

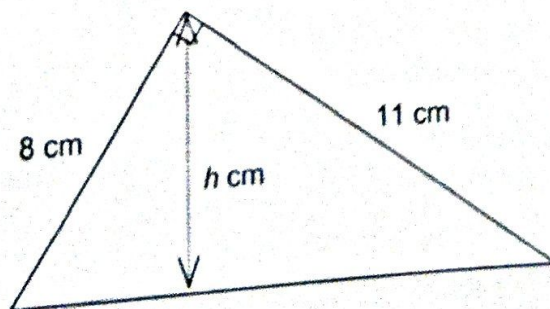
You are expected to use a calculator in this paper.

All working should be clearly shown.

You should attempt all the questions, in any order you like.

- 1 How long, in hours and minutes, does it take to travel 187 kilometres at 82.5 kilometres per hour?
- 2 The 217 boys in a school have an average of 23 marbles each. Their wicked Head Master confiscated all their marbles and shared as many as possible out equally amongst his eleven teachers. How many marbles was the Head Master left with?
- 3 Solve the equation.
$$3(2 - x) - x + 5 = \frac{2}{3}(8x - 1)$$
- 4 Bromine has a density of 3.12 grams per cubic centimetre. A cylinder of radius 3.7 cm contains 2 kilograms of bromine. What is the height of the cylinder?
- 5 The Sheriff of Nottingham takes two hours and thirty-five minutes to travel the 41 leagues from his Tax Office to his Castle. He rides at 23 leagues per hour for the first forty-eight minutes, then nervously speeds up when he reaches Sherwood Forest and rides at 37 leagues per hour for the next 14.8 leagues. He is then set upon by Robin Hood and ducked in the river, which takes eleven minutes. After this, he is chased to his Castle on foot. At what average speed does the Sheriff run when pursued by stave-wielding Merry Men?
- 6 Consecutive cubes are cubes of positive whole numbers which are next to each other in the usual order. For example, $7^3 = 343$, $8^3 = 512$ and $9^3 = 729$ are three consecutive cubes. With the help of your calculator, find
 - a the smallest three consecutive cubes whose sum is also the cube of a whole number;
 - b the smallest three consecutive cubes whose sum is greater than 1 000 000.

- 7
 - a Find the area of the right-angled triangle below.



- 7
 - b Find, correct to three significant figures,
 - i the length of the hypotenuse of the triangle;
 - ii the height, h, of the triangle.

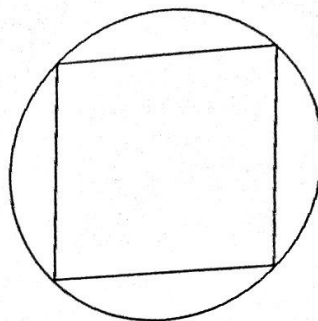
8 Simplify

a $\frac{ab^2}{2b} + \frac{a^2b}{2a}$

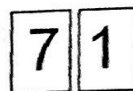
b $\frac{x-2+x}{2}$

- 9 a Boxes of my favourite breakfast cereal used to weigh 12 ounces. Now they weigh 300 grams. If one ounce is the same weight as 28.35 grams, what is the percentage decrease in weight?
- b My favourite chocolate bar has just increased in weight by 25%. It now weighs 225 grams. What did it weigh before the increase?
- c Bags of my favourite sweets increased in weight by 30% last year. This year the manufacturers have decreased the weight by 30%. What is the overall percentage change in weight over the two years? Is it an increase or a decrease?

- 10 In this diagram, the area of the circle is 355 cm^2 . What is the area of the square?



- 11 In this question, do not attempt to list all the possibilities you are asked to count.
- a How many of the numbers from 10 to 99, inclusive, have different tens and units digits?
- b The digits from 1 to 9 (not 0) are written on nine cards. How many different two-digit numbers can be made by choosing two of these cards?
- c In a league, each team plays every other team both at home and away.
- i If there are nine teams in the league, how many matches are played?
- ii If there are thirty-two teams in the league, how many matches are played?



- 12 In each part of this question, decide which of the two events is more likely. Explain how you decide. You are NOT expected to calculate any probabilities.

- a Getting a two on each of three dice when you roll them simultaneously;
or getting a total of six when you roll three dice simultaneously.
- b Getting an even number on each of three dice when you roll them simultaneously;
or not getting all odd numbers when you roll three dice simultaneously.

- 13 In this question, "numbers" means "positive whole numbers".

- a i For the three numbers 2, 4 and 7, write down the three possible sums of pairs of them.
ii The three sums of pairs of three original numbers are 5, 7 and 10. What were the original numbers?
- b i For the four numbers 2, 4, 7 and 12, write down all the possible sums of pairs of them.
ii The sums of pairs for four original numbers are 5, 7, 8, 10, 11 and 13. Give two possibilities for the four original numbers.
iii The sums of pairs for four original numbers are 4, 5, 7, 11, 13 and 14. Show that there is only one possibility for the four original numbers.
iv Show that there is no set of four original numbers for which the sums of pairs are 4, 5, 7, 8, 10 and 12.
v Show that it is possible to choose four original numbers whose sums in pairs are six consecutive numbers.