

TOOWOOMBA MATHS CENTRE
MATHEMATICS TEAM CHALLENGE 1994

TEAM COMPETITION (JUNIOR SECONDARY)

TIME: 45 MINS.
TOTAL: 150

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Calculators Allowed

T1 (10 points)

Determine the missing digit, x , given that the whole number below is divisible by 11.

$$293493x6707$$

T2 (15 points)

An equilateral triangle has an area of 60cm^2 . Find the area of the largest circle which can be inscribed in the triangle.

T3 (10 points)

Given $x + \frac{1}{x} = 3$

find the value of $x^3 + \frac{1}{x^3}$

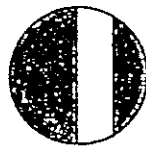
T4 (15 points)

Find the millionth term of this sequence.

R, B, B, R, R, R, B, B, B, B, R, R, R, R, R,

T5 (15 points)

A circular grass plot 12 metres in diameter is cut by a straight brick driveway that is 3 metres wide. Given one edge of the driveway passes through the centre of the plot, determine the area of the driveway.



T6 (10 points)

What is the value of $a + b$?

$$\sqrt{\frac{1 \times 3 \times 5 \times 7 \times 9 \times \dots \times a}{3 \times 5 \times 7 \times 9 \times 11 \times \dots \times b}} = \frac{1}{51}$$

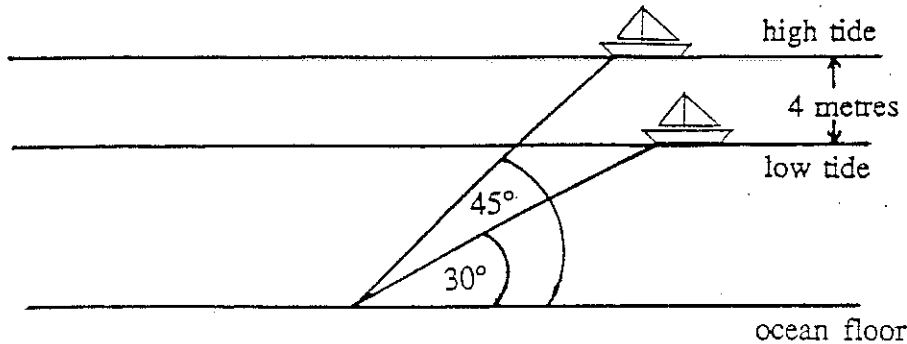
P.T.O.

T7 (20 points)

An escalator moves up at a rate of so many steps per second. A commuter walks up the escalator at the rate of one step per second and reaches the top in fifteen seconds. The next day the commuter's rate was two steps per second, and he reached the top in twelve seconds. How many steps does the escalator have?

T8 (20 points)

The angle made by a yacht's anchor chain with the ocean floor is 30° at low tide. At high tide the angle is 45° . Find the length of the yacht's anchor chain given that the difference in heights between low tide and high tide is 4 metres.

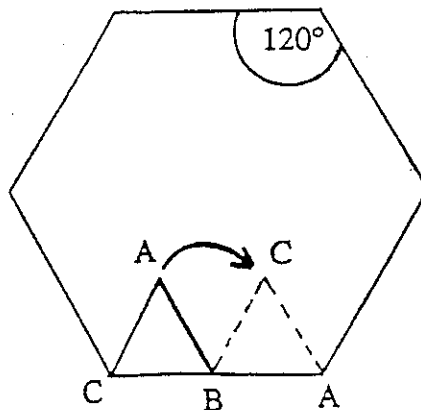


T9 (15 points)

A total of 720 numbers can be formed using all 6 digits 1, 2, 3, 4, 5, and 6. If these numbers are arranged in increasing order: 123456, 123465, 123546, 123564, up to 654321, which one is 300th in this order?

T10 (20 points)

The diagram shows a hexagon with sides of length 2cm and an equilateral triangle ABC with sides of length 1cm sitting inside it. To begin with, C is at one vertex of the hexagon and BC lies along its bottom edge. The triangle is rotated about its corners C, A, B in turn and rolls without slipping around the inside of the hexagon. Calculate the total distance travelled by vertex A when the vertices A, B and C have returned to their original positions. (Note: All interior angles of a hexagon equal 120°).



MATHS TEAMS CHALLENGE 1994

TEAM EVENT ANSWER SHEET

All Units to be included

Question	(Points)	ANSWER	Score
T.1	10		
T.2	15		
T.3	10		
T.4	15		
T.5	15		
T.6	10		
T.7	20		
T.8	20		
T.9	15		
T.10	20		

TOTAL

SCHOOL:

TEAM: 1 / 2

(Strike out whichever does not apply)

MATHS TEAMS CHALLENGE 1994

TEAM EVENT ANSWER SHEET

All Units to be included

Question	(Points)	ANSWER	Score
T.1	10	5	
T.2	15	$11.55\pi\text{cm}^2$ or 36.28cm^2 etc.	
T.3	10	18	
T.4	15	B	
T.5	15	$6\pi + 3\sqrt{27}\text{m}^2$ or 34.438m^2 etc.	
T.6	10	5200	
T.7	20	60 steps	
T.8	20	19.31m or 19.3m etc.	
T.9	15	342651	
T.10	20	$4\pi\text{cm}$ or 12.57cm etc.	

TOTAL

SCHOOL:

TEAM: 1 / 2

(Strike out whichever does not apply)