

**Toowoomba Education Centre**  
**2005 MATHEMATICS TEAMS CHALLENGE**

**JUNIOR SECONDARY RELAY**

**Time: 60 min**

**Calculators Allowed**

**100 points**

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**R1. (4 points)**

[96 points remaining]

Your group wishes to buy ice-creams and their two favourite kinds are “Antarctic Chill” at \$2.10 and “Frozen Alaska” at \$2.40. You have a certain amount of money within the group and you realize that you can either:

- spend it all buying “Antarctic Chills”, with no change left over, or
- spend it all buying “Frozen Alaskas”, with no change left over.

What is the smallest amount of money which you could have?

**R2. (4 points)**

[92 points remaining]

Insert each of the operators +, −, ×, and ÷ once only between the numbers on the left hand side of this equation to make it true. No brackets are needed.

$$14 \quad 2 \quad 15 \quad 4 \quad 10 \quad = 57.$$

**R3. (6 points)**

[86 points remaining]

The average of a set of fourteen numbers is 25. If another number is included, the average falls to 24. What number was included?

**R4. (6 point)**

[80 points remaining]

What is the second smallest integer which leaves a remainder of 3 when divided by either 12, 25 and 50?

**R 5. (4 points)**

[76 points remaining]

Toowoomba and District Mathematics Teachers’ Association meets on the second Wednesday of every month. If they met on 10<sup>th</sup> March 1999, what was the date of their July meeting that year?

**R 6. ( 4 points)**

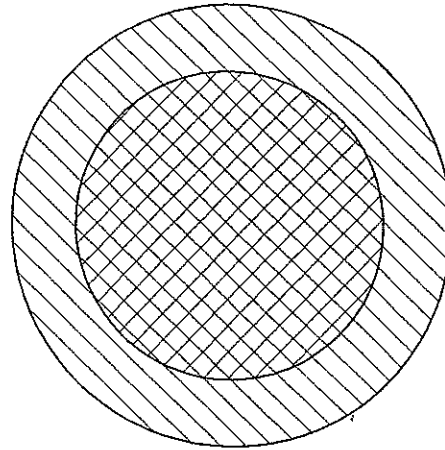
[72 points remaining]

Calculate  $\sqrt[3]{\frac{(81^3 - 71^2)^2}{579 \times \sqrt{296}}}$  to the nearest integer. Note that this is a cube root.

**R 7. (6 points)**

[66 points remaining]

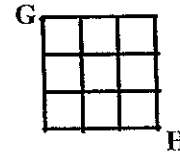
The interior of a circle of radius 10cm is divided into two regions by a circle of radius 7cm as shown. By what percentage is one of these regions larger than the other? Round your answer to one decimal place.



**R 8. (6 points)**

[60 points remaining]

The diagram shows some streets in a town. A man walks from G to H along six blocks, always getting closer to H. In how many ways can he do this?



**R 9. (4 points)**

[56 points remaining]

What common fraction in lowest terms is halfway between three-eighths and two-fifths?

**R 10. (4 points)**

[52 points remaining]

Excluding 1 and 144, how many positive integers divide into 144 without remainder?

**R 11. (6 points)**

[46 points remaining]

If  $x$  soccer teams score  $y$  goals each, and  $y$  soccer teams score  $x$  goals each, what is the simplest expression for the average number of goals scored by each team?

**R12. (6 points)**

[40 points remaining]

Two sides of a triangle measure 14 cm and 10cm. How many lengths are possible for the third side if it is also an integer?

**R 13. (5 points)**

[35 points remaining]

If  $\frac{1}{2x+3} = \frac{2}{5}$ , what is the value of  $\frac{1}{2x+1}$  ?

**R 14. (5 points)**

[30 points remaining]

Three vertices of a parallelogram ABCD are  $A(-1,-3)$ ,  $B(5,1)$ , and  $C(-2,4)$ . What are the coordinates of D?

**R 15. (5 point)**

[25 points remaining]

A cube with edge 3cm is painted on all faces. It is then cut completely into smaller cubes with edge 1cm. How many of the smaller cubes have paint on exactly two faces?

**R 16. (5 points)**

[20 points remaining]

A swimming pool measures 50m by 24m. Each day 6.5mm depth of water is lost due to evaporation, so each morning the pool is "topped up" to replace the previous day's water loss. If a high pressure hose delivering 15.9L per second is used, how long will this take in minutes and seconds to the nearest second?

**R 17. (4 points)**

[16 points remaining]

A safe contains notes of these denominations: \$5, \$10, \$20, \$50, and \$100. There are 243 notes altogether, and the manager says that there are more \$20 notes than any other denomination. What is the smallest possible number of \$20 notes there could be?

**R 18. (4 points)**

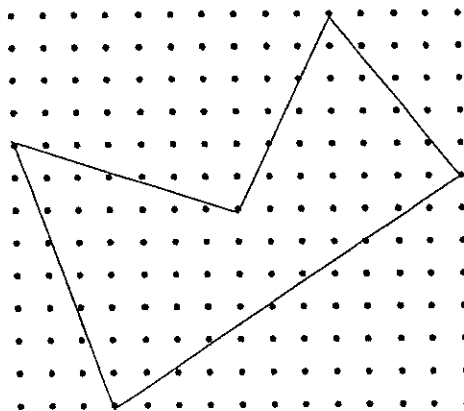
[12 points remaining]

Express the sum of the recurring decimals  $0.7777\dots$  and  $0.06666\dots$  as a common fraction in lowest terms.

**R 19. (6 points)**

[6 points remaining]

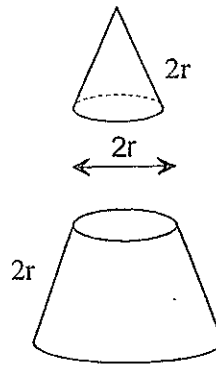
The dots in this grid are two units apart. Find the area in square units of the pentagon shown.



**R 20. (6 points)**

[0 points remaining]

A solid wooden cone is cut into two parts at the halfway mark. Express the ratio of the surface area of the smaller part to that of the larger as the ratio of two integers in lowest terms. (The curved surface area of a cone is given by  $A = \pi rs$ , where  $r$  is the radius and  $s$  is the slant height.)



**MATHS TEAM CHALLENGE (2005)**  
**Relay Answer Sheet**  
**JUNIOR SECONDARY**

Question	Answer	Attempts x or /							Score	Progressive Score
		7	6	5	4	3	2	1		
R1 (4 points)	\$16.80									
R2 (4 points)	÷ + × -									
R3 (6 points)	10									
R4 (6 points)	603									
<b>CHANGE</b>										
R5 (4 points)	14 <sup>th</sup> or 14 <sup>th</sup> July									
R6 (4 points)	303									
R7 (6 points)	4.1%									
R8 (6 points)	20									
<b>CHANGE</b>										
R9 (4 points)	31/80									
R10 (4 points)	13									
R11 (6 points)	$2xy/(x + y)$									
R12 (6 points)	19									
<b>CHANGE</b>										
R13 (5 points)	2									
R14 (5 points)	(-8,0)									
R15 (5 points)	12									
R16 (5 points)	8 min 11 sec									
<b>CHANGE</b>										
R17 (4 points)	50									
R18 (4 points)	38/45									
R19 (6 points)	254									
R20 (6 points)	3:11									
<b>TOTAL</b>										

School: _____ Team 1: <input type="checkbox"/> Team 2: <input type="checkbox"/>
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