Reigate Grammar School

13+ Entrance Examination
November 2013

MATHEMATICS

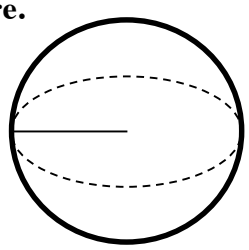
Calculator Paper

Time allowed: 45 minutes

NAME……

- **Work through the paper carefully**
- **<u>You do not have to finish everything</u>**
- **You may use a calculator**
- **Do not spend too much time on any single question**
- **Show any working in the spaces provided**
- **Use the blank left hand pages for rough work**

Given that $p = \sqrt[3]{r^4 + 4q}$, find **(i)** p **when** r **= 3 and** q **= 11** …… **(ii)** q **when** p **= 4 and** r **= 4** ……	**Do not write in this box** **3** **4**
Solve the equations **3**x **= 7**x **– (15 –** x**)** ……	**3**
$\frac{2x}{5} - \frac{x}{3} = 4$ ……	**3**
$\frac{5x}{3} = \frac{6}{7}$ ……	**3**
$\frac{14}{x} = 21$ ……	**2**

You are given that the surface area of a sphere is equal to the area of the largest circular cross-section multiplied by 4. **Given that the radius of the largest circular cross-section is 10cm, find the surface area of the sphere shown here.**  **……..**	**Do not write in this box** **4**
The cost of 6 roses and 1 orchid is £40. This information can be written as **6r + o = 40** **The cost of 2 roses and 5 orchids is £60. Write down an equation to represent this information.** **……..** **Assuming all roses are the same price and all orchids are the same price, find the cost of each rose and each orchid.** **1 Rose = £……..** **1 Orchid = £……..**	**2** **3**

Look at the pattern below

		TOTAL	
Row 1	1^3	**= 1**	$= (1)^2$
Row 2	$1^3 + 2^3$	**= 9**	$= (1 + 2)^2$
Row 3	$1^3 + 2^3 + 3^3$	**= 36**	$= (1 + 2 + 3)^2$
Row 4	$1^3 + 2^3 + 3^3 + 4^3$	**= 100**	$= (1 + 2 + 3 + 4)^2$

On the dotted line below complete Row 5

Row 5…… **2**

Which row will have a total of 784?

…… **2**

What is the total of row 8?

…… **2**

A second pattern shows teams in three leagues, where each team in league A plays each team in leagues B and C.

TEAMS	**3**	**6**		**9**	
MATCHES	A1 vs B1	A1 vs B1	A1 vs B1	A3 vs B1	B3 vs C1
	A1 vs C1	A1 vs B2	A1 vs B2	A3 vs B2	B3 vs C2
	B1 vs C1	A1 vs C1	A1 vs B3	A3 vs B3	B3 vs C3
		A1 vs C2	A1 vs C1	A3 vs C1	
		A2 vs B1	A1 vs C2	A3 vs C2	
		A2 vs B2	A1 vs C3	A3 vs C3	
		A2 vs C1	A2 vs B1	B1 vs C1	
		A2 vs C2	A2 vs B2	B1 vs C2	
		B1 vs C1	A2 vs B3	B1 vs C3	
		B1 vs C2	A2 vs C1	B2 vs C1	
		B2 vs C1	A2 vs C2	B2 vs C2	
		B2 vs C2	A2 vs C3	B2 vs C3	
TOTAL	**3**	**12**		**27**	

Each total is obtained by counting the number of matches.

What is the TOTAL number of league matches for 12 TEAMS?

2

……

What number of TEAMS would there be in a league with a TOTAL of 108 matches?

2

……

Do not write in this box

	Do not write in this box
A bag of nuts contains 15 Almonds, 12 Brazils and 9 Cashews. I select a nut at random from the bag.	
(a) What is the probability that my nut is not a Cashew? ……	**1**
(b) What is the probability that my nut is an Almond? ……	**1**
I eat the first nut. I now select a second nut.	
(c) If my first nut was an Almond, what is the probability that my second nut is another Almond? **……**	**2**
(d) If my first nut was a Brazil what is the probability that my second nut is an Almond? **……**	**2**
It is estimated that the population of England goes up by 2% every year. According to the January 2011 census, there were 52,000,000 people living in the England.	
(i) What was England's population in January 2012? **……**	**2**
(ii) In the next census, 2021, what is the expected English population (nearest whole number)? **……**	**3**
At the start of which year will the population first be greater than 70 million? **……**	**3**
END OF EXAMINATION **IF YOU HAVE TIME, CHECK YOUR WORK**	