



FOUNDATION MATHEMATICS

JANUARY 2013

Examination Paper

Answer ALL questions:

Clearly cross out surplus answers.

Time: 2 hours

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

QUESTION 1

Marks

- | | | | |
|-------------|---|--|----------|
| a) | Simplify the following: | | |
| i) | $x^3 \times x^7 \div x^4$ | | 1 |
| ii) | $\frac{a^5}{a} \times \frac{a^2}{a^3}$ | | 1 |
| iii) | $(3p^4q^5r)^2$ | | 1 |
| iv) | $x^7 \times x^{-3}$ | | 1 |
| b) | Simplify the following: | | |
| i) | $2a^4b^3 \div 3a^2b$ | | 1 |
| ii) | $(-xy) \times (5x)$ | | 1 |
| iii) | $2(5p+q) + 4(2p+3q)$ | | 1 |
| iv) | $5c \div (-8d)$ | | 1 |
| c) | Factorise the following: | | |
| i) | $4x^3 - 9xy^2$ | | 2 |
| ii) | $x^2 + 7x + 12$ | | 2 |
| d) | Simplify the following: | | |
| i) | $\frac{3}{2x} - \frac{4}{3x}$ | | 2 |
| ii) | $\frac{x^2 + 3x + 2}{x^2 - x - 6}$ | | 2 |
| e) | Transpose the following formulae to make x the subject: | | |
| i) | $y = 3(x + a)$ | | 2 |
| ii) | $2y - x^2 = 20$ | | 2 |

Total 20 Marks

QUESTION 2**Marks****a)** Solve the following equations and find the value of x :

i) $12 - 3x = 2(1 + x)$

2

ii) $\frac{x+5}{2} - \frac{x-3}{4} = 7$

2**b)** Solve the following quadratic equations by factorising:

$x^2 + 6x + 8 = 0$

2**c)** Solve the following quadratic equation by using the Quadratic Formula:

$2x^2 - 8x = -8$

2**d)** Solve the following simultaneous equations:

i) $x + y = 5$ and $6x - 3y = 3$

2

ii) $4x - 2y = 5$ and $3x + 2y = 9$

2**e)** THIRTY (30) members of an orchestra were asked how many different instruments each could play. The results are presented in the table below.

Number of instruments, x	1	2	3	4	5
Frequency, f	11	10	5	3	1

i) Calculate the range.**1****ii)** Calculate the mean.**2****iii)** Calculate the mean deviation. Give your answer as either a fraction or to one decimal place.**2****iv)** Calculate the variance to one decimal place.**3****Total 20 Marks**

QUESTION 3**Marks**

- a) Calculate the gradients of the following curves using differentiation:
- i) $y = (2x + 3)^2$ 2
 - ii) $y = \frac{2}{x^3}$ 2
- b) A ball has a velocity of v m/s. After t seconds the velocity is given by $v = 8 + 10t - t^2$
- i) Find the acceleration after t seconds. 2
 - ii) What is the acceleration after 2 seconds? 1
 - iii) At what time, t , is the acceleration zero? 2
- c) Given that $y = x^3 + 3x^2 - 9x - 7$:
- i) Calculate the gradient of the tangent of the curve of y at the point where $x = 2$ 3
 - ii) Using differentiation, find the co-ordinates of the turning points on the curve $y = x^3 + 3x^2 - 9x - 7$ 4
 - iii) Identify the turning points as either minimum **or** maximum turning points. 4

Total 20 Marks**QUESTION 4**

- a) Integrate the following expression: 2
 $x^7 + \frac{1}{x^2} - \sqrt{x}$
- b) The gradient of the curve which passes through the point (3, 14) is given by $x^2 + 1$. Find the equation of the curve. 3
- c) Evaluate the definite integral: 3
 $\int_1^4 (5 + 4x - x^2) dx$
- d) i) Find the area bounded by the curve $y = 3x^2 + 6x + 8$, the x -axis and the lines $x = 1$ and $x = 3$ 3
- ii) Find the area under the curve $y = 2x^2 + 4x + 3$, between $x = 2$ and $x = 5$ 3

- e) i) The acceleration of a moving body at the end of t seconds from the commencement of motion is $(6 - t)$ metres per second. Find the velocity at the end of 10 seconds if the body if the initial velocity is 4 metres per second. **3**
- ii) Find the distance travelled by the particle at the end of 10 seconds. **3**

Total 20 Marks

QUESTION 5

Marks

- a) Andrew and Billy are taking an English test. The probability that Andrew will pass the test is 0.8. The probability that Billy will pass the test is 0.7.
- i) Draw a probability tree diagram to show all the possible outcomes of their English test. **8**
- ii) Use your tree diagram to find out the probability that **only ONE** (1) passes the test. **2**
- iii) Use your tree diagram to find out the probability that **at least ONE** (1) passes the test. **2**
- b) This table shows the number of points that a snooker player scored at each visit to the snooker table during a tournament. **4**

Points scored	Number of visits
0-19	10
20-39	7
40-59	9
60-79	2
80-99	1

Construct a histogram to illustrate this data.

- c) The number of children in FORTY (40) households is recorded as follows.

1 2 2 3 1 3 1 2 2 3
 0 1 0 2 1 1 1 3 5 3
 2 4 1 1 3 1 1 2 2 1
 2 2 2 1 1 2 1 4 2 1

- i) Summarise this data as a frequency distribution table. **2**
- ii) Find the modal number of children. **1**
- iii) Find the median number of children. **1**

Total 20 Marks

END OF PAPER