



OUNDLÉ

School

ACADEMIC SCHOLARSHIP 2009

MATHEMATICS

PAPER 1

1½ hours

CALCULATORS ARE NOT ALLOWED FOR THIS PAPER

INSTRUCTIONS TO CANDIDATES

You are not expected to have time to do all the questions.

You may answer the questions in any order.

Choose those questions which you think you can answer best.

Remember to show your working and clearly show the method you are using.

Some questions are longer than others.

The number of marks for each question is shown in square brackets.



1. Calculate:

- a) $8 - \frac{7+6}{5 \times 4} - 3 \times 2 - 1$
- b) $0.1 - 0.2 - (0.3 - (0.4 - 0.5))$
- c) $1 - \frac{2}{3 - \frac{4}{5}}$ (leave your answer as a fraction)
- d) $\sqrt{1 + \sqrt{4 + \sqrt{9 + \sqrt{2^2 + 3^2 + 5^2 + 7^2 + 13^2}}}}$
- e) $\sqrt{0.00147 \div 0.3}$

[14]

2. Find the value of the following, giving fractions in their lowest terms:

- a) $1\frac{2}{3} \times 3\frac{4}{5}$
- b) $1\frac{2}{3} + 3\frac{4}{5}$
- c) $\left(-\frac{1}{2} \right) \left(-\frac{2}{3} \right) \left(-\frac{3}{4} \right) \left(-\frac{4}{5} \right)$
- d) $\frac{142857}{285714} \times \frac{571428}{714285} \times \frac{857142}{428571}$

[13]

3. Solve, showing full working:

- a) $\frac{3x-2}{2} + \frac{5x+3}{4} = 8$
- b) $5(x-2) - 3(1+x) = -4$
- c) $1 - \frac{1}{x} = 5$

[10]

4. The following describe the properties of three different *convex* quadrilaterals (four sided shapes whose diagonals are completely contained inside the shape):

- a) Both diagonals cut each other exactly in half (they bisect each other), they are of equal length and the diagonals meet at a right angle.
- b) Both diagonals bisect each other, they are NOT of equal length and the diagonals meet at a right angle.
- c) The diagonals intersect at right angles, but only one of the diagonals is bisected. The diagonals may or may not be of equal length.
- d) Each diagonal intersects the other at a point one third of the way along its length, and the diagonals are of equal length.

In each case, name the polygon and state the number of lines of symmetry and the order of rotational symmetry.

[10]

5. Given that $x = \frac{0.584}{2.85+1.02}$ and $y = 0.584(28.5 + 10.2)$, express the following in terms of x , or y , or both x and y :

a) $\frac{5.84}{2.85+1.02}$

c) 0.584^2

b) $\frac{5.84}{28.5+10.2}$

d) $\frac{1}{2.85+1.02}$

[10]

6. The volume of a sphere = $\frac{4}{3}\pi r^3$, and the surface area of a sphere = $4\pi r^2$, where r is the radius.

- a) The area of a particular circle (in cm^2) and its circumference (in cm), have equal numerical value. What is the radius of this circle?
- b) The volume in cm^3 and the total surface area in cm^2 of a particular solid hemisphere (half a sphere) are numerically equal. Calculate its radius.

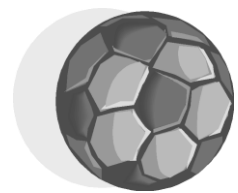
Eight “hemi-demi-semispheres” are created by cutting a sphere into eight equal pieces by three cuts at right angles to each other.

- c) For a particular hemi-demi-semisphere, the numerical value of its volume in cm^3 equals the numerical value of its surface area in cm^2 . Find its radius.

[12]

7. Joe scored one out of the five penalties he attempted last season, and 5 out of 7 this season. Mary-Ann scored 2 out of 8 penalties last season and 4 out of 5 this season.

- a) Who was the better penalty taker last season? Show your working.
- b) Who was the better penalty taker this season? Show your working.
- c) Show, by calculation, that Joe has the better record overall. Comment on your answer.



[10]

8. Solve the following set of simultaneous equations:

$$2x + y + z = 15$$

$$x + 2y + z = 16$$

$$x + y + 2z = 17$$

[8]

Turn over

9. The pupils in Year 8 have chosen to play either cricket or rounders, in the ratio 5:9.
- a) If three people change their choice from rounders to cricket, the ratio is now 2:3.
How many people in the year group?

The school cricket team has remained unbeaten in the league all season. They are awarded 3 points for a win and 1 point if a game is drawn.

- b) If the ratio of points scored to games played is 5:4, what is the ratio of wins to draws (in its lowest terms)?

[12]

10. A triangle, T, has corners A(3, 1), B(4, 2) and C(1, 4). Find the coordinates of its new corners when T is:
- a) Reflected in the y-axis
b) Reflected in the line $x = -5$
c) Enlarged by scale factor 2 through the centre (10, 10)
d) Rotated by 90° clockwise about the point $(-40, 40)$

[15]

END OF EXAMINATION