.$
$\frac{dy}{dt} = -\frac{12}{8} = -1.5$ m/s.
The negative sign means the top is moving down, so the top slides down at 1.5 m/s.

Why other options are wrong: 2 ignores the geometry; 2.5 and 3 misuse the side lengths.

Final Answer: Top slides at 1.5 m/s $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q22

Q23.

Solution

Concept — Minimum by calculus: To find a minimum, differentiate the function, set the derivative equal to zero to locate the critical point, then evaluate the function there (the second derivative confirms it is a minimum).

Step 1 — Write the derivative:
$f(x) = x + \frac{1}{x} = x + x^{-1}$.
$f'(x) = 1 - x^{-2} = 1 - \frac{1}{x^2}$.

Step 2 — Set the derivative to zero:
$1 - \frac{1}{x^2} = 0$.

Step 3 — Isolate the fraction:
$\frac{1}{x^2} = 1$.

Step 4 — Solve for x:
$x^2 = 1$.
$x = 1$ (we take the positive root since $x > 0$).

Step 5 — Confirm it is a minimum:
$f''(x) = \frac{2}{x^3}$, and $f''(1) = 2 > 0$, so $x = 1$ gives a minimum.

Step 6 — Evaluate the minimum value:
$f(1) = 1 + \frac{1}{1} = 1 + 1 = 2$.

Why other options are wrong: 0 and 1 are below the actual minimum (impossible for $x > 0$); 4 uses a wrong value of x.

Final Answer: Minimum value $= 2 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q23

Q24.

Solution

Concept — Integration as reverse differentiation: Integrating a function means finding an antiderivative – a function whose derivative is the integrand. We look for the function whose derivative is $\sec^2 x$.

Step 1 — Recall the matching derivative:

$\frac{d}{dx}(\tan x) = \sec^2 x.$

Step 2 — Reverse the differentiation:
Since differentiating $\tan x$ gives $\sec^2 x$, integrating $\sec^2 x$ gives $\tan x$.
$\int \sec^2 x \, dx = \tan x + C.$
(The constant C is added because any constant has derivative zero.)

Why other options are wrong: $\sec x$ and $\cot x$ have different derivatives; $-\tan x$ has the wrong sign.

Final Answer: $\tan x + C \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q24

Q25.

Solution

Concept — The logarithmic integral: The power rule $\int x^n \, dx = \frac{x^{n+1}}{n+1}$ fails when $n = -1$, because the denominator $n+1$ would be zero. The integral of $\frac{1}{x}$ is instead the natural logarithm.

Step 1 — Note the power rule breaks down:
$\frac{1}{x} = x^{-1}$, so $n = -1$, giving $n + 1 = 0$. We cannot divide by zero, so the power rule does not apply.

Step 2 — Use the matching derivative:
$\frac{d}{dx} \ln |x| = \frac{1}{x}.$

Step 3 — Reverse it to integrate:
$\int \frac{1}{x} \, dx = \ln |x| + C.$
(The absolute value allows negative x, and C is the constant of integration.)

Why other options are wrong: $-\frac{1}{x^2}$ and $\frac{1}{x^2}$ are derivatives, not integrals; $\frac{x^2}{2}$ is the integral of x.

Final Answer: $\ln |x| + C \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q25

Q26.

Solution

Concept — Evaluating a definite integral: First find the antiderivative, then apply the Fundamental Theorem of Calculus by substituting the upper limit minus the lower limit.

Step 1 — Find the antiderivative:
$\frac{d}{dx}(-\cos x) = \sin x$, so $\int \sin x\,dx = -\cos x$.
$\int_0^{\pi} \sin x\,dx = \big[-\cos x\big]_0^{\pi}$.

Step 2 — Substitute the limits:
$= \big(-\cos\pi\big) - \big(-\cos 0\big)$.

Step 3 — Use $\cos\pi = -1$ and $\cos 0 = 1$:
$= -(-1) - (-1)$.
$= 1 + 1$.
$= 2$.

Why other options are wrong: 0 ignores the sign change; 1 and π come from integrating incorrectly.

Final Answer: The integral $= 2 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q26

Q27.

Solution

Concept — Area under a curve: The area between a curve $y = f(x)$ and the x-axis is $\int_a^b f(x)\,dx$, provided $f(x) \geq 0$ on $[a, b]$. Here $\sin x \geq 0$ throughout $[0, \pi]$, so the area is the integral itself.

Step 1 — Set up the integral:
Area $= \int_0^{\pi} \sin x\,dx$.

Step 2 — Find the antiderivative:
$\int \sin x\,dx = -\cos x$.
Area $= \big[-\cos x\big]_0^{\pi}$.

Step 3 — Substitute the limits:
$= \big(-\cos\pi\big) - \big(-\cos 0\big)$.

Step 4 — Use $\cos\pi = -1$ and $\cos 0 = 1$:

$= -(-1) - (-1).$
$= 1 + 1.$
$= 2.$

Why other options are wrong: 0 and 1 underestimate the area; π confuses the area with the length of the interval.

Final Answer: Area $= 2 \Rightarrow \boxed{C}$

Answer: (C) Go Back to Q27

Q28.

Solution

Concept — Order of a differential equation: The order is the order of the highest derivative that appears in the equation. The power to which a derivative is raised affects the degree, not the order.

Step 1 — List the derivatives present:
The equation $\left(\frac{dy}{dx}\right)^4 + 3y\frac{dy}{dx} + x = 0$ contains only the first derivative $\frac{dy}{dx}$.
There is no $\frac{d^2y}{dx^2}$ or higher derivative.

Step 2 — Identify the highest-order derivative:
The highest (and only) derivative is $\frac{dy}{dx}$, which is a first-order derivative.

Step 3 — State the order:
Order $= 1$.
Note: the power 4 on $\frac{dy}{dx}$ would give the degree, not the order.

Why other options are wrong: 4, 3 and 2 confuse the power or a coefficient with the order.

Final Answer: Order $= 1 \Rightarrow \boxed{D}$

Answer: (D) Go Back to Q28

Q29.

Solution

Concept — Separable equation: A separable differential equation can be rearranged so that all y-terms are on one side and all x-terms on the other, then each side is integrated.

Step 1 — Separate the variables:

$\frac{dy}{dx} = -y.$

Divide by y and multiply by dx: $\frac{dy}{y} = -\,dx.$

Step 2 — Integrate both sides:

$\int \frac{dy}{y} = \int -\,dx.$

$\ln|y| = -x + c.$

Step 3 — Exponentiate to remove the logarithm:

$|y| = e^{-x+c}.$

$|y| = e^{c}\,e^{-x}.$

Step 4 — Replace $\pm e^c$ by a single constant C:

$y = Ce^{-x}.$

Why other options are wrong: Ce^x satisfies $y' = +y$, not $y' = -y$; Cx and $x + C$ do not satisfy the equation.

Final Answer: $y = Ce^{-x} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q29

Q30.

Solution

Concept — Slope-intercept form: A line written as $y = mx + c$ has slope m (the coefficient of x) and y-intercept c (the constant term).

Step 1 — Compare with the standard form:

Standard form: $y = mx + c$.

Given line: $y = 3x - 2$.

Step 2 — Match the parts:

Coefficient of x: $m = 3$.

Constant term: $c = -2$.

Step 3 — Read off the slope:

Slope $= m = 3$.

Why other options are wrong: -2 is the y-intercept, not the slope; -3 has the wrong sign; 2 misreads the coefficient.

Final Answer: Slope $= 3 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q30

Q31.

Solution

Concept — Concurrency: Three lines are concurrent if they all pass through one common point. So we find where the first two meet, then force the third line to pass through that same point.

Step 1 — Add the first two equations to eliminate y:
$x + y = 2.$
$2x - y = 1.$
Adding: $(x + 2x) + (y - y) = 2 + 1.$
$3x = 3.$

Step 2 — Solve for x:
$x = \frac{3}{3} = 1.$

Step 3 — Find y from the first equation:
$x + y = 2.$
$1 + y = 2.$
$y = 1.$
So the intersection point is $(1, 1)$.

Step 4 — Substitute $(1, 1)$ into the third line:
$x - 2y = k.$
$1 - 2(1) = k.$
$1 - 2 = k.$
$k = -1.$

Why other options are wrong: 1, 0 and 2 do not make the third line pass through $(1, 1)$.

Final Answer: $k = -1 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q31

Q32.

Solution

Concept — Concentric circles: Concentric circles share the same centre but have different radii. The general circle $x^2 + y^2 + 2gx + 2fy + c = 0$ has centre $(-g, -f)$.

Step 1 — Match the given equation to the general form:
$x^2 + y^2 - 4x + 6y - 3 = 0.$
Compare with $x^2 + y^2 + 2gx + 2fy + c = 0.$
$2g = -4 \Rightarrow g = -2.$

$2f = 6 \Rightarrow f = 3.$

Step 2 — Compute the centre:
Centre $= (-g, -f)$.
$= \big(-(-2), -(3)\big).$
$= (2, -3).$

Step 3 — Conclude:
Any circle concentric with this one has the same centre, regardless of its radius.
Centre $= (2, -3)$.

Why other options are wrong: $(-2, 3)$ forgets the sign flip; $(4, -6)$ uses $2g, 2f$ directly; $(2, 3)$ has the wrong sign on y.

Final Answer: Centre $= (2, -3) \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q32

Q33.

Solution

Concept — Parabola from focus and directrix: A parabola with focus $(a, 0)$ on the positive x-axis and directrix $x = -a$ opens rightward and has the standard equation $y^2 = 4ax$.

Step 1 — Read off a from the focus:
Focus is $(3, 0)$, which matches $(a, 0)$.
So $a = 3$.

Step 2 — Check the directrix is consistent:
Directrix should be $x = -a = -3$, which matches the given $x = -3$. (Consistent.)

Step 3 — Substitute a into $y^2 = 4ax$:
$y^2 = 4(3)x.$
$y^2 = 12x.$

Why other options are wrong: $x^2 = 12y$ opens upward (wrong axis); $y^2 = 6x$ and $y^2 = 3x$ use the wrong value of a.

Final Answer: $y^2 = 12x \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q33

Q34.

Solution

Concept — Asymptotes of a hyperbola: For the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, the asymptotes are the straight lines $y = \pm\frac{b}{a}x$.

Step 1 — Identify a^2 and b^2:
Comparing $\frac{x^2}{9} - \frac{y^2}{4} = 1$ with $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$:
$a^2 = 9$ and $b^2 = 4$.

Step 2 — Take square roots:
$a = \sqrt{9} = 3$.
$b = \sqrt{4} = 2$.

Step 3 — Substitute into the asymptote formula:
$y = \pm\frac{b}{a}x$.
$y = \pm\frac{2}{3}x$.

Why other options are wrong: $\pm\frac{3}{2}x$ inverts the ratio $\frac{b}{a}$; $\pm x$ and $\pm\frac{4}{9}x$ misuse a and b.

Final Answer: $y = \pm\frac{2}{3}x \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q34

Q35.

Solution

Concept — Scalar projection: The scalar projection of $\vec{a}$ onto $\vec{b}$ is $\frac{\vec{a}\cdot\vec{b}}{|\vec{b}|}$, where $\vec{a}\cdot\vec{b}$ is the dot product and $|\vec{b}|$ is the magnitude of $\vec{b}$.

Step 1 — Write the components:
$\vec{a} = 3\hat{i} + 4\hat{j}$, so its components are $(3, 4)$.
$\vec{b} = \hat{i} = 1\hat{i} + 0\hat{j}$, so its components are $(1, 0)$.

Step 2 — Compute the dot product:
$\vec{a}\cdot\vec{b} = (3)(1) + (4)(0)$.
$= 3 + 0$.
$= 3$.

Step 3 — Compute the magnitude of $\vec{b}$:
$|\vec{b}| = \sqrt{1^2 + 0^2} = \sqrt{1} = 1$.

Step 4 — Divide to get the projection:
Projection $= \dfrac{\vec{a}\cdot\vec{b}}{|\vec{b}|} = \dfrac{3}{1} = 3.$

Why other options are wrong: 4 is the $\hat{j}$-component of $\vec{a}$; 5 is the magnitude $|\vec{a}|$; 7 adds the two components.

Final Answer: Projection $= 3 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q35

Q36.

Solution

Concept — Direction of the cross product: The cross product $\vec{a}\times\vec{b}$ is a vector that points perpendicular to the plane containing $\vec{a}$ and $\vec{b}$, with its direction given by the right-hand rule.

Step 1 — Recall the defining property:
$(\vec{a}\times\vec{b})\cdot\vec{a} = 0$ and $(\vec{a}\times\vec{b})\cdot\vec{b} = 0$.
A dot product of zero means the vectors are at right angles.

Step 2 — Interpret:
Since $\vec{a}\times\vec{b}$ is perpendicular to both $\vec{a}$ and $\vec{b}$, it is perpendicular to the whole plane they span.

Why other options are wrong: It is not parallel to either vector; it is the zero vector only when $\vec{a}$ and $\vec{b}$ are parallel, which is excluded since they are non-parallel.

Final Answer: Perpendicular to both $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q36

Q37.

Solution

Concept — Distance from the origin to a plane: For a plane $ax + by + cz = d$, the perpendicular distance from the origin is $\dfrac{|d|}{\sqrt{a^2+b^2+c^2}}$.

Step 1 — Identify the coefficients:
From $2x + 2y + z = 6$: $a = 2$, $b = 2$, $c = 1$, $d = 6$.

Step 2 — Compute the denominator:
$\sqrt{a^2+b^2+c^2} = \sqrt{2^2+2^2+1^2}$.
$= \sqrt{4+4+1}$.

$= \sqrt{9}.$
$= 3.$

Step 3 — Form the distance:
Distance $= \frac{|6|}{3} = \frac{6}{3}.$

Step 4 — Compute:
$= 2.$

Why other options are wrong: 6 ignores the denominator; 3 is just the denominator; $\frac{6}{5}$ uses a wrong norm.

Final Answer: Distance $= 2 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q37

Q38.

Solution

Concept — Effect of adding a constant: If every observation is increased by the same constant c, the mean also increases by c. This is because the mean is the total divided by the count, and the total rises by $n \cdot c$ for n observations.

Step 1 — Recall the shift rule:
New mean $=$ old mean $+c$.

Step 2 — Substitute the values:
Old mean $= 20$, constant added $c = 5$.
New mean $= 20 + 5$.

Step 3 — Compute:
New mean $= 25$.

Why other options are wrong: 20 ignores the shift; 100 wrongly multiplies; 15 subtracts instead of adding.

Final Answer: New mean $= 25 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q38

Q39.

Solution

Concept — Mutually exclusive events: The general addition rule is $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. If A and B are mutually exclusive they cannot happen together, so $P(A \cap B) = 0$ and the rule simplifies to $P(A \cup B) = P(A) + P(B)$.

Step 1 — Apply the mutually-exclusive condition:
$P(A \cap B) = 0$.
$P(A \cup B) = P(A) + P(B) - 0 = P(A) + P(B)$.

Step 2 — Substitute the values:
$P(A \cup B) = 0.3 + 0.4$.

Step 3 — Add:
$P(A \cup B) = 0.7$.

Why other options are wrong: 0.12 multiplies the probabilities (that is for independent events); 0.1 subtracts; 1 is far too large.

Final Answer: $P(A \cup B) = 0.7 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q39

Q40.

Solution

Concept — Expected value: The expected value is $E(X) = \sum x_i\, P(x_i)$. For a fair die, each face 1 through 6 is equally likely with probability $\dfrac{1}{6}$.

Step 1 — Write the expectation as a sum:
$E(X) = 1 \cdot \frac{1}{6} + 2 \cdot \frac{1}{6} + 3 \cdot \frac{1}{6} + 4 \cdot \frac{1}{6} + 5 \cdot \frac{1}{6} + 6 \cdot \frac{1}{6}$.

Step 2 — Factor out the common probability:
$E(X) = \dfrac{1}{6}\,(1 + 2 + 3 + 4 + 5 + 6)$.

Step 3 — Add the face values:
$1 + 2 + 3 + 4 + 5 + 6 = 21$.

Step 4 — Divide:
$E(X) = \dfrac{21}{6}$.
$E(X) = 3.5$.

Why other options are wrong: 3 and 4 are nearby integers but not the exact mean; 6 is the maximum face value, not the average.

Final Answer: $E(X) = 3.5 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q40

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	B	3	C	4	D	5	B
6	C	7	A	8	D	9	B	10	A
11	C	12	D	13	B	14	A	15	C
16	D	17	A	18	B	19	C	20	D
21	A	22	B	23	D	24	C	25	A
26	B	27	C	28	D	29	B	30	A
31	D	32	C	33	A	34	B	35	C
36	D	37	A	38	B	39	C	40	D