

## SAMPLE MATHEMATICS TEST

*Please write your answers in the answer book provided. Marks for each question or part question are shown in square brackets. Show all your working out.*

*Calculators may be used.*

*Answer as many of the following 10 questions as you can. Do not spend too much time on any one question.*

*Do NOT spend more than 45 minutes on the mathematics test.*

1) Simplify:

a)  $X^2 \times X^4$  [1]

b)  $\sqrt{X^{16}}$  [1]

c)  $2(3a + b) - (a - 2b) =$  [1]

2) Expand:

a)  $(a + b)(a - b)$  [1]

b)  $(a + b)(b + c)(c + d)$  [2]

3) Evaluate  $z$  when

a)  $z = \sqrt{\frac{x+y}{x-y}}$  and  $x = 5, y = 3$  [2]

b)  $1 - z = 4z - 9$  [2]

c)  $\frac{z-1}{z+3} = \frac{2z+3}{2z-3}$  [4]

4) Evaluate  $\frac{3}{8} \times \left( \frac{2}{3} + \frac{3}{7} \right)$ . [2]

5) Which is the larger of the two fractions  $\frac{17}{120}$  and  $\frac{2}{9}$ ? [3]

6) A mother leaves an estate worth £150000 to be divided between her two daughters divided according to their ages 24 and 16. However, death duties of 20% must be paid on the estate. Calculate:

a) the amount of death duty to be paid, [2]

b) the value of the estate after death duty has been paid, [1]

c) the inheritance of the younger daughter. [3]

- 7) I sell a car for £3450 having made a loss of 25% on the price I paid for it three years ago.
- What was the original price I paid for the car? [2]
  - Assuming car prices depreciate at 8% per year, have I sold my car for more than I could have expected to, explaining your answer? [3]
- 8) Solve the simultaneous equations for  $p$  and  $q$ : 
$$\begin{cases} 3p + 2q = 9 \\ 4p - 6q = 25 \end{cases}$$
 [4]
- 9) A student has obtained marks of 65, 72, 62 and 75 in her first four examinations. She has one examination left to do and hopes to obtain a distinction which requires an average mark of 75 over the 5 examinations.
- Calculate her current average mark. [2]
  - Explain, giving your reasoning whether she can get a distinction given that the maximum mark available on the final examination is 100? [3]
- 10) A multiple choice examination consists of 20 questions each of which have 4 possible answers. A candidate gets 5 marks for a correct answer and has 2 marks deducted for an incorrect answer. (If the candidate does not answer the question no marks are awarded or deducted.) The pass mark is 30.
- What are the maximum and minimum possible examination marks? [2]
  - What is the minimum number of questions a candidate needs to answer correctly in order to pass the examination? [1]
  - Estimate the number of marks a candidate would get if he or she answered each question by picking 1 of the 4 multiple choice answers at random. [1]
  - Assume a candidate answers every question, and let  $x$  be the number of questions he answers correctly.
    - Write down an expression in terms of  $x$  for the number of questions he answers incorrectly. [2]
    - Write down an expression in terms of  $x$  for the number of marks he obtains. [3]
    - If the candidate obtained 44 marks, how many answers did he answer correctly. [3]
    - How many must he answer correctly to pass the examination? [3]
  - If, instead, 4 marks are awarded for each correctly answered question
    - what is the minimum number of questions a candidate needs to answer correctly in order to pass the examination? [2]
    - If a candidate answers all the questions, how many must a candidate answer correctly to pass the examination? [4]