RADLEY COLLEGE
Entrance Scholarships

MATHEMATICS II

March 2010

Time allowed 1 hour

Show all working.

You may use a calculator

1. I want to buy a new car. I have two options. Motorsupermarket is reducing all list prices by 15%. Carvalue is reducing all list prices by 9%, and then taking another £1,350 off that reduced price. The car I like has a list price of £20,000.

   (a) Calculate the cost of my car if I decide to buy it from Motorsupermarket.

   (b) Calculate the cost of my car if I decide to buy it from Carvalue.

   (c) Calculate the list price of a car that would cost exactly the same at each of the two garages.

2. (a) Calculate the volume of a sphere of radius 3cm.

   (b) Eight identical metal spheres, each of radius 3cm, are melted down and reformed into one larger sphere. Calculate the radius of that new large sphere.

   (c) How many spheres of radius 3cm can be made by melting down a single sphere of radius 30cm?

   (*Hint: the volume of a sphere is given by the formula* $V = \frac{4}{3}\pi r^3$)

3. Solve the following pairs of simultaneous equations

   (a) $3x + 5y = 1$

   $5x - 2y = 12$

   (b) $\frac{3}{x} + \frac{5}{y} = 1$

   $\frac{5}{x} - \frac{2}{y} = 12$

4. A man walks the 90km from Abingdon to Bedford at a speed of $x\,\text{kmh}^{-1}$

(a) Find an expression, in terms of x, for the time he takes.

For the return journey he decides to cycle. He finds that his cycling speed is $4\,\text{kmh}^{-1}$ faster than his walking speed.

(b) Find an expression, in terms of x, for the time of his return journey.

Given that the return journey takes 6 hours less time than his outward journey

(c) write down an equation for x,

(d) solve your equation to find the value of x.

5. (a) Calculate $3^2 - 1^2$

(b) Calculate $4^2 - 2^2$

(c) Calculate $5^2 - 3^2$

(d) Calculate $6^2 - 4^2$

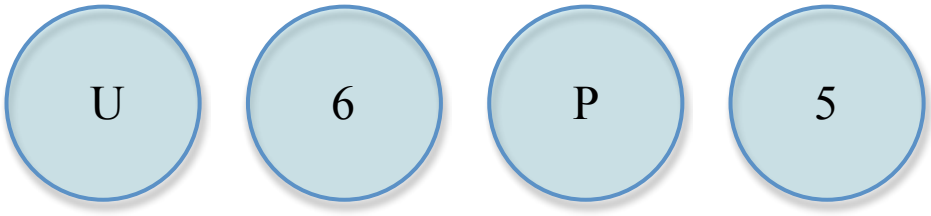
(e) Calculate $101^2 - 99^2$

(f) Write down a formula that summarises all of the above calculations

(g) Justify your formula.

Please turn over

6.



The diagram shows four discs. Each disc has a letter on one side and a number on the reverse side.

(a) Andrew claims that any disc that has a vowel on one side will have an even number on the reverse. Which discs do I have to turn over to check if Andrew's claim is true?

(b) Brian claims that no disc will have an odd number on one side and a consonant on the reverse. Which discs do I have to turn over to check if Brian's claim is true?

(c) Charles claims that if a disc does not have a vowel on one side then it will not have an even number on the reverse. Which discs do I have to turn over to check if Charles' claim is true?