RADLEY COLLEGE
Entrance Scholarships

MATHEMATICS II

March 2006

Time allowed 1 hour

Show all working.

You may use a calculator

1. In the sales I read the following offers:

   A. Buy two and get a third free

   B. Buy one and get a second half price

   C. 35% off everything

   D. 20% off everything and then another 20% off that sale price.

   Which do you think is the best offer, and which is the worst? Justify your answer.

2. A bicycle called a 'penny farthing' has one large wheel at the front, and a much smaller wheel at the back. The radius of the larger wheel is 80 cm.

In order to work out how far he has gone a man counts the number of revolutions of the front wheel. A man cycles from Radley to Abingdon.

(a) Given the front wheel makes 650 complete revolutions find the distance from Radley to Abingdon.

(b) Given the smaller wheel makes 2,000 revolutions on the same journey, calculate the radius of the smaller wheel.

3. (a) If three bottles of claret and five bottles of burgundy cost £92.82, and four bottles of claret and one bottle of burgundy cost £71.40, calculate the cost of a bottle of claret.

(b) It is later discovered that the French have been adding an extra tax of 20% to the price of their wines. Calculate the price of a bottle of claret without the tax.

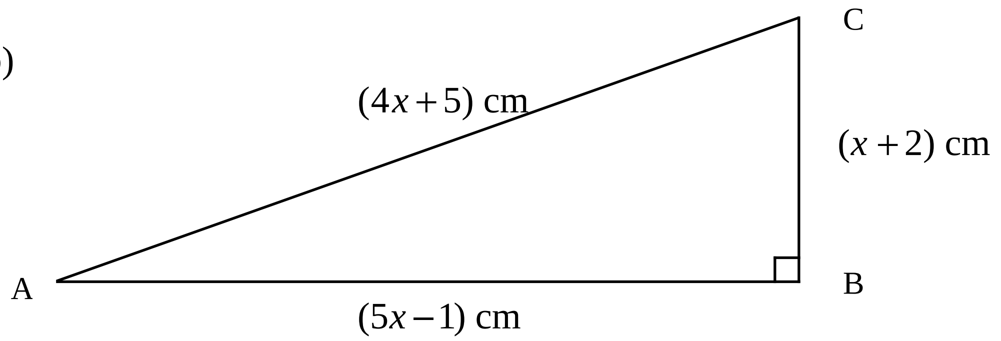
4. (a) Multiply out the brackets and simplify each of the following

(i) $(x+2)^2$

(ii) $(4x+5)^2$

(iii) $(5x-1)^2$

(b)



The diagram above shows a right-angled triangle, ABC.

(i) Using Pythagoras' Theorem, show that $5x^2-23x-10=0$

(ii) Hence find the lengths of the sides of the triangle, ABC.

5. (a) Calculate $(1\times 3)+1$

(b) Calculate $(2\times 4)+1$

(c) Calculate $(3\times 5)+1$

(d) Calculate $(4\times 6)+1$

(e) Calculate $(24\times 26)+1$

(f) Write down a general formula which summarises all of the above calculations.

(g) Justify your answer.

6. Sam is drawing rectangles whose sides have lengths which are a whole number of centimetres

(a) He decides to draw rectangles with a perimeter of 24 cm

(i) How many different rectangles can he draw?

(ii) What is the largest possible area of those rectangles he can draw?

(b) If instead he decides to draw rectangles with an area of 24 cm^2 what is the largest possible perimeter of those rectangles he can draw?