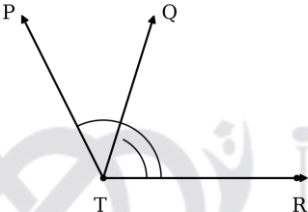
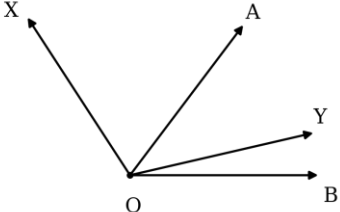
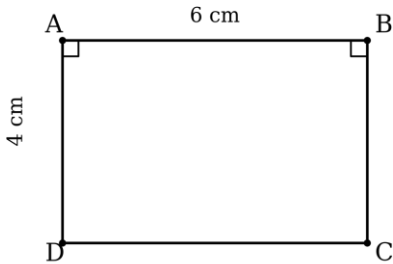


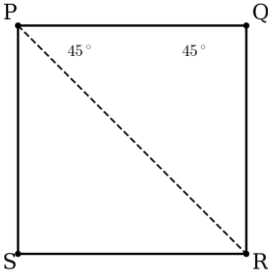
Q.No	Step-by-Step Solution	Marks per Step
SECTION – A (Q1, 12 MCQ sub-parts, 1 mark each)		
1(i)	$35 = 5 \times 7$ $50 = 2 \times 5 \times 5$ Common factor = 5 Answer: (A) 5	1 mark for the correct option.
1(ii)	List the primes from 1 to 50: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47 Count them: there are 15 primes. Answer: (B) 15	1 mark for the correct option.
1(iii)	Check (A): 3 and 5 are primes but are odd, so not all primes are even — FALSE. Check (B): 1 has only one factor (itself), so 1 is not a prime number — FALSE. Check (D): 2 is a prime number, not a composite number — FALSE. Check (C): every composite number has more than 2 factors, so it must be bigger than 1 — TRUE. Answer: (C) All composite numbers are greater than 1	1 mark for the correct option.
1(iv)	Count the digit 7 in the units place: 7, 17, 27, 37, 47, 57, 67, 77, 87, 97 That is 10 numbers. Count the digit 7 in the tens place: 70, 71, 72, 73, 74, 75, 76, 77, 78, 79 That is also 10 numbers. Total occurrences = $10 + 10 = 20$ Answer: (B) 20	1 mark for the correct option.
1(v)	A palindrome reads the same forwards and backwards. For the largest 5-digit palindrome, use the largest digit (9) in every place: 99999 Answer: (C) 99999	1 mark for the correct option.
1(vi)	Look at each number: $4 = 2^2$, $9 = 3^2$, $25 = 5^2$ These are squares of the prime numbers 2, 3, 5 in order. The next prime after 5 is 7. $7^2 = 49$ Answer: (A) 49	1 mark for the correct option.
1(vii)	Check if 36 is a square number: $6 \times 6 = 36$, so yes. Check if 36 is a triangular number: $T_8 = 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 = 36$, so yes. 36 is both a square number and a triangular number. Answer: (D) 36	1 mark for the correct option.
1(viii)	A clock face is divided into 12 equal parts. Each part = $\frac{360^\circ}{12} = 30^\circ$	1 mark for the correct option.

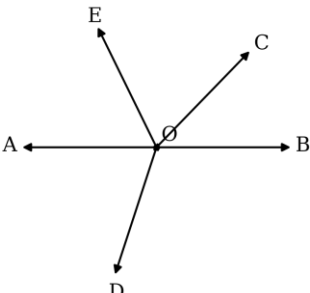
Q.No	Step-by-Step Solution	Marks per Step
	At 2 o'clock, the hour hand is 2 steps away from the minute hand (which is at 12). Angle = $2 \times 30^\circ = 60^\circ$ Answer: (B) 60°	
1(ix)	Count the labelled points on the line in the figure: A, B, C, D That is 4 points. Answer: (D) 4	1 mark for the correct option.
1(x)	A line can be drawn through a single point in any direction. There is no limit to the number of directions possible. So infinitely many lines can be drawn through one point. Answer: (C) infinite	1 mark for the correct option.
1(xi)	Go around the square in order, either way: $S \rightarrow P \rightarrow Q \rightarrow R$ or $P \rightarrow Q \rightarrow R \rightarrow S$. Valid names (each vertex next to its true neighbour): SPQR, PQRS, QRSP, RSPQ. Check PQSR: after Q it jumps to S, skipping R, which is Q's actual neighbour. So PQSR is not a valid name for this square. Answer: (A) PQSR	1 mark for the correct option.
1(xii)	The half circle sits exactly on top of AB, so AB is the diameter. $AB = 8 \text{ cm}$ Radius = $\frac{\text{diameter}}{2} = \frac{8}{2} = 4 \text{ cm}$ Answer: (B) 4 cm	1 mark for the correct option.
SECTION – B (Q2–7, 2 marks each)		
2	Twin primes are two primes that differ by 2. List primes between 11 and 20: 11, 13, 17, 19 Check 11, 13: both prime, and $13 - 11 = 2 \Rightarrow$ twin primes. Check 17, 19: both prime, and $19 - 17 = 2 \Rightarrow$ twin primes. Answer: (11, 13) and (17, 19)	1 mark for each valid pair.
3	(i) To make the number as small as possible, use as few digits as possible. With 2 digits, the biggest possible digit sum is $9 + 9 = 18$, which is enough to reach 14. To keep the number small, keep the tens digit as small as possible. Tens digit $\geq 14 - 9 = 5$, so the smallest tens digit is 5. Then units digit = $14 - 5 = 9$ Answer: smallest number = 59 (ii) To make a 5-digit number as large as possible, make the leftmost digits as large as possible first.	(i) 1 mark for the smallest number. (ii) 1 mark for the largest number.

Q.No	Step-by-Step Solution	Marks per Step
	First digit = 9 (the biggest digit); remaining sum needed = $14 - 9 = 5$ Second digit = 5 (uses up the rest); remaining sum needed = 0 Remaining three digits = 0, 0, 0 Answer: largest number = 95000	
4	Collatz rule: if the number is even, divide by 2. If the number is odd, multiply by 3 and add 1. Repeat until the number reaches 1. Start: 10 (even) $\rightarrow 10 \div 2 = 5$ 5 (odd) $\rightarrow 5 \times 3 + 1 = 16$ 16 (even) $\rightarrow 16 \div 2 = 8$ 8 (even) $\rightarrow 8 \div 2 = 4$ 4 (even) $\rightarrow 4 \div 2 = 2$ 2 (even) $\rightarrow 2 \div 2 = 1$ The sequence reached 1, so the Collatz Conjecture holds for 10.	1 mark for the correct sequence; 1 mark for the conclusion.
5	 The three rays TP, TQ, TR start from the same point T. The angle between TP and TQ is $\angle PTQ$. The angle between TQ and TR is $\angle QTR$. Together, $\angle PTQ + \angle QTR = \angle PTR$. Answer: the marked angles are $\angle PTQ$ and $\angle QTR$	1.5 marks for naming each angle correctly.
6	 The rays from O, from the horizontal line upward, are in this order: OB, OY, OA, OX. Ray OA lies inside $\angle XOY$, and ray OY lies inside $\angle AOB$. Measure (using a protractor, or by tracing one angle onto the other): $\angle XOA \approx 70^\circ$ $\angle AOY \approx 40^\circ$ $\angle YOB \approx 13^\circ$ $\angle XOY = \angle XOA + \angle AOY \approx 70^\circ + 40^\circ = 110^\circ$ $\angle AOB = \angle AOY + \angle YOB \approx 40^\circ + 13^\circ = 53^\circ$	1 mark for the comparison method (tracing/measuring); 1 mark for the correct conclusion with reasoning.

Q.No	Step-by-Step Solution	Marks per Step
	Since $110^\circ > 53^\circ$, $\angle XOY$ is the bigger angle. Answer: $\angle XOY$ is greater than $\angle AOB$	
7	Step 1: Draw a line segment $PQ = 6$ cm using a ruler. Step 2: At P, use a compass and ruler to construct a 90° angle. Draw ray PX. Step 3: With centre P and radius 6 cm, cut ray PX at S. Now $PS = 6$ cm. Step 4: At Q, construct a 90° angle. Draw ray QY. Step 5: With centre Q and radius 6 cm, cut ray QY at R. Now $QR = 6$ cm. Step 6: Join S to R. $PQRS$ is the required square (check: $SR = 6$ cm too).	2 marks for accurate right angles; 2 marks for correct side lengths.
SECTION – C (Q8–10, 3 marks each)		
8	Read the rays off the protractor, measuring from OP: $OP = 0^\circ$, $OQ = 40^\circ$, $OR = 90^\circ$ $OS = 130^\circ$, $OT = 160^\circ$, $OU = 180^\circ$ $\angle POQ = 40^\circ - 0^\circ = 40^\circ$ — this is an acute angle $\angle POR = 90^\circ - 0^\circ = 90^\circ$ — this is a right angle $\angle POU = 180^\circ - 0^\circ = 180^\circ$ — this is a straight angle Answer: $\angle POQ = 40^\circ$, $\angle POR = 90^\circ$, $\angle POU = 180^\circ$ (other valid choices also acceptable)	1 mark for each correctly named and measured angle (any three valid).

Q.No	Step-by-Step Solution	Marks per Step
9	 Step 1: Draw $AB = 6$ cm using a ruler. Step 2: At A, construct a 90° angle. Draw ray AX. Step 3: With centre A and radius 4 cm, cut ray AX at D. Now $AD = 4$ cm. Step 4: At B, construct a 90° angle. Draw ray BY. Step 5: With centre B and radius 4 cm, cut ray BY at C. Now $BC = 4$ cm. Step 6: Join D to C. $ABCD$ is the required rectangle (check: $DC = 6$ cm and every angle is 90°).	2 marks for accurate right angles; 1 mark for correct side lengths.
10	Triangular numbers are 1, 3, 6, 10, 15, 21, ... Rule for this sequence: multiply each triangular number by 6, then add 1. $1 \times 6 + 1 = 7$ $3 \times 6 + 1 = 19$ $6 \times 6 + 1 = 37$ $10 \times 6 + 1 = 61$ $15 \times 6 + 1 = 91$ $21 \times 6 + 1 = 127$ Answer: 7, 19, 37, 61, 91, 127	3 marks: 0.5 mark for each of the six terms.
SECTION – D (Q11–13, 5 marks each)		
11	(i) A 4-digit palindrome has the form $\overline{abba}$. Whether a number is divisible by 4 depends only on its last two digits, here $\overline{ba}$. Since $10b$ is always even, $10b + a$ is even only when a is even. So a must be even for the palindrome to be divisible by 4. For the smallest palindrome: try the smallest even $a = 2$. Need $10b + 2$ divisible by 4, which means b must be odd; smallest odd $b = 1$. Smallest palindrome = 2112 Check: last two digits 12, and $12 \div 4 = 3 \checkmark$ For the largest palindrome: try the largest even $a = 8$. Need $10b + 8$ divisible by 4, which means b must be even; largest even $b = 8$. Largest palindrome = 8888 Check: last two digits 88, and $88 \div 4 = 22 \checkmark$ Answer: smallest = 2112, largest = 8888 (ii)	(i) 1 mark for smallest palindrome; 1 mark for largest palindrome. (ii) 3 marks: 1 mark for each number correctly checked.

Q.No	Step-by-Step Solution	Marks per Step
	A number divisible by 2, 4, 5, 8 and 10 together must end in 0. Its last 3 digits must also be divisible by 8. Check 2352: ends in 2, so not divisible by 5 or 10 $\Rightarrow$ fails. Check 5600: ends in 0 $\checkmark$ $5600 \div 2 = 2800$, $\div 4 = 1400$, $\div 5 = 1120$, $\div 8 = 700$, $\div 10 = 560$ — all exact. 5600 is divisible by all five numbers. Check 77622160: ends in 0 $\checkmark$ Last two digits 60, and $60 \div 4 = 15$ $\checkmark$ Last three digits 160, and $160 \div 8 = 20$ $\checkmark$ 77622160 is divisible by all five numbers. Answer: 5600 and 77622160 are divisible by 2, 4, 5, 8 and 10; 2352 is not.	
12	Look at the pattern of blocks: step 1 = 2, step 2 = 6, step 3 = 12 Write each as a product: $1 \times 2 = 2$, $2 \times 3 = 6$, $3 \times 4 = 12$ So step n uses $n \times (n + 1)$ blocks. (i) Answer: rule is $n(n + 1)$ (ii) 5th step: $5 \times 6 = 30$ blocks (ii) Answer: 30 blocks (iii) First 5 steps: $2 + 6 + 12 + 20 + 30$ $= 70$ blocks (iii) Answer: 70 blocks (iv) 4th step = $4 \times 5 = 20$ blocks 5th step = 30 blocks (from part ii) 6th step = $6 \times 7 = 42$ blocks Total from 4th to 6th step = $20 + 30 + 42 = 92$ blocks (iv) Answer: 92 blocks	1 mark for the rule; 1 mark for the 5th term; 1.5 marks for the total of 5 steps; 1.5 marks for the 4th–6th total.
13	 Think about what shape has a diagonal that splits each corner into two 45° angles. In a rectangle, this only happens when the two sides meeting at that corner are equal in length. So the required rectangle must actually be a square. Step 1: Draw a line segment $PQ = 6$ cm (choosing 6 cm as the side). Step 2: At P, construct a 90° angle. Draw ray PX. Step 3: With centre P and radius 6 cm, cut ray PX at S. Step 4: At Q, construct a 90° angle. Draw ray QY. Step 5: With centre Q and radius 6 cm, cut ray QY at R.	1 mark for identifying it as a square; 4 marks for the construction steps.

Q.No	Step-by-Step Solution	Marks per Step
	Step 6: Join S to R. $PQRS$ is the required square. Its diagonal PR (or QS) bisects each corner angle into two 45° angles, as required.	
SECTION – E (Q14–16, case-based, 4 marks each)		
14	(i) Two-digit multiples of 3, from smallest: 12, 15, 18, ... Check 12: is it also a multiple of 5? $12 \div 5$ is not a whole number, so no. So 12 is a multiple of 3 but not of 5. Answer: 12 (ii) Two-digit multiples of 5, from largest: 95, 90, 85, ... Check 95: is it also a multiple of 3? $95 \div 3 = 31.67$, not a whole number, so no. So 95 is a multiple of 5 but not of 3. Answer: 95 (iii) 'Idli-vada' numbers are multiples of both 3 and 5, i.e. multiples of 15. Smallest two-digit multiple of 15: $15 \times 1 = 15$ Answer: 15 (iii) OR Greatest two-digit multiple of 15: $15 \times 6 = 90$ $15 \times 7 = 105$, which is three digits, too big. Answer: 90	(i) 1 mark. (ii) 1 mark. (iii) 2 marks (main) / 2 marks (OR).
15	 (i) Rays from O: OA, OB, OC, OD, OE Answer: ray OA and ray OB (any two are valid) (ii) Line segments joining O to each labelled point: OA, OB, OC, OD, OE Answer: segment OA and segment OC (any two are valid)	(i) 1 mark. (ii) 1 mark. (iii) 2 marks (main) / 2 marks (OR).

Q.No	Step-by-Step Solution	Marks per Step
	(iii) Look at each angle at O and compare it to a right angle (90°). $\angle DOB$ opens wider than 90°. $\angle COA$ opens wider than 90°. Answer: $\angle DOB$ and $\angle COA$ are obtuse angles (iii) OR Look at each angle at O and compare it to a right angle (90°). $\angle AOE$ opens narrower than 90°. $\angle COB$ opens narrower than 90°. Answer: $\angle AOE$ and $\angle COB$ are acute angles	
16	(i) A palindrome reads the same forwards and backwards. In a 5-digit number, this means: 1st digit = 5th digit, and 2nd digit = 4th digit. The middle (3rd) digit can be anything. Answer: general format $\overline{abcba}$ (with $a \neq 0$) (ii) A 4-digit palindrome has the form $\overline{abba}$. Pick $a = 1$, $b = 2$: gives 1221 Answer: 1221 (any valid $\overline{abba}$ is acceptable) (iii)(a) Current time: 10:01 Check if it's already palindromic: digits 1, 0, 0, 1 read the same both ways — yes. For the NEXT palindromic time, the minutes must be the hour digits reversed. For hour 10: reversed minutes = 01, which is the current time already. Try the next hour, 11: reversed minutes = 11 So the next palindromic time is 11:11 Minutes from 10:01 to 11:11: that is 1 hour 10 minutes. 1 hour 10 minutes = 70 minutes Answer: 70 minutes (next palindromic time is 11:11) (iii)(b) OR The password is a 5-digit palindrome $\overline{abcba}$. Clue: digit sum = 25. Clue: hundreds digit, $c = 7$. Sum of digits: $a + b + c + b + a = 2a + 2b + c$ $2a + 2b + 7 = 25$ $2a + 2b = 18$ $a + b = 9$	(i) 1 mark. (ii) 1 mark. (iii)(a) 2 marks (OR) (iii)(b) 2 marks.

Q.No	Step-by-Step Solution	Marks per Step
	Since $a \neq 0$ (it's the leading digit), pick $a = 1$, $b = 8$. Password = 18781 Answer: one valid password is 18781	

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