MARLBOROUGH COLLEGE

ENTRANCE & FOUNDATION SCHOLARSHIPS EXAMINATIONS 2005

Mathematics I

Compulsory Paper

TUESDAY 8th MARCH 2005

Time: 1 hour 30 minutes

Attempt all questions.

1.(a) Use your calculator to find, correct to three significant figures:

$$\sqrt{\frac{(168^2 + 182^2 + 174^2)}{3} - \frac{(168 + 182 + 174)^2}{9}}$$

(b) If $a = 2$, $b = 3$, $c = 5$, $d = 4$ and $e = 7$:

Find the value of $\dfrac{1}{c} + \dfrac{a}{b} \times \dfrac{1}{d} - \dfrac{a}{e}$

showing all your working.

2.   Bodgits cost £ 1.80 in 2004 and cost £1.98 in 2005, what is the percentage increase in price?
2500 Bodgits were sold in 2004, while the sales in 2005 dropped to 2200, what percentage change was this?
What percentage change in the total money taken from the sales of Bodgits occurred from 2004 to 2005?

Fudgits prices dropped by 20% in 2005, the increase in the number sold meant that the total money in 2005 was the same as in 2004. What was the percentage increase in the number sold in 2005 compared with 2004?
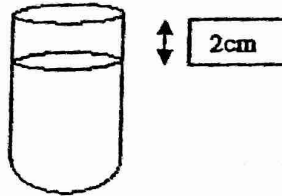
In 2005 a company doubled the number of Widgits sold by dropping their prices by 35%. What was the percentage change in the total money taken?

3. You are given that:

The volume of a sphere is $\frac{4}{3} \Pi r^3$, and the volume of a cylinder is $\Pi r^2 h$.

A container for a liquid painkilling drug consists of a cylinder of radius 1.5cm and length 5 cm, with a hemisphere (half a sphere) on one end.

When the container is held with the hemisphere downwards, the liquid leaves a gap of 2 cm from the top.
The container is now turned the other way up, so the hemisphere is at the top. How far up the container does the liquid reach?

4. Isabel Imperial ordered some top-soil, by telephone from her supplier, Mike Metric. She ordered ten **tons**, but he mistook it as ten **tonnes**.
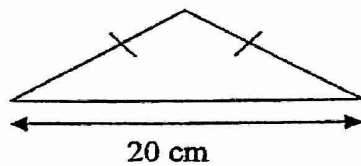You are given that:

	14 pounds	=	1 stone
	8 stones	=	1 hundredweight (cwt)
	20 cwt	=	1 ton
	1000kg	=	1 tonne
and	1 kg	=	2.2 pounds

Find the difference between the ordered amount and the supplied amount in pounds, and state whether Isabel received more or less than she expected.

5. To cook chicken, Granny's recipe book says that the time needed is 25 minutes per pound plus a further 25 minutes. How long will it take to cook a 7-pound chicken? Give your answer in hours and minutes.
For lamb, the time is 30 minutes per pound plus a further 30 minutes. Use algebra to give the cooking time, in hours, for a piece of lamb which weighs x pounds.
Beef times are 20 minutes per pound plus 20 minutes. A piece of beef is 2½ pounds heavier than a piece of lamb and they both take the same time to cook. Write an equation and solve it to find the weights of the piece of beef and the piece of lamb.
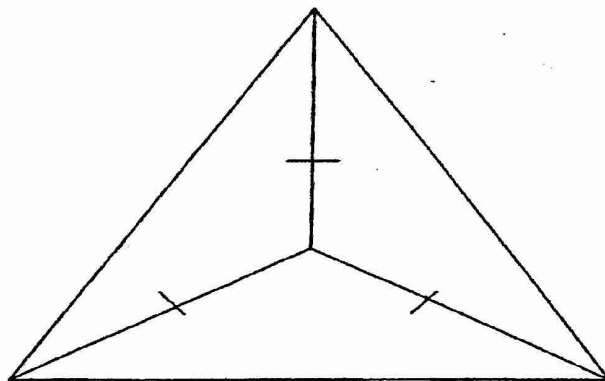
6. In a car park, there are blue cars, red cars, white cars and silver cars. The ratio of blue cars to red cars is 3 : 4 and there are 3 times as many red cars as white cars. The probability that a car is silver is 11/36. Draw a pie chart to illustrate this information.
(suggested radius 5cm)

7. An isosceles triangle has base 20 cm

Not to scale

20 cm

Three of these triangles fit together to make a larger triangle as shown:

(a) Use Pythagoras' Theorem to calculate the height of the larger triangle.
(b) Calculate the area of the larger triangle
(c) Find the height of the smaller triangle   (work to 1 d.p.).

8. All books have an ISBN (International Standard Book Number) of 10 digits. The tenth digit is a check digit and is calculated from the other nine. (This is to reduce copying down errors in the orders.)

The check digit is worked out as follows:

Multiply the first digit by 1, the second by 2, the third by 3 and so on until the ninth, which is multiplied by 9. These are then added and the check digit is the remainder when the total is divided by 11. If the remainder is 10, then X is used instead.

Show that 1857027124 is a valid ISBN.

Find the tenth digit, for a different book's ISBN, if the first nine of its digits are 186197612.

End of examination, now go back and check your answers.