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# MATHS MOCK TEST

## Board Pattern

MM : 80

Time Allowed : 3 hours

### GENERAL INSTRUCTIONS

Read the following instructions carefully and follow them :

- (i) This question paper contains 38 questions. All questions are compulsory.
- (ii) Question paper is divided into FIVE sections- Section A, B, C, D and E.
- (iii) In section A, questions number 1 to 18 are multiple choice questions (MCQs) and question number 19 and 20 are Assertion-Reason based questions of 1 mark each.
- (iv) In section B, question number 21 to 25 are very short answer (VSA) type questions of 2 marks each.
- (v) In section C, question number 26 to 31 are short answer (SA) type questions carrying 3 marks each.
- (vi) In section D, question number 32 to 35 are long answer (LA) type questions carrying 5 marks each.
- (vii) In section E, question number 36 to 38 are case based integrated units of assessment questions carrying 4 marks each. Internal choice is provided in 2 marks question in each case study.
- (viii) There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.
- (ix) Draw neat figures wherever required. Take  $\pi = 22/7$  wherever required if not stated.
- (x) Use of calculator is not allowed.

**PLEASE FILL IT IN CAPITAL LETTERS**

Students Name :

Father's Name :

School :

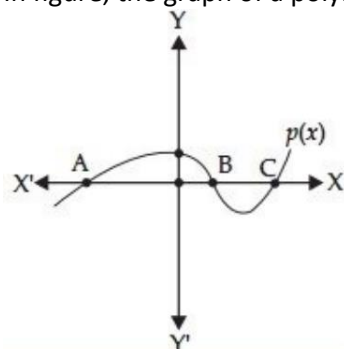
## SECTION - A

Section A Consists of Multiple Choice Type questions of 1 mark each

1. Let  $p$  be a prime number and  $k$  be a positive integer  
If  $p$  divides  $k^2$ , then which of the se DEFINITELY divisible by  $p$ ?

$\frac{1}{2}$	$k$	$7k$	$k^3$
---------------	-----	------	-------

- (a) Only  $k$  (b) Only  $k$  and  $7k$   
 (c) Only  $k$ ,  $7k$  and  $7k^3$  (d) all  $\frac{k}{2}$ ,  $k$ ,  $7$ ,  $k$  and  $k^3$
2. In figure, the graph of a polynomial  $p(x)$  is shown. The number of zeroes of  $p(x)$  is



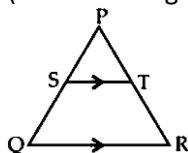
- (a) 1 (b) 2  
 (c) 3 (d) 4
3. Two linear equations in variable  $x$  and  $y$  are given below :

$$a_1x + b_1y + c = 0$$

$$a_2x + b_2y + c = 0$$

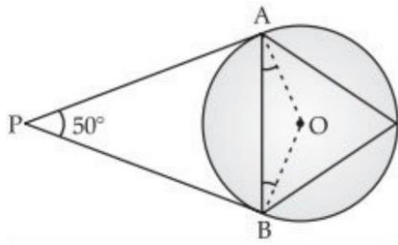
Which of the following pieces of information is independently sufficient to determine a solution exists or not for this pair of linear equation?

- (i)  $\frac{a_1}{b_1} = \frac{a_2}{b_2} = 1$  (ii)  $\frac{a_1}{b_2} = \frac{b_1}{b_2}$   
 (iii)  $\frac{a_1}{a_2} = \frac{a_1}{b_1} \neq 1$  (iv)  $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$   
 (a) IV (b) I and IV  
 (c) II and IV (d) I and III
4. A (5, 1), B(1, 4) and C(8, 5) are the coordinates of the vertices of a triangle.  
Which of the following types of triangle will  $\triangle ABC$  be ?
- (a) Equilateral triangle (b) Scalene right-angled triangle  
 (c) Isosceles right-angles triangle (d) Isosceles acute-angled triangle
5. X-axis divides the join of (2, -3) and (5, 6) in the ratio :
- (a) 1 : 2 (b) 2 : 1  
 (c) 2 : 5 (d) 5 : 2
6. In the following figure,  $ST \parallel QR$ , point S divides PQ in the ratio 4 : 5. If  $ST = 1.6$  cm, what is the length of QR?  
**(Note :** The figure is not to scale)



- (a) 0.71 cm (b) 2 cm  
 (c) 3.6 cm (d) cannot be calculated from the given data

7. In the given figure, if PA and PB are tangents to the circle with centre O such that  $\angle APB = 50^\circ$ , then  $\angle OAB$  is equal to :



- (a)  $25^\circ$  (b)  $30^\circ$   
(c)  $40^\circ$  (d)  $50^\circ$
8. A circle has a centre O and radii OQ and OR. Two tangents, PQ and PR, are drawn from an external point, P. In addition to the above information, which of these must also be known to conclude that the quadrilateral PQOR is a square?  
(i) OQ and OR are at an angle of  $90^\circ$ .  
(ii) The tangents meet at an angle of  $90^\circ$ .  
(a) Only (i) (b) only (ii)  
(c) either (i) or (ii) (d) both (i) and (ii)
9. P and Q are acute angles such that  $P > Q$ . Which of the following is DEFINITELY true?  
(a)  $\sin P < \sin Q$  (b)  $\tan P > \tan Q$   
(c)  $\cos P > \cos Q$  (d)  $\cos P > \sin Q$
10. If the height of a vertical pole is  $\sqrt{3}$  times the length of its shadow on the ground, then the angle of elevation of the Sun at that time is :  
(a)  $30^\circ$  (b)  $60^\circ$   
(c)  $45^\circ$  (d)  $75^\circ$
11. The sum of circumference and the radius of a circle is 102 cm. The radius of circle is :  
(a) 7 cm (b) 14 cm  
(c) 10 cm (d) 18 cm
12. A number was selected at random from 1 to 100 (inclusive of both number) and it was found to be a multiple of 10. What is the probability that the selected number is a multiple of 5?  
(a)  $\frac{1}{10}$  (b)  $\frac{1}{5}$   
(c)  $\frac{1}{2}$  (d) 1
13. At a party, there is one last pizza slice and two people (Ananya and Pranit) who want it. To decide who gets the last slice, two fair six-sided dice are rolled, if the largest number in the roll is :  
1, 3 or 6 Ananya would get the last slice, and 2, 4 or 5, Pranit would get it.  
In a random roll of dice, who has a higher chance of getting the last pizza slice?  
(Note : If the number on both the dice is the same, then consider that number as the larger number)  
(a) Ananya (b) Pranit  
(c) Both have an equal chance (d) (cannot be answered without knowing the exact number in a roll)
14. A survey was conducted on 80 gamers on how many games did they plan in a 6 day. The data is given below.

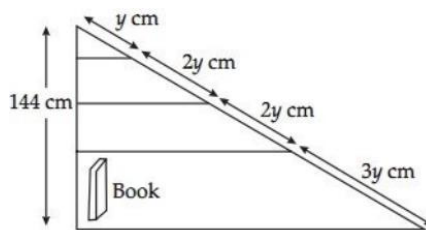
Number of games	Number of gamers
1-2	20
2-3	24
3-4	10
4-5	12
5-6	8
6-7	4
7-8	2

Which of the following is the modal class?

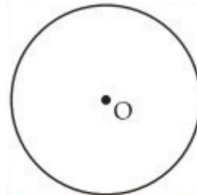
- (a) 1-2 (b) 2-3  
(c) 4-5 (d) 7-8

15.  $\sqrt{n}$  is a natural number such that  $n > 1$ .  
Which of these can DEFINITELY be expressed as a product of primes?
- (i)  $\sqrt{n}$  (ii)  $n$   
(iii)  $\frac{\sqrt{n}}{2}$
- (a) Only (ii) (b) Only (i) and (ii)  
(c) All (i), (ii) and (iii) (d) Cannot be determined with knowing  $n$
16. If a pair of linear equations given by  $a_1x + b_1y + c_1 = 0$  and  $a_2x + b_2y + c_2 = 0$  has a unique solution, then which of the following is true?
- (a)  $a_1a_2 = b_1b_2$  (b)  $a_1b_2 \neq a_2b_1$   
(c)  $\frac{a_1}{a_2} = \frac{b_1}{b_2}$  (d)  $\frac{a_1}{b_2} \neq \frac{b_1}{a_2}$

17. Leela has a triangular cabinet that fits under his staircase. There are four parallel shelves as shown below.  
**(Note : The figure is not to scale)**  
The total height of the cabinet is 144 cm. What is the maximum height of a book that can stand upright on the bottom-most shelf?



- (a) 18 cm (b) 36 cm  
(c) 54 cm (d) 86.4 cm
18. Here is a circle with centre O.  
Manu wants to draw a tangent RS to the circle.  
What is the number of points at which the line RS will meet the circle?



- (a) 0 (b) 1  
(c) 2 (d) 3
- DIRECTIONS (18) :** Two statements are given below-one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements (A) and (R).
- (A) Both (A) and (R) are true and (R) is the correct explanation of the (A).  
(B) Both (A) and (R) are true but (R) is not the correct explanation of the (A).  
(C) (A) is true but (R) is false  
(D) (A) is false but (R) is true
19. **Assertion (A) :** The volume of a right circular cylinder of base radius 7 cm and height 10 cm is  $1540 \text{ cm}^3$ .  
**Reason (R) :** According to assertion, the curved surface area of cylinder is  $440 \text{ cm}^2$ .

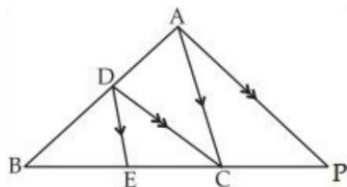
- DIRECTIONS :** Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements (A) and (R).
- (A) Both (A) and (R) are true and (R) is the correct explanation of the (A).  
(B) Both (A) and (R) are true but (R) is not the correct explanation of the (A).  
(C) (A) is true but (R) is false.  
(D) (A) is false but (R) is true.
20. **Assertion (A) :** In  $n^{\text{th}}$  term of an A.P. is  $(2n + 1)$ , then the sum of its first three terms is 15.  
**Reason (R) :** The sum of first 16 terms of the A.P. 10, 6, 2, ..... is 420.

## SECTION - B

Section B consists of 5 questions of 2 marks each.

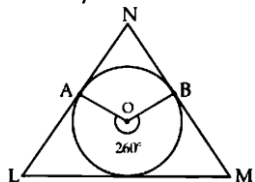
21. Show that  $5 + 2\sqrt{7}$  is an irrational number, where  $\sqrt{7}$  is given to be an irrational number:

22. In the adjoining figure,  $DE \parallel AC$  and  $DC \parallel AP$ . Prove that  $\frac{BE}{EC} = \frac{BC}{CP}$ .



23. (A) If  $\cos(A+2B)=0, 0^\circ \leq (A+2B) \leq 90^\circ$  and  $\cos(B-A) = \frac{\sqrt{3}}{2}, 0^\circ \leq (B-A) \leq 90^\circ$ , then find  $\operatorname{cosec}(2A+B)$ .

Show your work.



OR

(B) State whether the following statements are true or false. Give reasons

(i) As the value of  $\sin\theta$  increases, the value of  $\tan\theta$  decreases.

(ii) When the value of  $\sin\theta$  is maximum, the value of  $\operatorname{cosec}\theta$  is also maximum.

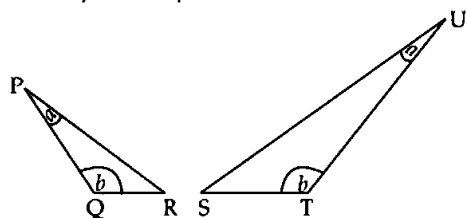
(Note :  $0^\circ < \theta < 90^\circ$ )

24. In the below figure,  $QR = 4$  cm,  $RP = 8$  cm and  $ST = 6$  cm.

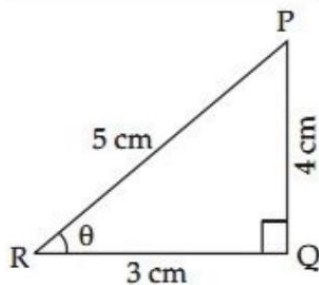
(Note : The figure is not to scale.)

If the perimeter of  $\triangle STU$  is 27 cm, find the length of  $PQ$ .

Show your steps.

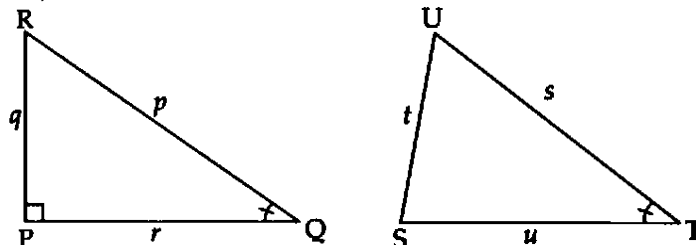


25. (A) Show that  $\sin\theta = \cos(90^\circ - \theta)$  is true using the definition of trigonometric ratios.



OR

(B) In the triangle shown below,  $\angle Q = \angle T$ .

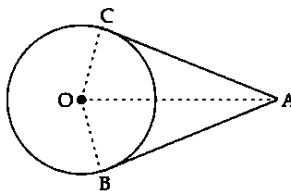


Write an expression each for  $\cos Q$  and  $\sin T$ .

## SECTION - C

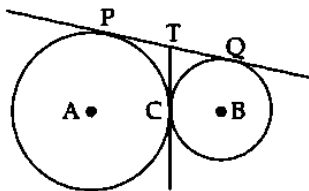
Section B Consists of 6 questions of 3 marks each

26. Find the smallest pair of 4-digit numbers such that the difference between them is 303 and their HCF is 101. Show your steps.
27. (A)  $3(3)^{2m} + 11(3)^m = 4$   
Use the substitution  $(3)^m = x$  to solve for  $m$ . Show your steps.
- OR**
- (B) Find all the possible value(s) of  $x$  for the following equation to be true.  
 $\sqrt{(15-2x)} = x$   
Show your steps and give valid reasons.
28. Prove that  $\frac{\cos^4 x - \sin^4 x}{1 - \tan x} = \frac{(\cot x + 1)}{\sec x \operatorname{cosec} x}$
29. Find all pairs of positive integer whose sum is 91 and HCF is 13. Show your work.
30. If one root of the quadratic equation  $3x^2 + px + 4 = 0$  is  $\frac{2}{3}$ , then find the value of  $p$  and the other root of the equation.
31. (A) Given below is the diagram of pair of pulleys.  
The length of  $AC$  is 12 cm.  
In the given figure,  $\angle CAB = 20^\circ$ .  
What is the measure of  $\angle AOC$ ?



**OR**

- (B) In given figure, two circles touch each other at the point  $C$ . Prove that the common tangent to the circles at  $C$ , bisects the common tangent at  $P$  and  $Q$ .



## SECTION - D

Section D Consists of 4 questions of 5 marks each

32. (A) Two water taps together can fill a tank in  $1\frac{7}{8}$  hours. The tap with longer diameter takes 2 hours less than the tap with smaller one to fill the tank separately. Find the time in which each tap can fill the tank separately.
- OR**
- (B) To fill a swimming pool two pipes are used. If the pipe of larger diameter used for 4 hours and the pipe of smaller diameter for 9 hours, only half of the pool can be filled. Find, how long it would take for each pipe to fill the pool separately, if the pipe of smaller diameter takes 10 hours more than the pipe of larger diameter to fill the pool?

33. (A) A bird feeder tube has a diameter of 8 cm and height of 28 cm. The tube has 7 circular openings of 2 cm diameter each for the birds to eat from. The tube can hold a maximum of 3 kg of bird food.  
 (Note : The image is for visual representation only.)  
 If the birds eat an average of 75 g of food per hour, what will be the height of the food in the tube after 5 hours? Show your work.  
 (Note : Take  $\pi$  as  $\frac{22}{7}$ )



OR

- (B) Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/hour. How much area will it irrigate in 30 minutes; if 8 cm standing water is needed ?
34. (A) In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/h from its usual speed and time of flight increased by 30 minutes. Find the scheduled duration of flight.

OR

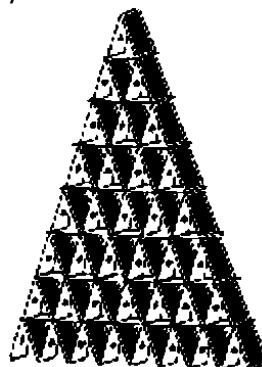
- (B) A boat goes 30 km upstream and 44 km downstream in 10 h. In 13 h, it can go 40 km upstream and 55 km downstream. Determine the speed of the stream and that of the boat in still water.
35. In the median on the following frequency distribution is 32.5. Find the values of  $f_1$  and  $f_2$ .

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency	$f_1$	5	9	12	$f_2$	3	2	40

## SECTION - E

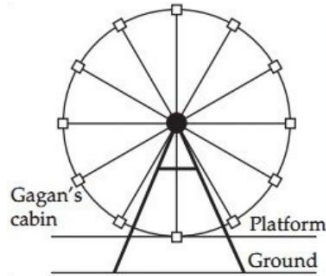
Case study based questions are compulsory

36. **Answer the questions based on the given information.**  
 Shown below is a house of cards, a structure created by stacking playing cards on top of each other in the shape of a pyramid. Each small triangle is made using 3 cards and each layer has 1 less triangle than the layer below it. Ankit and his friends were having a sleepover and wanted to do something fun. One of the friends suggested that they could make a house of cards.
- (i) Ankit and his friends want to use 3 cards in the top layer and 18 in the bottom layer. From an AP showing the number of cards in each layer starting from the layer.
- (ii) They have total of 360 cards with them.
- Find the maximum number of layers that Ankit and his friends can make using the cards they have, if they want to have 1 triangle (3 cards) at the top layer. Show your work.

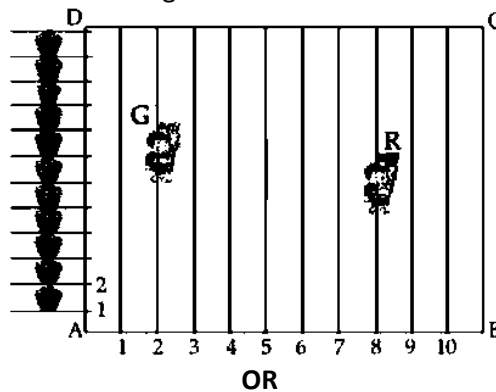




37. In the giant wheel shown below. Gagan is sitting in one of the cabins which is 12 m high from the platform. Jyoti and Karan are sitting in the lowest and the highest cabins from the platform respectively. From Gagan, the angle of depression of Jyoti and the angle of elevation of Karan is  $30^\circ$  and  $60^\circ$  respectively. (Note : The figure is not to scale.)
- What will be the angle of elevation of Gagan from Jyoti?
  - Find the diameter of the giant wheel?



38. In order to conduct Sports Day activities in your School, lines have been drawn with chalk powder at a distance of 1m each, in a rectangular shaped ground ABCD, 100 flower pots have been placed at a distance of 1 m from each other along AD, as shown in given figure below. Niharika runs  $\frac{1}{4}$ <sup>th</sup> the distance AD on the 2<sup>nd</sup> line and posts a green (G) flag. Preet runs  $\frac{1}{5}$ <sup>th</sup> distance AD on the eighth line and posts a red (R) flag.
- Find the position of green flag?
  - Find the position of red flag?
  - What is the distance between both the flags?



OR

If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flag, Where should she post her flag?

# Student FAQ's

## 1- Which course or stream do I have to choose if I wish to crack the IAS/IPC/UPSC Exam?

To crack the IAS/IPC/UPSC exam, opt for a bachelor's degree in subjects like History, Public Administration, Political Science, Sociology, or Geography. Join a civil services coaching institute for exam-specific guidance and focus on optional subjects, current affairs, and general studies for a well-rounded preparation.

## 2- What are the prerequisites of Architecture?

You have to get to the top architecture colleges in India including IITs (through JEE Advanced), School of Planning and Architecture (SPA, Delhi) through JEE Main Paper 2 or AAT, and Chandigarh College of Architecture (CCA) through NATA scores.

## 3- How can I pursue a degree in Interior designing and Fashion designing?

To pursue a degree in Interior Designing or Fashion Designing, consider colleges like National Institute of Design (NID), National Institute of Fashion Technology (NIFT), or other reputed institutes offering these courses. Choose subjects related to design, art, and creativity in high school, such as Fine Arts, Home Science, or any other similar subjects. These subjects can help build a strong foundation for your future studies in Interior Designing or Fashion Designing.

## 4- How can I become Ethical Hacker, is there any degree of hacking ?

To become an Ethical Hacker in India, pursue a degree in Computer Science, Cybersecurity, or Information Technology from colleges like Indian Institute of Technology (IIT) Bombay, International Institute of Information Technology (IIIT) Hyderabad, or Amity University Noida. Focus on subjects like Computer Networks, Cryptography, and Information Security. Consider certifications like Certified Ethical Hacker (CEH) and Offensive Security Certified Professional (OSCP) for additional skills and credibility.

## 5- How can I become a Game Designer/ Application Designer?

- Pursue a bachelor's degree in Computer Science, Game Design, or a related field.
- Gain practical experience through internships or personal projects.
- Develop strong skills in programming, game development software, and design principles.
- Build a portfolio showcasing your projects and apply for positions in-game or app development companies.

## 6- How can I become an Air Hostess/Stewart?

- Education: Minimum 10+2 (Higher Secondary) qualification.
- Training: Complete an air hostess training course from a recognized institute like Frankfinn Institute of Air Hostess Training, or from airlines like Air India or Jet Airways.
- Skills: Develop excellent communication, customer service, and language skills.
- Physical Requirements: Meet the height, weight, and vision standards set by airlines.

## 7- How to become a Pilot?

To become a Pilot in India, students with Physics and Mathematics in grade 12 (Science-A Group) can attain a Pilot Licence. The process involves three stages: Student Pilot Licence, Private Pilot Licence, and Commercial Pilot Licence from a DGCA-approved flying school. Candidates must log a certain number of flying hours and pass DGCA-prescribed tests. Alternatively, one can join the Indian Air Force, where training is provided, and a service bond is required.





Pathik Roy

IIT Roorkee  
AIR - 959  
8 years Exp.

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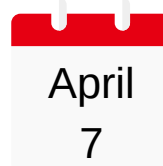
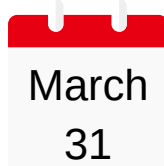
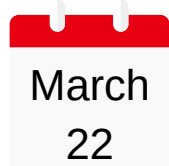
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