

2002 TOOWOOMBA MATHEMATICS TEAM CHALLENGE

SENIOR SECONDARY

RELAY CONTEST

Time: 1 hour

Calculators may be used

Total of 100 points

R1 (4 points) (96 points remaining)

A regular hexagon and an equilateral triangle have the same perimeter. What is the ratio of the area of the hexagon to the area of the triangle correct to three decimal places?

R2 (4 points) (92 points remaining)

The sum of three consecutive integers is equal to four times the smallest of them. What is the value of the product of the three integers?

R3 (4 points) (88 points remaining)

A rise of 300 metres is needed to drive up the Toowoomba range. A new road is being considered with grade of 6%, the grade being the rise divided by the distance travelled along the road. How much longer (in metres) would the road need to be in order to reduce the grade to 5%?

R4 (4 points) (84 points remaining)

The area of a circle is doubled when its radius r is increased by 4. Find the value of r correct to three decimal places.

R5 (4 points)

(80 points remaining)

Jason the bushwalker set out for a non-stop walk at 10am and returned on the same track to the starting point at 4pm. He walked at 4km/h on level ground, 3km/h uphill, and 6km/h downhill. How far (in kilometres) did he walk?

R6 (4 points)

(76 points remaining)

Solve the equation $x^2 + y^2 + 2x - 2y + 2 = 0$ for (x, y) .

R7 (4 points)

(72 points remaining)

In our large family there are people, horses, and guinea pigs. Between us we have 16 heads, 48 legs, and 6 long tails. How many people are there?

R8 (5 points)

(67 points remaining)

40 couples (20 men and 20 women) get married in a mass ceremony. After the official speech each man shakes hands with each other man. The women kiss everyone. What is the total number of the handshakes and kisses that are exchanged?

R9 (5 points)

(62 points remaining)

A rectangular box has internal dimensions 2cm by 3cm by 4cm. Find the length of the longest needle (correct to three decimal places) which fits inside the box.

R10 (5 points)

(57 points remaining)

The two hands of a clock start together at 12 midnight. How many more times do the hands meet up to and including the next 12 midnight?

R11 (5 points)

(52 points remaining)

A bus travels throughout the day at the same constant speed between Toowoomba and Brisbane and back. Initially the bus leaves Toowoomba at midnight for the 120 km trip to Brisbane. The bus takes 2 hours for the journey and then travels back to Toowoomba. The turn-around time is 20 minutes in each of Toowoomba and Brisbane. At midnight at the end of the day, how far from Brisbane (in kilometres) is the last bus to leave Toowoomba.

R12 (5 points)

(47 points remaining)

$x = 3$ is one solution of the equation $x(2 + x(5 - x)) = 24$. Find the remaining solutions.

R13 (5 points)

(42 points remaining)

From Fabel, three separate roads lead to Abel, Babel, and Cabel. From Abel to Babel via Fabel, the distance is 7 stadia. From Abel to Cabel via Fabel, it is 8 stadia. From Babel to Cabel via Fabel, it is 12 stadia. What is the sum of the distances (in stadia) from Fabel to each of the other three towns?

R14 (6 points)

(36 points remaining)

A cube has side length 1 metre. What is the probability that a point chosen at random inside the cube is within 20cm of one of the six faces?

R15 (6 points)

(30 points remaining)

In numbering the pages of a book, 408 digits were used. How many pages has the book?

R16 (6 points)

(24 points remaining)

Five different roads lead directly from city A to city B . Three different roads lead directly from city B to city C . Two different roads lead directly from city A to city C . In how many different ways can you leave from A and return to A including C once and B at most once?

R17 (6 points)

(18 points remaining)

Three men play a game, each starting with a different amount of money and each competing at each round of the game. The rule is that the loser of each round must double the money of each of the other two. After three rounds, each had lost just once, and each ended up with \$40. One of the players lost money. How much (in dollars) did he lose?

R18 (6 points)

(12 points remaining)

Each of the eight digits 0, 1, 2, 3, 4, 5, 6, and 7 is placed at one of the vertices or mid-points of the sides of a square so that the sum of the three digits along any given side of the square is 10. Find the sum of the four digits at the mid-points of the sides of the square.

R19 (6 points)

(6 points remaining)

How many integers from 1 to 1000 inclusive are not divisible by either 4 or 10?

R20 (6 points)

(0 points remaining)

The first digit of a six digit number is 1. If the 1 is shifted to the other end, then the new six digit number is three times bigger than the old one. What was the old number?

MATHS TEAMS CHALLENGE (2002)

Relay Answer sheet SENIOR SECONDARY

Question	Answer	Attempts x or /							Score	Progressive Score
		7	6	5	4	3	2	1		
R1 (4 points)	3:2									
R2 (4 points)	60									
R3 (4 points)	1000									
R4 (4 points)	9.657									
CHANGE										
R5 (4 points)	24									
R6 (4 points)	(-1, 1)									
R7 (4 points)	8									
R8 (5 points)	780									
CHANGE										
R9 (5 points)	5.385									
R10 (5 points)	22									
R11 (5 points)	80									
R12 (5 points)	-2, 4									
CHANGE										
R13 (5 points)	13.5									
R14 (6 points)	0.784									
R15 (6 points)	172									
R16 (6 points)	64									
CHANGE										
R17 (6 points)	25									
R18 (6 points)	16									
R19 (6 points)	700									
R20 (6 points)	142857									
									TOTAL	

School: _____

Team 1: Team 2: