INTERNATIONAL INDIAN SCHOOL ABU DHABI

Online Series Examination – 2024 -'25
Mathematics
Cycle 2 – Descriptive – 22 December 2024
Grade 10

Time: 2 Hours | Maximum Marks: 60

General Instructions:

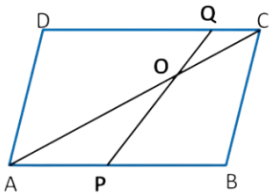
1. This Question Paper has 4 Sections B – E.
2. Section B has 5 questions carrying 02 marks each.
3. Section C has 6 questions carrying 03 marks each.
4. Section D has 4 questions carrying 05 marks each.
5. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
6. All Questions are compulsory. However, an internal choice has been provided in the 2 marks questions of Section E
7. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

SECTION B

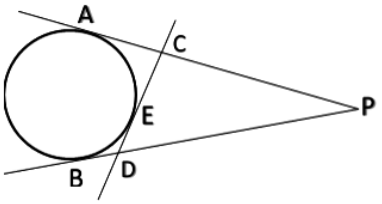
Section B consists of 5 questions of 2 marks each.

1. Prove that $\sqrt{2}$ is an irrational number. [2]

2. ABCD is a parallelogram. Point P divides AB in the ratio 2:3 and point Q divides DC in the ratio 4:1. Prove that OC is half of OA. [2]



3. From an external point P, two tangents, PA and PB are drawn to a circle with centre O. At a point E on the circle, a tangent is drawn to intersect PA and PB at C and D, respectively. If PA = 10 cm, find the perimeter of ΔPCD. [2]



4. If tan (A + B) = $\sqrt{3}$ and tan (A – B) = $\frac{1}{\sqrt{3}}$; 0° < A + B < 90°; A > B, find A & B. [2]

5. With vertices A, B and C of ΔABC as centres, arcs are drawn with radii 14 cm and the three portions of the triangle so obtained are removed. Find the total area removed from the triangle. [2]

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SECTION C

Section C consists of 6 questions of 3 marks each.

6. National Art convention got registrations from students from all parts of the country, of which 60 are interested in music, 84 are interested in dance and 108 students are interested in handicrafts. For optimum cultural exchange, organisers wish to keep them in minimum number of groups such that each group consists of students interested in the same artform and the number of students in each group is the same. Find the number of students in each group. Find the number of groups in each art form. How many rooms are required if each group will be allotted a room? [3]

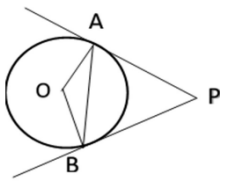
7. If α, β are zeroes of quadratic polynomial $5x^2 + 5x + 1$, find the value of: [3]

   (a) $\alpha^2 + \beta^2$

   (b) $\alpha^{-1} + \beta^{-1}$

8. The sum of a two-digit number and the number obtained by reversing the digits is 66. If the digits of the number differ by 2, find the number. How many such numbers are there? [3]

9. PA and PB are tangents drawn to a circle of centre O from an external point P. Chord AB makes an angle of 30° with the radius at the point of contact. If length of the chord is 6 cm, find the length of the tangent PA and the length of the radius OA. [3]



10. If $1 + sin^2\theta = 3sin\theta.cos\theta$, then prove that $tan\theta = 1$ or $\frac{1}{2}$ [3]

11. The length of 40 leaves of a plant are measured correct to nearest millimetre, and the data obtained is represented in the following table. [3]

Length in (mm)	118 – 126	127 – 135	136 – 144	145 – 153	154 – 162	163 – 171	172 – 180
No.of Leaves	3	5	9	12	5	4	2

Find the mean length of the leaves.

SECTION D

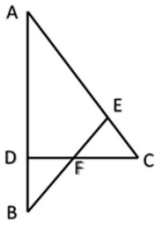
Section D consists of 4 questions of 5 marks each.

12. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of stream. [5]

13. (a) State and prove Basic Proportionality theorem. [5]

(b) In the given figure ∠CEF = ∠CFE. F is the midpoint of DC.

Prove that $\frac{AB}{BD} = \frac{AE}{FD}$.



14. A tent is in the shape of a cylinder surmounted by a conical top. If the height and radius of the cylindrical part are 3 m and 14 m respectively, and the total height of the tent is 13.5 m, find the area of the canvas required for making the tent, keeping a provision of 26 m^2 of canvas for stitching and wastage. Also, find the cost of the canvas to be purchased at the rate of ₹ 500 per m^2. [5]

15. The median of the following data is 50. Find the values of 'p' and 'q', if the sum of all frequencies is 90. Also find the mode of the data. [5]

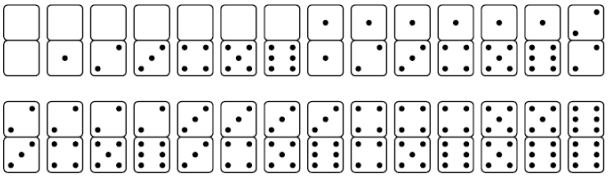
Marks Obtained	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90
No. of Students	p	15	25	20	q	8	10

SECTION E

Section E consists of 3 questions of 4 marks each.

16. Double-six Dominos: It is a game played with the 28 numbered tiles shown in the diagram. [4]

The 28 dominos are placed in a bag, shuffled, and then one domino is randomly drawn. Give the following answer.



(i) What is the probability the total number of dots on the domino is three or less?

(ii) What is the probability the total number of dots on the domino is greater than three?

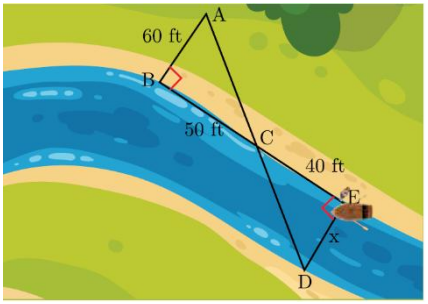
(iii) What is the probability the total number of dots on the domino does not have a blank half?

OR

What is the probability the total number of dots on the domino is not a "double" (both sides the same)?

17. Tania is very intelligent in maths. She always tries to relate the concept of maths in daily life. One day she plans to cross a river and want to know how far it is to the other side. [4]

She takes measurements on her side of the river and make the drawing as shown below.



(i) Which similarity criterion is used in solving the above problem?

(ii) Consider the following statement:

S_1: $\angle ACB = \angle DCE$

S_2: $\angle BAC = \angle CDE$

Which of the above statement is/are correct.

(a) S_1 and S_2 both (b) S_1 (c) S_2 (d) None

(iii) Consider the following statement

S_3: $\frac{AB}{DE} = \frac{CA}{CD}$ S_4: $\frac{BC}{CE} = \frac{AB}{DE}$ S_5: $\frac{CA}{CD} = \frac{DE}{AB}$

Which of the above statements are correct?

(a) S3 and S5 (b) S4 and S5

(c) S3 and S4 (d) All three

(iv) What is the distance x across the river?

OR

What is the approximate length of AD shown in the figure?

18. **100 Metres Race:** The 100 metres is a sprint race in track and field competitions. The shortest common outdoor running distance, it is one of the most popular and prestigious events in the sport of athletics. [4]

It has been contested at the summer Olympics since 1896 for men and since 1928 for women. The World Championships 100 metres has been contested since 1983. The reigning 100 m Olympic

or world champion is often named “the fastest man or woman in the world”. A stopwatch was used to find the time that it took a group of students to run 100 m.

Time (in sec)	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
No. of Students	8	10	13	6	3

Based on the above information, answer the following questions.

(i) Estimate the mean time taken by a student to finish the race.

(ii) What will be the upper limit of the modal class?

(iii) What is the sum of lower limits of median class and modal class?

OR

How many students finished the race within 1 minute?