



# Foundation Mathematics

## Sample

### Examination Paper

Answer ALL questions.

Clearly cross out surplus answers.

**Time: 2 hours**

The maximum mark for this paper is 100.

Any reference material brought into the examination room must be handed to the invigilator before the start of the examination.

Candidates are allowed to use a scientific calculator during this examination.

Graph paper will be provided by the centre.

You must show your workings.  
Marks are awarded for these.

<b>Answer ALL questions</b>
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**Marks**

**Question 1**

**a)** Simplify the following:

i)  $r^9 \div r^4 \div r^2$  1

ii)  $m^5 \times m^3 \times m^{-4}$  1

iii)  $p^2q \times p^4q^{-3}$  1

**b)** Simplify the following:

i)  $\frac{4}{3xy} \times \frac{x^2}{3y^3}$  1

ii)  $\frac{24a^4b^2c}{6a^3c}$  1

iii)  $r(3r^2 - s) + s(r - r^4)$  1

**c)** Factorise the following:

i)  $12x^2y + 6xy^3$  2

ii)  $u^2 + 10u + 21$  2

**d)** Simplify the following:

i)  $\frac{5}{3x} + \frac{1}{4x}$  2

ii)  $\frac{7}{15b} - \frac{2}{5b}$  2

**e)** Transpose the following formula to make  $x$  the subject: 2

$$y = \frac{x(z + 2)}{7}$$

**f)** Solve the following equation **and** find the value of  $g$ : 2

$$3g - 10 = 8$$

**g)** Solve the following quadratic equation by factorising: 2

$$x^2 + 6x - 16 = 0$$

**Total 20 Marks**

## Question 2

- a) Solve the following quadratic equation by using the quadratic formula: 2  
$$5x^2 + 11x - 3 = 0$$
  
You may leave your answer in surd form.
- b) Solve the following simultaneous equations and find the value of  $x$  and  $y$ .
- i)  $3x + 8y = 2$  and  $5x - 8y = -18$  2
- ii)  $6x - 2y = 8$  and  $2x + y = 11$  2
- c) Tom thinks of a number,  $n$ . Tom adds 3 to it and then multiplies the answer by 4 and gets 32. 3  
What is the value of  $n$ ?
- d) Calculate the gradient of the following curves using differentiation at the point where  $x = 2$ .
- i)  $y = 3x^2 - 5x$  3
- ii)  $y = x^3 + 0.25x^2$  3
- e) A particle has a velocity of  $v = 5t^3 - 10t$ .
- i) Find the acceleration,  $a$ , after  $t$  seconds. 2
- ii) What is the acceleration at  $t = 3$  seconds? 1
- iii) At what time,  $t$ , is the acceleration  $50 \text{ m/s}^2$ ? 2

Total 20 Marks

## Question 3

a) i) Using differentiation, find the coordinates of the turning point on the curve:  $y = -3x^2 - 3x + 6$  4

ii) Construct and complete a table of values for the curve  $-3x^2 - 3x + 6$  for  $-3 \leq x \leq 3$ . 5

Use these values to plot a graph of the curve  $y = -3x^2 - 3x + 6$  and identify the turning point found in part (a)(i) as either a maximum or minimum turning point. You should use the graph paper provided.

b) Integrate the following expression:  $3x^5 + \sqrt{x}$  2

c) The gradient of the curve which passes through the point (2, 17) is given by  $6x^2 + 4x$ . Find the equation of the curve. 3

d) Evaluate the definite integral:  $\int_1^3 (8x^3 - x) dx$  3

e) Find the area bounded by the curve  $y = 7x^3 + 3x^2$ , the  $x$ -axis and the lines  $x = 1$  and  $x = 2$ . 3

**Total 20 Marks**

## Question 4

- a) The velocity of a moving body is  $3t^2 + 5$  metres per second after a time of  $t$  seconds. Find the distance travelled by the body at the end of 3 seconds. **3**
- b) Reena and Simon are playing a game of chess and a game of draughts against each other.  
The probability that Reena will win the chess game is  $\frac{5}{6}$ .  
The probability that Simon will win the draughts game is  $\frac{2}{3}$ .  
There are no draws in either game.
- i) Draw a probability tree diagram to show all the possible outcomes. **8**
- ii) Use your tree diagram to find out the probability that Reena wins one game and Simon wins one game. **2**
- iii) Use your tree diagram to find out the probability that one person wins both games. **2**
- iv) Use your tree diagram to find the probability that Simon wins at least one game. **2**
- c) You are given a box containing 7 books. How many ways can you arrange 3 of them on a shelf? **3**

**Total 20 Marks**

**Question 5**

- a) A college records the grades achieved by 40 students in a science exam. The results are shown in the table below.

Method of transport of 60 shoppers.

Grade	Frequency
Distinction	7
Merit	11
Pass	18
Fail	4

The college decides to present the data as a pie chart.

- i) Calculate the relative frequency for 'Distinction' **and** the angle of the 'Distinction' sector on the pie chart. **2**
- ii) Calculate the relative frequency for 'Merit' **and** the angle of the 'Merit' sector on the pie chart. **2**
- iii) Calculate the relative frequency for 'Pass' **and** the angle of the 'Pass' sector on the pie chart. **2**

- b) A hotel manager records the age of people staying in the hotel on one particular night as follows:

Age (years)	Frequency
0 < 15	32
15 < 30	13
30 < 45	20
45 < 60	17
60 < 75	15
75 < 90	8

- i) Calculate the mean age of the people. **4**
- ii) Construct a histogram to illustrate the data from part (b)(i). **4**

- c) The following data set is recorded:

51 24 37 39 42 31 38 29 53 59 22

- i) Calculate the range of the data. **1**
- ii) Find the median of the data. **2**
- iii) Find the lower quartile and the upper quartile of the data. **2**
- iv) Calculate the quartile range of the data. **1**

**Total 20 Marks**

**End of paper**